"*The Filter Bubble* shows how unintended consequences of well-meaning online designs can impose profound and sudden changes on politics. All agree that the Internet is a potent tool for change, but whether changes are for the better or worse is up to the people who create and use it. If you feel that the Web is your wide open window on the world, you need to read this book to understand what you aren't seeing."

—Jaron Lanier, author of *You Are Not a Gadget*

"For more than a decade, reflective souls have worried about the consequences of perfect personalization. Eli Pariser's is the most powerful and troubling critique yet."

—Lawrence Lessig, author of *Code v2*, *Free Culture*, and *Remix*

"Eli Pariser isn't just the smartest person I know thinking about the relationship of digital technology to participation in the democratic process—he is also the most experienced. *The Filter Bubble* reveals how the world we encounter is shaped by programs whose very purpose is to narrow what we see and increase the predictability of our responses. Anyone who cares about the future of human agency in a digital landscape should read this book—especially if it is not showing up in your recommended reads on Amazon."

—Douglas Rushkoff, author of *Life Inc.* and *Program or Be Programmed*

"In *The Filter Bubble*, Eli Pariser reveals the news slogan of the personalized Internet: Only the news that fits you we print."

—George Lakoff, author of *Don't Think of an Elephant!* and *The Political Mind*

THE FILTER BUBBLE

How the New Personalized Web Is Changing What We Read and How We Think

ELI PARISER

PENGUIN BOOKS

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INTRODUCTION

A squirrel dying in front of your house may be more relevant to your interests right now than people dying in Africa.

—*Mark Zuckerberg*, Facebook founder

We shape our tools, and thereafter our tools shape us.

—*Marshall McLuhan*, media theorist

Few people noticed the post that appeared on Google's corporate blog on December 4, 2009. It didn't beg for attention—no sweeping pronouncements, no Silicon Valley hype, just a few paragraphs of text sandwiched between a weekly roundup of top search terms and an update about Google's finance software.

Not everyone missed it. Search engine blogger Danny Sullivan pores over the items on Google's blog looking for clues about where the monolith is headed next, and to him, the post was a big deal. In fact, he wrote later that day, it was "the biggest change that has ever happened in search engines." For Danny, the headline said it all: "Personalized search for everyone."

Starting that morning, Google would use fifty-seven *signals*—everything from where you were logging in from to what browser you were using to what you had searched for before—to make guesses about who you were and what kinds of sites you'd like. Even if you were logged out, it would customize its results, showing you the pages it predicted you were most likely to click on.

Most of us assume that when we Google a term, we all see the same results—the ones that the company's famous Page Rank algorithm suggests are the most authoritative based on other pages' links. But since December 2009, this is no longer true. Now you get the result that Google's algorithm suggests is best for you in particular—and someone else may see something entirely different. In other words, there is no standard Google anymore.

It's not hard to see this difference in action. In the spring of 2010, while the remains of the Deepwater Horizon oil rig were spewing crude oil into the Gulf of Mexico, I asked two friends to search for the term "BP." They're pretty similar—educated white left-leaning women who live in the Northeast. But the results they saw were quite different. One of my friends saw investment information about BP. The other saw news. For one, the first page of results contained links about the oil spill; for the other, there was nothing about it except for a promotional ad from BP.

Even the number of results returned by Google differed—about 180 million results for one friend and 139 million for the other. If the results were that different for these two progressive East Coast women, imagine how different they would

be for my friends and, say, an elderly Republican in Texas (or, for that matter, a businessman in Japan).

With Google personalized for everyone, the query "stem cells" might produce diametrically opposed results for scientists who support stem cell research and activists who oppose it. "Proof of climate change" might turn up different results for an environmental activist and an oil company executive. In polls, a huge majority of us assume search engines are unbiased. But that may be just because they're increasingly biased to share our own views. More and more, your computer monitor is a kind of one-way mirror, reflecting your own interests while algorithmic observers watch what you click.

Google's announcement marked the turning point of an important but nearly invisible revolution in how we consume information. You could say that on December 4, 2009, the era of personalization began.

WHEN I WAS growing up in rural Maine in the 1990s, a new *Wired* arrived at our farmhouse every month, full of stories about AOL and Apple and how hackers and technologists were changing the world. To my preteen self, it seemed clear that the Internet was going to democratize the world, connecting us with better information and the power to act on it. The California futurists and techno-optimists in those pages spoke with a clear-eyed certainty: an inevitable, irresistible revolution was just around the corner, one that would flatten society, unseat the elites, and usher in a kind of freewheeling global utopia.

During college, I taught myself HTML and some rudimentary pieces of the languages PHP and SQL. I dabbled in building Web sites for friends and college projects. And when an e-mail referring people to a Web site I had started went viral after 9/11, I was suddenly put in touch with half a million people from 192 countries.

To a twenty-year-old, it was an extraordinary experience—in a matter of days, I had ended up at the center of a small movement. It was also overwhelming. So I joined forces with a small civic-minded startup from Berkeley called MoveOn.org. The cofounders, Wes Boyd and Joan Blades, had built a software company that brought the world the Flying Toasters screen saver. Our lead programmer was a twenty-something libertarian named Patrick Kane; his consulting service, We Also Walk Dogs, was named after a sci-fi story. Carrie Olson, a veteran of the Flying Toaster days, managed operations. We all worked out of our homes.

The work itself was mostly unglamorous—formatting and sending out e-mails, building Web pages. But it was exciting because we were sure the Internet had the potential to usher in a new era of transparency. The prospect that leaders could directly communicate, for free, with constituents could change everything. And the Internet gave constituents new power to aggregate their efforts and make their voices heard. When we looked at Washington, we saw a system clogged with gatekeepers and bureaucrats; the Internet had the potential to wash all of that away.

When I joined MoveOn in 2001, we had about five hundred thousand U.S. members. Today, there are 5 million

members—making it one of the largest advocacy groups in America, significantly larger than the NRA. Together, our members have given over $120 million in small donations to support causes we've identified together—health care for everyone, a green economy, and a flourishing democratic process, to name a few.

For a time, it seemed that the Internet was going to entirely redemocratize society. Bloggers and citizen journalists would single-handedly rebuild the public media. Politicians would be able to run only with a broad base of support from small, everyday donors. Local governments would become more transparent and accountable to their citizens. And yet the era of civic connection I dreamed about hasn't come. Democracy requires citizens to see things from one another's point of view, but instead we're more and more enclosed in our own bubbles. Democracy requires a reliance on shared facts; instead, we're being offered parallel but separate universes.

My sense of unease crystallized when I noticed that my conservative friends had disappeared from my Facebook page. Politically, I lean to the left, but I like to hear what conservatives are thinking, and I've gone out of my way to befriend a few and add them as Facebook connections. I wanted to see what links they'd post, read their comments, and learn a bit from them.

But their links never turned up in my Top News feed. Facebook was apparently doing the math and noticing that I was still clicking my progressive friends' links more than my conservative friends'—and links to the latest Lady Gaga videos more than either. So no conservative links for me.

I started doing some research, trying to understand how Facebook was deciding what to show me and what to hide. As it turned out, Facebook wasn't alone.

WITH LITTLE NOTICE or fanfare, the digital world is fundamentally changing. What was once an anonymous medium where anyone could be anyone—where, in the words of the famous *New Yorker* cartoon, nobody knows you're a dog—is now a tool for soliciting and analyzing our personal data. According to one *Wall Street Journal* study, the top fifty Internet sites, from CNN to Yahoo to MSN, install an average of 64 data-laden cookies and personal tracking beacons each. Search for a word like "depression" on Dictionary.com, and the site installs up to 223 tracking cookies and beacons on your computer so that other Web sites can target you with antidepressants. Share an article about cooking on ABC News, and you may be chased around the Web by ads for Teflon-coated pots. Open—even for an instant—a page listing signs that your spouse may be cheating and prepare to be haunted with DNA paternity-test ads. The new Internet doesn't just know you're a dog; it knows your breed and wants to sell you a bowl of premium kibble.

The race to know as much as possible about you has become the central battle of the era for Internet giants like Google, Facebook, Apple, and Microsoft. As Chris Palmer of the Electronic Frontier Foundation explained to me, "You're getting a free service, and the cost is information about you. And Google and Facebook translate that pretty directly into money." While

Gmail and Facebook may be helpful, free tools, they are also extremely effective and voracious extraction engines into which we pour the most intimate details of our lives. Your smooth new iPhone knows exactly where you go, whom you call, what you read; with its built-in microphone, gyroscope, and GPS, it can tell whether you're walking or in a car or at a party.

While Google has (so far) promised to keep your personal data to itself, other popular Web sites and apps—from the airfare site Kayak.com to the sharing widget AddThis—make no such guarantees. Behind the pages you visit, a massive new market for information about what you do online is growing, driven by low-profile but highly profitable personal data companies like BlueKai and Acxiom. Acxiom alone has accumulated an average of 1,500 pieces of data on each person on its database—which includes 96 percent of Americans—along with data about everything from their credit scores to whether they've bought medication for incontinence. And using lightning-fast protocols, any Web site—not just the Googles and Facebooks of the world—can now participate in the fun. In the view of the "behavior market" vendors, every "click signal" you create is a commodity, and every move of your mouse can be auctioned off within microseconds to the highest commercial bidder.

As a business strategy, the Internet giants' formula is simple: The more personally relevant their information offerings are, the more ads they can sell, and the more likely you are to buy the products they're offering. And the formula works. Amazon sells billions of dollars in merchandise by predicting what each customer is interested in and putting it in the front of the virtual

store. Up to 60 percent of Netflix's rentals come from the personalized guesses it can make about each customer's movie preferences—and at this point, Netflix can predict how much you'll like a given movie within about half a star. Personalization is a core strategy for the top five sites on the Internet—Yahoo, Google, Facebook, YouTube, and Microsoft Live—as well as countless others.

In the next three to five years, Facebook COO Sheryl Sandberg told one group, the idea of a Web site that isn't customized to a particular user will seem quaint. Yahoo Vice President Tapan Bhat agrees: "The future of the web is about personalization . . . now the web is about 'me.' It's about weaving the web together in a way that is smart and personalized for the user." Google CEO Eric Schmidt enthuses that the "product I've always wanted to build" is Google code that will "guess what I'm trying to type." Google Instant, which guesses what you're searching for as you type and was rolled out in the fall of 2010, is just the start—Schmidt believes that what customers want is for Google to "tell them what they should be doing next."

It would be one thing if all this customization was just about targeted advertising. But personalization isn't just shaping what we buy. For a quickly rising percentage of us, personalized news feeds like Facebook are becoming a primary news source—36 percent of Americans under thirty get their news through social networking sites. And Facebook's popularity is skyrocketing worldwide, with nearly a million more people joining each day. As founder Mark Zuckerberg likes to brag, Facebook may be the biggest source of news in the world (at least for some definitions of "news").

And personalization is shaping how information flows far beyond Facebook, as Web sites from Yahoo News to the *New York Times*–funded startup News.me cater their headlines to our particular interests and desires. It's influencing what videos we watch on YouTube and a dozen smaller competitors, and what blog posts we see. It's affecting whose e-mails we get, which potential mates we run into on OkCupid, and which restaurants are recommended to us on Yelp—which means that personalization could easily have a hand not only in who goes on a date with whom but in where they go and what they talk about. The algorithms that orchestrate our ads are starting to orchestrate our lives.

The basic code at the heart of the new Internet is pretty simple. The new generation of Internet filters looks at the things you seem to like—the actual things you've done, or the things people like you like—and tries to extrapolate. They are prediction engines, constantly creating and refining a theory of who you are and what you'll do and want next. Together, these engines create a unique universe of information for each of us—what I've come to call a filter bubble—which fundamentally alters the way we encounter ideas and information.

Of course, to some extent we've always consumed media that appealed to our interests and avocations and ignored much of the rest. But the filter bubble introduces three dynamics we've never dealt with before.

First, you're alone in it. A cable channel that caters to a narrow interest (say, golf) has other viewers with whom you share a frame of reference. But you're the only person in your bubble. In an age when shared information is the bedrock of shared

experience, the filter bubble is a centrifugal force, pulling us apart.

Second, the filter bubble is invisible. Most viewers of conservative or liberal news sources know that they're going to a station curated to serve a particular political viewpoint. But Google's agenda is opaque. Google doesn't tell you who it thinks you are or why it's showing you the results you're seeing. You don't know if its assumptions about you are right or wrong—and you might not even know it's making assumptions about you in the first place. My friend who got more investment-oriented information about BP still has no idea why that was the case—she's not a stockbroker. Because you haven't chosen the criteria by which sites filter information in and out, it's easy to imagine that the information that comes through a filter bubble is unbiased, objective, true. But it's not. In fact, from within the bubble, it's nearly impossible to see how biased it is.

Finally, you don't choose to enter the bubble. When you turn on Fox News or read *The Nation*, you're making a decision about what kind of filter to use to make sense of the world. It's an active process, and like putting on a pair of tinted glasses, you can guess how the editors' leaning shapes your perception. You don't make the same kind of choice with personalized filters. They come to you—and because they drive up profits for the Web sites that use them, they'll become harder and harder to avoid.

OF COURSE, THERE'S a good reason why personalized filters have such a powerful allure. We are overwhelmed by a

torrent of information: 900,000 blog posts, 50 million tweets, more than 60 million Facebook status updates, and 210 billion e-mails are sent off into the electronic ether every day. Eric Schmidt likes to point out that if you recorded all human communication from the dawn of time to 2003, it'd take up about 5 billion gigabytes of storage space. Now we're creating that much data every two *days*.

Even the pros are struggling to keep up. The National Security Agency, which copies a lot of the Internet traffic that flows through AT&T's main hub in San Francisco, is building two new stadium-size complexes in the Southwest to process all that data. The biggest problem they face is a lack of power: There literally isn't enough electricity on the grid to support that much computing. The NSA is asking Congress for funds to build new power plants. By 2014, they anticipate dealing with so much data they've invented new units of measurement just to describe it.

Inevitably, this gives rise to what blogger and media analyst Steve Rubel calls the attention crash. As the cost of communicating over large distances and to large groups of people has plummeted, we're increasingly unable to attend to it all. Our focus flickers from text message to Web clip to e-mail. Scanning the ever-widening torrent for the precious bits that are actually important or even just relevant is itself a full-time job.

So when personalized filters offer a hand, we're inclined to take it. In theory, anyway, they can help us find the information we need to know and see and hear, the stuff that really matters among the cat pictures and Viagra ads and treadmill-dancing music videos. Netflix helps you find the right movie to watch in its vast catalog of 140,000 flicks. The Genius function of

iTunes calls new hits by your favorite band to your attention when they'd otherwise be lost.

Ultimately, the proponents of personalization offer a vision of a custom-tailored world, every facet of which fits us perfectly. It's a cozy place, populated by our favorite people and things and ideas. If we never want to hear about reality TV (or a more serious issue like gun violence) again, we don't have to—and if we want to hear about every movement of Reese Witherspoon, we can. If we never click on the articles about cooking, or gadgets, or the world outside our country's borders, they simply fade away. We're never bored. We're never annoyed. Our media is a perfect reflection of our interests and desires.

