"A relentless intellectual argument, executed in the tradition of George Orwell and Christopher Hitchens." —*The Washington Post*

WORLD WITHOUT MIND

THE EXISTENTIAL THREAT OF BIG TECH



FRANKLIN FOER



Praise for *World Without Mind*

Named one of the Best Books of 2017 by *The New York Times, Los Angeles Times,* NPR, and *The Sunday Times* of London

"But Foer's writing is deft enough to make this a polemic in the best sense of the word, which is to say a relentless intellectual argument, executed in the tradition of George Orwell and Christopher Hitchens, which often eschews nuance in favor of wit and aggression."

—*The Washington Post*

"A splash of ice cold water, a fierce call to action, and a great read."

—Booklist (starred review)

"When the author Franklin Foer first raised concerns about Silicon Valley's power players, 'people looked at me funny'. Now his work appears prophetic."

—*The Guardian* (London)

"Foer conjures concise, insightful psychological profiles of each mover-and-shaker, detailing how they've mixed utopianism and monopolism into an insidious whole. He also offers compelling mini-bios of everyone from Edward Bernays, Sigmund Freud's nephew and the father of modern propaganda, to Stewart Brand, publisher of *The Whole Earth Catalog* and a massive influence on Silicon Valley. . . . *World Without Mind* is a searing take, a polemic packed with urgency and desperation that, for all its erudition and eloquence, is not afraid to roll up its sleeves and make things personal."

—NPR.org

"Important and incredibly informative (and entertaining) new book . . . I can't recommend this enough. . . . I want everyone to go out and get *World Without Mind*."

—Hugh Hewitt

“Foer does have a fine Orwell-lie eye for cant, sham, and injustice.”

—*The Sunday Times* (London)

“What sets it apart is the style and verve of the writing . . . *World Without Mind* is full of sharp insights, elegantly expressed.”

—*The Literary Review*

“Lucid and ambitious new book . . . Foer is smart and trenchant when he attacks.”

—*The Globe and Mail* (Toronto)

“Foer’s denunciation of online journalism . . . is not just powerful, but essential reading for any journalist, or indeed reader of journalism.”

—*The Times* (London)

“*World Without Mind* is an argument in the spirit of those brave democracy protestors who stand alone before tanks. Franklin Foer asks us to unplug and think. He asks us to recognize and challenge Silicon Valley’s monopoly power. His book is a vital response to digital utopianism at a time when we desperately need new ethics for social media.”

—Steve Coll, Pulitzer Prize–winning author of *Ghost Wars* and *Private Empire*

“A provocative, enlightening, and above all, important book that is asking the most important question of our times. It is nothing less than an examination of the future of humanity and what we like to call ‘free will.’ It is also a good read —Foer writes with an engaging vibrancy that makes the book a page-turner.”

—Tim Wu, author of *The Attention Merchants* and *The Master Switch*

“As the dust settles from the great tech upheavals of the early twenty-first century, it turns out that the titans of Silicon Valley have not ushered us into a utopia of peace and freedom. Instead, as Foer so convincingly shows, by monopolizing the means of distribution, they have systematically demonetized and degraded the written word. *World Without Mind* makes a passionate, deeply informed case for the need to take back culture—knowledge, information, ideas —from the Facebooks and Amazons. Its message could not be more timely.”

—William Deresiewicz, *New York Times* bestselling author of *Excellent Sheep* and *A Jane Austen Education*

“Franklin Foer’s *World Without Mind* is a fascinating biography of the biggest players in big tech—a handful of humans that, through their decisions, govern the lives of seven billion tech consumers. Foer shows that these decisions are robbing us of our humanity, our values, and our ability to grapple with complexity. *World Without Mind* is an important and urgent book that should be required reading for anyone who’s ever shopped on Amazon, swiped the screen on an Apple device, or scrolled through the Facebook News Feed—in short, for all of us.”

—Adam Alter, *New York Times* bestselling author of *Irresistible* and *Drunk Tank Pink*

“Essential reading—while we still know what reading is—Foer’s terrifying analysis of the cyber state we’re in is both portrait gallery of the robber barons, the monopolists, the tax dodgers, and the fantasists who own the data troughs from which we feed, and passionate plea for the retention of those values of privacy, nonconformity, contemplation, creativity, and mind, which the Big Tech companies are well on their way to destroying, not out of cynicism but the deepest ignorance of what a person is and why individuality is indispensable to him. This book leaves us in no doubt: no greater threat to our humanity exists.”

—Howard Jacobson, Man Booker Prize–winning author of *The Dog’s Last Walk* and *The Finkler Question*

ABOUT THE AUTHOR

Franklin Foer is a national correspondent for *The Atlantic*. He is the author of *How Soccer Explains the World*, which has been translated into twenty-seven languages, and is a winner of a National Jewish Book Award. For seven years, he edited *The New Republic* magazine.

ALSO BY FRANKLIN FOER

How Soccer Explains the World

AS EDITOR

Jewish Jocks (with Marc Tracy)

Insurrections of the Mind

WORLD WITHOUT MIND

THE EXISTENTIAL THREAT OF BIG TECH

FRANKLIN FOER



PENGUIN BOOKS

To Bert Foer
Ardent Trustbuster, Gentle Father

“The glow of one warm thought is to me worth more than money.”

Thomas Jefferson, 1773

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PROLOGUE

UNTIL RECENTLY, it was easy to define our most widely known corporations. Any third grader could describe their essence. Exxon sells oil; McDonald's makes hamburgers; Walmart is a place to buy stuff. This is no longer so. The ascendant monopolies of today aspire to encompass all of existence. Some of these companies have named themselves for their limitless aspirations. Amazon, as in the most voluminous river on the planet, has a logo that points from A to Z; Google derives from googol, a number (1 followed by 100 zeros) that mathematicians use as shorthand for unimaginably large quantities.

