

THE BLACK BOX SOCIETY

The Secret Algorithms That Control Money and Information

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CONTENTS

- 1 Introduction—The Need to Know 1
- 2 Digital Reputation in an Era of Runaway Data 19
- 3 The Hidden Logics of Search 59
- 4 Finance’s Algorithms: The Emperor’s New Codes 101
- 5 Watching (and Improving) the Watchers 140
- 6 Toward an Intelligible Society 189

Notes 221

Acknowledgments 305

Index 307

[T]here is one world in common for those who are awake, but
[when] men are asleep each turns away into a world of his own.

—Heracleitus

Million-fuelèd, ' nature's bonfire burns on.
But quench her bonniest, dearest ' to her, her clearest-selvèd spark
Man, how fast his firedint, ' his mark on mind, is gone!
Both are in an unfathomable, all is in an enormous dark
Drowned.

—Gerard Manley Hopkins

1

INTRODUCTION—THE NEED TO KNOW

EVERYBODY KNOWS the story about the man crawling intently around a lamppost on a dark night. When a police officer comes along and wants to know what he's doing, he says he's looking for his keys. "You lost them here?" asks the cop. "No," the seeker replies, "but this is where the light is." This bromide about futility has lately taken on a whole new meaning as a metaphor for our increasingly enigmatic technologies.

There's a noble tradition among social scientists of trying to clarify how power works: who gets what, when, where, and why.¹ Our common life is explored in books like *The Achieving Society*, *The Winner-Take-All Society*, *The Good Society*, and *The Decent Society*. At their best, these works also tell us why such inquiry matters.²

But efforts like these are only as good as the information available. We cannot understand, or even investigate, a subject about which nothing is known. Amateur epistemologists have many names for this problem. "Unknown unknowns," "black swans," and "deep secrets" are popular catchphrases for our many areas of social blankness.³ There is even an emerging field of "agnotology" that studies the "structural production of ignorance, its diverse causes and conformations, whether brought about by neglect, forgetfulness, myopia, extinction, secrecy, or suppression."⁴

Gaps in knowledge, putative and real, have powerful implications, as do the uses that are made of them. Alan Greenspan, once the most powerful central banker in the world, claimed that today's markets are driven by an "unredeemably opaque" version of Adam Smith's "invisible hand," and that no one (including regulators) can ever get "more than a glimpse at the internal workings of the simplest of modern financial systems." If this is true, libertarian policy would seem to be the only reasonable response. Friedrich von Hayek, a preeminent theorist of *laissez-faire*, called the "knowledge problem" an insuperable barrier to benevolent government interventions in the economy.⁵

But what if the "knowledge problem" is not an intrinsic aspect of the market, but rather is deliberately encouraged by certain businesses? What if financiers keep their doings opaque on purpose, precisely to avoid or to confound regulation? That would imply something very different about the merits of deregulation.

The challenge of the "knowledge problem" is just one example of a general truth: What we do and don't know about the social (as opposed to the natural) world is not inherent in its nature, but is itself a function of social constructs. Much of what we can find out about companies, governments, or even one another, is governed by law. Laws of privacy, trade secrecy, the so-called Freedom of Information Act—all set limits to inquiry. They rule certain investigations out of the question before they can even begin. We need to ask: To whose benefit?

Some of these laws are crucial to a decent society. No one wants to live in a world where the boss can tape our bathroom breaks. But the laws of information protect much more than personal privacy. They allow pharmaceutical firms to hide the dangers of a new drug behind veils of trade secrecy and banks to obscure tax liabilities behind shell corporations. And they are much too valuable to their beneficiaries to be relinquished readily.

Even our political and legal systems, the spaces of our common life that are supposed to be the most open and transparent, are being colonized by the logic of secrecy. The executive branch has been lobbying ever more forcefully for the right to enact and enforce "secret law" in its pursuit of the "war on terror," and voters contend in

an electoral arena flooded with “dark money”—dollars whose donors, and whose influence, will be disclosed only *after* the election, if at all.⁶

But while powerful businesses, financial institutions, and government agencies hide their actions behind nondisclosure agreements, “proprietary methods,” and gag rules, our own lives are increasingly open books. Everything we do online is recorded; the only questions left are to whom the data will be available, and for how long. Anonymizing software may shield us for a little while, but who knows whether trying to hide isn’t itself the ultimate red flag for watchful authorities? Surveillance cameras, data brokers, sensor networks, and “supercookies” record how fast we drive, what pills we take, what books we read, what websites we visit. The law, so aggressively protective of secrecy in the world of commerce, is increasingly silent when it comes to the privacy of persons.

That incongruity is the focus of this book. How has secrecy become so important to industries ranging from Wall Street to Silicon Valley? What are the social implications of the invisible practices that hide the way people and businesses are labeled and treated? How can the law be used to enact the best possible balance between privacy and openness? To answer these questions is to chart a path toward a more intelligible social order.