By definition, it's an appealing prospect—a return to a Ptolemaic universe in which the sun and everything else revolves around us. But it comes at a cost: Making everything more personal, we may lose some of the traits that made the Internet so appealing to begin with.

When I began the research that led to the writing of this book, personalization seemed like a subtle, even inconsequential shift. But when I considered what it might mean for a whole society to be adjusted in this way, it started to look more important. Though I follow tech developments pretty closely, I realized there was a lot I didn't know: How did personalization work? What was driving it? Where was it headed? And most important, what will it do to us? How will it change our lives?

In the process of trying to answer these questions, I've talked to sociologists and salespeople, software engineers and law professors. I interviewed one of the founders of OkCupid, an algorithmically driven dating Web site, and one of the chief

visionaries of the U.S. information warfare bureau. I learned more than I ever wanted to know about the mechanics of online ad sales and search engines. I argued with cyberskeptics and cybervisionaries (and a few people who were both).

Throughout my investigation, I was struck by the lengths one has to go to in order to fully see what personalization and filter bubbles do. When I interviewed Jonathan McPhie, Google's point man on search personalization, he suggested that it was nearly impossible to guess how the algorithms would shape the experience of any given user. There were simply too many variables and inputs to track. So while Google can look at overall clicks, it's much harder to say how it's working for any one person.

I was also struck by the degree to which personalization is already upon us—not only on Facebook and Google, but on almost every major site on the Web. "I don't think the genie goes back in the bottle," Danny Sullivan told me. Though concerns about personalized media have been raised for a decade—legal scholar Cass Sunstein wrote a smart and provocative book on the topic in 2000—the theory is now rapidly becoming practice: Personalization is already much more a part of our daily experience than many of us realize. We can now begin to see how the filter bubble is actually working, where it's falling short, and what that means for our daily lives and our society.

Every technology has an interface, Stanford law professor Ryan Calo told me, a place where you end and the technology begins. And when the technology's job is to show you the world, it ends up sitting between you and reality, like a camera lens. That's a powerful position, Calo says. "There are lots of

ways for it to skew your perception of the world." And that's precisely what the filter bubble does.

THE FILTER BUBBLE'S costs are both personal and cultural. There are direct consequences for those of us who use personalized filters (and soon enough, most of us will, whether we realize it or not). And there are societal consequences, which emerge when masses of people begin to live a filter-bubbled life.

One of the best ways to understand how filters shape our individual experience is to think in terms of our information diet. As sociologist danah boyd said in a speech at the 2009 Web 2.0 Expo:

> Our bodies are programmed to consume fat and sugars because they're rare in nature. . . . In the same way, we're biologically programmed to be attentive to things that stimulate: content that is gross, violent, or sexual and that gossip which is humiliating, embarrassing, or offensive. If we're not careful, we're going to develop the psychological equivalent of obesity. We'll find ourselves consuming content that is least beneficial for ourselves or society as a whole.

Just as the factory farming system that produces and delivers our food shapes what we eat, the dynamics of our media shape what information we consume. Now we're quickly shifting toward a regimen chock-full of personally relevant information. And while that can be helpful, too much of a good thing

can also cause real problems. Left to their own devices, personalization filters serve up a kind of invisible autopropaganda, indoctrinating us with our own ideas, amplifying our desire for things that are familiar and leaving us oblivious to the dangers lurking in the dark territory of the unknown.

In the filter bubble, there's less room for the chance encounters that bring insight and learning. Creativity is often sparked by the collision of ideas from different disciplines and cultures. Combine an understanding of cooking and physics and you get the nonstick pan and the induction stovetop. But if Amazon thinks I'm interested in cookbooks, it's not very likely to show me books about metallurgy. It's not just serendipity that's at risk. By definition, a world constructed from the familiar is a world in which there's nothing to learn. If personalization is too acute, it could prevent us from coming into contact with the mind-blowing, preconception-shattering experiences and ideas that change how we think about the world and ourselves.

And while the premise of personalization is that it provides you with a service, you're not the only person with a vested interest in your data. Researchers at the University of Minnesota recently discovered that women who are ovulating respond better to pitches for clingy clothes and suggested that marketers "strategically time" their online solicitations. With enough data, guessing this timing may be easier than you think.

At best, if a company knows which articles you read or what mood you're in, it can serve up ads related to your interests. But at worst, it can make decisions on that basis that negatively affect your life. After you visit a page about Third World

backpacking, an insurance company with access to your Web history might decide to increase your premium, law professor Jonathan Zittrain suggests. Parents who purchased EchoMetrix's Sentry software to track their kids online were outraged when they found that the company was then selling their kids' data to third-party marketing firms.

Personalization is based on a bargain. In exchange for the service of filtering, you hand large companies an enormous amount of data about your daily life—much of which you might not trust friends with. These companies are getting better at drawing on this data to make decisions every day. But the trust we place in them to handle it with care is not always warranted, and when decisions are made on the basis of this data that affect you negatively, they're usually not revealed.

Ultimately, the filter bubble can affect your ability to choose how you want to live. To be the author of your life, professor Yochai Benkler argues, you have to be aware of a diverse array of options and lifestyles. When you enter a filter bubble, you're letting the companies that construct it choose which options you're aware of. You may think you're the captain of your own destiny, but personalization can lead you down a road to a kind of informational determinism in which what you've clicked on in the past determines what you see next—a Web history you're doomed to repeat. You can get stuck in a static, ever-narrowing version of yourself—an endless you-loop.

And there are broader consequences. In *Bowling Alone*, his bestselling book on the decline of civic life in America, Robert Putnam looked at the problem of the major decrease in "social capital"—the bonds of trust and allegiance that encourage

people to do each other favors, work together to solve common problems, and collaborate. Putnam identified two kinds of social capital: There's the in-group-oriented "bonding" capital created when you attend a meeting of your college alumni, and then there's "bridging" capital, which is created at an event like a town meeting when people from lots of different backgrounds come together to meet each other. Bridging capital is potent: Build more of it, and you're more likely to be able to find that next job or an investor for your small business, because it allows you to tap into lots of different networks for help.

Everybody expected the Internet to be a huge source of bridging capital. Writing at the height of the dot-com bubble, Tom Friedman declared that the Internet would "make us all next door neighbors." In fact, this idea was the core of his thesis in *The Lexus and the Olive Tree*: "The Internet is going to be like a huge vise that takes the globalization system . . . and keeps tightening and tightening that system around everyone, in ways that will only make the world smaller and smaller and faster and faster with each passing day."

Friedman seemed to have in mind a kind of global village in which kids in Africa and executives in New York would build a community together. But that's not what's happening: Our virtual next-door neighbors look more and more like our real-world neighbors, and our real-world neighbors look more and more like us. We're getting a lot of bonding but very little bridging. And this is important because it's bridging that creates our sense of the "public"—the space where we address the problems that transcend our niches and narrow self-interests.

We are predisposed to respond to a pretty narrow set of

stimuli—if a piece of news is about sex, power, gossip, violence, celebrity, or humor, we are likely to read it first. This is the content that most easily makes it into the filter bubble. It's easy to push "Like" and increase the visibility of a friend's post about finishing a marathon or an instructional article about how to make onion soup. It's harder to push the "Like" button on an article titled, "Darfur sees bloodiest month in two years." In a personalized world, important but complex or unpleasant issues—the rising prison population, for example, or homelessness—are less likely to come to our attention at all.

As a consumer, it's hard to argue with blotting out the irrelevant and unlikable. But what is good for consumers is not necessarily good for citizens. What I seem to like may not be what I actually want, let alone what I need to know to be an informed member of my community or country. "It's a civic virtue to be exposed to things that appear to be outside your interest," technology journalist Clive Thompson told me. "In a complex world, almost everything affects you—that closes the loop on pecuniary self-interest." Cultural critic Lee Siegel puts it a different way: "Customers are always right, but people aren't."

THE STRUCTURE OF our media affects the character of our society. The printed word is conducive to democratic argument in a way that laboriously copied scrolls aren't. Television had a profound effect on political life in the twentieth century—from the Kennedy assassination to 9/11—and it's probably not a coincidence that a nation whose denizens spend thirty-six hours a week watching TV has less time for civic life.

The era of personalization is here, and it's upending many of our predictions about what the Internet would do. The creators of the Internet envisioned something bigger and more important than a global system for sharing pictures of pets. The manifesto that helped launch the Electronic Frontier Foundation in the early nineties championed a "civilization of Mind in cyberspace"—a kind of worldwide metabrain. But personalized filters sever the synapses in that brain. Without knowing it, we may be giving ourselves a kind of global lobotomy instead.

From megacities to nanotech, we're creating a global society whose complexity has passed the limits of individual comprehension. The problems we'll face in the next twenty years—energy shortages, terrorism, climate change, and disease—are enormous in scope. They're problems that we can only solve together.

Early Internet enthusiasts like Web creator Tim Berners-Lee hoped it would be a new platform for tackling those problems. I believe it still can be—and as you read on, I'll explain how. But first we need to pull back the curtain—to understand the forces that are taking the Internet in its current, personalized direction. We need to lay bare the bugs in the code—and the coders—that brought personalization to us.

If "code is law," as Larry Lessig famously declared, it's important to understand what the new lawmakers are trying to do. We need to understand what the programmers at Google and Facebook believe in. We need to understand the economic and social forces that are driving personalization, some of which are inevitable and some of which are not. And we need to understand what all this means for our politics, our culture, and our future.

Without sitting down next to a friend, it's hard to tell how the version of Google or Yahoo News that you're seeing differs from anyone else's. But because the filter bubble distorts our perception of what's important, true, and real, it's critically important to render it visible. That is what this book seeks to do.

1

The Race for Relevance

If you're not paying for something, you're not the customer; you're the product being sold.

—*Andrew Lewis*, under the alias Blue_beetle, on the Web site MetaFilter

In the spring of 1994, Nicholas Negroponte sat writing and thinking. At the MIT Media Lab, Negroponte's brainchild, young chip designers and virtual-reality artists and robot-wranglers were furiously at work building the toys and tools of the future. But Negroponte was mulling over a simpler problem, one that millions of people pondered every day: what to watch on TV.

By the mid-1990s, there were hundreds of channels streaming out live programming twenty-four hours a day, seven days a week. Most of the programming was horrendous and boring: infomercials for new kitchen gadgets, music videos for the latest one-hit-wonder band, cartoons, and celebrity news. For any given viewer, only a tiny percentage of it was likely to be interesting.

As the number of channels increased, the standard method of surfing through them was getting more and more hopeless.

It's one thing to search through five channels. It's another to search through five hundred. And when the number hits five thousand—well, the method's useless.

But Negroponte wasn't worried. All was not lost: in fact, a solution was just around the corner. "The key to the future of television," he wrote, "is to stop thinking about television as television," and to start thinking about it as a device with embedded intelligence. What consumers needed was a remote control that controls itself, an intelligent automated helper that would learn what each viewer watches and capture the programs relevant to him or her. "Today's TV set lets you control brightness, volume, and channel," Negroponte typed. "Tomorrow's will allow you to vary sex, violence, and political leaning."

And why stop there? Negroponte imagined a future swarming with intelligent agents to help with problems like the TV one. Like a personal butler at a door, the agents would let in only your favorite shows and topics. "Imagine a future," Negroponte wrote, "in which your interface agent can read every newswire and newspaper and catch every TV and radio broadcast on the planet, and then construct a personalized summary. This kind of newspaper is printed in an edition of one. . . . Call it the Daily Me."

The more he thought about it, the more sense it made. The solution to the information overflow of the digital age was smart, personalized, embedded editors. In fact, these agents didn't have to be limited to television; as he suggested to the editor of the new tech magazine *Wired*, "Intelligent agents are the unequivocal future of computing."

In San Francisco, Jaron Lanier responded to this argument with dismay. Lanier was one of the creators of virtual reality; since the eighties, he'd been tinkering with how to bring computers and people together. But the talk of agents struck him as crazy. "What's got into all of you?" he wrote in a missive to the "Wired-style community" on his Web site. "The idea of 'intelligent agents' is both wrong and evil. . . . The agent question looms as a deciding factor in whether [the Net] will be much better than TV, or much worse."

Lanier was convinced that, because they're not actually people, agents would force actual humans to interact with them in awkward and pixelated ways. "An agent's model of what you are interested in will be a cartoon model, and you will see a cartoon version of the world through the agent's eyes," he wrote.

And there was another problem: The perfect agent would presumably screen out most or all advertising. But since online commerce was driven by advertising, it seemed unlikely that these companies would roll out agents who would do such violence to their bottom line. It was more likely, Lanier wrote, that these agents would have double loyalties—bribable agents. "It's not clear who they're working for."

It was a clear and plangent plea. But though it stirred up some chatter in online newsgroups, it didn't persuade the software giants of this early Internet era. They were convinced by Negroponte's logic: The company that figured out how to sift through the digital haystack for the nuggets of gold would win the future. They could see the attention crash coming, as the information options available to each person rose toward infinity.

If you wanted to cash in, you needed to get people to tune in. And in an attention-scarce world, the best way to do that was to provide content that really spoke to each person's idiosyncratic interests, desires, and needs. In the hallways and data centers of Silicon Valley, there was a new watchword: relevance.

Everyone was rushing to roll out an "intelligent" product. In Redmond, Microsoft released Bob—a whole operating system based on the agent concept, anchored by a strange cartoonish avatar with an uncanny resemblance to Bill Gates. In Cupertino, almost exactly a decade before the iPhone, Apple introduced the Newton, a "personal desktop assistant" whose core selling point was the agent lurking dutifully just under its beige surface.

As it turned out, the new intelligent products bombed. In chat groups and on e-mail lists, there was practically an industry of snark about Bob. Users couldn't stand it. *PC World* named it one of the twenty-five worst tech products of all time. And the Apple Newton didn't do much better: Though the company had invested over $100 million in developing the product, it sold poorly in the first six months of its existence. When you interacted with the intelligent agents of the midnineties, the problem quickly became evident: They just weren't that smart.

Now, a decade and change later, intelligent agents are still nowhere to be seen. It looks as though Negroponte's intelligent-agent revolution failed. We don't wake up and brief an e-butler on our plans and desires for the day.

But that doesn't mean they don't exist. They're just hidden. Personal intelligent agents lie under the surface of every Web

site we go to. Every day, they're getting smarter and more powerful, accumulating more information about who we are and what we're interested in. As Lanier predicted, the agents don't work only for us: They also work for software giants like Google, dispatching ads as well as content. Though they may lack Bob's cartoon face, they steer an increasing proportion of our online activity.

In 1995 the race to provide personal relevance was just beginning. More than perhaps any other factor, it's this quest that has shaped the Internet we know today.

The John Irving Problem

Jeff Bezos, the CEO of Amazon.com, was one of the first people to realize that you could harness the power of relevance to make a few billion dollars. Starting in 1994, his vision was to transport online bookselling "back to the days of the small bookseller who got to know you very well and would say things like, 'I know you like John Irving, and guess what, here's this new author, I think he's a lot like John Irving,'" he told a biographer. But how to do that on a mass scale? To Bezos, Amazon needed to be "a sort of a small Artificial Intelligence company," powered by algorithms capable of instantly matching customers and books.