Where do these companies begin and end? Larry Page and Sergey Brin founded Google with the mission of organizing all knowledge, but that proved too narrow. Google now aims to build driverless cars, manufacture phones, and conquer death. Amazon was once content being "the everything store," but now produces television shows, designs drones, and powers the cloud. The most ambitious tech companies—throw Facebook, Microsoft, and Apple into the mix—are in a race to become our "personal assistant." They want to wake us in the morning, have their artificial intelligence software guide us through the day, and never quite leave our sides. They aspire to become the repository for precious and private items, our calendar and contacts, our photos and documents. They intend for us to unthinkingly turn to them for information and entertainment, while they build unabridged catalogs of our intentions and aversions. Google Glass and the Apple Watch prefigure the day when these companies implant their artificial intelligence within our bodies.

More than any previous coterie of corporations, the tech monopolies aspire to mold humanity into their desired image of it. They believe that they have the opportunity to complete the long merger between man and machine—to redirect the trajectory of human evolution. How do I know this? Such suggestions are fairly commonplace in Silicon Valley, even if much of the tech press is too obsessed with covering the latest product launch to take much notice of them. In annual addresses and townhall meetings, the founding fathers of these

companies often make big, bold pronouncements about human nature—a view of human nature that they intend to impose on the rest of us.

There's an oft-used shorthand for the technologist's view of the world. It is assumed that libertarianism dominates Silicon Valley, which isn't wholly wrong. High-profile devotees of Ayn Rand can be found there. But if you listen hard to the titans of tech, that's not the worldview that emerges. In fact, it is something much closer to the opposite of a libertarian's veneration of the heroic, solitary individual. The big tech companies believe we're fundamentally social beings, born to collective existence. They invest their faith in the network, the wisdom of crowds, collaboration. They harbor a deep desire for the atomistic world to be made whole. By stitching the world together, they can cure its ills. Rhetorically, the tech companies gesture toward individuality—to the empowerment of the "user"—but their worldview rolls over it. Even the ubiquitous invocation of users is telling, a passive, bureaucratic description of us.

The big tech companies—the Europeans have charmingly, and correctly, lumped them together as GAFA (Google, Apple, Facebook, Amazon)—are shredding the principles that protect individuality. Their devices and sites have collapsed privacy; they disrespect the value of authorship, with their hostility to intellectual property. In the realm of economics, they justify monopoly with their well-articulated belief that competition undermines our pursuit of the common good and ambitious goals. When it comes to the most central tenet of individualism—free will—the tech companies have a different way. They hope to automate the choices, both large and small, that we make as we float through the day. It's their algorithms that suggest the news we read, the goods we buy, the path we travel, the friends we invite into our circle.

It's hard not to marvel at these companies and their inventions, which often make life infinitely easier. But we've spent too long marveling. The time has arrived to consider the consequences of these monopolies, to reassert our own role in determining the human path. Once we cross certain thresholds—once we transform the values of institutions, once we abandon privacy—there's no turning back, no restoring our lost individuality.

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OVER THE GENERATIONS, we've been through revolutions like this before. Back so many years ago, we delighted in the wonders of television dinners and the other newfangled foods that suddenly filled our kitchens: plastic-encased slices of cheese, oozing pizzas that emerged from a crust of ice, bags of crunchy tater tots. In the history of man, these seemed breakthrough innovations. Time-

consuming tasks—shopping for ingredients; each of those tedious steps in a recipe, with their trail of collaterally crusted pots and pans—were suddenly and miraculously consigned to history.

The revolution in cuisine wasn't just enthralling. It was transformational. New products embedded themselves deeply in everyday life, so much so that it took decades for us to understand the price we paid for their convenience, efficiency, and abundance. These foods were feats of engineering all right—but they were engineered to make us fat. Their delectable taste required massive quantities of sodium and sizable stockpiles of lipids, which happened to reset our pallets and made it harder to sate hunger. It took vast new quantities of meat and corn to fabricate these dishes, a spike in demand that re-created the very essence of American agriculture and exacted a terrible environmental toll. A whole new system of industrial farming emerged, with penny-conscious conglomerates cramming chickens into feces-covered pens and stuffing them full of antibiotics. By the time we came to understand the consequences of our revised patterns of consumption, the damage had been done to our waistline, longevity, soul, and planet.

Something like the midcentury food revolution is now reordering the production and consumption of knowledge. Our intellectual habits are being scrambled by the dominant firms. Just as Nabisco and Kraft wanted to change how we eat and what we eat, Amazon, Facebook, and Google aspire to alter how we read and what we read. The biggest tech companies are, among other things, the most powerful gatekeepers the world has ever known. Google helps us sort the Internet by providing a sense of hierarchy to information; Facebook uses its algorithms and its intricate understanding of our social circles to sort the news we encounter; Amazon bestrides book publishing with its overwhelming hold on that market.

Such dominance endows these companies with the ability to remake the markets they control. As with the food giants, the big tech companies have given rise to a new science that aims to construct products that pander to the tastes of their consumers. They want to overhaul the entire chain of cultural production, so that they can capture greater profit. Intellectuals, freelance writers, investigative journalists, and midlist novelists are the analog to the family farmers, who have always struggled but simply can't compete in this transformed economy.

In the realm of knowledge, monopoly and conformism are inseparable perils. Monopoly is the danger that a powerful firm will use its dominance to squash the diversity of competition. Conformism is the danger that one of those monopolistic firms, intentionally or inadvertently, will use its dominance to

squash diversity of opinion and taste. Concentration is followed by homogenization. With food, we only belatedly understood this pattern.

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I WASN'T ALWAYS SO SKEPTICAL. At my first job, I would eat lunch staring at the Berlin Wall, its impressive thickness, all of its divots and bruises. The wall had defined the impenetrable boundary of an empire; now it casually decorated a new center of power in the world. This section of the wall belonged to Bill Gates and it resided in Microsoft's cafeteria.