But first, we must fully understand the problem. The term “black box” is a useful metaphor for doing so, given its own dual meaning. It can refer to a recording device, like the data-monitoring systems in planes, trains, and cars. Or it can mean a system whose workings are mysterious; we can observe its inputs and outputs, but we cannot tell how one becomes the other. We face these two meanings daily: tracked ever more closely by firms and government, we have no clear idea of just how far much of this information can travel, how it is used, or its consequences.⁷

The Power of Secrecy

Knowledge is power. To scrutinize others while avoiding scrutiny oneself is one of the most important forms of power.⁸ Firms seek out intimate details of potential customers’ and employees’ lives, but give regulators as little information as they possibly can about

their own statistics and procedures.⁹ Internet companies collect more and more data on their users but fight regulations that would let those same users exercise some control over the resulting digital dossiers.

As technology advances, market pressures raise the stakes of the data game. Surveillance cameras become cheaper every year; sensors are embedded in more places.¹⁰ Cell phones track our movements; programs log our keystrokes. New hardware and new software promise to make “quantified selves” of all of us, whether we like it or not.¹¹ The resulting information—a vast amount of data that until recently went unrecorded—is fed into databases and assembled into profiles of unprecedented depth and specificity.

But to what ends, and to whose? The decline in personal privacy might be worthwhile if it were matched by comparable levels of transparency from corporations and government. But for the most part it is not. Credit raters, search engines, major banks, and the TSA take in data about us and convert it into scores, rankings, risk calculations, and watch lists with vitally important consequences. But the proprietary algorithms by which they do so are immune from scrutiny, except on the rare occasions when a whistleblower litigates or leaks.

Sometimes secrecy is warranted. We don’t want terrorists to be able to evade detection because they know exactly what Homeland Security agents are looking out for.¹² But when every move we make is subject to inspection by entities whose procedures and personnel are exempt from even remotely similar treatment, the promise of democracy and free markets rings hollow. Secrecy is approaching critical mass, and we are in the dark about crucial decisions. Greater openness is imperative.

Reputation, Search, Finance

At the core of the information economy are Internet and finance companies that accumulate vast amounts of digital data, and with it intimate details of their customers’—our—lives. They use it to make important decisions about us and to influence the decisions we make for ourselves. But what do we know about them? A bad credit score may cost a borrower hundreds of thousands of dollars, but he will never understand exactly how it was calculated. A predictive

analytics firm may score someone as a “high cost” or “unreliable” worker, yet never tell her about the decision.

More benignly, perhaps, these companies influence the choices we make ourselves. Recommendation engines at Amazon and YouTube affect an automated familiarity, gently suggesting offerings they think we’ll like. But don’t discount the significance of that “perhaps.” The economic, political, and cultural agendas behind their suggestions are hard to unravel. As middlemen, they specialize in shifting alliances, sometimes advancing the interests of customers, sometimes suppliers: all to orchestrate an online world that maximizes their own profits.

Financial institutions exert direct power over us, deciding the terms of credit and debt. Yet they too shroud key deals in impenetrable layers of complexity. In 2008, when secret goings-on in the money world provoked a crisis of trust that brought the banking system to the brink of collapse, the Federal Reserve intervened to stabilize things—and kept key terms of those interventions secret as well. Journalists didn’t uncover the massive scope of its interventions until late 2011.¹³ That was well after landmark financial reform legislation had been debated and passed—*without* informed input from the electorate—and then watered down by the same corporate titans whom the Fed had just had to bail out.

Reputation. Search. Finance. These are the areas in which Big Data looms largest in our lives. But too often it looms invisibly, undermining the openness of our society and the fairness of our markets. Consider just a few of the issues raised by the new technologies of ranking and evaluation:

- Should a credit card company be entitled to raise a couple’s interest rate if they seek marriage counseling? If so, should cardholders know this?
- Should Google, Apple, Twitter, or Facebook be able to shut out websites or books entirely, even when their content is completely legal? And if they do, should they tell us?
- Should the Federal Reserve be allowed to print unknown sums of money to save banks from their own scandalous behavior? If so, how and when should citizens get to learn what’s going on?

- Should the hundreds of thousands of American citizens placed on secret “watch lists” be so informed, and should they be given the chance to clear their names?

The leading firms of Wall Street and Silicon Valley are not alone in the secretiveness of their operations, but I will be focusing primarily on them because of their unique roles in society. While accounting for “less than 10% of the value added” in the U.S. economy in the fourth quarter of 2010, the finance sector took 29 percent—\$57.7 billion—of profits.¹⁴ Silicon Valley firms are also remarkably profitable, and powerful.¹⁵ What finance firms do with money, leading Internet companies do with attention. They direct it toward some ideas, goods, and services, and away from others. They organize the world for us, and we have been quick to welcome this data-driven convenience. But we need to be honest about its costs.

Secrecy and Complexity

Deconstructing the black boxes of Big Data isn’t easy. Even if they were willing to expose their methods to the public, the modern Internet and banking sectors pose tough challenges to our understanding of those methods. The conclusions they come to—about the productivity of employees, or the relevance of websites, or the attractiveness of investments—are determined by complex formulas devised by legions of engineers and guarded by a phalanx of lawyers.