In 1994, as a young computer scientist working for Wall Street firms, Bezos had been hired by a venture capitalist to come up with business ideas for the burgeoning Web space. He worked methodically, making a list of twenty products the team

could theoretically sell online—music, clothing, electronics—and then digging into the dynamics of each industry. Books started at the bottom of his list, but when he drew up his final results, he was surprised to find them at the top.

Books were ideal for a few reasons. For starters, the book industry was decentralized; the biggest publisher, Random House, controlled only 10 percent of the market. If one publisher wouldn't sell to him, there would be plenty of others who would. And people wouldn't need as much time to get comfortable with buying books online as they might with other products—a majority of book sales already happened outside of traditional bookstores, and unlike clothes, you didn't need to try them on. But the main reason books seemed attractive was simply the fact that there were so many of them—3 million active titles in 1994, versus three hundred thousand active CDs. A physical bookstore would never be able to inventory all those books, but an online bookstore could.

When he reported this finding to his boss, the investor wasn't interested. Books seemed like a kind of backward industry in an information age. But Bezos couldn't get the idea out of his head. Without a physical limit on the number of books he could stock, he could provide hundreds of thousands more titles than industry giants like Borders or Barnes & Noble, and at the same time, he could create a more intimate and personal experience than the big chains.

Amazon's goal, he decided, would be to enhance the process of discovery: a personalized store that would help readers find books and introduce books to readers. But how?

Bezos started thinking about machine learning. It was a

tough problem, but a group of engineers and scientists had been attacking it at research institutions like MIT and the University of California at Berkeley since the 1950s. They called their field "cybernetics"—a word taken from Plato, who coined it to mean a self-regulating system, like a democracy. For the early cyberneticists, there was nothing more thrilling than building systems that tuned themselves, based on feedback. Over the following decades, they laid the mathematical and theoretical foundations that would guide much of Amazon's growth.

In 1990, a team of researchers at the Xerox Palo Alto Research Center (PARC) applied cybernetic thinking to a new problem. PARC was known for coming up with ideas that were broadly adopted and commercialized by others—the graphical user interface and the mouse, to mention two. And like many cutting-edge technologists at the time, the PARC researchers were early power users of e-mail—they sent and received hundreds of them. E-mail was great, but the downside was quickly obvious. When it costs nothing to send a message to as many people as you like, you can quickly get buried in a flood of useless information.

To keep up with the flow, the PARC team started tinkering with a process they called collaborative filtering, which ran in a program called Tapestry. Tapestry tracked how people reacted to the mass e-mails they received—which items they opened, which ones they responded to, and which they deleted—and then used this information to help order the inbox. E-mails that people had engaged with a lot would move to the top of the list; e-mails that were frequently deleted or unopened would

go to the bottom. In essence, collaborative filtering was a time-saver: Instead of having to sift through the pile of e-mail yourself, you could rely on others to help presift the items you'd received.

And of course, you didn't have to use it just for e-mail. Tapestry, its creators wrote, "is designed to handle any incoming stream of electronic documents. Electronic mail is only one example of such a stream: others are newswire stories and NetNews articles."

Tapestry had introduced collaborative filtering to the world, but in 1990, the world wasn't very interested. With only a few million users, the Internet was still a small ecosystem, and there just wasn't much information to sort or much bandwidth to download with. So for years collaborative filtering remained the domain of software researchers and bored college students. If you e-mailed ringo@media.mit.edu in 1994 with some albums you liked, the service would send an e-mail back with other music recommendations and the reviews. "Once an hour," according to the Web site, "the server processes all incoming messages and sends replies as necessary." It was an early precursor to Pandora; it was a personalized music service for a pre-broadband era.

But when Amazon launched in 1995, everything changed. From the start, Amazon was a bookstore with personalization built in. By watching which books people bought and using the collaborative filtering methods pioneered at PARC, Amazon could make recommendations on the fly. ("Oh, you're getting *The Complete Dummy's Guide to Fencing*? How about adding a copy of *Waking Up Blind: Lawsuits over Eye Injury?*") And by

tracking which users bought what over time, Amazon could start to see which users' preferences were similar. ("Other people who have similar tastes to yours bought this week's new release, *En Garde!*") The more people bought books from Amazon, the better the personalization got.

In 1997, Amazon had sold books to its first million customers. Six months later, it had served 2 million. And in 2001, it reported its first quarterly net profit—one of the first businesses to prove that there was serious money to be made online.

If Amazon wasn't quite able to create the feeling of a local bookstore, its personalization code nonetheless worked quite well. Amazon executives are tight-lipped about just how much revenue it's brought in, but they often point to the personalization engine as a key part of the company's success.

At Amazon, the push for more user data is never-ending: When you read books on your Kindle, the data about which phrases you highlight, which pages you turn, and whether you read straight through or skip around are all fed back into Amazon's servers and can be used to indicate what books you might like next. When you log in after a day reading Kindle e-books at the beach, Amazon is able to subtly customize its site to appeal to what you've read: If you've spent a lot of time with the latest James Patterson, but only glanced at that new diet guide, you might see more commercial thrillers and fewer health books.

Amazon users have gotten so used to personalization that the site now uses a reverse trick to make some additional cash. Publishers pay for placement in physical bookstores, but they can't buy the opinions of the clerks. But as Lanier predicted,

buying off algorithms is easy: Pay enough to Amazon, and your book can be promoted as if by an "objective" recommendation by Amazon's software. For most customers, it's impossible to tell which is which.

Amazon proved that relevance could lead to industry dominance. But it would take two Stanford graduate students to apply the principles of machine learning to the whole world of online information.

Click Signals

As Jeff Bezos's new company was getting off the ground, Larry Page and Sergey Brin, the founders of Google, were busy doing their doctoral research at Stanford. They were aware of Amazon's success—in 1997, the dot-com bubble was in full swing, and Amazon, on paper at least, was worth billions. Page and Brin were math whizzes; Page, especially, was obsessed with AI. But they were interested in a different problem. Instead of using algorithms to figure out how to sell products more effectively, what if you could use them to sort through sites on the Web?

Page had come up with a novel approach, and with a geeky predilection for puns, he called it PageRank. Most Web search companies at the time sorted pages using keywords and were very poor at figuring out which page for a given word was the most relevant. In a 1997 paper, Brin and Page dryly pointed out that three of the four major search engines couldn't find themselves. "We want our notion of 'relevant' to only include the

very best documents," they wrote, "since there may be tens of thousands of slightly relevant documents."

Page had realized that packed into the linked structure of the Web was a lot more data than most search engines made use of. The fact that a Web page linked to another page could be considered a "vote" for that page. At Stanford, Page had seen professors count how many times their papers had been cited as a rough index of how important they were. Like academic papers, he realized, the pages that a lot of other pages cite—say, the front page of Yahoo—could be assumed to be more "important," and the pages that those pages voted for would matter more. The process, Page argued, "utilized the uniquely democratic structure of the web."

In those early days, Google lived at google.stanford.edu, and Brin and Page were convinced it should be nonprofit and advertising free. "We expect that advertising funded search engines will be inherently biased towards the advertisers and away from the needs of the consumers," they wrote. "The better the search engine is, the fewer advertisements will be needed for the consumer to find what they want. . . . We believe the issue of advertising causes enough mixed incentives that it is crucial to have a competitive search engine that is transparent and in the academic realm."

But when they released the beta site into the wild, the traffic chart went vertical. Google worked—out of the box, it was the best search site on the Internet. Soon, the temptation to spin it off as a business was too great for the twenty-something cofounders to bear.

In the Google mythology, it is PageRank that drove the

company to worldwide dominance. I suspect the company likes it that way—it's a simple, clear story that hangs the search giant's success on a single ingenious breakthrough by one of its founders. But from the beginning, PageRank was just a small part of the Google project. What Brin and Page had really figured out was this: The key to relevance, the solution to sorting through the mass of data on the Web was . . . more data.

It wasn't just which pages linked to which that Brin and Page were interested in. The position of a link on the page, the size of the link, the age of the page—all of these factors mattered. Over the years, Google has come to call these clues embedded in the data *signals*.

From the beginning, Page and Brin realized that some of the most important signals would come from the search engine's users. If someone searches for "Larry Page," say, and clicks on the second link, that's another kind of vote: It suggests that the second link is more relevant to that searcher than the first one. They called this a *click signal*. "Some of the most interesting research," Page and Brin wrote, "will involve leveraging the vast amount of usage data that is available from modern web systems. . . . It is very difficult to get this data, mainly because it is considered commercially valuable." Soon they'd be sitting on one of the world's largest stores of it.

Where data was concerned, Google was voracious. Brin and Page were determined to keep everything: every Web page the search engine had ever landed on, every click every user ever made. Soon its servers contained a nearly real-time copy of most of the Web. By sifting through this data, they were certain they'd find more clues, more signals, that could be used to

tweak results. The search-quality division at the company acquired a black-ops kind of feel: few visitors and absolute secrecy were the rule.

"The ultimate search engine," Page was fond of saying, "would understand exactly what you mean and give back exactly what you want." Google didn't want to return thousands of pages of links—it wanted to return one, the one you wanted. But the perfect answer for one person isn't perfect for another. When I search for "panthers," what I probably mean are the large wild cats, whereas a football fan searching for the phrase probably means the Carolina team. To provide perfect relevance, you'd need to know what each of us was interested in. You'd need to know that I'm pretty clueless about football; you'd need to know who I was.

The challenge was getting enough data to figure out what's personally relevant to each user. Understanding what someone means is tricky business—and to do it well, you have to get to know a person's behavior over a sustained period of time.

But how? In 2004, Google came up with an innovative strategy. It started providing other services, services that required users to log in. Gmail, its hugely popular e-mail service, was one of the first to roll out. The press focused on the ads that ran along Gmail's sidebar, but it's unlikely that those ads were the sole motive for launching the service. By getting people to log in, Google got its hands on an enormous pile of data—the hundreds of millions of e-mails Gmail users send and receive each day. And it could cross-reference each user's e-mail and behavior on the site with the links he or she clicked in the Google search engine. Google Apps—a suite of online word-processing

and spreadsheet-creation tools—served double duty: It undercut Microsoft, Google's sworn enemy, and it provided yet another hook for people to stay logged in and continue sending click signals. All this data allowed Google to accelerate the process of building a theory of identity for each user—what topics each user was interested in, what links each person clicked.

By November 2008, Google had several patents for personalization algorithms—code that could figure out the groups to which an individual belongs and tailor his or her result to suit that group's preference. The categories Google had in mind were pretty narrow: to illustrate its example in the patent, Google used the example of "all persons interested in collecting ancient shark teeth" and "all persons not interested in collecting ancient shark teeth." People in the former category who searched for, say, "Great White incisors" would get different results from the latter.

Today, Google monitors every signal about us it can get its hands on. The power of this data can't be underestimated: If Google sees that I log on first from New York, then from San Francisco, then from New York again, it knows I'm a bicoastal traveler and can adjust its results accordingly. By looking at what browser I use, it can make some guesses about my age and even perhaps my politics.

How much time you take between the moment you enter your query and the moment you click on a result sheds light on your personality. And of course, the terms you search for reveal a tremendous amount about your interests.

Even if you're not logged in, Google is personalizing your search. The neighborhood—even the block—that you're logging

in from is available to Google, and it says a lot about who you are and what you're interested in. A query for "Sox" coming from Wall Street is probably shorthand for the financial legislation "Sarbanes Oxley," while across the Upper Bay in Staten Island it's probably about baseball.

"People always make the assumption that we're done with search," said founder Page in 2009. "That's very far from the case. We're probably only 5 percent of the way there. We want to create the ultimate search engine that can understand anything. . . . Some people could call that artificial intelligence."

In 2006, at an event called Google Press Day, CEO Eric Schmidt laid out Google's five-year plan. One day, he said, Google would be able to answer questions such as "Which college should I go to?" "It will be some years before we can at least partially answer those questions. But the eventual outcome is . . . that Google can answer a more hypothetical question."

Facebook Everywhere

Google's algorithms were unparalleled, but the challenge was to coax users into revealing their tastes and interests. In February 2004, working out of his Harvard dorm room, Mark Zuckerberg came up with an easier approach. Rather than sifting through click signals to figure out what people cared about, the plan behind his creation, Facebook, was to just flat out ask them.

Since he was a college freshman, Zuckerberg had been

interested in what he called the "social graph"—the set of each person's relationships. Feed a computer that data, and it could start to do some pretty interesting and useful things—telling you what your friends were up to, where they were, and what they were interested in. It also had implications for news: In its earliest incarnation as a Harvard-only site, Facebook automatically annotated people's personal pages with links to the *Crimson* articles in which they appeared.

Facebook was hardly the first social network: As Zuckerberg was hacking together his creation in the wee hours of the morning, a hairy, music-driven site named MySpace was soaring; before MySpace, Friendster had for a brief moment captured the attention of the technorati. But the Web site Zuckerberg had in mind was different. It wouldn't be a coy dating site, like Friendster. And unlike MySpace, which encouraged people to connect whether they knew each other or not, Facebook was about taking advantage of existing real-world social connections. Compared to its predecessors, Facebook was stripped down: the emphasis was on information, not flashy graphics or a cultural vibe. "We're a utility," Zuckerberg said later. Facebook was less like a nightclub than a phone company, a neutral platform for communication and collaboration.

Even in its first incarnation, the site grew like wildfire. After Facebook expanded to a few select Ivy League campuses, Zuckerberg's inbox was flooded with requests from students on other campuses, begging him to turn on Facebook for them. By May of 2005, the site was up and running at over eight hundred colleges. But it was the development of the News Feed the following September that pushed Facebook into another league.

On Friendster and MySpace, to find out what your friends were up to, you had to visit their pages. The News Feed algorithm pulled all of these updates out of Facebook's massive database and placed them in one place, up front, right when you logged in. Overnight, Facebook had turned itself from a network of connected Web pages into a personalized newspaper featuring (and created by) your friends. It's hard to imagine a purer source of relevance.

And it was a gusher. In 2006, Facebook users posted literally billions of updates—philosophical quotes, tidbits about who they were dating, what was for breakfast. Zuckerberg and his team egged them on: The more data users handed over to the company, the better their experience could be and the more they'd keep coming back. Early on, they'd added the ability to upload photos, and now Facebook had the largest photo collection in the world. They encouraged users to post links from other Web sites, and millions were submitted. By 2007, Zuckerberg bragged, "We're actually producing more news in a single day for our 19 million users than any other media outlet has in its entire existence."

At first, the News Feed showed nearly everything your friends did on the site. But as the volume of posts and friends increased, the Feed became unreadable and unmanageable. Even if you had only a hundred friends, it was too much to read.

Facebook's solution was EdgeRank, the algorithm that powers the default page on the site, the Top News Feed. EdgeRank ranks every interaction on the site. The math is complicated, but the basic idea is pretty simple, and it rests on three factors.

The first is affinity: The friendlier you are with someone—as determined by the amount of time you spend interacting and checking out his or her profile—the more likely it is that Facebook will show you that person's updates. The second is the relative weight of that type of content: Relationship status updates, for example, are weighted very highly; everybody likes to know who's dating whom. (Many outsiders suspect that the weight, too, is personalized: Different people care about different kinds of content.) The third is time: Recently posted items are weighted over older ones.