My career in journalism began at Gates's software company. Microsoft had just built a new campus—centered on a quad, with a stream running through it—in the suburbs of Seattle to house all of its newly launched media. The company had created a women's magazine called *Underwire* (wonder why that one failed), an automotive magazine, and other sites devoted to urban life. After graduating from college, I flew west to be the low person on the masthead at a new outlet called *Slate*, which would become Microsoft's higher-brow, general interest offering.

These early efforts at Internet journalism were exhilarating. Our readers absorbed us on screens, which suggested a need for different styles of writing. But of what sort? We were no longer constrained by the mail and the printing press, so how often would we publish? Daily? Hourly? All of the conventions of writing felt thrillingly up for grabs.

As with so many aspects of the Internet, Microsoft had misjudged the shape of things to come. Microsoft tried to refashion itself as a state-of-the art media company, but its efforts were clunky and expensive. It made the mistake of actually producing editorial content. Its successors—Facebook, Google, Apple—didn't repeat that error. They surpassed Microsoft by adapting a revolutionary approach: the domination of media without hiring writers and editors, without owning much of anything.

Over the decades, the Internet revolutionized reading patterns. Instead of beginning with the home pages for *Slate* or the *New York Times*, a growing swath of readers now encounters articles through Google, Facebook, Twitter, and Apple. Sixty-two percent of Americans get their news through social media, and most of it via Facebook; a third of all traffic to media sites flows from Google. This has placed media in a state of abject financial dependence on tech companies. To survive, media companies lost track of their values. Even journalists of the highest integrity have internalized a new mind-set; they worry about how to successfully pander to Google's and Facebook's algorithms. In

pursuit of clicks, some of our nation's most important purveyors of news have embraced sensationalism; they have published dubious stories; they have heaped attention on propagandists and conspiracists, one of whom was elected president of the United States. Facebook and Google have created a world where the old boundaries between fact and falsehood have eroded, where misinformation spreads virally.

I experienced an industrial-strength version of this narrative. Most of my career was spent at the *New Republic*—a little magazine based in Washington, always with fewer than one hundred thousand subscribers, devoted to politics and literature. We sputtered our way through the convulsions of the Internet era, until Chris Hughes bought the magazine in 2012. Chris wasn't just a savior; he was a face of the zeitgeist. At Harvard, Chris had roomed with Mark Zuckerberg, who had anointed him one of the first employees of Facebook. Chris gave our fusty old magazine a millennial imprimatur, a bigger budget, and an insider's knowledge of social media. We felt as if we carried the hopes of journalism, which was yearning for a dignified solution to all that ailed it. Chris hired me to edit the *New Republi*c—a position I had held once before—and we began to remake the magazine, setting out to fulfill our own impossibly high expectations.

In the end, those expectations were too much for us to sustain. We couldn't move quickly enough to suit Chris. Our traffic boomed, but not exponentially. We never sufficiently mastered social media, in his view. My relationship with Chris frayed disastrously. He fired me after two and a half years—a bust-up interpreted widely as a parable of Silicon Valley's failure to understand the journalistic world over which it now exerted so much influence. There's no doubt that this experience informs the argument of this book.

I hope this book doesn't come across as fueled by anger, but I don't want to deny my anger either. The tech companies are destroying something precious, which is the possibility of contemplation. They have created a world in which we're constantly watched and always distracted. Through their accumulation of data, they have constructed a portrait of our minds, which they use to invisibly guide mass behavior (and increasingly individual behavior) to further their financial interests. They have eroded the integrity of institutions—media, publishing—that supply the intellectual material that provokes thought and guides democracy. Their most precious asset is our most precious asset, our attention, and they have abused it.

The companies have already succeeded in their goal of altering human evolution. We've all become a bit cyborg. Our phone is an extension of our memory; we've outsourced basic mental functions to algorithms; we've handed

over our secrets to be stored on servers and mined by computers. What we need to always remember is that we're not just merging with machines, but with the companies that run the machines. This book is about the ideas that fuel these companies—and the imperative of resisting them.

MONOPOLISTS
OF MIND

Three

MARK ZUCKERBERG'S WAR ON FREE WILL

SILICON VALLEY GRADUATED from the counterculture, but not really. All the values it professes are the values of the sixties. The big tech companies present themselves as platforms for personal liberation, just as Stewart Brand preached. Everyone has the right to speak their mind on social media, to fulfill their intellectual and democratic potential, to express their individuality. Where television had been a passive medium that rendered citizens inert, Facebook is participatory and empowering. It allows users to read widely, think for themselves, and form their own opinions.

We can't entirely dismiss this rhetoric. There are parts of the world, even in the United States, where Facebook emboldens citizens and enables them to organize themselves in opposition to power. But we shouldn't accept Facebook's self-conception as sincere, either. Facebook is a carefully managed top-down system, not a robust public square. It mimics some of the patterns of conversation, but that's a surface trait. In reality, Facebook is a tangle of rules and procedures for sorting information, rules devised by the corporation for the ultimate benefit of the corporation. Facebook is always surveilling users, always auditing them, using them as lab rats in its behavioral experiments. While it creates the impression that it offers choice, Facebook paternalistically nudges users in the direction it deems best for them, which also happens to be the direction that thoroughly addicts them. It's a phoniness most obvious in the compressed, historic career of Facebook's mastermind.

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MARK ZUCKERBERG IS A GOOD BOY, but he wanted to be bad, or maybe just a little bit naughty. The heroes of his adolescence were the original hackers. Let's be

precise about the term. His idols weren't malevolent data thieves or cyber-terrorists. In the parlance of hacker culture, such ill-willed outlaws are known as crackers. Zuckerberg never put crackers on a pedestal. Still, his hacker heroes were disrespectful of authority. They were technically virtuosic, infinitely resourceful nerd cowboys, unbound by conventional thinking. In MIT's labs, during the sixties and seventies, they broke any rule that interfered with building the stuff of early computing, such marvels as the first video games and word processors. With their free time, they played epic pranks, which happened to draw further attention to their own cleverness—installing a living, breathing cow on the roof of a Cambridge dorm; launching a weather balloon, which miraculously emerged from beneath the turf, emblazoned with "MIT," in the middle of a Harvard-Yale football game.

