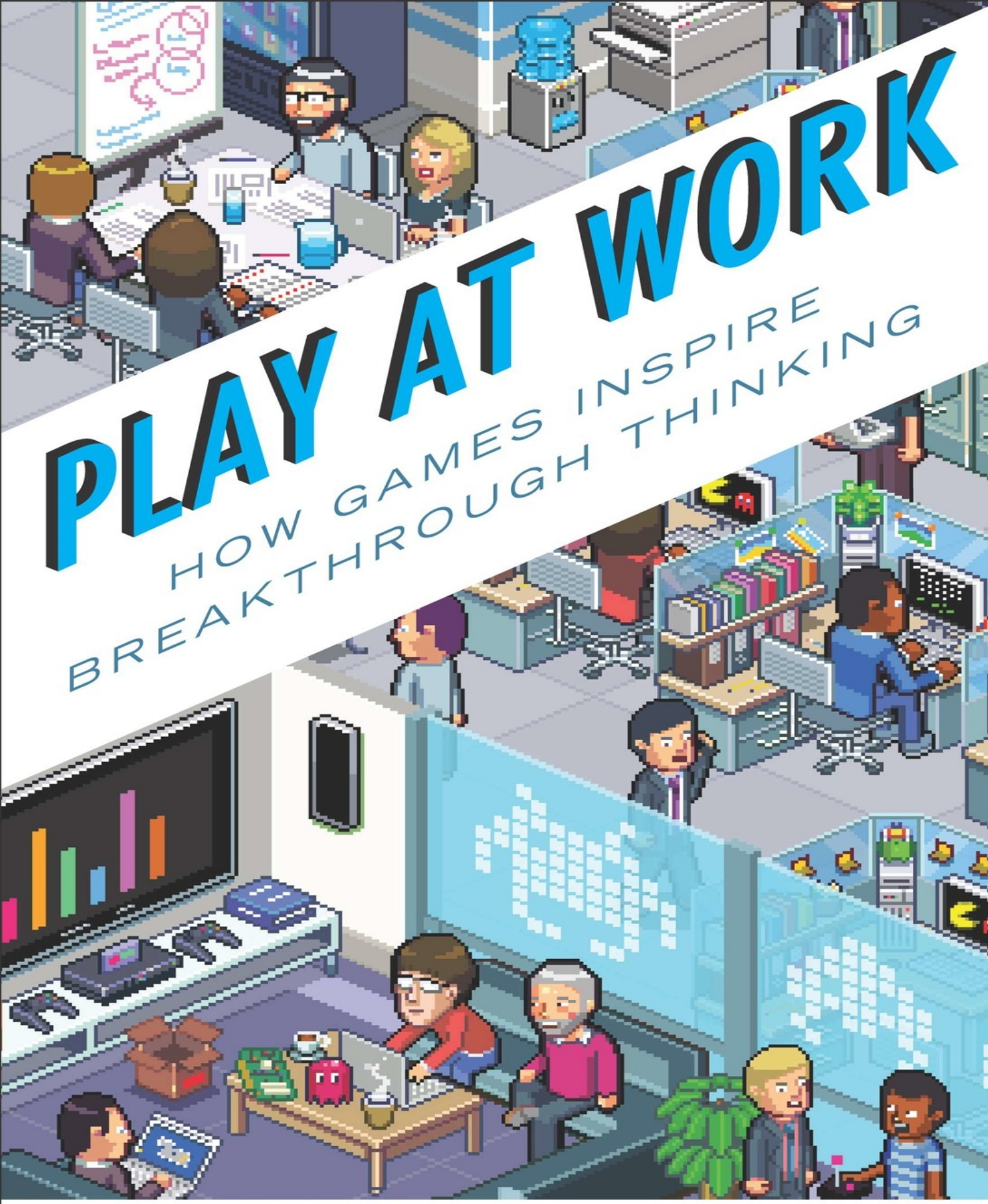

PLAY AT WORK

HOW GAMES INSPIRE BREAKTHROUGH THINKING

ADAM L. PENENBERG

PLAY AT WORK

HOW GAMES INSPIRE BREAKTHROUGH THINKING

ADAM L. PENENBERG

PORTFOLIO / PENGUIN

PORTFOLIO / PENGUIN
Published by the Penguin Group
Penguin Group (USA), 375 Hudson Street,
New York, New York 10014, USA