EdgeRank demonstrates the paradox at the core of the race for relevancy. To provide relevance, personalization algorithms need data. But the more data there is, the more sophisticated the filters must become to organize it. It's a never-ending cycle.

By 2009, Facebook had hit the 300 million user mark and was growing by 10 million people per month. Zuckerberg, at twenty-five, was a paper billionaire. But the company had bigger ambitions. What the News Feed had done for social information, Zuckerberg wanted to do for all information. Though he never said it, the goal was clear: Leveraging the social graph and the masses of information Facebook's users had provided, Zuckerberg wanted to put Facebook's news algorithm engine at the center of the web.

Even so, it was a surprise when, on April 21, 2010, readers loaded the *Washington Post* homepage and discovered that their friends were on it. In a prominent box in the upper right corner—the place where any editor will tell you the eye lands first—was a feature titled Network News. Each person who visited saw a different set of links in the box—the *Washington Post* links their

friends had shared on Facebook. The *Post* was letting Facebook edit its most valuable online asset: its front page. The *New York Times* soon followed suit.

The new feature was one piece of a much bigger rollout, which Facebook called "Facebook Everywhere" and announced at its annual conference, f8 ("fate"). Ever since Steve Jobs sold the Apple by calling it "insanely great," a measure of grandiosity has been part of the Silicon Valley tradition. But when Zuckerberg walked onto the stage on April 21, 2010, his words seemed plausible. "This is the most transformative thing we've ever done for the web," he announced.

The aim of Facebook Everywhere was simple: make the whole Web "social" and bring Facebook-style personalization to millions of sites that currently lack it. Want to know what music your Facebook friends are listening to? Pandora would now tell you. Want to know what restaurants your friends like? Yelp now had the answer. News sites from the *Huffington Post* to the *Washington Post* were now personalized.

Facebook made it possible to press the Like button on any item on the Web. In the first twenty-four hours of the new service, there were 1 billion Likes—and all of that data flowed back into Facebook's servers. Bret Taylor, Facebook's platform lead, announced that users were sharing 25 billion items a month. Google, once the undisputed leader in the push for relevance, seemed worried about the rival a few miles down the road.

The two giants are now in hand-to-hand combat: Facebook poaches key executives from Google; Google's hard at work constructing social software like Facebook. But it's not totally

obvious why the two new-media monoliths should be at war. Google, after all, is built around answering questions; Facebook's core mission is to help people connect with their friends.

But both businesses' bottom lines depend on the same thing: targeted, highly relevant advertising. The contextual advertisements Google places next to search results and on Web pages are its only significant source of profits. And while Facebook's finances are private, insiders have made clear that advertising is at the core of the company's revenue model. Google and Facebook have different starting points and different strategies—one starts with the relationships among pieces of information, while the other starts with the relationships among people—but ultimately, they're competing for the same advertising dollars.

From the point of view of the online advertiser, the question is simple. Which company can deliver the most return on a dollar spent? And this is where relevance comes back into the equation. The masses of data Facebook and Google accumulate have two uses. For users, the data provides a key to providing personally relevant news and results. For advertisers, the data is the key to finding likely buyers. The company that has the most data and can put it to the best use gets the advertising dollars.

Which brings us to lock-in. Lock-in is the point at which users are so invested in their technology that even if competitors might offer better services, it's not worth making the switch. If you're a Facebook member, think about what it'd take to get you to switch to another social networking site—even if the site had vastly greater features. It'd probably take a

lot—re-creating your whole profile, uploading all of those pictures, and laboriously entering your friends' names would be extremely tedious. You're pretty locked in. Likewise, Gmail, Gchat, Google Voice, Google Docs, and a host of other products are part of an orchestrated campaign for Google lock-in. The fight between Google and Facebook hinges on which can achieve lock-in for the most users.

The dynamics of lock-in are described by Metcalfe's law, a principle coined by Bob Metcalfe, the inventor of the Ethernet protocol that wires together computers. The law says that the usefulness of a network increases at an accelerating rate as you add each new person to it. It's not much use to be the only person you know with a fax machine, but if everyone you work with uses one, it's a huge disadvantage not to be in the loop. Lock-in is the dark side of Metcalfe's law: Facebook is useful in large part because everyone's on it. It'd take a lot of mismanagement to overcome that basic fact.

The more locked in users are, the easier it is to convince them to log in—and when you're constantly logged in, these companies can keep tracking data on you even when you're not visiting their Web sites. If you're logged into Gmail and you visit a Web site that uses Google's Doubleclick ad service, that fact can be attached to your Google account. And with tracking cookies these services place on your computer, Facebook or Google can provide ads based on your personal information on third-party sites. The whole Web can become a platform for Google or Facebook.

But Google and Facebook are hardly the only options. The daily turf warfare between Google and Facebook occupies

scores of business reporters and gigabytes of blog chatter, but there's a stealthy third front opening up in this war. And though most of the companies involved operate under the radar, they may ultimately represent the future of personalization.

The Data Market

The manhunt for accomplices of the 9/11 killers was one of the most extensive in history. In the immediate aftermath of the attacks, the scope of the plot was unclear. Were there more hijackers who hadn't yet been found? How extensive was the network that had pulled off the attacks? For three days, the CIA, FBI, and a host of other acronymed agencies worked around the clock to identify who else was involved. The country's planes were grounded, its airports closed.

When help arrived, it came from an unlikely place. On September 14, the bureau had released the names of the hijackers, and it was now asking—pleading—for anyone with information about the perpetrators to come forward. Later that day, the FBI received a call from Mack McLarty, a former White House official who sat on the board of a little-known but hugely profitable company called Acxiom.

As soon as the hijackers' names had been publicly released, Acxiom had searched its massive data banks, which take up five acres in tiny Conway, Arkansas. And it had found some very interesting data on the perpetrators of the attacks. In fact, it turned out, Acxiom knew more about eleven of the nineteen hijackers than the entire U.S. government did—including

their past and current addresses and the names of their housemates.

We may never know what was in the files Acxiom gave the government (though one of the executives told a reporter that Acxiom's information had led to deportations and indictments). But here's what Acxiom knows about 96 percent of American households and half a billion people worldwide: the names of their family members, their current and past addresses, how often they pay their credit card bills whether they own a dog or a cat (and what breed it is), whether they are right-handed or left-handed, what kinds of medication they use (based on pharmacy records) . . . the list of data points is about 1,500 items long.

Acxiom keeps a low profile—it may not be an accident that its name is nearly unpronounceable. But it serves most of the largest companies in America—nine of the ten major credit card companies and consumer brands from Microsoft to Blockbuster. "Think of [Acxiom] as an automated factory," one engineer told a reporter, "where the product we make is data."

To get a sense of Acxiom's vision for the future, consider a travel search site like Travelocity or Kayak. Ever wondered how they make money? Kayak makes money in two ways. One is pretty simple, a holdover from the era of travel agents: When you buy a flight using a link from Kayak, airlines pay the site a small fee for the referral.

The other is much less obvious. When you search for the flight, Kayak places a cookie on your computer—a small file that's basically like putting a sticky note on your forehead saying "Tell me about cheap bicoastal fares." Kayak can then sell

that piece of data to a company like Acxiom or its rival BlueKai, which auctions it off to the company with the highest bid—in this case, probably a major airline like United. Once it knows what kind of trip you're interested in, United can show you ads for relevant flights—not just on Kayak's site, but on literally almost any Web site you visit across the Internet. This whole process—from the collection of your data to the sale to United—takes under a second.

The champions of this practice call it "behavioral retargeting." Retailers noticed that 98 percent of visitors to online shopping sites leave without buying anything. Retargeting means businesses no longer have to take "no" for an answer.

Say you check out a pair of running sneakers online but leave the site without springing for them. If the shoe site you were looking at uses retargeting, their ads—maybe displaying a picture of the exact sneaker you were just considering—will follow you around the Internet, showing up next to the scores from last night's game or posts on your favorite blog. And if you finally break down and buy the sneakers? Well, the shoe site can sell that piece of information to BlueKai to auction it off to, say, an athletic apparel site. Pretty soon you'll be seeing ads all over the Internet for sweat-wicking socks.

This kind of persistent, personalized advertising isn't just confined to your computer. Sites like Loopt and Foursquare, which broadcast a user's location from her mobile phone, provide advertisers with opportunities to reach consumers with targeted ads even when they're out and about. Loopt is working on an ad system whereby stores can offer special discounts and promotions to repeat customers on their phones—right as

they walk through the door. And if you sit down on an air flight, the ads on your seat-back TV screen may be different from your neighbors'. The airline, after all, knows your name and who you are. And by cross-indexing that personal information with a database like Acxiom's, it can know a whole lot more about you. Why not show you your own ads—or, for that matter, a targeted show that makes you more likely to watch them?

TargusInfo, another of the new firms that processes this sort of information, brags that it "delivers more than 62 billion real-time attributes a year." That's 62 billion points of data about who customers are, what they're doing, and what they want. Another ominously named enterprise, the Rubicon Project, claims that its database includes more than half a billion Internet users.

For now, retargeting is being used by advertisers, but there's no reason to expect that publishers and content providers won't get in on it. After all, if the *Los Angeles Times* knows that you're a fan of Perez Hilton, it can front-page its interview with him in your edition, which means you'll be more likely to stay on the site and click around.

What all of this means is that your behavior is now a commodity, a tiny piece of a market that provides a platform for the personalization of the whole Internet. We're used to thinking of the Web as a series of one-to-one relationships: You manage your relationship with Yahoo separately from your relationship with your favorite blog. But behind the scenes, the Web is becoming increasingly integrated. Businesses are realizing that it's profitable to share data. Thanks to Acxiom and the data

market, sites can put the most relevant products up front and whisper to each other behind your back.

The push for relevance gave rise to today's Internet giants, and it is motivating businesses to accumulate ever more data about us and to invisibly tailor our online experiences on that basis. It's changing the fabric of the Web. But as we'll see, the consequences of personalization for how we consume news, make political decisions, and even how we think will be even more dramatic.

2

The User Is the Content

Everything which bars freedom and fullness of communication sets up barriers that divide human beings into sets and cliques, into antagonistic sects and factions, and thereby undermines the democratic way of life.

—*John Dewey*

The technology will be so good, it will be very hard for people to watch or consume something that has not in some sense been tailored for them.

—*Eric Schmidt*, Google CEO

Microsoft Building 1 in Mountain View, California, is a long, low, gunmetal gray hangar, and if it weren't for the cars buzzing by behind it on Highway 101, you'd almost be able to hear the whine of ultrasonic security. On this Saturday in 2010, the vast expanses of parking lot were empty except for a few dozen BMWs and Volvos. A cluster of scrubby pine trees bent in the gusty wind.

Inside, the concrete-floored hallways were crawling with CEOs in jeans and blazers trading business cards over coffee

4

The You Loop

I believe this is the quest for what a personal computer really is. It is to capture one's entire life.

—*Gordon Bell*

"You have one identity," Facebook founder Mark Zuckerberg told journalist David Kirkpatrick for his book *The Facebook Effect*. "The days of you having a different image for your work friends or coworkers and for the other people you know are probably coming to an end pretty quickly. . . . Having two identities for yourself is an example of a lack of integrity."

A year later, soon after the book had been published, twenty-six-year-old Zuckerberg sat onstage with Kirkpatrick and NPR interviewer Guy Raz at the Computer History Museum in Mountain View, California. "In David's book," Raz said, "you say that people should have one identity. . . . But I behave a different way around my family than I do around my colleagues."

Zuckerberg shrugged. "No, I think that was just a sentence I said."

Raz continued: "Are you the same person right now as when you're with your friends?"

"Uh, yeah," Zuckerberg said. "Same awkward self."

If Mark Zuckerberg were a standard mid-twenty-something, this tangle of views might be par for the course: Most of us don't spend too much time musing philosophically about the nature of identity. But Zuckerberg controls the world's most powerful and widely used technology for managing and expressing who we are. And his views on the matter are central to his vision for the company and for the Internet.

Speaking at an event during New York's Ad Week, Facebook COO Sheryl Sandberg said she expected the Internet to change quickly. "People don't want something targeted to the whole world—they want something that reflects what they want to see and know," she said, suggesting that in three to five years that would be the norm. Facebook's goal is to be at the center of that process—the singular platform through which every other service and Web site incorporates your personal and social data. You have one identity, it's your Facebook identity, and it colors your experience everywhere you go.

It's hard to imagine a more dramatic departure from the early days of the Internet, in which *not* exposing your identity was part of the appeal. In chat rooms and online forums, your gender, race, age, and location were whatever you said they were, and the denizens of these spaces exulted about the way the medium allowed you to shed your skin. Electronic Frontier Foundation (EFF) founder John Perry Barlow dreamed of "creating a world that all may enter without privilege or prejudice accorded by race, economic power, military force, or station of birth." The freedom

that this offered anyone who was interested to transgress and explore, to try on different personas for size, felt revolutionary.

As law and commerce have caught up with technology, however, the space for anonymity online is shrinking. You can't hold an anonymous person responsible for his or her actions: Anonymous customers commit fraud, anonymous commenters start flame wars, and anonymous hackers cause trouble. To establish the trust that community and capitalism are built on, you need to know whom you're dealing with.

As a result, there are dozens of companies working on de-anonymizing the Web. PeekYou, a firm founded by the creator of RateMyProfessors.com, is patenting ways of connecting online activities done under a pseudonym with the real name of the person involved. Another company, Phorm, helps Internet service providers use a method called "deep packet inspection" to analyze the traffic that flows through their servers; Phorm aims to build nearly comprehensive profiles of each customer to use for advertising and personalized services. And if ISPs are leery, BlueCava is compiling a database of every computer, smartphone, and online-enabled gadget in the world, which can be tied to the individual people who use them. Even if you're using the highest privacy settings in your Web browser, in other words, your hardware may soon give you away.

These technological developments pave the way for a more persistent kind of personalization than anything we've experienced to date. It also means that we'll increasingly be forced to trust the companies at the center of this process to properly express and synthesize who we really are. When you meet someone in a bar or a park, you look at how they behave and

act and form an impression accordingly. Facebook and the other identity services aim to mediate that process online; if they don't do it right, things can get fuzzy and distorted. To personalize well, you have to have the right idea of what represents a person.

There's another tension in the interplay of identity and personalization. Most personalized filters are based on a three-step model. First, you figure out who people are and what they like. Then, you provide them with content and services that best fit them. Finally, you tune to get the fit just right. Your identity shapes your media. There's just one flaw in this logic: Media also shape identity. And as a result, these services may end up creating a good fit between you and your media by changing . . . you. If a self-fulfilling prophecy is a false definition of the world that through one's actions becomes true, we're now on the verge of self-fulfilling identities, in which the Internet's distorted picture of us becomes who we really are.