In this book, we will be exploring three critical strategies for keeping black boxes closed: “real” secrecy, legal secrecy, and obfuscation. *Real secrecy* establishes a barrier between hidden content and unauthorized access to it. We use real secrecy daily when we lock our doors or protect our e-mail with passwords. *Legal secrecy* obliges those privy to certain information to keep it secret; a bank employee is obliged both by statutory authority and by terms of employment not to reveal customers’ balances to his buddies.¹⁶ *Obfuscation* involves deliberate attempts at concealment when secrecy has been compromised. For example, a firm might respond to a request for information by delivering 30 million pages of documents, forcing its investigator to waste time looking for a needle in a haystack.¹⁷ And

the end result of both types of secrecy, and obfuscation, is *opacity*, my blanket term for remediable incomprehensibility.¹⁸

Detailed investment prospectuses, for instance, can run to dozens or hundreds of pages. They can refer to other documents, and those to still others. There may be conflicts among the documents that the original source references.¹⁹ Anyone really trying to understand the investment is likely to have to process thousands of pages of complicated legal verbiage—some of which can be quite obfuscatory. The same holds for accounting statements. When law professor Frank Partnoy and Pulitzer Prize-winning journalist Jesse Eisinger teamed up to explore “what’s inside America’s banks” in early 2013, they were aghast at the enduring opacity. They reported on the banks as “‘black boxes’ that may still be concealing enormous risks—the sort that could again take down the economy.”²⁰ Several quotes in the article portrayed an American banking system still out of control five years after the crisis:

- “There is no major financial institution today whose financial statements provide a meaningful clue” about its risks, said one hedge fund manager.
- “After serving on the [Financial Accounting Standards] board [FASB],” said Don Young, “I no longer trust bank accounting.”
- Another former FASB member, asked if he trusted bank accounting, answered: “Absolutely not.”²¹

These quotes came five years after the financial crisis and three years after the Dodd-Frank Act, a gargantuan piece of legislation that comprehensively altered banking law. Financial crises result when a critical mass of investors act on that distrust, and their skepticism cascades throughout the system. And when governments step in with their “bailouts” and “liquidity facilities,” they add new layers of complexity to an already byzantine situation.

In the case of technology companies, complexity is not as important as secrecy. However sprawling the web becomes, Google’s search engineers are at least working on a “closed system”; their own company’s copies of the Internet. Similarly, those in charge of Twitter and Facebook “feeds” have a set body of information to

work with. Their methods are hard to understand primarily because of a mix of real and legal secrecy, and their scale. Interlocking technical and legal prohibitions prevent anyone outside such a company from understanding fundamental facts about it.

Activists often press for transparency as a solution to the black box issues raised in this book. In many cases, sunshine truly is the “best disinfectant.” However, transparency may simply provoke complexity that is as effective at defeating understanding as real or legal secrecy. Government has frequently stepped in to require disclosure and “plain language” formats for consumers. But financiers have parried transparency rules with more complex transactions. When this happens, without substantial gains in efficiency, regulators should step in and limit complexity. Transparency is not just an end in itself, but an interim step on the road to intelligibility.

The Secret Judgments of Software

So why does this all matter? It matters because authority is increasingly expressed algorithmically.²² Decisions that used to be based on human reflection are now made automatically. Software encodes thousands of rules and instructions computed in a fraction of a second. Such automated processes have long guided our planes, run the physical backbone of the Internet, and interpreted our GPSes. In short, they improve the quality of our daily lives in ways both noticeable and not.

But where do we call a halt? Similar protocols also influence—invisibly—not only the route we take to a new restaurant, but which restaurant Google, Yelp, OpenTable, or Siri recommends to us. They might help us find reviews of the car we drive. Yet choosing a car, or even a restaurant, is not as straightforward as optimizing an engine or routing a drive. Does the recommendation engine take into account, say, whether the restaurant or car company gives its workers health benefits or maternity leave? Could we prompt it to do so? In their race for the most profitable methods of mapping social reality, the data scientists of Silicon Valley and Wall Street tend to treat recommendations as purely technical problems. The values and prerogatives that the encoded rules enact are hidden within black boxes.²³

The most obvious question is: Are these algorithmic applications fair? Why, for instance, does YouTube (owned by Google) so consistently beat out other video sites in Google's video search results? How does one particular restaurant or auto stock make it to the top of the hit list while another does not? What does it mean when Internet retailers quote different prices for the same product to different buyers? Why are some borrowers cut slack for a late payment, while others are not?

Defenders of the status quo say that results like these reflect a company's good-faith judgment about the quality of a website, an investment, or a customer. Detractors contend that they cloak self-serving appraisals and conflicts of interest in a veil of technological wizardry. Who is right? It's anyone's guess, as long as the algorithms involved are kept secret. Without knowing what Google actually *does* when it ranks sites, we cannot assess when it is acting in good faith to help users, and when it is biasing results to favor its own commercial interests. The same goes for status updates on Facebook, trending topics on Twitter, and even network management practices at telephone and cable companies. All these are protected by laws of secrecy and technologies of obfuscation.

The One-Way Mirror

With so much secrecy so publicly in place, it is easy for casual observers to conclude that there is a rough parity between the informational protection of individuals and civil associations and those of corporations and government. It is comforting to think that our personal bank records are as secure as the bank's own secrets. But I will attempt to overthrow this assumption. We do not live in a peaceable kingdom of private walled gardens; the contemporary world more closely resembles a one-way mirror. Important corporate actors have unprecedented knowledge of the minutiae of our daily lives, while we know little to nothing about how they use this knowledge to influence the important decisions that we—and they—make.