USA | Canada | UK | Ireland | Australia | New Zealand | India | South Africa | China

Penguin Books Ltd, Registered Offices: 80 Strand, London WC2R 0RL, England
For more information about the Penguin Group visit penguin.com

ISBN 978-1-101-62302-2

FOR THE PENENGIRLS:

Charlotte, Lila, and Sophie

CONTENTS

Title Page

Copyright

Dedication

Introduction

PART I
GAMEFUL DESIGN

CHAPTER 1
This Is Your Brain on Games

CHAPTER 2
Mass Organizer

CHAPTER 3
The Red Balloon Game

CHAPTER 4
The Wisdom of Cars

CHAPTER 5
Anyone Can Be an Inventor

PART II
SERIOUS PLAY

CHAPTER 6
That’s Edutainment!

CHAPTER 7
Wii-hab

CHAPTER 8
Blinded Me with Science

CHAPTER 9
Med-Sims

PART III
GAMES AT WORK

CHAPTER 10
New World Order

CHAPTER 11
Customer Feedback Loops

CHAPTER 12
The Bug Tester

Conclusion

Acknowledgments

Notes

Index

INTRODUCTION

Over the years, Ian Bogost has developed a colorful palette of interactive games, although probably not the kind you're accustomed to playing. As a game designer and professor of digital media and interactive computing at the Georgia Institute of Technology, Bogost is the antithesis to profit-hungry entertainment behemoths such as Electronic Arts, creating games as a mode of expression for social, political, and artistic commentary, and not so much for commercial gain.

For instance, in *Jetset,* which Bogost released through his company, Persuasive Games, a player assumes the role of TSA screeners at an airport and deals with angry passengers and ever-more-complicated rules (shirts are banned, then cell phones) until the line grinds to a halt and he's fired. *Simony*, rendered predominately in Latin, is a combination art installation and iPhone/iPad game that addresses "the role of belief and religion in a technological, secular world." Bogost has released games that feature snippy Kinko's employees serving irate customers, tomato growers confronting *E. coli* outbreaks, and dieters forced to manage their menus on ever-leaner budgets. The ingenious *Oil God* seeks to explore the ties that bind geopolitics, gas prices, and oil profits. "Wreak havoc on the world's oil supplies by unleashing war and disaster," reads the promotional copy that Bogost penned. "Bend governments and economies to your will to alter trade practices. Your goal? Double consumer gasoline prices in five years using whatever means necessary: start wars, overthrow leaders, spawn natural disasters—even beckon the assistance of extraterrestrial overlords."

Given his approach to game design, you shouldn't be surprised to learn that Bogost despises "gamification": the integration of gamelike elements into nongame activities. The way he sees it, ove the past few years gamification has become the "it girl" of business, spawning conferences and a heft dose of me-too-ism as some companies, eager to embrace it, tack on points or badges to just about an mundane activity to trick employees into thinking it's actually fun. That way they'll complete it mor quickly and efficiently. Meanwhile, marketers use it in an attempt to get us to buy more stuff. Think Tropicana, which tried rewarding frequent orange juice drinkers with redeemable points. You might call that lame-ification.

Bogost dismisses gamification as "exploitationware," a "grifter's game, pursued to capitalize on cultural moment," and "to bring about results meant to last only long enough to pad [gamification proponents'] bank accounts" before the next trend comes along. It "gives Vice Presidents and Brand Managers comfort: they're doing everything right, and they can do even better by adding 'a games strategy' to their existing products, slathering on 'gaminess' like aioli on ciabatta at the consultant's indulgent sales lunch."

The mellifluously acerbic Bogost also aims his ire at social game makers such as Zynga, which h dubbed "the Wall Street hedge-fund guys of games" for its purveyance of uncreative, unchallenging

experiences. Bogost's own games also have players engage in uncreative, unchallenging work and game play, too, but that's precisely his point. He views them as tools to educate, to show players how the other half lives, to embrace the mundane and "disrupt and change fundamental attitudes and beliefs about the world, leading to potentially-significant long-term social change." His videographic work, like *Jetset* and *Oil God,* are more performance art than commercial product, and few outside a cadre of gamesian academics have actually played them. But that changed when Bogost shined his critical klieg lights on Zynga's *Farmville,* which requires players to return over and over to water plants that would otherwise die. Bogost "feared" this "behaviorist experiment with rats," as he told CNET, arguing that Zynga's designers were exploiting people's compulsions. If there were a deeper, more critical artistic or social aspect to Zynga's games, that would be one thing. Bogost found it maddening that the company was simply in it for the money.