Personalized filtering can even affect your ability to choose your own destiny. In "Of Sirens and Amish Children," a much-cited tract, information law theorist Yochai Benkler describes how more-diverse information sources make us freer. Autonomy, Benkler points out, is a tricky concept: To be free, you have to be able not only to do what you want, but to know what's possible to do. The Amish children in the title are plaintiffs in a famous court case, *Wisconsin v. Yoder*, whose parents sought to prevent them from attending public school so that they wouldn't be exposed to modern life. Benkler argues that this is a real threat to the children's freedom: Not knowing that it's possible to be an astronaut is just as much a

prohibition against becoming one as knowing and being barred from doing so.

Of course, too many options are just as problematic as too few—you can find yourself overwhelmed by the number of options or paralyzed by the paradox of choice. But the basic point remains: The filter bubble doesn't just reflect your identity. It also illustrates what choices you have. Students who go to Ivy League colleges see targeted advertisements for jobs that students at state schools are never even aware of. The personal feeds of professional scientists might feature articles about contests that amateurs never become aware of. By illustrating some possibilities and blocking out others, the filter bubble has a hand in your decisions. And in turn, it shapes who you become.

A Bad Theory of You

The way that personalization shapes identity is still becoming clear—especially because most of us still spend more time consuming broadcast media than personalized content streams. But by looking at how the major filterers think about identity, it's becoming possible to predict what these changes might look like. Personalization requires a theory of what makes a person—of what bits of data are most important to determine who someone is—and the major players on the Web have quite different ways of approaching the problem.

Google's filtering systems, for example, rely heavily on Web history and what you click on (click signals) to infer what you like and dislike. These clicks often happen in an entirely private

context: The assumption is that searches for "intestinal gas" and celebrity gossip Web sites are between you and your browser. You might behave differently if you thought other people were going to see your searches. But it's that behavior that determines what content you see in Google News, what ads Google displays—what determines, in other words, Google's theory of you.

The basis for Facebook's personalization is entirely different. While Facebook undoubtedly tracks clicks, its primary way of thinking about your identity is to look at what you share and with whom you interact. That's a whole different kettle of data from Google's: There are plenty of prurient, vain, and embarrassing things we click on that we'd be reluctant to share with all of our friends in a status update. And the reverse is true, too. I'll cop to sometimes sharing links I've barely read—the long investigative piece on the reconstruction of Haiti, the bold political headline—because I like the way it makes me appear to others. The Google self and the Facebook self, in other words, are pretty different people. There's a big difference between "you are what you click" and "you are what you share."

Both ways of thinking have their benefits and drawbacks. With Google's click-based self, the gay teenager who hasn't come out to his parents can still get a personalized Google News feed with pieces from the broader gay community that affirm that he's not alone. But by the same token, a self built on clicks will tend to draw us even more toward the items we're predisposed to look at already—toward our most Pavlovian selves. Your perusal of an article on TMZ.com is filed away, and the next time you're looking at the news, Brad Pitt's marriage drama is more likely to flash on to the screen. (If Google didn't persistently downplay porn, the problem would presumably be far worse.)

Facebook's share-based self is more aspirational: Facebook takes you more at your word, presenting you as you'd like to be seen by others. Your Facebook self is more of a performance, less of a behaviorist black box, and ultimately it may be more prosocial than the bundle of signals Google tracks. But the Facebook approach has its downsides as well—to the extent that Facebook draws on the more public self, it necessarily has less room for private interests and concerns. The same closeted gay teenager's information environment on Facebook might diverge more from his real self. The Facebook portrait remains incomplete.

Both are pretty poor representations of who we are, in part because there is no one set of data that describes who we are. "Information about our property, our professions, our purchases, our finances, and our medical history does not tell the whole story," writes privacy expert Daniel Solove. "We are more than the bits of data we give off as we go about our lives."

Digital animators and robotics engineers frequently run into a problem known as the *uncanny valley*. The uncanny valley is the place where something is lifelike but not convincingly alive, and it gives people the creeps. It's part of why digital animation of real people still hasn't hit the big screens: When an image looks almost like a real person, but not quite, it's unsettling on a basic psychological level. We're now in the uncanny valley of personalization. The doppelgänger selves reflected in our media are a lot like, but not exactly, ourselves. And as we'll see, there are some important things that are lost in the gap between the data and reality.

To start with, Zuckerberg's statement that we have "one identity" simply isn't true. Psychologists have a name for this fallacy: fundamental attribution error. We tend to attribute peoples' behavior to their inner traits and personality rather than to the situations they're placed in. Even in situations where the context clearly plays a major role, we find it hard to separate how someone behaves from who she is.

And to a striking degree, our characteristics are fluid. Someone who's aggressive at work may be a doormat at home. Someone who's gregarious when happy may be introverted when stressed. Even some of our closest-held traits—our disinclination to do harm, for example—can be shaped by context. Groundbreaking psychologist Stanley Milgram demonstrated this when, in an oft-cited experiment at Yale in the 1960s, he got decent ordinary people to apparently electrocute other subjects when given the nod by a man in a lab coat.

There is a reason that we act this way: The personality traits that serve us well when we're at dinner with our family might get in the way when we're in a dispute with a passenger on the train or trying to finish a report at work. The plasticity of the self allows for social situations that would be impossible or intolerable if we always behaved exactly the same way. Advertisers have understood this phenomenon for a long time. In the jargon, it's called *day-parting*, and it's the reason that you don't hear many beer ads as you're driving to work in the morning. People have different needs and aspirations at eight A.M. than they do at eight P.M. By the same token, billboards in the nightlife district promote different products than billboards in the residential neighborhoods the same partiers go home to.

On his own Facebook page, Zuckerberg lists "transparency" as one of his top Likes. But there's a downside to perfect transparency: One of the most important uses of privacy is to manage and maintain the separations and distinctions among our different selves. With only one identity, you lose the nuances that make for a good personalized fit.

Personalization doesn't capture the balance between your work self and your play self, and it can also mess with the tension between your aspirational and your current self. How we behave is a balancing act between our future and present selves. In the future, we want to be fit, but in the present, we want the candy bar. In the future, we want to be a well-rounded, well-informed intellectual virtuoso, but right now we want to watch *Jersey Shore*. Behavioral economists call this present bias—the gap between your preferences for your future self and your preferences in the current moment.

The phenomenon explains why there are so many movies in your Netflix queue. When researchers at Harvard and the Analyst Institute looked at people's movie-rental patterns, they were able to watch as people's future aspirations played against their current desires. "Should" movies like *An Inconvenient Truth* or *Schindler's List* were often added to the queue, but there they languished while watchers gobbled up "want" movies like *Sleepless in Seattle*. And when they had to choose three movies to watch instantly, they were less likely to choose "should" movies at all. Apparently there are some movies we'd always rather watch tomorrow.

At its best, media help mitigate present bias, mixing "should" stories with "want" stories and encouraging us to dig into the difficult but rewarding work of understanding complex problems.

But the filter bubble tends to do the opposite: Because it's our present self that's doing all the clicking, the set of preferences it reflects is necessarily more "want" than "should."

The one-identity problem isn't a fundamental flaw. It's more of a bug: Because Zuckerberg thinks you have one identity and you don't, Facebook will do a worse job of personalizing your information environment. As John Battelle told me, "We're so far away from the nuances of what it means to be human, as reflected in the nuances of the technology." Given enough data and enough programmers, the context problem is solvable—and according to personalization engineer Jonathan McPhie, Google is working on it. We've seen the pendulum swing from the anonymity of the early Internet to the one-identity view currently in vogue; the future may look like something in between.

But the one-identity problem illustrates one of the dangers of turning over your most personal details to companies who have a skewed view of what identity is. Maintaining separate identity zones is a ritual that helps us deal with the demands of different roles and communities. And something's lost when, at the end of the day, everything inside your filter bubble looks roughly the same. Your bacchanalian self comes knocking at work; your work anxieties plague you on a night out.

And when we're aware that everything we do enters a permanent, pervasive online record, another problem emerges: The knowledge that what we do affects what we see and how companies see us can create a chilling effect. Genetic privacy expert Mark Rothstein describes how lax regulations around genetic data can actually reduce the number of people willing to be tested for certain diseases: If you might be discriminated

against or denied insurance for having a gene linked to Parkinson's disease, it's not unreasonable just to skip the test and the "toxic knowledge" that might result.

In the same way, when our online actions are tallied and added to a record that companies use to make decisions, we might decide to be more cautious in our surfing. If we knew (or even suspected, for that matter) that purchasers of *101 Ways to Fix Your Credit Score* tend to get offered lower-premium credit cards, we'd avoid buying the book. "If we thought that our every word and deed were public," writes law professor Charles Fried, "fear of disapproval or more tangible retaliation might keep us from doing or saying things which we would do or say could we be sure of keeping them to ourselves." As Google expert Siva Vaidhyanathan points out, "F. Scott Fitzgerald's enigmatic Jay Gatsby could not exist today. The digital ghost of Jay Gatz would follow him everywhere."

In theory, the one-identity, context-blind problem isn't impossible to fix. Personalizers will undoubtedly get better at sensing context. They might even be able to better balance long-term and short-term interests. But when they do—when they are able to accurately gauge the workings of your psyche—things get even weirder.

Targeting Your Weak Spots

The logic of the filter bubble today is still fairly rudimentary: People who bought the *Iron Man* DVD are likely to buy *Iron Man II;* people who enjoy cookbooks will probably be interested

in cookware. But for Dean Eckles, a doctoral student at Stanford and an adviser to Facebook, these simple recommendations are just the beginning. Eckles is interested in means, not ends: He cares less about what types of products you like than which kinds of arguments might cause you to choose one over another.

Eckles noticed that when buying products—say, a digital camera—different people respond to different pitches. Some people feel comforted by the fact that an expert or product review site will vouch for the camera. Others prefer to go with the product that's most popular, or a money-saving deal, or a brand that they know and trust. Some people prefer what Eckles calls "high cognition" arguments—smart, subtle points that require some thinking to get. Others respond better to being hit over the head with a simple message.

And while most of us have preferred styles of argument and validation, there are also types of arguments that really turn us off. Some people rush for a deal; others think that the deal means the merchandise is subpar. Just by eliminating the persuasion styles that rub people the wrong way, Eckles found he could increase the effectiveness of marketing materials by 30 to 40 percent.

While it's hard to "jump categories" in products—what clothing you prefer is only slightly related to what books you enjoy—"persuasion profiling" suggests that the kinds of arguments you respond to are highly transferrable from one domain to another. A person who responds to a "get 20% off if you buy NOW" deal for a trip to Bermuda is much more likely than someone who doesn't to respond to a similar deal for, say, a new laptop.

If Eckles is right—and research so far appears to be validating his theory—your "persuasion profile" would have a pretty significant financial value. It's one thing to know how to pitch products to you in a specific domain; it's another to be able to improve the hit rate anywhere you go. And once a company like Amazon has figured out your profile by offering you different kinds of deals over time and seeing which ones you responded to, there's no reason it couldn't then sell that information to other companies. (The field is so new that it's not clear if there's a correlation between persuasion styles and demographic traits, but obviously that could be a shortcut as well.)

There's plenty of good that could emerge from persuasion profiling, Eckles believes. He points to DirectLife, a wearable coaching device by Philips that figures out which arguments get people eating more healthily and exercising more regularly. But he told me he's troubled by some of the possibilities. Knowing what kinds of appeals specific people respond to gives you power to manipulate them on an individual basis.

With new methods of "sentiment analysis, it's now possible to guess what mood someone is in. People use substantially more positive words when they're feeling up; by analyzing enough of your text messages, Facebook posts, and e-mails, it's possible to tell good days from bad ones, sober messages from drunk ones (lots of typos, for a start). At best, this can be used to provide content that's suited to your mood: On an awful day in the near future, Pandora might know to preload *Pretty Hate Machine* for you when you arrive. But it can also be used to take advantage of your psychology.

Consider the implications, for example, of knowing that particular customers compulsively buy things when stressed or when they're feeling bad about themselves, or even when they're a bit tipsy. If persuasion profiling makes it possible for a coaching device to shout "you can do it" to people who like positive reinforcement, in theory it could also enable politicians to make appeals based on each voter's targeted fears and weak spots.

Infomercials aren't shown in the middle of the night only because airtime then is cheap. In the wee hours, most people are especially suggestible. They'll spring for the slicer-dicer that they'd never purchase in the light of day. But the three A.M. rule is a rough one—presumably, there are times in all of our daily lives when we're especially inclined to purchase whatever's put in front of us. The same data that provides personalized content can be used to allow marketers to find and manipulate your personal weak spots. And this isn't a hypothetical possibility: Privacy researcher Pam Dixon discovered that a data company called PK List Management offers a list of customers titled "Free to Me—Impulse Buyers"; those listed are described as being highly susceptible to pitches framed as sweepstakes.

If personalized persuasion works for products, it can also work for ideas. There are undoubtedly times and places and styles of argument that make us more susceptible to believe what we're told. Subliminal messaging is illegal because we recognize there are some ways of making an argument that are essentially cheating; priming people with subconsciously flashed words to sell them things isn't a fair game. But it's not such a stretch to imagine political campaigns targeting voters at times when they can circumvent our more reasonable impulses.

We intuitively understand the power in revealing our deep motivations and desires and how we work, which is why most of us only do that in day-to-day life with people whom we really trust. There's a symmetry to it: You know your friends about as well as they know you. Persuasion profiling, on the other hand, can be done invisibly—you need not have any knowledge that this data is being collected from you—and therefore it's asymmetrical. And unlike some forms of profiling that take place in plain sight (like Netflix), persuasion profiling is handicapped when it's revealed. It's just not the same to hear an automated coach say "You're doing a great job! I'm telling you that because you respond well to encouragement!"

So you don't necessarily see the persuasion profile being made. You don't see it being used to influence your behavior. And the companies we're turning over this data to have no legal obligation to keep it to themselves. In the wrong hands, persuasion profiling gives companies the ability to circumvent your rational decision making, tap into your psychology, and draw out your compulsions. Understand someone's identity, and you're better equipped to influence what he or she does.

A Deep and Narrow Path

Someday soon, Google Vice President Marissa Mayer says, the company hopes to make the search box obsolete. "The next step of search is doing this automatically," Eric Schmidt said in 2010. "When I walk down the street, I want my smartphone to be doing searches constantly—'did you know?' 'did you know?' 'did you know?' 'did you know?' " In other words, your phone

should figure out what you would like to be searching for before you do.

In the fast-approaching age of search without search, identity drives media. But the personalizers haven't fully grappled with a parallel fact: Media also shapes identity. Political scientist Shanto Iyengar calls one of primary factors accessibility bias, and in a paper titled "Experimental Demonstrations of the 'Not-So-Minimal' Consequences of Television News,'" in 1982, he demonstrated how powerful the bias is. Over six days, Iyengar asked groups of New Haven residents to watch episodes of a TV news program, which he had doctored to include different segments for each group.

Afterward, Iyengar asked subjects to rank how important issues like pollution, inflation, and defense were to them. The shifts from the surveys they'd filled out before the study were dramatic: "Participants exposed to a steady stream of news about defense or about pollution came to believe that defense or pollution were more consequential problems," Iyengar wrote. Among the group that saw the clips on pollution, the issue moved from fifth out of six in priority to second.