Furthermore, even as critical power over money and new media rapidly concentrates in a handful of private companies, we remain largely ignorant of critical ways in which these companies interact

(and conflict) with public powers. Though this book is primarily about the private sector, I have called it *The Black Box Society* (rather than *The Black Box Economy*) because the distinction between state and market is fading. We are increasingly ruled by what former political insider Jeff Connaughton called “The Blob,” a shadowy network of actors who mobilize money and media for private gain, whether acting officially on behalf of business or of government.²⁴ In one policy area (or industry) after another, these insiders decide the distribution of society’s benefits (like low-interest credit or secure employment) and burdens (like audits, wiretaps, and precarity).

Admittedly, as Jon Elster has written in his book *Local Justice*, there is no perfectly fair way to allocate opportunities.²⁵ But a market-state increasingly dedicated to the advantages of speed and stealth crowds out even the most basic efforts to make these choices fairer. Technocrats and managers cloak contestable value judgments in the garb of “science”: thus the insatiable demand for mathematical models that reframe subtle and subjective conclusions (such as the worth of a worker, service, article, or product) as the inevitable dictate of salient, measurable data.²⁶ Big data driven decisions may lead to unprecedented profits. But once we use computation not merely to exercise power over things, but also over people, we need to develop a much more robust ethical framework than “the Blob” is now willing to entertain.

The Secrecy of Business and the Business of Secrecy

Today’s finance and Internet companies feverishly sort, rank, and rate. They say they keep techniques strictly secret in order to preserve valuable intellectual property—but their darker motives are also obvious. For example, litigation has revealed that some drug companies have cherry-picked the most positive studies for publication, hiding those with serious health or safety implications.²⁷ Journalists are prying open Wall Street’s pre-financial crisis black boxes to this day.²⁸ The Sunlight Foundation, Center for Effective Government, AllTrials.net, and Transparency International press for openness.

Politicians are responding, and try to improve disclosure here and there. But they must be cautious. When a gadfly proves too inconve-

nient, companies can band together in a super PAC, funding attacks on the would-be reformer without having to reveal what they are doing until well after the election.²⁹

Asked about Google's privacy practices, former CEO Eric Schmidt once said that "Google policy is to get right up to the creepy line and not cross it." It is probably more accurate to say that he and other Silicon Valley leaders don't want to be *caught* crossing the creepy line.³⁰ As long as secrecy can be used to undermine market competition and law enforcement, they will be emboldened to experiment with ever creepier, more intrusive, and even exploitative practices.

Looking Back

The quest for a more transparent society—more easily understood, and more open about its priorities—has animated leading reformers in the United States. Louis Brandeis's comment that "sunlight is said to be the best of disinfectants," so often cited today, is a century old, dating back to business scandals of the Gilded Age eerily similar to today's casino capitalism.³¹ Muckraking journalists and trust-busters of the Progressive Era shamed robber barons by exposing their misdeeds.³² They targeted politicians, too: the Publicity Act of 1910 mandated disclosure of campaign donations.³³

Many states of the time took up similar reforms. Voters wanted politics and business subject to public scrutiny. After shady commercial practices surged again in the 1920s, the New Deal echoed and amplified Progressivism. Congress, disgusted by the hucksters who paved the way for the great crash of 1929, imposed sweeping new disclosure obligations in the Securities Act of 1933 and the Securities Exchange Act of 1934. New legislation created the Federal Communications Commission and gave it plenary power to investigate abuses in the telegraph and radio industries.³⁴ New Deal agencies revealed the inner workings of critical industries.³⁵

Government balanced these new powers by opening itself up in important ways. For example, the Administrative Procedure Act (APA) of 1947 forced agencies to give the public notice and a chance to comment before they imposed important rules. Reformers built on the APA with the 1966 Freedom of Information Act, which opened up many government records.³⁶

In the 1960s, a broad coalition of interests fought both government and corporate secrecy in the name of citizen empowerment and consumer protection.³⁷ Perhaps their most enduring legacy was the establishment of procedures of openness. For example, the National Environmental Policy Act required major federal projects to include Environmental Impact Statements that would reveal likely effects on air, water, flora, and fauna. Agencies ranging from the Food and Drug Administration to the Consumer Product Safety Commission now make daily activities less dangerous by revealing the risks of things we purchase.³⁸

But there was always pushback. By the late 1960s, businesses were successfully challenging scrutiny from what they branded the “nanny state.” When the Environmental Protection Agency wanted to release data on the composition of some pesticides, for example, Monsanto fought back. It won a Supreme Court ruling that prevented the disclosure on the grounds that the formulations were a “trade secret” (a form of intellectual property we’ll explore in more detail later). Such rulings chilled many disclosure initiatives, including investigations of Philip Morris’s cigarettes and frackers’ chemicals.³⁹