The hackers' archenemies were the bureaucrats who ran universities, corporations, and governments. Bureaucrats talked about making the world more efficient, just like the hackers. But they were really small-minded paper-pushers who fiercely guarded the information they held, even when that information yearned to be shared. When hackers clearly engineered better ways of doing things—a box that enabled free long-distance calls, an instruction that might improve an operating system—the bureaucrats stood in their way, wagging an unbending finger. The hackers took aesthetic and comic pleasure in outwitting the men in suits.

When Zuckerberg arrived at Harvard in the fall of 2002, the heyday of the hackers had long passed. They were older guys now, the stuff of good tales, some stuck in twilight struggles against The Man. But Zuckerberg wanted to hack, too, and with that old-time indifference to norms. In high school—using the *nom de hack* Zuck Fader—he picked the lock that prevented outsiders from fiddling with AOL's code and added his own improvements to its instant messaging program. As a college sophomore he hatched a site called Facemash —with the high-minded purpose of determining the hottest kid on campus. Zuckerberg asked users to compare images of two students and then determine the better looking of the two. The winner of each pairing advanced to the next round of his hormonal tournament. To cobble this site together, Zuckerberg needed photos. He purloined those from the servers of the various Harvard houses that stockpiled them. "One thing is certain," he wrote on a blog as he put the finishing touches on his creation, "and it's that I'm a jerk for making this site. Oh well."

His brief experimentation with rebellion ended with his apologizing to a Harvard disciplinary panel, as well as campus women's groups, and mulling strategies to redeem his soiled reputation. In the years since, he's shown that

defiance really wasn't his natural inclination. His distrust of authority was such that he sought out Don Graham, then the venerable chairman of the Washington Post company, as his mentor. After he started Facebook, he shadowed various giants of corporate America so that he could study their managerial styles up close. Though he hasn't fully shed his awkward ways, he has sufficiently overcome his introversion to appear at fancy dinner parties, Charlie Rose interviews, and *Vanity Fair* cover shoots.

Still, the juvenile fascination with hackers never did die, or rather he carried it forward into his new, more mature incarnation. When he finally had a corporate campus of his own, he procured a vanity address for it: One Hacker Way. He designed a plaza with h-a-c-k inlaid into the concrete. In the center of his office park, he created an open meeting space called Hacker Square. This is, of course, the venue where his employees join for all-night Hackathons. As he told a group of would-be entrepreneurs, "We've got this whole ethos that we want to build a hacker culture."

Plenty of companies have similarly appropriated hacker culture—hackers are the ur-disrupters—but none have gone as far as Facebook. Of course, that's not without risks. "Hacking" is a loaded term, and a potentially alienating one, at least to shareholders who crave sensible rule-abiding leadership. But by the time Zuckerberg began extolling the virtues of hacking, he'd stripped the name of most of its original meaning and distilled it into a managerial philosophy that contains barely a hint of rebelliousness. It might even be the opposite of rebelliousness. Hackers, he told one interviewer, were "just this group of computer scientists who were trying to quickly prototype and see what was possible. That's what I try to encourage our engineers to do here." To hack is to be a good worker, a responsible Facebook citizen—a microcosm of the way in which the company has taken the language of radical individualism and deployed it in the service of conformism.

Zuckerberg claimed to have distilled that hacker spirit into a motivational motto: "Move Fast and Break Things." Indeed, Facebook has excelled at that. The truth is, Facebook moved faster than Zuckerberg could ever have imagined. He hadn't really intended his creation. His company was, as we all know, a dorm room lark, a thing he ginned up in a Red Bull–induced fit of sleeplessness. As his creation grew, it needed to justify its new scale to its investors, to its users, to the world. It needed to grow up fast. According to Dustin Moskovitz, who cofounded the company with Zuckerberg at Harvard, "It was always very important for our brand to get away from the image of frivolity it had, especially in Silicon Valley." Over the span of its short life, the company has caromed from self-description to self-description. It has called itself a tool, a utility, and a

platform. It has talked about openness and connectedness. And in all these attempts at defining itself, it has managed to clarify its intentions.

Though Facebook will occasionally talk about the transparency of governments and corporations, what it really wants to advance is the transparency of individuals—or what it has called, at various moments, "radical transparency" or "ultimate transparency." The theory holds that the sunshine of sharing our intimate details will disinfect the moral mess of our lives. Even if we don't intend for our secrets to become public knowledge, their exposure will improve society. With the looming threat that our embarrassing information will be broadcast, we'll behave better. And perhaps the ubiquity of incriminating photos and damning revelations will prod us to become more tolerant of one another's sins. Besides, there's virtue in living our lives truthfully. "The days of you having a different image for your work friends or co-workers and for the other people you know are probably coming to an end pretty quickly," Zuckerberg has said. "Having two identities for yourself is an example of a lack of integrity."

The point is that Facebook has a strong, paternalistic view on what's best for you, and it's trying to transport you there. "To get people to this point where there's more openness—that's a big challenge. But I think we'll do it," Zuckerberg has said. He has reason to believe that he will achieve that goal. With its size, Facebook has amassed outsized powers. These powers are so great that Zuckerberg doesn't bother denying that fact. "In a lot of ways Facebook is more like a government than a traditional company. We have this large community of people, and more than other technology companies we're really setting policies."