Drew Westen, a neuropsychologist whose focus is on political persuasion, demonstrates the strength of this priming effect by asking a group of people to memorize a list of words that include *moon* and *ocean*. A few minutes later, he changes topics and asks the group which detergent they prefer. Though he hasn't mentioned the word, the group's show of hands indicates a strong preference for Tide.

Priming isn't the only way media shape our identities. We're also more inclined to believe what we've heard before. In a

1977 study by Hasher and Goldstein, participants were asked to read sixty statements and mark whether they were true or false. All of the statements were plausible, but some of them ("French horn players get cash bonuses to stay in the Army") were true; others ("Divorce is only found in technically advanced societies") weren't. Two weeks later, they returned and rated a second batch of statements in which some of the items from the first list had been repeated. By the third time, two weeks after that, the subjects were far more likely to believe the repeated statements. With information as with food, we are what we consume.

All of these are basic psychological mechanisms. But combine them with personalized media, and troubling things start to happen. Your identity shapes your media, and your media then shapes what you believe and what you care about. You click on a link, which signals an interest in something, which means you're more likely to see articles about that topic in the future, which in turn prime the topic for you. You become trapped in a you loop, and if your identity is misrepresented, strange patterns begin to emerge, like reverb from an amplifier.

If you're a Facebook user, you've probably run into this problem. You look up your old college girlfriend Sally, mildly curious to see what she is up to after all these years. Facebook interprets this as a sign that you're interested in Sally, and all of a sudden her life is all over your news feed. You're still mildly curious, so you click through on the new photos she's posted of her kids and husband and pets, confirming Facebook's hunch. From Facebook's perspective, it looks as though you have a

relationship with this person, even if you haven't communicated in years. For months afterward, Sally's life is far more prominent than your actual relationship would indicate. She's a "local maximum": Though there are people whose posts you're far more interested in, it's her posts that you see.

In part, this feedback effect is due to what early Facebook employee and venture capitalist Matt Cohler calls the local-maximum problem. Cohler was an early employee at Facebook, and he's widely considered one of Silicon Valley's smartest thinkers on the social Web.

The local-maximum problem, he explains to me, shows up any time you're trying to optimize something. Say you're trying to write a simple set of instructions to help a blind person who's lost in the Sierra Nevadas find his way to the highest peak. "Feel around you to see if you're surrounded by downward-sloping land," you say. "If you're not, move in a direction that's higher, and repeat."

Programmers face problems like this all the time. What link is the best result for the search term "fish"? Which picture can Facebook show you to increase the likelihood that you'll start a photo-surfing binge? The directions sound pretty obvious—you just tweak and tune in one direction or another until you're in the sweet spot. But there's a problem with these hill-climbing instructions: They're as likely to end you up in the foothills—the local maximum—as they are to guide you to the apex of Mount Whitney.

This isn't exactly harmful, but in the filter bubble, the same phenomenon can happen with any person or topic. I find it hard not to click on articles about gadgets, though I don't

actually think they're that important. Personalized filters play to the most compulsive parts of you, creating "compulsive media" to get you to click things more. The technology mostly can't distinguish compulsion from general interest—and if you're generating page views that can be sold to advertisers, it might not care.

The faster the system learns from you, the more likely it is that you can get trapped in a kind of identity cascade, in which a small initial action—clicking on a link about gardening or anarchy or Ozzy Osbourne—indicates that you're a person who likes those kinds of things. This in turn supplies you with more information on the topic, which you're more inclined to click on because the topic has now been primed for you.

Especially once the second click has occurred, your brain is in on the act as well. Our brains act to reduce cognitive dissonance in a strange but compelling kind of unlogic—"Why would I have done x if I weren't a person who does x—therefore I must be a person who does x." Each click you take in this loop is another action to self-justify—"Boy, I guess I just really love 'Crazy Train.'" When you use a recursive process that feeds on itself, Cohler tells me, "You're going to end up down a deep and narrow path." The reverb drowns out the tune. If identity loops aren't counteracted through randomness and serendipity, you could end up stuck in the foothills of your identity, far away from the high peaks in the distance.

And that's when these loops are relatively benign. Sometimes they're not.

We know what happens when teachers think students are dumb: They get dumber. In an experiment done before the

advent of ethics boards, teachers were given test results that supposedly indicated the IQ and aptitude of students entering their classes. They weren't told, however, that the results had been randomly redistributed among students. After a year, the students who the teachers had been told were bright made big gains in IQ. The students who the teachers had been told were below average had no such improvement.

So what happens when the Internet thinks you're dumb? Personalization based on perceived IQ isn't such a far-fetched scenario—Google Docs even offers a helpful tool for automatically checking the grade-level of written text. If your education level isn't already available through a tool like Acxiom, it's easy enough for anyone with access to a few e-mails or Facebook posts to infer. Users whose writing indicates college-level literacy might see more articles from the *New Yorker*; users with only basic writing skills might see more from the *New York Post*.

In a broadcast world, everyone is expected to read or process information at about the same level. In the filter bubble, there's no need for that expectation. On one hand, this could be great—vast groups of people who have given up on reading because the newspaper goes over their heads may finally connect with written content. But without pressure to improve, it's also possible to get stuck in a grade-three world for a long time.

Incidents and Adventures

In some cases, letting algorithms make decisions about what we see and what opportunities we're offered gives us fairer results.

A computer can be made blind to race and gender in ways that humans usually can't. But that's only if the relevant algorithms are designed with care and acuteness. Otherwise, they're likely to simply reflect the social mores of the culture they're processing—a regression to the social norm.

In some cases, algorithmic sorting based on personal data can be even *more* discriminatory than people would be. For example, software that helps companies sift through résumés for talent might "learn" by looking at which of its recommended employees are actually hired. If nine white candidates in a row are chosen, it might determine that the company isn't interested in hiring black people and exclude them from future searches. "In many ways," writes NYU sociologist Dalton Conley, "such network-based categorizations are more insidious than the hackneyed groupings based on race, class, gender, religion, or any other demographic characteristic." Among programmers, this kind of error has a name. It's called *overfitting*.

The online movie rental Web site Netflix is powered by an algorithm called CineMatch. To start, it was pretty simple. If I had rented the first movie in the *Lord of the Rings* trilogy, let's say, Netflix could look up what other movies *Lord of the Rings* watchers had rented. If many of them had rented *Star Wars*, it'd be highly likely that I would want to rent it, too.

This technique is called kNN (k-nearest-neighbor), and using it CineMatch got pretty good at figuring out what movies people wanted to watch based on what movies they'd rented and how many stars (out of five) they'd given the movies they'd seen. By 2006, CineMatch could predict within one star how much a given user would like any movie from Netflix's vast

hundred-thousand-film emporium. Already CineMatch was better at making recommendations than most humans. A human video clerk would never think to suggest *Silence of the Lambs* to a fan of *The Wizard of Oz*, but CineMatch knew people who liked one usually liked the other.

But Reed Hastings, Netflix's CEO, wasn't satisfied. "Right now, we're driving the Model-T version of what's possible," he told a reporter in 2006. On October 2, 2006, an announcement went up on the Netflix Web site: "We're interested, to the tune of $1 million." Netflix had posted an enormous swath of data—reviews, rental records, and other information from its user database, scrubbed of anything that would obviously identify a specific user. And now the company was willing to give $1 million to the person or team who beat CineMatch by more than 10 percent. Like the longitude prize, the Netflix Challenge was open to everyone. "All you need is a PC and some great insight," Hastings declared in the *New York Times*.

After nine months, about eighteen thousand teams from more than 150 countries were competing, using ideas from machine learning, neural networks, collaborative filtering, and data mining. Usually, contestants in high-stakes contests operate in secret. But Netflix encouraged the competing groups to communicate with one another and built a message board where they could coordinate around common obstacles. Read through the message board, and you get a visceral sense of the challenges that bedeviled the contestants during the three-year quest for a better algorithm. Overfitting comes up again and again.

There are two challenges in building pattern-finding algorithms. One is finding the patterns that are there in all the noise. The other problem is the opposite: *not* finding patterns in the data that aren't actually really there. The pattern that describes "1, 2, 3" could be "add one to the previous number" or "list positive prime numbers from smallest to biggest." You don't know for sure until you get more data. And if you leap to conclusions, you're overfitting.

Where movies are concerned, the dangers of overfitting are relatively small—many analog movie watchers have been led to believe that because they liked *The Godfather* and *The Godfather: Part II*, they'll like *The Godfather: Part III*. But the overfitting problem gets to one of the central, irreducible problems of the filter bubble: Overfitting and stereotyping are synonyms.

The term *stereotyping* (which in this sense comes from Walter Lippmann, incidentally) is often used to refer to malicious xenophobic patterns that aren't true—"people of this skin color are less intelligent" is a classic example. But stereotypes and the negative consequences that flow from them aren't fair to specific people *even if* they're generally pretty accurate.

Marketers are already exploring the gray area between what can be predicted and what predictions are fair. According to Charlie Stryker, an old hand in the behavioral targeting industry who spoke at the Social Graph Symposium, the U.S. Army has had terrific success using social-graph data to recruit for the military—after all, if six of your Facebook buddies have enlisted, it's likely that you would consider doing so too. Drawing inferences based on what people like you or people linked to you do is pretty good business. And it's not just the army. Banks are beginning to use social data to decide to whom to offer loans:

If your friends don't pay on time, it's likely that you'll be a deadbeat too. "A decision is going to be made on creditworthiness based on the creditworthiness of your friends," Stryker said. "There are applications of this technology that can be very powerful," another social targeting entrepreneur told the *Wall Street Journal*. "Who knows how far we'd take it?"

Part of what's troubling about this world is that companies aren't required to explain on what basis they're making these decisions. And as a result, you can get judged without knowing it and without being able to appeal. For example, LinkedIn, the social job-hunting site, offers a career trajectory prediction site; by comparing your résumé to other peoples' who are in your field but further along, LinkedIn can forecast where you'll be in five years. Engineers at the company hope that soon it'll be able to pinpoint career choices that lead to better outcomes—"mid-level IT professionals like you who attended Wharton business school made $25,000/year more than those who didn't." As a service to customers, it's pretty useful. But imagine if LinkedIn provided that data to corporate clients to help them weed out people who are forecast to be losers. Because that could happen entirely without your knowledge, you'd never get the chance to argue, to prove the prediction wrong, to have the benefit of the doubt.

If it seems unfair for banks to discriminate against you because your high school buddy is bad at paying his bills or because you like something that a lot of loan defaulters also like, well, it is. And it points to a basic problem with induction, the logical method by which algorithms use data to make predictions.

Philosophers have been wrestling with this problem since long before there were computers to induce with. While you can prove the truth of a mathematical proof by arguing it out from first principles, the philosopher David Hume pointed out in 1772 that reality doesn't work that way. As the investment cliché has it, past performance is not indicative of future results.

This raises some big questions for science, which is at its core a method for using data to predict the future. Karl Popper, one of the preeminent philosophers of science, made it his life's mission to try to sort out the problem of induction, as it came to be known. While the optimistic thinkers of the late 1800s looked at the history of science and saw a journey toward truth, Popper preferred to focus on the wreckage along the side of the road—the abundance of failed theories and ideas that were perfectly consistent with the scientific method and yet horribly wrong. After all, the Ptolemaic universe, with the earth in the center and the sun and planets revolving around it, survived an awful lot of mathematical scrutiny and scientific observation.

Popper posed his problem in a slightly different way: Just because you've only ever seen white swans doesn't mean that all swans are white. What you have to look for is the black swan, the counterexample that proves the theory wrong. "Falsifiability," Popper argued, was the key to the search for truth: The purpose of science, for Popper, was to advance the biggest claims for which one could not find any countervailing examples, any black swans. Underlying Popper's view was a deep humility about scientifically induced knowledge—a sense that we're wrong as often as we're right, and we usually don't know when we are.

It's this humility that many algorithmic prediction methods fail to build in. Sure, they encounter people or behaviors that don't fit the mold from time to time, but these aberrations don't fundamentally compromise their algorithms. After all, the advertisers whose money drives these systems don't need the models to be perfect. They're most interested in hitting demographics, not complex human beings.

When you model the weather and predict there's a 70 percent chance of rain, it doesn't affect the rain clouds. It either rains or it doesn't. But when you predict that because my friends are untrustworthy, there's a 70 percent chance that I'll default on my loan, there are consequences if you get me wrong. You're discriminating.

The best way to avoid overfitting, as Popper suggests, is to try to prove the model wrong and to build algorithms that give the benefit of the doubt. If Netflix shows me a romantic comedy and I like it, it'll show me another one and begin to think of me as a romantic-comedy lover. But if it wants to get a good picture of who I really am, it should be constantly testing the hypothesis by showing me *Blade Runner* in an attempt to prove it wrong. Otherwise, I end up caught in a local maximum populated by Hugh Grant and Julia Roberts.

The statistical models that make up the filter bubble write off the outliers. But in human life it's the outliers who make things interesting and give us inspiration. And it's the outliers who are the first signs of change.

One of the best critiques of algorithmic prediction comes, remarkably, from the late-nineteenth-century Russian novelist Fyodor Dostoyevsky, whose *Notes from Underground* was a

passionate critique of the utopian scientific rationalism of the day. Dostoyevsky looked at the regimented, ordered human life that science promised and predicted a banal future. "All human actions," the novel's unnamed narrator grumbles, "will then, of course, be tabulated according to these laws, mathematically, like tables of logarithms up to 108,000, and entered in an index . . . in which everything will be so clearly calculated and explained that there will be no more incidents or adventures in the world."

The world often follows predictable rules and falls into predictable patterns: Tides rise and fall, eclipses approach and pass; even the weather is more and more predictable. But when this way of thinking is applied to human behavior, it can be dangerous, for the simple reason that our best moments are often the most unpredictable ones. An entirely predictable life isn't worth living. But algorithmic induction can lead to a kind of information determinism, in which our past clickstreams entirely decide our future. If we don't erase our Web histories, in other words, we may be doomed to repeat them.

a community if they all don't know just me but also have independent relationships with one another. Communication builds stronger community.

Ultimately, democracy works only if we citizens are capable of thinking beyond our narrow self-interest. But to do so, we need a shared view of the world we cohabit. We need to come into contact with other peoples' lives and needs and desires. The filter bubble pushes us in the opposite direction—it creates the impression that our narrow self-interest is all that exists. And while this is great for getting people to shop online, it's not great for getting people to make better decisions together.

"The prime difficulty" of democracy, John Dewey wrote, "is that of discovering the means by which a scattered, mobile, and manifold public may so recognize itself as to define and express its interests." In the early days of the Internet, this was one of the medium's great hopes—that it would finally offer a medium whereby whole towns—and indeed countries—could co-create their culture through discourse. Personalization has given us something very different: a public sphere sorted and manipulated by algorithms, fragmented by design, and hostile to dialogue.

Which begs an important question: Why would the engineers who designed these systems want to build them this way?

6

Hello, World!

SOCRATES: Or again, in a ship, if a man having the power to do what he likes, has no intelligence or skill in navigation [αρετης κυβερνητικης, *aretēs kybernētikēs*], do you see what will happen to him and to his fellow-sailors?