Confidence in government waned during the stagflation of the 1970s, and business lobbyists seized the opportunity to argue that journalists could do a better job at exposing and punishing corporate wrongdoing than bureaucrats. With zealous investigators ferreting out bad behavior, why bother to require reports? Establishment figures pooh-pooed complaints that banks were becoming too big, complex, and rapacious. “Sophisticated investors” could understand the risks, they insisted, and banks themselves would avoid duplicity to preserve their reputations.⁴⁰

Companies tried to maintain an advantage over their competitors by classifying innovative work as “proprietary” or “confidential.” As computerized exchanges made it possible to gain or lose fortunes within seconds, information advantage became critical throughout the economy. Some economists began to question the wisdom of regulating, or even monitoring, the fast-moving corporate world. Some failed to disclose that they were being paid for “consulting” by the same secretive corporations their writings supported. Business

schools taught MBAs the basics of game theory, which stressed the importance of gaining an information advantage over rivals.⁴¹

Over the last decade, fortunes made via stealth techniques made secrecy even sexier. Google rose to the top of the tech pack while zealously guarding its “secret sauce”—the complex algorithms it used to rank sites. Investment banks and hedge funds made billions of dollars by courting sellers who didn’t understand the value of what they were holding and buyers who didn’t understand the problems with what they were purchasing.⁴²

While neoliberals were vitiating the regulatory state’s ability to expose (or even understand) rapidly changing business practices, neoconservatives began to advance a wall of secrecy for the deep state.⁴³ In the Nixon administration, Dick Cheney and Donald Rumsfeld were already chafing at the idea that Congress could force the executive branch to explain its foreign engagements and strategies. When they renewed their executive service in the George W. Bush administration, they expanded the executive branch’s freedom to maneuver (and its power to avoid oversight).⁴⁴ After 9/11, they pressed even harder for government secrecy, claiming that the only way to win the “war on terror” was for the state to act as clandestinely as its shadowy enemies.⁴⁵

The Obama administration embraced the expansion of executive secrecy, with far-reaching (and occasionally surreal) results. By 2010, leading intelligence agency experts could not even estimate the overall costs of the U.S. antiterrorism effort; nor could they map the extent of the surveillance apparatus they had built.⁴⁶ And their fumbling responses to questions were positively enlightening in comparison with the silence of defense officials funded by the “black budget,” whose appropriations only a sliver of Congress and responsible officials are privy to understand.⁴⁷ Big government now stands together with security contractors to manage strategic surprise.

Thus the openness mantra of Progressive Era reformers has been neatly reversed in favor of a Faustian (and credulous) bargain: just keep us safe and we won’t ask about the details. “Nanny state” takes on a very different connotation in this context.

Things weren’t supposed to turn out this way. Little more than a decade ago, the Internet was promising a new era of transparency,

in which open access to information would result in extraordinary liberty. Law professor Glenn Reynolds predicted that “an army of Davids” would overthrow smug, self-satisfied elites. Space physicist David Brin believed that new technology would finally answer the old Roman challenge, “Who will guard the guardians?” But the powerful actors of business, finance, and search did not meekly submit to the fishbowl vision of mutual surveillance that Brin prophesied in *The Transparent Society*. Instead, they deployed strategies of obfuscation and secrecy to consolidate power and wealth.⁴⁸ Their opaque technologies are spreading, unmonitored and unregulated.

The Shape of the Book

In this book, I will explore the business practices of leading Internet and finance companies, focusing on their use of proprietary reputation, search, and finance technologies in our often chaotic information environment. In some cases, they enable great gains in efficiency. In others, however, they undermine both economic growth and individual rights.

The success of individuals, businesses, and their products depends heavily on the synthesis of data and perceptions into *reputation*. In ever more settings, reputation is determined by secret algorithms processing inaccessible data. Few of us appreciate the extent of ambient surveillance, and fewer still have access either to its results—the all-important profiles that control so many aspects of our lives—or to the “facts” on which they are based. Chapter 2 illustrates how broadly the new technologies of reputation have infiltrated society.⁴⁹

The more we rely on search engines and social networks to find what we want and need, the more influence they wield. The power to include, exclude, and rank is the power to ensure that certain public impressions become permanent, while others remain fleeting.⁵⁰ How does Amazon decide which books to prioritize in searches? How does it ferret out fake or purchased reviews? Why do Facebook and Twitter highlight some political stories or sources at the expense of others?⁵¹ Although internet giants say their algorithms are scientific and neutral tools, it is very difficult to verify those claims.⁵² And while they have become critical economic infrastructure, trade secrecy law permits managers to hide their methodolo-

gies, and business practices, deflecting scrutiny.⁵³ Chapter 3 examines some personal implications of opaque search technology, along with larger issues that it raises in business and law.

Like the reputation and search sectors, the finance industry has characterized more and more decisions as computable, programmable procedures. Big data enables complex pattern recognition techniques to analyze massive data sets. Algorithmic methods of reducing judgment to a series of steps were supposed to rationalize finance, replacing self-serving or biased intermediaries with sound decision frameworks. And they did reduce some inefficiencies. But they also ended up firmly building in some dubious old patterns of credit castes and corporate unaccountability.⁵⁴ The black boxes of finance replaced familiar old problems with a triple whammy of technical complexity, real secrecy, and trade secret laws. They contributed to the financial crisis of 2008, according to the *Financial Times*'s John Gapper, because "the opacity and complexity . . . let deception, overpricing and ultimately fraud flourish."⁵⁵ Perhaps worse, by naturalizing these (avoidable) features of our social landscape, unregulated financial secrecy is starting to give them a patina of inevitability. Chapter 4 examines the role of opaque models and practices in financial markets, along with the challenges they present to citizens, to society, and to the law.