On his blog he railed against the whole idea of social games, where "friends aren't really friends; they are mere resources," and "not just resources for the player, but also for the game developer, who relies on insipid, 'viral' aspects of a design to make a system replicate." The makers of these games "build compulsion into their design" and "the play acts themselves are rote." If a player gets stuck, h can buy his way to the next level. What's worse, "Social games so covet our time that they abuse us while we are away from them, through obligation, worry, and dread over missed opportunities." They not only waste our time when we play them, "they also destroy the time we spend away from them."

Instead of merely talking about it, though, Bogost decided to make a statement with a satire that would deploy the same inane, albeit addictive, hooks as *Farmville.* The result: *Cow Clicker,* a Facebook game he unveiled at a "Social Games on Trial" seminar held at NYU in 2010.

I'll let Bogost describe it:

> It's a Facebook game about Facebook games. It's partly a satire, and partly a playable theory of today's social games, and partly an earnest example of that genre. You get a cow. You can click on it. In six hours, you can click it again. Clicking earns you clicks. You can buy custom "premium" cows through micropayments (the *Cow Clicker* currency is called "mooney"), and you can buy your way out of the time delay by spending it. You can publish feed stories about clicking your cow, and you can click friends' cow clicks in their feed stories. *Cow Clicker* is Facebook games distilled to their essence.

Bogost made *Cow Clicker* extra social by allowing each player to invite eight others to join his pasture, and whenever someone clicked on a cow, everybody would receive a point (adding incentive savvy that?). A leaderboard tracked the clickiest cow clickers.

Then something remarkable happened. His parody of a game became a hit. It started with those in on the joke playing for the love of irony, but quickly spread well beyond. Soon tens of thousands of players were feverishly clicking on Bogost's bovines, and most weren't in on the joke. Perhaps he shouldn't have been surprised. He had intended *Cow Clicker* to ape *Farmville*—inane, insipid, insultingly easy—except his was a practical joke made at the expense of its players, while Zynga's designers produced theirs for commercial gain. Their ends might have diverged, but their means didn't.

While disturbed by the success of *Cow Clicker,* Bogost, like any good designer, added features to keep players hooked. He introduced "mooney," a virtual game currency that users could purchase wit

Facebook credits, which they in turn bought with real money. (The micropayment exchange rate: 125 mooney = 10 Facebook credits = $1.) This allowed them to purchase *Steel Cow* (a bargain at 10 mooney); *Oil Cow* (200 mooney), which was slathered in petroleum and sported a BP-like emblem; *Bacon Cow* (200 mooney), exactly as it sounds; *Mao Cow* (500 mooney); and a herd of others. Then, to really mess with his users, he created special-issue cows at obscene prices. There was *Bling Cow*, which ran 10,000 mooney, or a cool $80. Many paid, though some became alienated. The introductio of *Stargazer Cow*, which was identical to the standard-issue cow except it was turned the other direction and priced cynically at 2,500 mooneys (or $20), drove 8,000 irate players (16 percent of his playing base) to quit the game in one day. Bogost couldn't have cared less.

To poke fun at the idea of "clicktivism," the term coined to describe what Bogost views as an inherently lazy expression of online political activism when a user chooses to like or follow a cause o person, he partnered with Oxfam America. On a special page called "Cow Clicktivism" ("Click your cow. Change the World."), players could transform virtual cows into real cows by taking part in click ins every six hours, with Bogost promising to donate a real cow to Oxfam if enough people clicked. He also offered for sale a special-edition Cowclicktivist Cow (sad-faced, skinny, ribs showing, ears sagging) for $110. In the end, he raised more than $1,125, or enough to donate fifteen real-life, mooing cows.

In Bogost's view, *Cow Clicker* "distilled social games to their essence, offering players incentive to instrumentalize their friendships, obsess over arbitrary timed events, buy their way out of challeng and effort, and incrementally blight their offline lives through worry and dread." Nevertheless, he layered in more features. Some were conceived to juice the game's virality by awarding mooneys to those who clicked on clicks announced by players in Facebook's news feed. Others played on the idea of badges, like his awarding the Golden Cowbell to players who hit 100,000 clicks. Still others added an element of chance by letting players randomly win or lose money on each click. He sold *Cow Clicker* T-shirts, hoodies, commemorative mugs, and car decals. Still, people bought and Bogost mad money.