—*Plato, First Alcibiades*, the earliest known use of the word *cybernetics*

It's the first fragment of code in the code book, the thing every aspiring programmer learns on day one. In the C++ programming language, it looks like this:

```
void main()
{
cout << "Hello, World!" <<
endl;
}
```

Although the code differs from language to language, the result is the same: a single line of text against a stark white screen:

Hello, World!

A god's greeting to his invention—or perhaps an invention's greeting to its god. The delight you experience is electric—the current of creation, running through your fingers into the keypad, into the machine, and back out into the world. *It's alive!*

That every programmer's career begins with "Hello, World!" is not a coincidence. It's the power to create new universes, which is what often draws people to code in the first place. Type in a few lines, or a few thousand, strike a key, and something seems to come to life on your screen—a new space unfolds, a new engine roars. If you're clever enough, you can make and manipulate anything you can imagine.

"We are as Gods," wrote futurist Stewart Brand on the cover of his *Whole Earth Catalog* in 1968, "and we might as well get good at it." Brand's catalog, which sprang out of the back-to-the-land movement, was a favorite among California's emerging class of programmers and computer enthusiasts. In Brand's view, tools and technologies turned people, normally at the mercy of their environments, into gods in control of them. And the computer was a tool that could become any tool at all.

Brand's impact on the culture of Silicon Valley and geekdom is hard to overestimate—though he wasn't a programmer himself, his vision shaped the Silicon Valley worldview. As Fred Turner details in the fascinating *From Counterculture to Cyberculture*, Brand and his cadre of do-it-yourself futurists were disaffected hippies—social revolutionaries who were uncomfortable with the communes sprouting up in Haight-Ashbury. Rather than seeking to build a new world through political change, which required wading through the messiness of

compromise and group decision making, they set out to build a world on their own.

In *Hackers*, his groundbreaking history of the rise of engineering culture, Steve Levy points out that this ideal spread from the programmers themselves to the users "each time some user flicked the machine on, and the screen came alive with words, thoughts, pictures, and sometimes elaborate worlds built out of air—those computer programs which could make any man (or woman) a god." (In the era described by Levy's book, the term *hacker* didn't have the transgressive, lawbreaking connotations it acquired later.)

The God impulse is at the root of many creative professions: Artists conjure up color-flecked landscapes, novelists build whole societies on paper. But it's always clear that these are creations: A painting doesn't talk back. A program can, and the illusion that it's "real" is powerful. Eliza, one of the first rudimentary AI programs, was programmed with a battery of therapistlike questions and some basic contextual cues. But students spent hours talking to it about their deepest problems: "I'm having some troubles with my family," a student might write, and Eliza would immediately respond, "Tell me more about your family."

Especially for people who've been socially ostracized due to quirks or brains or both, there are at least two strong draws to the world-building impulse. When social life is miserable or oppressive, escapism is a reasonable response—it's probably not coincidental that role-playing games, sci-fi and fantasy literature, and programming often go together.

The infinitely expandable universe of code provides a second

benefit: complete power over your domain. "We all fantasize about living without rules," says Siva Vaidyanathan. "We imagine the Adam Sandler movie where you can move around and take people's clothes off. If you don't think of reciprocity as one of the beautiful and rewarding things about being a human being, you wish for a place or a way of acting without consequence." When the rules of high school social life seem arbitrary and oppressive, the allure of making your own rules is pretty powerful.

This approach works pretty well as long as you're the sole denizen of your creation. But like the God of Genesis, coders quickly get lonely. They build portals into their homespun worlds, allowing others to enter. And that's where things get complicated: On the one hand, the more inhabitants in the world you've built, the more power you have. But on the other hand, the citizens can get uppity. "The programmer wants to set up some rules, to either a game or a system, and then let it run without interference from anything," says Douglas Rushkoff, an early cyberbooster-turned-cyberpragmatist. "If you have a program that needs a minder to come in and help it run, then it's not a very good program, is it? It's supposed to just run."

Coders sometimes harbor God impulses; they sometimes even have aspirations to revolutionize society. But they almost never aspire to be politicians. "While programming is considered a transparent, neutral, highly controllable realm . . . where production results in immediate gratification and something useful," writes NYU anthropologist Gabriella Coleman, "politics tends to be seen by programmers as buggy, mediated,

tainted action clouded by ideology that is not productive of much of anything." There's some merit to that view, of course. But for programmers to shun politics completely is a problem—because increasingly, given the disputes that inevitably arise when people come together, the most powerful ones will be required to adjudicate and to govern.

Before we get to how this blind spot affects our lives, though, it's worth looking at how engineers think.

The Empire of Clever

Imagine that you're a smart high school student on the low end of the social totem pole. You're alienated from adult authority, but unlike many teenagers, you're also alienated from the power structures of your peers—an existence that can feel lonely and peripheral. Systems and equations are intuitive, but people aren't—social signals are confusing and messy, difficult to interpret.

Then you discover code. You may be powerless at the lunch table, but code gives you power over an infinitely malleable world and opens the door to a symbolic system that's perfectly clear and ordered. The jostling for position and status fades away. The nagging parental voices disappear. There's just a clean, white page for you to fill, an opportunity to build a better place, a home, from the ground up.

No wonder you're a geek.

This isn't to say that geeks and software engineers are friendless or even socially inept. But there's an implicit promise in

becoming a coder: Apprentice yourself to symbolic systems, learn to carefully understand the rules that govern them, and you'll gain power to manipulate them. The more powerless you feel, the more appealing this promise becomes. "Hacking," Steven Levy writes, "gave you not only an understanding of the system but an addictive control as well, along with the illusion that total control was just a few features away."

As anthropologist Coleman points out, beyond the Jocks-and-Nerds stereotypes, there are actually many different geek cultures. There are open-software advocates, most famously embodied by Linux founder Linus Torvalds, who spend untold hours collaboratively building free software tools for the masses, and there are Silicon Valley start-up entrepreneurs. There are antispam zealots, who organize online posses to seek out and shut down Viagra purveyors. And then there's the more antagonistic wing: spammers; "trolls," who spend their time looking for fun ways to leverage technology at others' expense; "phreaks," who are animated by the challenge to break open telecommunications systems; and hackers who break into government systems to prove it can be done.

Generalizations that span these different niches and communities run the risk of stereotyping and tend to fall short. But at the heart of these subcultures is a shared method for looking at and asserting power in the world, which influences how and why online software is made.

The through-line is a focus on systematization. Nearly all geek cultures are structured as an empire of clever wherein ingenuity, not charisma, is king. The intrinsic efficiency of a creation is more important than how it looks. Geek cultures are

data driven and reality based, valuing substance over style. Humor plays a prominent role—as Coleman points out, jokes demonstrate an ability to manipulate language in the same way that an elegant solution to a tricky programming problem demonstrates mastery over code. (The fact that humor also often serves to unmask the ridiculous pieties of the powerful is undoubtedly also part of its appeal.)

Systematization is especially alluring because it doesn't offer power just in the virtual sphere. It can also provide a way to understand and navigate social situations. I learned this firsthand when, as an awkward seventeen-year-old with all the trappings of geek experience (the fantasy books, the introversion, the obsession with HTML and BBSes), I flew across the country to accept the wrong job.

In a late-junior-year panic, I'd applied for every internship I could find. One group, a nuclear disarmament organization based in San Francisco, had gotten back to me, and without much further investigation, I'd signed up. It was only when I walked into the office that I realized I'd signed up to be a canvaser. Off the top of my head, I couldn't imagine a worse fit, but because I had no other prospects, I decided to stick out the day of training.

Canvasing, the trainer explained, was a science as much as an art. And the laws were powerful. Make eye contact. Explain why the issue matters to you. And after you ask for money, let your target say the first thing. I was intrigued: Asking people for money was scary, but the briefing hinted at a hidden logic. I committed the rules to memory.

When I walked through my first grassy Palo Alto lawn, my

heart was in my throat. Here I was at the doorstep of someone I'd never met, asking for $50. The door opened and a harried woman with long gray hair peeped out. I took a deep breath, and launched into my spiel. I asked. I waited. And then she nodded and went to get her checkbook.

The euphoria I felt wasn't about the $50. It was about something bigger—the promise that the chaos of human social life could be reduced to rules that I could understand, follow, and master. Conversation with strangers had never come naturally to me—I didn't know what to talk about. But the hidden logic of getting someone I'd never met to trust me with $50 had to be the tip of a larger iceberg. By the end of a summer traipsing through the yards of Palo Alto and Marin, I was a master canvaser.

Systematization is a great method for building functional software. And the quantitative, scientific approach to social observation has given us many great insights into human phenomena as well. Dan Ariely researches the "predictably irrational" decisions we make on a daily basis; his findings help us make better decisions. The blog at OkCupid.com, a math-driven dating Web site, identifies patterns in the e-mails flying back and forth between people to make them better daters ("Howdy" is a better opener than "Hi").

But there are dangers in taking the method too far. As I discussed in chapter 5, the most human acts are often the most unpredictable ones. Because systematizing works much of the time, it's easy to believe that by reducing and brute-forcing an understanding of any system, you can control it. And as a master of a self-created universe, it's easy to start to view people as a means to an end, as variables to be manipulated on a mental

spreadsheet, rather than as breathing, thinking beings. It's difficult both to systematize and to appeal to the fullness of human life—its unpredictability, emotionality, and surprising quirks—at the same time.

David Gelernter, a Yale computer scientist, barely survived an encounter with an explosive package sent by the Unabomber; his eyesight and right hand are permanently damaged as a result. But Gelernter is hardly the technological utopian Ted Kaczinski believed him to be.

"When you do something in the public sphere," Gelernter told a reporter, "it behooves you to know something about what the public sphere is like. How did this country get this way? What was the history of the relationship between technology and the public? What's the history of political exchange? The problem is, hackers don't tend to know any of that. And that's why it worries me to have these people in charge of public policy. Not because they're bad, just because they're uneducated."

Understanding the rules that govern a messy, complex world makes it intelligible and navigable. But systematizing inevitably involves a trade-off—rules give you some control, but you lose nuance and texture, a sense of deeper connection. And when a strict systematizing sensibility entirely shapes social space (as it often does online), the results aren't always pretty.

The New Architects

The political power of design has long been obvious to urban planners. If you take the Wantagh State Parkway from

Westbury to Jones Beach on Long Island, at intervals you'll pass under several low, vine-covered overpasses. Some of them have as little as nine feet of clearance. Trucks aren't allowed on the parkway—they wouldn't fit. This may seem like a design oversight, but it's not.

There are about two hundred of these low bridges, part of the grand design for the New York region pioneered by Robert Moses. Moses was a master deal maker, a friend of the great politicians of the time, and an unabashed elitist. According to his biographer, Robert A. Caro, Moses's vision for Jones Beach was as an island getaway for middle-class white families. He included the low bridges to make it harder for low-income (and mostly black) New Yorkers to get to the beach, as public buses—the most common form of transport for inner-city residents—couldn't clear the overpasses.

The passage in Caro's *The Power Broker* describing this logic caught the eye of Langdon Winner, a *Rolling Stone* reporter, musician, professor, and philosopher of technology. In a pivotal 1980 article titled "Do Artifacts Have Politics?" Winner considered how Moses's "monumental structures of concrete and steel embody a systematic social inequality, a way of engineering relationships among people that, after a time, became just another part of the landscape."

On the face of it, a bridge is just a bridge. But often, as Winner points out, architectural and design decisions are underpinned by politics as much as aesthetics. Like goldfish that grow only large enough for the tank they're in, we're contextual beings: how we behave is dictated in part by the shape of our environments. Put a playground in a park, and you

encourage one kind of use; build a memorial, and you encourage another.

As we spend more of our time in cyberspace—and less of our time in what geeks sometimes call meatspace, or the offline world—Moses's bridges are worth keeping in mind. The algorithms of Google and Facebook may not be made of steel and concrete, but they regulate our behavior just as effectively. That's what Larry Lessig, a law professor and one of the early theorists of cyberspace, meant when he famously wrote that "code is law."

If code is law, software engineers and geeks are the ones who get to write it. And it's a funny kind of law, created without any judicial system or legislators and enforced nearly perfectly and instantly. Even with antivandalism laws on the books, in the physical world you can still throw a rock through the window of a store you don't like. You might even get away with it. But if vandalism isn't part of the design of an online world, it's simply impossible. Try to throw a rock through a virtual storefront, and you just get an error.

Back in 1980, Winner wrote, "Consciously or unconsciously, deliberately or inadvertently, societies choose structures for technologies that influence how people are going to work, communicate, travel, consume, and so forth over a very long time." This isn't to say that today's designers have malevolent impulses, of course—or even that they're always explicitly trying to shape society in certain ways. It's just to say that they can—in fact, they can't help but shape the worlds they build.

To paraphrase Spider-Man creator Stan Lee, with great power comes great responsibility. But the programmers who

brought us the Internet and now the filter bubble aren't always game to take on that responsibility. The Hacker Jargon File, an online repository of geek culture, puts it this way: "Hackers are far more likely than most non-hackers to either (a) be aggressively apolitical or (b) entertain peculiar or idiosyncratic political ideas." Too often, the executives of Facebook, Google, and other socially important companies play it coy: They're social revolutionaries when it suits them and neutral, amoral businessmen when it doesn't. And both approaches fall short in important ways.

Playing It Coy

When I first called Google's PR department, I explained that I wanted to know how Google thought about its enormous curatorial power. What was the code of ethics, I asked, that Google uses to determine what to show to whom? The public affairs manager on the other end of the phone sounded confused. "You mean privacy?" No, I said, I wanted to know how Google thought about its editorial power. "Oh," he replied, "we're just trying to give people the most relevant information." Indeed, he seemed to imply, no ethics were involved or required.

I persisted: If a 9/11 conspiracy theorist searches for "9/11," was it Google's job to show him the *Popular Mechanics* article that debunks his theory or the movie that supports it? Which was more relevant? "I see what you're getting at," he said. "It's an interesting question." But I never got a clear answer.

Much of the time, as the Jargon File entry claims, engineers

resist the idea that their work has moral or political consequences at all. Many engineers see themselves as interested in efficiency and design, in building cool stuff rather than messy ideological disputes and inchoate values. And it's true that if political consequences of, say, a somewhat faster video-rendering engine exist, they're pretty obscure.

But at times, this attitude can verge on a "Guns don't kill people, people do" mentality—a willful blindness to how their design decisions affect the daily lives of millions. That Facebook's button is named Like prioritizes some kinds of information over others. That Google has moved from PageRank—which is designed to show the societal consensus result—to a mix of PageRank and personalization represents a shift in how Google understands relevance and meaning.

This amorality would be par for the corporate course if it didn't coincide with sweeping, world-changing rhetoric from the same people and entities. Google's mission to organize the world's information and make it accessible to everyone carries a clear moral and even political connotation—a democratic redistribution of knowledge from closed-door elites to the people. Apple's devices are marketed with the rhetoric of social change and the promise that they'll revolutionize not only your life but our society as well. (The famous Super Bowl ad announcing the release of the Macintosh computer ends by declaring that "1984 won't be like *1984*.")