In his book *Turing's Cathedral*, George Dyson quipped that "Facebook defines who we are, Amazon defines what we want, and Google defines what we think."⁵⁶ We can extend that epigram to include *finance*, which defines what we have (materially, at least), and *reputation*, which increasingly defines our opportunities. Leaders in each sector aspire to make these decisions without regulation, appeal, or explanation. If they succeed, our fundamental freedoms and opportunities will be outsourced to systems with few discernible values beyond the enrichment of top managers and shareholders.

This book charts two paths of resistance. Chapter 5 recommends several legal strategies for checking the worst abuses by black box firms. Chapter 6 makes the case for a new politics and economics of reputation, search, and finance, based on the ideal of an intelligible society. It would be foolish to hope for immediate traction in today's gridlocked political environment. But agencies would need to make "all the right moves" within existing legal frameworks to cabin black

box practices. Moreover, those concerned about the power of Silicon Valley and Wall Street need to do more than complain about the limited availability of crucial information. We can imagine a future in which the power of algorithmic authority is limited to environments where it can promote fairness, freedom, and rationality.

We do not have to live in a world where hidden scores determine people's fates, or human manipulations of the stock market remain as inscrutable as the "invisible hand." We should not have to worry that the fates of individuals, businesses, and even our financial systems are at the mercy of hidden databases, dubious scores, and shadowy bets. The same technological and legal revolutions that have so far eviscerated personal privacy can be used to protect it and to advance, rather than curtail, our freedoms and our understanding of the social world. Directed at the right targets, data mining and pervasive surveillance might even prevent the kinds of financial crises and massive misallocations of resources that have devastated the U.S. economy over the past decade.

We need to promote public values in Internet and finance companies, drawing on best practices in other, more regulated sectors. In health care, for example, regulators are deploying technologically savvy contractors to detect and deter fraud, abuse, and unnecessary treatments.⁵⁷ Similar techniques can and should be applied to keep banks, search engines, and social networks honest.

More transparency would help outside analysts check "irrational exuberance" in markets and uncover corporate misconduct that is now too easily hidden. It might expose unfair competitive or discriminatory practices. But as I propose regulatory measures, I will repeatedly make the point that transparency is not enough, particularly in the finance sector. When companies parry with complexity too great to monitor or understand, disclosure becomes an empty gesture. We need to put an end to the recursive games of "disclosure" and "tricks to defeat disclosure" that have plagued regulators. Transactions that are too complex to explain to outsiders may well be too complex to be allowed to exist.⁵⁸

The Self-Preventing Prophecy

We need to face the darker possibilities betokened by current trends. There is a venerable fiction genre known as the "self-preventing

prophecy.”⁵⁹ An author imagines a dystopia, plausibly extrapolating to the future some of the worst trends of the present. If enough readers are shaken from their complacency, they start to make the changes that can prevent the prophecy.⁶⁰ The author then avoids the fate of Cassandra, the prophetess of Greek myth whose warnings were fated to be disregarded. George Orwell’s *1984* and Aldous Huxley’s *Brave New World* could both be understood in this way, helping to mobilize resistance to the totalitarian futures they described.⁶¹

Films have also aimed for self-preventing prophecy. In Terry Gilliam’s *Brazil*, things start to go downhill for protagonist Sam Lowry after a fly accidentally jams a printer at an antiterror agency. As he tries to fix the error, a sclerotic bureaucracy closes in around him, wrongly associating him with violent extremists. Gilliam depicted a state run amok, unaccountable and opaque. Its workings are as mindless and catatonic as the citizens whom it tortures into submission.⁶²

We like to believe that we have escaped Gilliam’s 1985 dystopia, just as the plausibility of *1984* was eroded by the Eastern Bloc revolutions of 1989. Most major decisions about our lives are made in the private sector, not by a state bureaucracy. State-of-the-art computers are a far cry from the dusty files of the Stasi or the Rube Goldberg contraptions of Gilliam’s imagining.⁶³ The vibrant leaders of Wall Street and Silicon Valley are far more polished than the bumbling and brutal beadies of *Brazil*. Cornucopians urge citizens to simply get out of their way, and to rest assured that technology will solve problems ranging from traffic jams to freakish weather.

But complacency is unwarranted. Many of these companies make decisions affecting millions of people every day, and small mistakes can cascade into life-changing reclassifications. We cannot access critical features of their decision-making processes. The corporate strategists and governmental authorities of the future will deploy their massive resources to keep their one-way mirrors in place; the advantages conferred upon them by Big Data technologies are too great to give up without a fight. But black boxes are a signal that information imbalances have gone too far. We have come to rely on the titans of reputation, search, and finance to help us make sense of the world; it is time for policymakers to help us make sense of the sensemakers.