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WITHOUT KNOWING IT, Zuckerberg is the heir to a long political tradition. Over the last two hundred years, the West has been unable to shake an abiding fantasy, a dream sequence in which we throw out the bum politicians and replace them with engineers—rule by slide rule. The French were the first to entertain this notion in the bloody, world-churning aftermath of their revolution. A coterie of the country's most influential philosophers (notably, Henri de Saint-Simon and Auguste Comte) were genuinely torn about the course of the country. They hated all the old ancient bastions of parasitic power—the feudal lords, the priests, and the warriors—but they also feared the chaos of the mob. To split the difference, they proposed a form of technocracy—engineers and assorted technicians would rule with beneficent disinterestedness. Engineers would strip

the old order of its power, while governing in the spirit of science. They would impose rationality and order.

This dream has captivated intellectuals ever since, especially Americans. The great sociologist Thorstein Veblen was obsessed with installing engineers in power and, in 1921, wrote a book making his case. His vision briefly became a reality. In the aftermath of World War I, American elites were aghast at all the irrational impulses unleashed by that conflict—the xenophobia, the racism, the urge to lynch and riot. What's more, the realities of economic life had grown so complicated, how could politicians possibly manage them? Americans of all persuasions began yearning for the salvific ascendance of the most famous engineer of his time: Herbert Hoover. During the war, Hoover had organized a system that managed to feed starving Europe, despite the seeming impossibility of that assignment. In 1920, Franklin Roosevelt—who would, of course, ultimately vanquish him from politics—organized a movement to draft Hoover for the presidency.

The Hoover experiment, in the end, hardly realized the happy fantasies about the Engineer King. A very different version of this dream, however, has come to fruition, in the form of the CEOs of the big tech companies. We're not ruled by engineers, not yet, but they have become the dominant force in American life, the highest, most influential tier of our elite. Marc Andreessen coined a famous aphorism that holds, "Software is eating the world." There's a bit of obfuscation in that formula—it's really the authors of software who are eating the world.

There's another way to describe this historical progression. Automation has come in waves. During the Industrial Revolution, machinery replaced manual workers. At first machines required human operators. Over time, machines came to function with hardly any human intervention. For centuries, engineers automated physical labor; our new engineering elite has automated thought. They have perfected technologies that take over intellectual processes, that render the brain redundant. Or as Marissa Mayer once argued, "You have to make *words* less human and more a piece of the *machine*." Indeed, we have begun to outsource our intellectual work to companies that suggest what we should learn, the topics we should consider, and the items we ought to buy. These companies can justify their incursions into our lives with the very arguments that Saint-Simon and Comte articulated: They are supplying us with efficiency; they are imposing order on human life.

Nobody better articulates the modern faith in engineering's power to transform society than Zuckerberg. He told a group of software developers, "You know, I'm an engineer, and I think a key part of the engineering mindset is this hope and this belief that you can take any system that's out there and make it

much, much better than it is today. Anything, whether it's hardware, or software, a company, a developer ecosystem, you can take anything and make it much, much better." The world will improve, if only Zuckerberg's reason can prevail—and it will.

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THE PRECISE SOURCE OF FACEBOOK'S power is algorithms. That's a concept repeated dutifully in nearly every story about the tech giants, yet it remains fuzzy at best to users of those sites. From the moment of the algorithm's invention, it was possible to see its power, its revolutionary potential. The algorithm was developed in order to automate thinking, to remove difficult decisions from the hands of humans, to settle contentious debates. To understand the essence of the algorithm—and its utopian pretension—it's necessary to travel back to its birthplace, the brain of one of history's unimpeachable geniuses, Gottfried Leibniz.

Fifty years younger than Descartes, Leibniz grew up in the same world of religious conflict. His native Germany, Martin Luther's homeland, had become one of history's most horrific abattoirs, the contested territory at the center of the Thirty Years War. Although the battlefield made its own contribution to the corpse count, the aftermath of war was terrible, too. Dysentery, typhus, and plague conquered the German principalities. Famine and demographic collapse followed battle, some four million deaths in total. The worst-clobbered of the German states lost more than half of their population.

Leibniz was born as Europe negotiated the Peace of Westphalia ending the slaughter, so it was inevitable that he trained his prodigious intellectual energies on reconciling Protestants and Catholics, crafting schemes to unify humanity. Prodigious is perhaps an inadequate term to describe Leibniz's mental reserves. He produced schemes at, more or less, the rate he contracted his diaphragm. His archives, which still haven't been fully published, contain some two hundred thousand pages of his writing, filled with spectacular creations. Leibniz invented calculus—to be sure, he hadn't realized that Newton discovered the subject earlier, but it's his notation that we still use. He produced lasting treatises on metaphysics and theology, he drew up designs for watches and windmills, he advocated universal health care and the development of submarines. As a diplomat in Paris, he pressed Louis XIV to invade Egypt, a bank-shot ploy to divert Germany's mighty neighbor into an overseas adventure that might lessen the prospect of marching its armies east. Denis Diderot, no slouch, moaned, "When one compares . . . one's own small talents with those of a Leibniz, one is

tempted to throw away one's books and go die peacefully in the depths of some dark corner."

Of all Leibniz's schemes, the dearest was a new lexicon he called the universal characteristic—and it, too, sprang from his desire for peace. Throughout history, fanciful thinkers have created languages from scratch in the hope that their concoctions would smooth communication between the peoples of the world, fostering the preconditions for global oneness. Leibniz created his language for that reason, too, but he also had higher hopes: He argued that a new set of symbols and expressions would lead science and philosophy to new truths, to a new age of reason, to a deeper appreciation of the universe's elegance and harmony, to the divine.