His friend and Gamasutra columnist Leigh Alexander noticed a change had come over *Cow Clicker*'s creator, as his joke, which took him a grand total of three days to create, surpassed in popularity all the other projects on which he had lavished attention. Bogost had entered a "no-win spiral," she wrote, "taking on the aura of a mad scientist, making triumphant declarations over equations that were comprehensible only to him and to his inexplicably entrenched players, now indistinguishable from his fellow satirists." He was hooked on administering the game he had created as a satire on the inanity and addictiveness of social games. Bogost also recognized these dangers. "Just like playing one, running a game as a service is a prison one may never escape."

Six months after *Cow Clicker*'s release, Bogost launched, with some fanfare, *cowclickification*, h not-so-veiled swipe at gamification, which he defined as "the application of cow-clicking mechanics to non-cow-clicking applications." Businesses, he boasted, could "employ new cow-clicking mechanics such as clicking a cow to distract customers from the vapid pointlessness of their products and services." Then there was *Cow Clicker Connect*, which allowed Web sites to embed cow-click buttons. "Think about it," Bogost wrote: "would you rather order a pizza, submit a comment, or rate an escort service by clicking a boring button . . . or by clicking your cow?" He churned out a sister game (*Cow Clicker Blitz*), a search engine (Moogle), and a mobile app ("Cow Clicker Moobile") that you could buy in "The Stockyard"—the *Cow Clicker* app store.

When he was finally ready to wind down the game, Bogost introduced a clock counting down to i end but with an ingenious Zynga-like twist: each time a player clicked a cow time ran off the clock,

but Bogost also let players pay $1 for an additional hour (or $400 for a month). Some eleventh-hour remittances delayed but could not postpone the inevitable "rapture." When the clock struck zero, Bogost unleashed the Cowpocalypse, and all the cows "were raptured to their heavenly pastures," eve the ones players spent money on. The game continued to live on with eerily empty pastures. Players could still click where cows used to be and possibly earn a Diamond Cowbell award if they achieved one million clicks. "In so doing," Bogost signed off, "the game has perhaps reached its maximum level of minimalism, although it's clear that nobody is clicking empty space, but rather they are clicking the memory of where a cow once nobly stood."

For his part, Bogost told *Wired* he wasn't sure whether *Cow Clickers* represented his greatest success or a colossal failure. All these people clicking on cows. What did it mean? He wasn't sure.

What it does show is that games and game mechanics can be, if designed intelligently, a powerful way to drive engagement, something that even gamification's most ardent critics would have to agree with.

The Game Layer

Look around. Games are everywhere. Start with that carton of orange juice in your fridge, which mig advertise it's worth three points, redeemable for discounts and prizes. It's a game. What about frequent-flier miles, which are games that reward loyalty? Mega Millions, Powerball, Take Five, and other state lotteries? Games. Nissan has an in-car gaming system that encourages drivers to compete for best efficiency levels (Bronze, Silver, Gold, and Platinum). Talk about a mobile game. You could look at Twitter as a game, the payoff being more and more followers and greater numbers of retweets the more you use it. Peer at the gamelike iconography of your iPhone and you might recognize it as reminiscent of old video games like *Pac-Man* and *Space Invaders*. The next time you go to Target notice the checkout screen. On it you'll see a game that rates the cashier's speed. According to one report, Target maintains a running average of an employee's scores, requiring that more than 88 percent of transactions make the speed cut, with a cashier's score affecting salary and promotions. Target has turned cashiers into players of a corporate game. In some urinals men may see a fly stuck on the bottom, a game mechanic put there to steady their aim (and keep restrooms cleaner).

The term "Baader-Meinhof" describes that feeling you get when you hear or read a word you've never encountered before then subsequently notice it all around you. It's born of our brains' tendency to filter out uninteresting information until it isn't uninteresting anymore. (If you think about it, the first time you read "Baader-Meinhof" may be to experience Baader-Meinhof.) This is what may happen when you begin to notice all the games—and their corresponding gamelike elements—that surround you. That's because games (or at least the characteristics of games) have been creeping into almost every facet of our lives. Some refer to it as the "game layer."