In their workplaces and in their homes, Americans are increasingly influenced—some might say bullied—by managers who keep their methods under wraps. Corporations depend on automated judgments that may be wrong, biased, or destructive. The black boxes of reputation, search, and finance endanger all of us. Faulty data, invalid assumptions, and defective models can't be corrected when they are hidden. This book exposes them, and proposes solutions.

more than \$50 billion in revenue.⁸⁷ Penalties in Silicon Valley are an order of magnitude more trivial. Although \$22.5 million is only about four hours of revenue for Google, the FTC touted it as a record-setting fine. Facebook settled one case for \$10 million.⁸⁸ The FCC once “punished” Google with a \$25,000 fine. It is a broken enforcement model, and we have black boxes to thank for much of this. People can’t be outraged at what they can’t understand. And without some public concern about the trivial level of penalties for lawbreaking here, there are no consequences for the politicians ultimately responsible for them.

The Limits of Black Boxes: A Hayekian Perspective

Admittedly, black boxes smooth things; they make ordinary transactions faster and more efficient. The reforms I propose would slow things down. They would incur expenses, which would likely get passed on to us. They would cost time, too. It takes an automatic algorithm milliseconds to act on a copyright complaint; it would take longer than that for people to appraise a website’s claim of fair use. Credit raters would have to expend human time and judgment to spot the times when negative credit information is less credible than the person it’s putting down.

I have no doubt that think tanks will offer ominous prognostications about the costs of such initiatives. (Whether they’ll be as forthcoming with the identity of their sponsors remains to be seen.)⁸⁹ It’s easy to forecast the loss of tens of thousands of jobs if financial transactions are taxed, or if credit bureaus are required to give a full and fair accounting of their actions. Wall Street firms have repeatedly purchased such studies and promoted them in lobbying campaigns. But, as law professor John C. Coates has shown, cost benefit analysis of regulation can be yet another misapplication of natural science methods to social scientific prediction.⁹⁰ Despite industry’s predictions of doom, it is just as plausible that accountability in the reputation, search, and finance sectors would *create* jobs rather than destroy them. Accountability requires human judgment, and only humans can perform the critical function of making sure that, as our social relations become ever more automated, domination and discrimination aren’t built invisibly into their code.

Another overefficiency of black boxes concerns the fact that information does not always lend itself to generalization. For example, Amar Bhidé, a professor at Tufts University with experience in finance and consulting, harshly criticizes the homogenizing impact of nationwide underwriting standards on local housing markets. He criticizes black boxes from a Hayekian perspective, exposing our giant finance firms for having faults eerily reminiscent of Communist central planners.⁹¹

Hayek's fundamental insight was that nobody knows everything about how goods and services in an economy should be priced, and that no one central decision maker can ever really grasp the idiosyncratic preferences, values, and purchasing power of millions of individuals.⁹² That kind of knowledge, Hayek said, is *distributed*.

Today, Hayek's most vocal supporters tend to assume that he was only criticizing the state. But the finance sector is plenty concentrated, and interconnected with state power. Bhidé says that its centralization, too, is concerning, and should give way to more localized decision making. A loan officer in Phoenix, for example, would be far more likely to recognize dodgy local mortgage applicants than a high-level manager several hundred miles away. Moreover, a local bank putting its own money on the line (originating loans to keep them) would have a strong incentive to estimate clearly the potential risks and rewards of its decisions.⁹³

A Hayekian critic of black box firms could take this line of reasoning even further. Why should so much of the Internet be organized by a single company, Google? Isn't its fast pace of acquiring start-ups a Promethean ambition to centralize more and more computing talent into a single firm? The same could be said with respect to Apple's tight grip over its app empire, or even the dominant provision of social networking by Facebook.⁹⁴ A committed Hayekian could easily make the case for far more aggressive antitrust enforcement in tech industries.⁹⁵

Black Box Endgame

In their common goals, procedures, and (increasingly) cultures, powerful alliances have developed among the reputation, search, and finance sectors. The first two deal in data, while the securities

of Wall Street, ostensibly at least, appear more concrete. But the differences, while real, are less fundamental than the similarities. Ultimately, they are all in the business of information. What is money (and all its derivative forms) other than *information* about how much of our collective goods and services its owner can demand? And what are reputation and search firms establishing other than new *currencies* for allocating opportunity and attention? All these firms try to process information to score quick gains. But we should never lose sight of the fact that the numbers on their computer terminals have real effects, deciding who gets funded and found, and who is left discredited or obscure.

All rely on secrecy to protect the information on which the quick scores depend. This book could have been about many different forms of secrecy, however. Why focus on Silicon Valley and Wall Street in particular? Leading Internet and finance firms present a formidable threat to important values of privacy, dignity, and fairness. This threat, now increasingly intertwined with the power of the government, is too often obscured by self-protective black box practices and irrelevant distractions. The American political debate for the last several decades has calcified into struggles over “market forces” or “state provision.” Meanwhile the agile impresarios behind reputation, search, and finance firms exploit (and create) problems that neither state nor market alone can solve.