What he imagined was an alphabet of human thought. It was an idea that he first pondered as a young student, the basis for his doctoral dissertation at Altdorf. Over the years, he fleshed out a detailed plan for realizing his fantasy. A group of scholars would create an encyclopedia containing the fundamental, incontestably true concepts of the world, of physics, philosophy, geometry, everything really. He called these core concepts "primitives," and they would include things like the earth, the color red, and God. Each of the primitives would be assigned a numerical value, which allowed them to be combined to create new concepts or to express complex extant ones. And those numerical values would form the basis for a new calculus of thought, what he called the calculus ratiocinator.

Leibniz illustrated his scheme with an example. What is a human? A rational animal, of course. That's an insight that we can write like this:

rational x animal = man

But Leibniz translated this expression into an even more mathematical sentence. "Animal," he suggested, might be represented with the number two; "rational" with the number three. Therefore:

2 x 3 = 6

Thought had been turned into math—and this allowed for a new, foolproof method for adjudicating questions of truth. Leibniz asked, for instance, are all men monkeys? Well, he knew the number assigned to monkeys, ten. If ten can't be divided by six, and six can't be divided by ten, then we know: There's no element of monkey in man—and no element of man in monkey.

That was the point of his language: Knowledge, all knowledge, could ultimately be derived from computation. It would be an effortless process, *cogitatio caeca* or blind thought. Humans were no longer even needed to conceive new ideas. A machine could do that, by combining and dividing concepts. In fact, Leibniz built a prototype of such a machine, a gorgeous, intricate compilation of polished brass and steel, gears and dials. He called it the Stepped Reckoner. Leibniz spent a personal fortune building it. With a turn of the crank in one direction the Stepped Reckoner could multiply, in the other direction divide. Leibniz had designed a user interface so meticulous that Steve Jobs would have bowed down before it. Sadly, whenever he tested the machine for an audience, as he did before the Royal Society in London in 1673, it failed. The resilient Leibniz forgave himself these humiliating demonstrations. The importance of the universal characteristic demanded that he press forward. "Once this has been done, if ever further controversies should arise, there should be no more reason for disputes between two philosophers than between two calculators." Intellectual and moral argument could be settled with the disagreeing parties declaring, "Let's calculate!" There would be no need for wars, let alone theological controversy, because truth would be placed on the terra firma of math.

Leibniz was a prophet of the digital age, though his pregnant ideas sat in the waiting room for centuries. He proposed a numeric system that used only zeros and ones, the very system of binary on which computing rests. He explained how automation of white-collar jobs would enhance productivity. But his critical insight was mechanical thinking, the automation of reason, the very thing that makes the Internet so miraculous, and the power of the tech companies so potentially menacing.

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THOSE PROCEDURES THAT enable mechanical thinking came to have a name. They were dubbed algorithms. The essence of the algorithm is entirely uncomplicated. The textbooks compare them to recipes—a series of precise steps that can be followed mindlessly. This is different from equations, which have one correct result. Algorithms merely capture the process for solving a problem and say nothing about where those steps ultimately lead.

These recipes are the crucial building blocks of software. Programmers can't simply order a computer to, say, search the Internet. They must give the computer a set of specific instructions for accomplishing that task. These instructions must take the messy human activity of looking for information and

transpose that into an orderly process that can be expressed in code. First do this . . . then do that. . . . The process of translation, from concept to procedure to code, is inherently reductive. Complex processes must be subdivided into a series of binary choices. There's no equation to suggest a dress to wear, but an algorithm could easily be written for that—it will work its way through a series of either/or questions (morning or night, winter or summer, sun or rain), with each choice pushing to the next.

Mechanical thinking was exactly what Alan Turing first imagined as he collapsed on his run through the meadows of Cambridge in 1935 and daydreamed about a fantastical new calculating machine. For the first decades of computing, the term "algorithm" wasn't much mentioned. But as computer science departments began sprouting across campuses in the sixties, the term acquired a new cachet. Its vogue was the product of status anxiety. Programmers, especially in the academy, were anxious to show that they weren't mere technicians. They began to describe their work as algorithmic, in part because it tied them to one of the greatest of all mathematicians—the Persian polymath Muḥammad ibn Mūsā al-Khwārizmi, or as he was known in Latin, Algoritmi. During the twelfth century, translations of al-Khwārizmi introduced Arabic numerals to the West; his treatises pioneered algebra and trigonometry. By describing the algorithm as the fundamental element of programming, the computer scientists were attaching themselves to a grand history. It was a savvy piece of name dropping: See, we're not arriviste, we're working with abstractions and theories, just like the mathematicians!

There was sleight of hand in this self-portrayal. The algorithm may be the essence of computer science—but it's not precisely a scientific concept. An algorithm is a system, like plumbing or a military chain of command. It takes know-how, calculation, and creativity to make a system work properly. But some systems, like some armies, are much more reliable than others. A system is a human artifact, not a mathematical truism. The origins of the algorithm are unmistakably human, but human fallibility isn't a quality that we associate with it. When algorithms reject a loan application or set the price for an airline flight, they seem impersonal and unbending. The algorithm is supposed to be devoid of bias, intuition, emotion, or forgiveness. They call it a search engine, after all—a nod to pistons, gears, and twentieth-century industry, with the machinery wiped clean of human fingerprints.

Silicon Valley's algorithmic enthusiasts were immodest about describing the revolutionary potential of their objects of affection. Algorithms were always interesting and valuable, but advances in computing made them infinitely more powerful. The big change was the cost of computing. It collapsed, and just as the

machines themselves sped up and were tied into a global network. Computers could stockpile massive piles of unsorted data—and algorithms could attack this data to find patterns and connections that would escape human analysts. In the hands of Google and Facebook, these algorithms grew ever more powerful. As they went about their searches, they accumulated more and more data. Their machines assimilated all the lessons of past searches, using these learnings to more precisely deliver the desired results.