Because games are about players achieving goals while having fun—a very powerful, very human drive—an array of companies such as Google, Microsoft, Cisco, Deloitte, Sun Microsystems, IBM, L'Oreal, Canon, Lexus, FedEx, UPS, Wells Fargo, and countless others have embraced them to make workers more satisfied, better trained, and more focused on their jobs, as well as to improve products and services. Google and Microsoft have created games to increase worker morale, quality control, and productivity. At Google, engineers have been able to spend an in-house currency called "Goobles on server time—often a scarce resource at Google—or use it to bet on certain outcomes as part of a company-wide predictions market. The Brobdingnagian search engine has also gamified its expense

system. If an employee spends less on an airline ticket than he has been allotted, the savings can be donated to a charity of the worker's choice. Microsoft released a game, *Ribbon Hero*, to teach users how to make better use of its Microsoft Office software and has experimented with games in its workplace.

Canon's repair techies learn their trade by dragging and dropping parts into place on a virtual copier. Cisco has developed a "sim" called myPlanNet, in which players become CEOs of service providers, and adopted gaming strategies to enhance its virtual global sales meeting and call center, lessening call time by 15 percent and improving sales between 8 percent and 12 percent. IBM created a game that has players run whole cities. L'Oréal created games for recruitment, for gauging the skill of potential employees and helping them discover where in the corporation they would most like to work. Sun Microsystems has games for employee training. Meanwhile, Japanese automaker Lexus safety tests vehicles in what it brags is the world's most sophisticated driving simulator at its Toyota research campus in Japan. FedEx and airlines deploy game simulations to train pilots, and UPS has its own version for new drivers—one even mimics the experience of walking on ice.

We can trace the term "gamification" to 2002, when Nick Pelling, a young British video game designer, started Conundra, a consulting firm that combined game mechanics with business strategy. Alas, he was too early, and his consultancy didn't last. Over the past few years an entire industry has sprouted up around gamification—the very thing that Ian Bogost detests. The Entertainment Software Association estimates that 70 percent of major employers use interactive software and games for training. Research firm Gartner projects that by 2014, 70 percent of two thousand global organizations will depend on gamified applications for employee performance, health care, marketing, and training, and 50 percent of corporate innovation will be gamified, with American corporations spending several billion dollars on it.

Companies like Badgeville, based in Redwood City and backed by forty million dollars in venture capital, boasts hundreds of Global 2000 businesses as customers. Wells Fargo uses Badgeville for customer and employee engagement, Chevron depends on it for juicing worker collaboration, GE deploys it on its sales team, while Deloitte reports that training programs that have been gamified take workers half the time to complete than traditional ones while concurrently improving attention span. With Badgeville, Coursera, the online education company, reports more activities per student per week, higher grade point averages, far fewer failures, and a significantly higher retention rate. After Samsung layered Badgeville over its Samsung Nation online community with its hundreds of thousands of members, the number of product reviews quintupled and four times as many people leveled up to being "advocates"—those identified as spending ten times as much on Samsung products as regular consumers.

"I think of gamification as music that you listen to when you run," Kris Duggan, Badgeville's founder and chief strategy officer, says. "It's more fun with music."

Games are proving good for business. Popchips' sales increased 40 percent to more than a hundred million dollars after the company created mobile games designed to overcome users' resistance to mobile ads, and Bell Media increased customer retention by 33 percent after introducing "social loyalty" rewards on its Web site. Games are contributing to a healthier workforce: NextJump tasks games with helping to induce employees to hit the gym more often, while AETNA uses Mindbloom's *Life Game* to encourage customers and employees to adopt healthier habits. Gamification may even be good for the environment. SAP created a game to encourage workers to carpool to cut down the company's carbon footprint, while RecycleBank and OpowerL increased recycling 20 percent.

Naturally, business isn't alone in embracing games. The military has been leading the charge into

3-D virtual worlds and experimenting with video games since 1997, when the marines adopted *Doom* the game that popularized the first-person shooter, which it purchased for $49.95, then modified by changing demons into Nazi soldiers firing M-16s. The army budgeted fifty million dollars to develop gaming systems, applying simulations to everything from recruitment to training soldiers in fixing tanks, using satellite feeds, piloting drones and aircraft, and full-out combat missions. Now "militainment" is a state-of-the-training methodology—perfect for young men and women who have already mastered the art of simulated war.