Facebook describes itself as a "social utility," as if it's a twenty-first-century phone company. But when users protest Facebook's constantly shifting and eroding privacy policy, Zuckerberg often shrugs it off with the caveat emptor posture

that if you don't want to use Facebook, you don't have to. It's hard to imagine a major phone company getting away with saying, "We're going to publish your phone conversations for anyone to hear—and if you don't like it, just don't use the phone."

Google tends to be more explicitly moral in its public aspirations; its motto is "Don't be evil," while Facebook's unofficial motto is "Don't be lame." Nevertheless, Google's founders also sometimes play a get-out-of-jail-free card. "Some say Google is God. Others say Google is Satan," says Sergey Brin. "But if they think Google is too powerful, remember that with search engines, unlike other companies, all it takes is a single click to go to another search engine. People come to Google because they choose to. We don't trick them."

Of course, Brin has a point: No one is forced to use Google, just as no one is forced to eat at McDonald's. But there's also something troubling about this argument, which minimizes the responsibility he might have to the billions of users who rely on the service Google provides and in turn drive the company's billions in advertising revenue.

To further muddle the picture, when the social repercussions of their work are troubling, the chief architects of the online world often fall back on the manifest-destiny rhetoric of technodeterminism. Technologists, Siva Vaidyanathan points out, rarely say something "could" or "should" happen—they say it "will" happen. "The search engines of the future will be personalized," says Google Vice President Marissa Mayer, using the passive tense.

Just as some Marxists believed that the economic conditions of a society would inevitably propel it through capitalism and

toward a world socialist regime, it's easy to find engineers and technodeterminist pundits who believe that technology is on a set course. Sean Parker, the cofounder of Napster and rogue early president of Facebook, tells *Vanity Fair* that he's drawn to hacking because it's about "re-architecting society. It's technology, not business or government, that's the real driving force behind large-scale societal shifts."

Kevin Kelly, the founding editor of *Wired*, wrote perhaps the boldest book articulating the technodeterminist view, *What Technology Wants*, in which he posits that technology is a "seventh kingdom of life," a kind of meta-organism with desires and tendencies of its own. Kelly believes that the technium, as he calls it, is more powerful than any of us mere humans. Ultimately, technology—a force that "wants" to eat power and expand choice—will get what it wants whether we want it to or not.

Technodeterminism is alluring and convenient for newly powerful entrepreneurs because it absolves them of responsibility for what they do. Like priests at the altar, they're mere vessels of a much larger force that it would be futile to resist. They need not concern themselves with the effects of the systems they've created. But technology *doesn't* solve every problem of its own accord. If it did, we wouldn't have millions of people starving to death in a world with an oversupply of food.

It shouldn't be surprising that software entrepreneurs are incoherent about their social and political responsibilities. A great deal of this tension undoubtedly comes from the fact that the nature of online business is to scale up as quickly as possible. Once you're on the road to mass success and riches—often as a very young coder—there simply isn't much time to fully

think all of this through. And the pressure of the venture capitalists breathing down your neck to "monetize" doesn't always offer much space for rumination on social responsibility.

The $50 Billion Sand Castle

Once a year, the Y Combinator start-up incubator hosts a day-long conference called Startup School, where successful tech entrepreneurs pass wisdom on to the aspiring audience of bright-eyed Y Combinator investees. The agenda typically includes many of the top CEOs in Silicon Valley, and in 2010, Mark Zuckerberg was at the top of the list.

Zuckerberg was in an affable mood, dressed in a black T-shirt and jeans and enjoying what was clearly a friendly crowd. Even so, when Jessica Livingston, his interviewer, asked him about *The Social Network*, the movie that had made him a household name, a range of emotions crossed his face. "It's interesting what kind of stuff they focused on getting right," Zuckerberg began. "Like, every single shirt and fleece they had in that movie is actually a shirt or fleece that I own."

Where there was an egregious discrepancy between fiction and reality, Zuckerberg told her, was how his own motivations were painted. "They frame it as if the whole reason for making Facebook and building something was that I wanted to get girls, or wanted to get into some kind of social institution. And the reality, for people who know me, is that I've been dating the same girl since before I started Facebook. It's such a big disconnect. . . . They just can't wrap their head around the idea that someone might build something because they like building things."

It's entirely possible that the line was just a clever bit of Facebook PR. And there's no question that the twenty-six-year-old billionaire is motivated by empire building. But the comment struck me as candid: For programmers as for artists and craftsmen, making things is often its own best reward.

Facebook's flaws and its founder's ill-conceived views about identity aren't the result of an antisocial, vindictive mind-set. More likely, they're a natural consequence of the odd situation successful start-ups like Facebook create, in which a twenty-something guy finds himself, in a matter of five years, in a position of great authority over the doings of 500 million human beings. One day you're making sand castles; the next, your sand castle is worth $50 billion and everyone in the world wants a piece of it.

Of course, there are far worse business-world personality types with whom to entrust the fabric of our social lives. With a reverence for rules, geeks tend to be principled—to carefully consider and then follow the rules they set for themselves and to stick to them under social pressure. "They have a somewhat skeptical view of authority," Stanford professor Terry Winograd said of his former students Page and Brin. "If they see the world going one way and they believe it should be going the other way, they are more like to say 'the rest of the world is wrong' rather than 'maybe we should reconsider.'"

But the traits that fuel the best start-ups—aggression, a touch of arrogance, an interest in empire building, and of course brilliant systematizing skills—can become a bit more problematic when you rule the world. Like pop stars who are vaulted onto the global stage, world-building engineers aren't always ready or willing to accept the enormous responsibility they come to

hold when their creations start to teem with life. And it's not infrequently the case that engineers who are deeply mistrustful of power in the hands of others see themselves as supreme rationalists impervious to its effects.

It may be that this is too much power to entrust to any small, homogeneous group of individuals. Media moguls who get their start with a fierce commitment to the truth become the confidants of presidents and lose their edge; businesses begun as social ventures become preoccupied with delivering shareholder value. In any case, one consequence of the current system is that we can end up placing a great deal of power in the hands of people who can have some pretty far-out, not entirely well-developed political ideas. Take Peter Thiel, one of Zuckerberg's early investors and mentors.

Thiel has penthouse apartments in San Francisco and New York and a silver gullwing McLaren, the fastest car in the world. He also owns about 5 percent of Facebook. Despite his boyish, handsome features, Thiel often looks as though he's brooding. Or maybe he's just lost in thought. In his teenage years, he was a high-ranking chess player but stopped short of becoming a grand master. "Taken too far, chess can become an alternate reality in which one loses sight of the real world," he told an interviewer for *Fortune*. "My chess ability was roughly at the limit. Had I become any stronger, there would have been some massive tradeoffs with success in other domains in life." In high school, he read Solzhenitsyn's *Gulag Archipelago* and J. R. R. Tolkien's *Lord of the Rings* series, visions of corrupt and totalitarian power. At Stanford, he started a libertarian newspaper, the *Stanford*, to preach the gospel of freedom.

In 1998, Thiel cofounded the company that would become PayPal, which he sold to eBay for $1.5 billion in 2002. Today Thiel runs a multi-billion-dollar hedge fund, Clarium, and a venture capital firm, Founder's Fund, which invests in software companies throughout Silicon Valley. Thiel has made some legendarily good picks—among them, Facebook, in which he was the first outside investor. (He's also made some bad ones—Clarium has lost billions in the last few years.) But for Thiel, investing is more than a day job. It's an avocation. "By starting a new Internet business, an entrepreneur may create a new world," Thiel says. "The hope of the Internet is that these new worlds will impact and force change on the existing social and political order."

His comments raise the question of what kind of change Thiel would like to see. While many billionaires are fairly circumspect about their political views, Thiel has been vocal—and it's safe to say that there are few with views as unusual as Thiel's. "Peter wants to end the inevitability of death and taxes," Thiel's sometime collaborator Patri Friedman (grandson of Milton) told *Wired*. "I mean, talk about aiming high!"

In an essay posted on the libertarian Cato Institute's Web site, Thiel describes why he believes that "freedom and democracy are no longer compatible." "Since 1920," he writes, "the vast increase in welfare beneficiaries and the extension of the franchise to women—two constituencies that are notoriously tough for libertarians—have rendered the notion of 'capitalist democracy' into an oxymoron." Then he outlines his hopes for the future: space exploration, "sea-steading," which involves building movable microcountries on the open ocean, and cyberspace. Thiel has poured millions into technologies to sequence genes

and prolong life. He's also focused on preparing for the Singularity, the moment a few decades from now when some futurists believe that humans and machines are likely to meld.

In an interview, he argues that should the Singularity arrive, one would be well advised to be on the side of the computers: "Certainly we would hope that [an artificially intelligent computer] would be friendly to human beings. At the same time, I don't think you'd want to be known as one of the human beings that is against computers and makes a living being against computers."

If all this sounds a little fantastical, it doesn't worry Thiel. He's focused on the long view. "Technology is at the center of what will determine the course of the 21st century," he says. "There are aspects of it that are great and aspects that are terrible, and there are some real choices humans have to make about which technologies to foster and which ones we should be more careful about."

Peter Thiel is entitled to his idiosyncratic views, of course, but they're worth paying attention to because they increasingly shape the world we all live in. There are only four other people on the Facebook board besides Mark Zuckerberg; Thiel is one of them, and Zuckerberg publicly describes him as a mentor. "He helped shape the way I think about the business," Zuckerberg said in a 2006 Bloomberg News interview. As Thiel says, we have some big decisions to make about technology. And as for how those decisions get made? "I have little hope," he writes, "that voting will make things better."

"What Game Are You Playing?"

Of course, not all engineers and geeks have the views about democracy and freedom that Peter Thiel does—he's surely an outlier. Craig Newmark, the founder of the free Web site craigslist, spends most of his time arguing for "geek values" that include service and public-spiritedness. Jimmy Wales and the editors at Wikipedia work to make human knowledge free to everyone. The filtering goliaths make huge contributions here as well: The democratic ideal of an enlightened, capable citizenry is well served by the broader set of relationships Facebook allows me to manage and the mountains of formerly hard-to-access research papers and other public information that Google has freed.

But the engineering community can do more to strengthen the Internet's civic space. And to get a sense of the path ahead, I talked to Scott Heiferman.

Heiferman, the founder of MeetUp.com, is soft-spoken in a Midwestern sort of way. That's fitting, because he grew up in Homewood, Illinois, a small town on the outskirts of Chicago. "It was a stretch to call it suburban," he says. His parents operated a paint store.

As a teenager, Heiferman devoured material about Steve Jobs, eating up the story about how Jobs wooed a senior executive from Pepsi by asking him if he wanted to change the world or sell sugar water. "Throughout my life," he told me, "I've had a love-hate relationship with advertising." At the University of Iowa in the early 1990s, Heiferman studied engineering and marketing but at night he ran a radio show called *Advertorial*

Infotainment in which he would remix and cut advertisements together to create a kind of sound art. He put the finished shows online and encouraged people to send in ads to remix, and the attention got him his first job, managing the Web site at Sony .com.

After a few years as Sony's "interactive-marketing frontiersman," Heiferman founded i-traffic, one of the major early advertising companies of the Web. Soon i-traffic was the agency of record for clients like Disney and British Airways. But although the company was growing quickly, he was dissatisfied. The back of his business card had a mission statement about connecting people with brands they'd love, but he was increasingly uncertain that was a worthy endeavor—perhaps he was selling sugar water after all. He left the company in 2000.

For the remainder of the year and into 2001, Heiferman was in a funk. "I was exhibiting what you could call being depressed," he says. When he heard the first word of the World Trade Center attacks on 9/11, he ran up to his lower-Manhattan rooftop and watched in horror. "I talked to more strangers in the next three days," he says, "than in the previous five years of living in New York."

Shortly after the attacks, Heiferman came across the blog post that changed his life. It argued that the attacks, as awful as they were, might bring Americans back together in their civic life, and referenced the bestselling book *Bowling Alone*. Heiferman bought a copy and read it cover to cover. "I became captivated," he says, "by the question of whether we could use technology to rebuild and strengthen community." MeetUp.com, a site that makes it easy for local groups to meet face-to-face, was his answer, and today, MeetUp serves over 79,000 local groups that

do that. There's the Martial Arts MeetUp in Orlando and the Urban Spirituality MeetUp in Barcelona and the Black Singles MeetUp in Houston. And Heiferman is a happier man.

"What I learned being in the ad business," he says, "is that people can just go a long time without asking themselves what they should put their talent towards. You're playing a game, and you know the point of the game is to win. But what game are you playing? What are you optimizing for? If you're playing the game of trying to get the maximum downloads of your app, you'll make the better farting app."

"We don't need more things," he says. "People are more magical than iPads! Your relationships are not media. Your friendships are not media. Love is not media." In his low-key way, Heiferman is getting worked up.

Evangelizing this view of technology—that it ought to do something meaningful to make our lives more fulfilling and to solve the big problems we face—isn't as easy as it might seem. In addition to MeetUp more generally, Scott founded the New York Tech MeetUp, a group of ten thousand software engineers who meet every month to preview new Web sites. At a recent meeting, Scott made an impassioned plea for the assembled group to focus on solving the problems that matter—education, health care, the environment. It didn't get a very good reception—in fact, he was just about booed off the stage. "'We just want to do cool stuff,' was the attitude," Scott told me later. "'Don't bother me with this politics stuff.'"

Technodeterminists like to suggest that technology is inherently good. But despite what Kevin Kelly says, technology is no more benevolent than a wrench or a screwdriver. It's only good when people make it do good things and use it in good ways.

Melvin Kranzberg, a professor who studies the history of technology, put it best nearly thirty years ago, and his statement is now known as Kranzberg's first law: "Technology is neither good or bad, nor is it neutral."

For better or worse, programmers and engineers are in a position of remarkable power to shape the future of our society. They can use this power to help solve the big problems of our age—poverty, education, disease—or they can, as Heiferman says, make a better farting app. They're entitled to do either, of course. But it's disingenuous to have it both ways—to claim your enterprise is great and good when it suits you and claim you're a mere sugar-water salesman when it doesn't.

Actually, building an informed and engaged citizenry—in which people have the tools to help manage not only their own lives but their own communities and societies—is one of the most fascinating and important engineering challenges. Solving it will take a great deal of technical skill mixed with humanistic understanding—a real feat. We need more programmers to go beyond Google's famous slogan, "Don't be evil." We need engineers who will do good.

And we need them soon: If personalization remains on its current trajectory, as the next chapter describes, the near future could be stranger and more problematic than many of us would imagine.

7

What You Want, Whether You Want It or Not

> There will always be plenty of things to compute in the detailed affairs of millions of people doing complicated things.
>
> —computing pioneer Vannevar Bush, 1945

> All collected data had come to a final end. Nothing was left to be collected. But all collected data had yet to be completely correlated and put together in all possible relationships.
>
> —from Isaac Asimov's short story "The Last Question"

I recently received a friend invitation on Facebook from someone whose name I didn't recognize, a curvy-figured girl with big eyes and thick lashes. Clicking to figure out who she was (and, I'll admit, to look more closely), I read over her profile. It didn't tell me a lot about her, but it seemed like the profile of someone I might plausibly know. A few of our interests were the same.

I looked again at the eyes. They were a little *too* big.

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