For them, the tug-of-war between market and state has become a *pas de deux*, and the blurring of this traditional distinction lies at the core of the black box society. The “markets” described in much of this book are markets for information—about how likely someone is to click on an ad; incur medical bills; pay off a loan. Information of this kind is valuable only if it is exclusive, *and it remains exclusive only if the full power of the state can be brought to bear on anyone who discloses it without authorization.*

In 1956, the sociologist C. Wright Mills sketched the American “power elite” of that time: the corporations, the military, and the government. Mills saw these entities in rough equipoise in their Cold War setting, each with its own independent base of power (that is, the capacity to force others to do what they would not be inclined to do otherwise). Mills’s division has been more and less relevant over

the course of the twentieth century; after the fall of the Berlin Wall, for instance, the military's domestic power waned, while 9/11 brought with it the resurgence of a defense/intelligence/policing complex. But his concept continues to capture attention and interest.⁹⁶

Some social theorists have adjusted Mills's typology to take into account the rise of other important actors, such as the media. But if Mills's "triangle of power" needs updating, its quaintness derives less from the failure to include other power centers than from the separate-but-equal status that Mills attributed to its members. Twenty-first-century revolving-door dynamics present a constant temptation for public servants to "cash out" for private-sector pay-days, leaving them loath to do anything that might disrupt either their own main chance or similar opportunities for their peers and protégés.

If we are to retrieve our political process from its outmoded and self-serving rut, we must recognize the new landscape. That requires studying the "ideal role of the state in the economic and social organization of a country" directly, rather than presuming it should merely get out of the way of markets.⁹⁷ This is the task of the classic social science of political economy, a method that integrates long-divided fields. Armed with that knowledge, we can take up once more the vital debate that has been so long derailed: What kind of a society do we really want?

Toward an Intelligible Society

Capitalist democracies increasingly use automated processes to assess risk and allocate opportunity. The companies that control these processes are some of the most dynamic, profitable, and important parts of the information economy. All of these services make use of algorithms, usually secret, to bring some order to vast amounts of information. The allure of the technology is clear—the ancient aspiration to predict the future, tempered with a modern twist of statistical sobriety.

Yet in a climate of secrecy, bad information is as likely to endure as good, and to result in unfair and even disastrous predictions. This is why the wholesale use of black box modeling, however prof-

itable it is for the insiders who manage it, is dangerous to society as a whole. It's bad enough when innocent individuals are hurt, branded as security threats or goldbrickers or credit risks by inaccuracies that they can't contest and may not even know about. Modeling is even worse when unfair or inappropriate considerations combine with the power of algorithms to create the failures they claim to merely predict.

Moreover, when the errors are systematic enough, algorithmic control fails on its own terms. That happened most spectacularly in the crisis of 2008. Order was restored only by the infusion of hundreds of billions of dollars of government money, and even in this mammoth intervention secrecy prevailed; the identity of many of the banks involved was kept under wraps at the time.

Educated citizenship today requires more than an understanding of government, which is just the tip of an iceberg of social organization. It also demands an understanding of the companies that influence our government and culture. The firms that order the Internet and direct the flow of capital have outsized influence in Washington. For better or worse, they also increasingly determine the value and visibility of labor, companies, and investments. But they do all this in the shadows. Public options in search and finance need to be developed to create spaces not only for transparency, but for intelligibility as well. Failing that, we can count on a society ever more skewed to the advantage of black box insiders, and a populace ever more ignorant of how its key institutions actually function.

Few of us understand how our car engines work, but we can judge well enough whether they get us to our destinations safely and comfortably. We cannot so easily assess how well the engines of reputation, search, and finance do their jobs. Trade secrecy, where it prevails, makes it practically impossible to test whether their judgments are valid, honest, or fair. The designation of a person as a bad employment prospect, or a website as irrelevant, or a loan as a bad risk may be motivated by illicit aims, but in most cases we'll never be privy to the information needed to prove that. What we do know is that those at the top of the heap will succeed further, thanks in large part to the reputation incurred by past success; those at the bottom are likely to endure cascading disadvantages. Despite the

promises of freedom and self-determination held out by the lords of the information age, black box methods are just as likely to entrench a digital aristocracy as to empower experts.

Open uses of technology hold a very different kind of promise. Instead of using surveillance technology against American citizens, the government could deploy it on our behalf, to monitor and contain corporate greed and waste. Public options in technology and finance would make our social world both fairer and more comprehensible. Rather than contort ourselves to fit “an impersonal economy lacking a truly human purpose,” we might ask how institutions could be reshaped to meet higher ends than shareholder value.⁹⁸ Admittedly, demands for dignity, due process, and social justice are controversial; there will always be holders of vested privilege who prefer not to share. Nevertheless, it is time for us as citizens to demand that important decisions about our financial and communication infrastructures be made intelligible, soon, to independent reviewers—and that, over the years and the decades to come, they be made part of a public record available to us all.

Black box services are often wondrous to behold, but our black box society has become dangerously unstable, unfair, and unproductive. Neither New York quants nor California engineers can deliver a sound economy or a secure society. Those are the tasks of a citizenry, which can perform its job only as well as it understands the stakes.

NOTES

ACKNOWLEDGMENTS

INDEX

NOTES

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I

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