And why not? Army life often imitates art. Operating the gunnery on a tank or firing missiles fro a naval destroyer resembles a first-person shooter game, while piloting a predator drone over Pakista from the comfort of a computer nine thousand miles away is a skill that brings to mind *Missile Command*, a star of the 1980s arcade. Lockheed Martin manufactured *Virtual Combat Convoy Traine* a system in which soldiers who shipped out to Afghanistan simulated battles over the same terrain an even the same streets as the ones they would patrol, grappling with everything from improvised explosive devices to snipers to suicide bombers, and was awarded a $146 million government contra to develop a war-game training system for U.S. and allied commanders.

It's perhaps telling that the army's most successful recruitment tool is a first-person-shooter gam called *America's Army*, in which players get points for blowing up enemy combatants. One study concluded that the game has done more to influence recruits "than all other forms of army advertisin combined," with "30 percent of all Americans aged 16 to 24 having a more positive impression of th Army because of the game." Extremely popular—more than seven million people, including 40 percent of new enlistees, have played the game since its 2002 release—it's also cost effective: *America's Army* cost six million dollars to create and the Web site is a mere four thousand dollars a year to maintain.

Three-lettered agencies like the CIA, FBI, NSA, and DoD use games to train agents in antiterrorism. The Defense Intelligence Agency (DIA) trains spies with PC-based games such as *Sudden Thrust*, written by David Freed, a B-list television writer. *Sudden Thrust* players take on the role of a DIA analyst confronting terrorists who have hijacked a tanker brimming with natural gas an steer it into New York Harbor. The CIA has commissioned the creation of video games to help train agents in counterterror techniques. Meanwhile the FBI uses Microsoft's Xbox in the classroom to show trainees how to plan and execute an arrest and secure crime scenes.

Games have been popping up at rehab facilities and encouraging people to adopt healthier lifestyles. Doctors practice cutting open avatars instead of cadavers before turning to living, breathin humans and perform surgeries in completely simulated environments. Game design has even been changing how we educate our kids, with the mechanics that make games so irresistible retrofitted int curricula and layered into students' classroom experiences. While the last decade witnessed the rise o the social Web, establishing the online framework for how we connect with one another, the next ten years will usher in the era of game design and carry with it a pervasive net of behavior-altering mechanisms.

On some levels this shouldn't be surprising. A large percentage of Americans have been reared o games and it's only fitting that something that has profoundly shaped our connections to the world would be transposed to other aspects of our lives. Today, about 97 percent of twelve-to-seventeen-year-olds play computer games, and so do almost 70 percent of the heads of American households, says the Entertainment Software Association. One survey found that 35 percent of C-suite executives play video games. Before turning twenty-one, the average American has spent two thousand to three thousand hours reading books—and more than three times that playing computer and video games.

You could argue that this much game play makes them experts, if you buy the theories of Dr. Anders Ericsson (popularized by Malcolm Gladwell in his book *Outliers*) on the value of ten thousand hours of deliberate practice. Globally, 350 million people spend a combined three billion hours per week playing these games. PricewaterhouseCoopers estimates that global sales of video games will grow from 2007's $41.9 billion to $68.4 billion in 2012, when they will exceed the combined global revenues of film box office and DVDs.

The massive multiplayer online game *World of Warcraft* boasted at its peak twelve million registered users paying fifteen dollars a month to spend an average of eighty hours per month inside the game. Since the game's release in 2004, users have racked up more than fifty billion hours of playing time—the equivalent of 5.93 million years. Game designer Jane McGonigal, author of *Reality Is Broken*, points out that 5.93 million years ago is when early primates began to walk upright. "We've spent as much time playing *World of Warcraft* as we've spent evolving as a species," she notes.

Play at Work is not about games per se. It is about harnessing the characteristics that make them so engaging and applying them to other aspects of our lives. These game mechanics can be applied to the workplace to make employees happier, more productive and motivated, to increase company profits and improve worker safety, to market new products, and to help with customer service. They can help people learn and better retain information, to create new products and solve big problems. And they can foster healthier lives. Because they are predicated on providing a system of principles, mechanisms, and rules that govern a system of rewards that lead to a set of predictable outcomes, they can ratchet up a person's engagement, and increase happiness and productivity, which in turn can pay big dividends.