For the entirety of human existence, the creation of knowledge was a slog of trial and error. Humans would dream up theories of how the world worked, then would examine the evidence to see whether their hypotheses survived or crashed upon their exposure to reality. Algorithms upend the scientific method—the patterns emerge from the data, from correlations, unguided by hypotheses. They remove humans from the whole process of inquiry. Writing in *Wired*, Chris Anderson argued: "We can stop looking for models. We can analyze the data without hypotheses about what it might show. We can throw the numbers into the biggest computing clusters the world has ever seen and let statistical algorithms find patterns where science cannot."

On one level, this is undeniable. Algorithms can translate languages without understanding words, simply by uncovering the patterns that undergird the construction of sentences. They can find coincidences that humans might never even think to seek. Walmart's algorithms found that people desperately buy strawberry Pop-Tarts as they prepare for massive storms. Still, even as an algorithm mindlessly implements its procedures—and even as it learns to see new patterns in the data—it reflects the minds of its creators, the motives of its trainers. Both Amazon and Netflix use algorithms to make recommendations about books and films. (One-third of purchases on Amazon come from these recommendations.) These algorithms seek to understand our tastes, and the tastes of like-minded consumers of culture. Yet the algorithms make fundamentally different recommendations. Amazon steers you to the sorts of books that you've seen before. Netflix directs users to the unfamiliar. There's a business reason for this difference. Blockbuster movies cost Netflix more to stream. Greater profit arrives when you decide to watch more obscure fare. Computer scientists have an aphorism that describes how algorithms relentlessly hunt for patterns: They talk about torturing the data until it confesses. Yet this metaphor contains unexamined implications. Data, like victims of torture, tells its interrogator what it wants to hear.

Sometimes, the algorithm reflects the subconscious of its creators. To take an extreme example: The Harvard professor Latanya Sweeney conducted a study that found that users with African American names were frequently targeted

with Google ads that bluntly suggested that they had arrest records in need of expunging. (“Latisha Smith, Arrested?”) Google is not particularly forthright about why such results appear. Their algorithm is a ferociously guarded secret. Yet, we know that Google has explicitly built its search engine to reflect values that it holds dear. It believes that the popularity of a Web site gives a good sense of its utility; it chooses to suppress pornography in its search results and not, say, anti-Semitic conspiracists; it believes that users will benefit from finding recent articles more than golden oldies. These are legitimate choices—and perhaps wise business decisions—but they are choices, not science.

Like economics, computer science has its preferred models and implicit assumptions about the world. When programmers are taught algorithmic thinking, they are told to venerate efficiency as a paramount consideration. This is perfectly understandable. An algorithm with an ungainly number of steps will gum up the machinery, and a molasseslike server is a useless one. But efficiency is also a value. When we speed things up, we’re necessarily cutting corners, we’re generalizing.

Algorithms can be gorgeous expressions of logical thinking, not to mention a source of ease and wonder. They can track down copies of obscure nineteenth-century tomes in a few milliseconds; they put us in touch with long-lost elementary school friends; they enable retailers to deliver packages to our doors in a flash. Very soon, they will guide self-driving cars and pinpoint cancers growing in our innards. But to do all these things, algorithms are constantly taking our measure. They make decisions about us and on our behalf. The problem is that when we outsource thinking to machines, we are really outsourcing thinking to the organizations that run the machines.

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MARK ZUCKERBERG DISINGENUOUSLY POSES as a friendly critic of algorithms. That’s how he implicitly contrasts Facebook with his rivals across the way at Google. Over in Larry Page’s shop, the algorithm is king, a cold, pulseless ruler. There’s not a trace of life force in its recommendations and very little apparent understanding of the person keying a query into its engine. Facebook, in his flattering self-portrait, is a respite from this increasingly automated, atomistic world. “Every product you use is better off with your friends,” he says.

What he is referring to is Facebook’s News Feed. Here’s a brief explanation for the sliver of humanity who have apparently resisted Facebook: The News Feed provides a reverse chronological index of all the status updates, articles, and photos that your friends have posted to Facebook. The News Feed is meant

to be fun, but also geared to solve one of the essential problems of modernity—our inability to sift through the ever-growing, always-looming mounds of information. Who better, the theory goes, to recommend what we should read and watch than our friends? Zuckerberg has boasted that the News Feed turned Facebook into a "personalized newspaper."

Unfortunately, our friends can do only so much to winnow things for us. Turns out, they like to share a lot. If we just read their musings and followed links to articles, we might be only a little less overwhelmed than before, or perhaps even deeper underwater. So Facebook makes its own choices about what should be read. The company's algorithms sort the thousands of things a Facebook user could possibly see down to a smaller batch of choice items. And then within those few dozen items, it decides what we might like to read first.

Algorithms are, by definition, invisibilia. But we can usually sense their presence—that somewhere in the distance, we're interacting with a machine. That's what makes Facebook's algorithm so powerful. Many users—60 percent, according to the best research—are completely unaware of its existence. But even if they know of its influence, it wouldn't really matter. Facebook's algorithm couldn't be more opaque. When the company concedes its existence to reporters, it manages to further cloud the algorithm in impenetrable descriptions. We know, for instance, that its algorithm was once called EdgeRank. But Facebook no longer uses that term. It's appropriate that the algorithm doesn't have a name. It has grown into an almost unknowable tangle of sprawl. The algorithm interprets more than one hundred thousand "signals" to make its decisions about what users see. Some of these signals apply to all Facebook users; some reflect users' particular habits and the habits of their friends. Perhaps Facebook no longer fully understands its own tangle of algorithms—the code, all sixty million lines of it, is a palimpsest, where engineers add layer upon layer of new commands. (This is hardly a condition unique to Facebook. The Cornell University computer scientist Jon Kleinberg cowrote an essay that argued, "We have, perhaps for the first time ever, built machines we do not understand. . . . At some deep level we don't even really understand how they're producing the behavior we observe. This is the essence of their incomprehensibility." What's striking is that the "we" in that sentence refers to the creators of code.)