There's a real need for this. Unhappiness in the workplace is endemic across all generations, even though, as Shawn Anchor, a Harvard professor and author of *The Happiness Advantage*, points out, "Nearly every company in the world gives lip service to the idea that 'our people are our greatest asset.'" The Conference Board, a private economic think tank in New York, found in a 2010 survey that only 45 percent of American workers were satisfied with their jobs, down from 49 percent two years earlier. Contrast that with the Conference Board's first survey, conducted in 1987, when 61 percent of workers reported being happy with their work. One reason: only half found their jobs interesting, another low in the survey's twenty-two-year history, and the same percentage were satisfied with their bosses, while in 1987 almost 70 percent found their work interesting. The younger workers—those twenty-five and under—claimed the highest levels of dissatisfaction, with 64 percent unhappy with their duties.

Mercer's What's Working survey in 2011 reported that 32 percent of workers were seriously considering leaving their jobs, with several factors contributing to the malaise. Workers cited a lack fair treatment as the most important reason, followed by "work/life balance, type of work, quality of co-workers and quality of leadership." Base pay ranked only sixth. A Gallup poll that same year found that 71 percent of American workers are "not engaged" or "actively disengaged" in their work, and highly educated workers are the least engaged. This is all the more disturbing because, as Gallup notes, engaged employees are more productive, more profitable, more customer-focused, safer, and more likely to remain with their employer. They are also healthier, with workers who are emotionally disconnected from their work about as likely as the unemployed to report suffering from chronic illnesses, obesity, diabetes, and high blood pressure and cholesterol. Further, "actively disengaged employees erode an organization's bottom line while breaking the spirits of colleagues in the process," according to Gallup, which estimates that this costs the American economy more than three hundred billion dollars in lost productivity alone.

Play at Work shows how to combat this abject negativity, which companies, educators, heath care practitioners, and individuals ignore at their own peril. It illustrates how businesses from the smalles start-ups to nonprofit organizations to schools to government agencies and the biggest multinational corporations are unleashing gameful design—the characteristics that make games fun and addictive—to increase worker productivity and job satisfaction, train employees, get them to communicate bette and interact more, incent them to be more environmentally conscious, and contribute to the creative process. It addresses how individuals can adopt games to rehabilitate serious injuries, to gin up motivation and help them conquer necessary tasks, to get fitter and stronger, lose weight, get smarter It peers into the brain and sheds a light on our biochemistry at the instant total engagement is achieved, and considers strategies to mimic this state of mind in the workplace and beyond. It addresses simulations as training tools for surgeons, and looks at ways game design is transforming education.

While games are a powerful mechanism in triggering rapt engagement, they aren't the only way. Communities often coalesce around shared interests, and the book looks at several instances where passion for a hobby has been redirected to help solve big problems in science by tapping the combine force of thousands of people or cocreating products from their initial inspiration through the design process to manufacturing and beyond. With the right approach, it's even possible to harness short bursts of drudgery—such as the security protocol that hundreds of thousands of Web sites have adopted that has you retype fuzzy letters into a box so the computer knows you're not a spambot—an transform it into something that benefits mankind.

Play at Work is divided into three parts. "Gameful Design" focuses on the process of tapping gam mechanics and fostering our natural inclination to play to organize massive numbers of people to solve big problems. It introduces a MacArthur "genius" grant recipient who specializes in combining vast computing power with human intelligence, retrofitting a security precaution used by millions of people to stamp out fraud in online purchases to clean up thousands of articles in the *New York Times* digital archive going back to 1850, as well as millions of pages of old books and maps, and his audacious plan to translate the entire Internet. It takes you into DARPA's headquarters to learn about experiments the agency has instituted to organize large groups of people to locate hard-to-spot clues and come up with better combat tactics. It offers a bird's-eye view of a factory in Phoenix, Arizona, where designs for cars and trucks are "cocreated" by a community of fifteen thousand gearheads. It recounts how one company taps the power of game mechanics to foster competition and lead regular people to post ideas for simple inventions that are collectively designed by thousands of contributors as well as professional designers, before being brought to market and sold at major retailers such as Target.