Pondering the abstraction of this algorithm, imagine one of those earliest computers with its nervously blinking lights and long rows of dials. To tweak the algorithm, the engineers turn the knob a click or two. The engineers are constantly making small adjustments, here and there, so that the machine performs to their satisfaction. With even the gentlest caress of the metaphorical

dial, Facebook changes what its users see and read. It can make our friends' photos more or less ubiquitous; it can punish posts filled with self-congratulatory musings and banish what it deems to be hoaxes; it can promote video rather than text; it can favor articles from the likes of the *New York Times* or BuzzFeed, if it so desires. Or if we want to be melodramatic about it, we could say Facebook is constantly tinkering with how its users view the world—always tinkering with the quality of news and opinion that it allows to break through the din, adjusting the quality of political and cultural discourse in order to hold the attention of users for a few more beats.

But how do the engineers know which dial to twist and how hard? There's a whole discipline, data science, to guide the writing and revision of algorithms. Facebook has a team, poached from academia, to conduct experiments on users. It's a statistician's sexiest dream—some of the largest data sets in human history, the ability to run trials on mathematically meaningful cohorts. When Cameron Marlow, the former head of Facebook's data science team, described the opportunity, he began twitching with ecstatic joy. "For the first time," Marlow said, "we have a microscope that not only lets us examine social behavior at a very fine level that we've never been able to see before but allows us to run experiments that millions of users are exposed to."

Facebook likes to boast of the fact of its experimentation more than the details of the actual experiments themselves. But there are examples that have escaped the confines of its laboratories. We know, for example, that Facebook sought to discover whether emotions are contagious. To conduct this trial, Facebook attempted to manipulate the mental state of its users. For one group, Facebook excised the positive words from the posts in the News Feed; for another group, it removed the negative words. Each group, it concluded, wrote posts that echoed the mood of the posts it had reworded. This study was roundly condemned as invasive, but it is not so unusual. As one member of Facebook's data science team confessed: "Anyone on that team could run a test. They're always trying to alter people's behavior."

There's no doubting the emotional and psychological power possessed by Facebook—at least Facebook doesn't doubt it. It has bragged about how it increased voter turnout (and organ donation) by subtly amping up the social pressures that compel virtuous behavior. Facebook has even touted the results from these experiments in peer-reviewed journals: "It is possible that more of the .60% growth in turnout between 2006 and 2010 might have been caused by a single message on Facebook." No other company has so precisely boasted about its ability to shape democracy like this—and for good reason. It's too much power to entrust to a corporation.

The many Facebook experiments add up. The company believes that it has unlocked social psychology and acquired a deeper understanding of its users than they possess of themselves. Facebook can predict users' race, sexual orientation, relationship status, and drug use on the basis of their "likes" alone. It's Zuckerberg's fantasy that this data might be analyzed to uncover the mother of all revelations, "a fundamental mathematical law underlying human social relationships that governs the balance of who and what we all care about." That is, of course, a goal in the distance. In the meantime, Facebook will probe—constantly testing to see what we crave and what we ignore, a never-ending campaign to improve Facebook's capacity to give us the things that we want and things that we don't even know we want. Whether the information is true or concocted, authoritative reporting or conspiratorial opinion, doesn't really seem to matter much to Facebook. The crowd gets what it wants and deserves.

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THE AUTOMATION OF THINKING: We're in the earliest days of this revolution, of course. But we can see where it's heading. Algorithms have retired many of the bureaucratic, clerical duties once performed by humans—and they will soon begin to replace more creative tasks. At Netflix, algorithms suggest the genres of movies to commission. Some news wires use algorithms to write stories about crime, baseball games, and earthquakes, the most rote journalistic tasks. Algorithms have produced fine art and composed symphonic music, or at least approximations of them.

It's a terrifying trajectory, especially for those of us in these lines of work. If algorithms can replicate the process of creativity, then there's little reason to nurture human creativity. Why bother with the tortuous, inefficient process of writing or painting if a computer can produce something seemingly as good and in a painless flash? Why nurture the overinflated market for high culture, when it could be so abundant and cheap? No human endeavor has resisted automation, so why should creative endeavors be any different?

The engineering mind-set has little patience for the fetishization of words and images, for the mystique of art, for moral complexity and emotional expression. It views humans as data, components of systems, abstractions. That's why Facebook has so few qualms about performing rampant experiments on its users. The whole effort is to make human beings predictable—to anticipate their behavior, which makes them easier to manipulate. With this sort of cold-blooded thinking, so divorced from the contingency and mystery of human life, it's easy to see how long-standing values begin to seem like an annoyance—why a

concept like privacy would carry so little weight in the engineer's calculus, why the inefficiencies of publishing and journalism seem so imminently disruptable.

Facebook would never put it this way, but algorithms are meant to erode free will, to relieve humans of the burden of choosing, to nudge them in the right direction. Algorithms fuel a sense of omnipotence, the condescending belief that our behavior can be altered, without our even being aware of the hand guiding us, in a superior direction. That's always been a danger of the engineering mind-set, as it moves beyond its roots in building inanimate stuff and begins to design a more perfect social world. We are the screws and rivets in the grand design.

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* Economists and antitrust lawyers won't care for my casual use of the term "monopoly." It has a technical meaning, they will grump. "Oligopoly" might be a more accurate description of some of the markets I describe. These criticisms are fair, except I'm not making a technical argument. Indeed, I believe that technical arguments have strangled the discussion. My hope is that we revive "monopoly" as a core piece of political rhetoric that broadly denotes dominant firms with pernicious powers. This might not fly in the bar association, but such usage has a proud and productive lineage tracing back to Thomas Jefferson.

*Amazon does publish books, mostly mass-market genre fiction. It also experimented with publishing Kindle Singles, which included serious long-form journalism, a project it has since dialed back.

* In epidemiology, the ζ represents the number of people who come in contact with a contagious individual, while β represents the probability of transmission.