"Serious Play" looks at using games to solve big problems. It searches for a workable definition o what a game is, analyzes the mechanic that make them engaging, and shows how our brains react when we play them. It looks at ways that "pleasure technologies" (movies, music, and video games) hack our brains by triggering innate reward systems. It explores how educators are increasingly using games to engage hard-to-reach students and the Wii as a staple in rehabilitation (so much so it's been dubbed "Wii-hab"). It profiles a game designer who works with nonprofits to code serious games to promote exercise, help diabetics make healthy food choices, and remind preteen and teenage HIV carriers to take their medications. It relates how games are being used in scientific discovery, helping researchers in ways that few could have imagined. It examines the use of simulations and lifelike mannequins in medical training, leading you on a guided tour of a six-million-dollar simulation cente used for preparing surgeons and health-care professionals for surgery and medical emergencies.

"Games at Work" describes the integration of gamelike mechanics and dynamics to improve business processes, customer experience, and the workplace. It traces the explosion of social media coupled with the expansion of mobile technology and how it is altering the relationship between consumers and products, and what this means for tomorrow's companies. It checks into the use of game mechanics in restaurants to improve service and the gamification of virtual call centers, predicting the call center of the future, where operators may operate inside video games. It takes you to Microsoft's main campus in Bellevue, Washington, to see how one man has been introducing games into the workplace to confront a generational divide that every business faces, improve bug testing and quality control, and in the process increase worker satisfaction and lessen attrition.

While *Play at Work* looks at some of the wonderful ways that games can help us, it is not a paean Games are not a panacea to everything that ails us. After all, someone has to pick up trash off the streets and unclog sewage pipes, and it's doubtful that games could make these pleasurable activities Nor are they likely, despite what some game-design boosters claim, to offer the path to a solution to problems like nuclear proliferation. To quote Gabe Zichermann, author of *Gamification by Design* an Chair of the Gamification Summit: "Game mechanics cannot solve fundamental business problems. will not rebuild poor infrastructure, nor will it heal disastrous customer service."

But intelligent use of game mechanics can help us achieve great things, and that is what this book is about.

PART I

GAMEFUL DESIGN

In a memorable scene in Mark Twain's *Adventures of Tom Sawyer,* Tom's aunt orders him to whitewash a fence as punishment for playing hooky. He doesn't relish this, so, ingenious boy that he is, he tricks several children to do the job for him by convincing them the task is so enjoyable that he doesn't want their help. The boys beg him to let them take over—they even pay him with twelve marbles, a chunk of blue bottle glass to look through, a kite, a key that wouldn't unlock anything, and a dead rat he could swing from a string.

Tom, Twain wrote:

> had discovered a great law of human action, without knowing it—namely, that in order to make a man or a boy covet a thing, it is only necessary to make the thing difficult to attain. If he had been a great and wise philosopher, like the writer of this book, he would now have comprehended that Work consists of whatever a body is *obliged* to do, and that Play consists of whatever a body is not obliged to do. And this would help him to understand why constructing artificial flowers or performing on a treadmill is work, while rolling ten-pins or climbing Mont Blanc is only amusement. There are wealthy gentlemen in England who drive four-horse passenger-coaches twenty or thirty miles on a daily line, in the summer, because the privilege costs them considerable money; but if they were offered wages for the service, that would turn it into work and then they would resign.

If Tom had money, he might have tried to buy his way out of his plight. In other words, he could have proffered what are known as "extrinsic rewards," that is, tangible benefits. In the workplace the are usually manifested as bonuses or a raise in pay. Although Tom Sawyer's friends would likely hav been pleased to receive some extra cash, their hearts wouldn't have been in the task at hand. Instead, Tom served up "intrinsic rewards" by convincing the children that whitewashing a fence was fun. Suddenly something they viewed as drudgery was transformed into a raucous party. Not only were they willing to take over painting the fence, they insisted, and the fence got whitewashed faster than Tom had worked alone.

Tom was deploying a secret weapon: gameful design. On her blog, Chelsea Howe, an independent

game designer who once worked at Zynga, believes that gameful design "helps you do what you want to do." As with Tom Sawyer's friends, "No one is telling you to play, no one is giving you money to play, no one is holding a gun to your head making you play," she told me. "You're intrinsically motivated." Even failing is a virtue—and that happens between 70 percent to 90 percent of the time. Yet they don't put the game down, they try harder. "But we love failing and love knowing that all that's holding us back is learning the system better," she says. "Learn what not to do, learn how to do the good things better, learn how to master the environments so you can get through it quicker, learn more about the people that you are up against so that you can do better against them. It's just a matter of effort and time and skill and harnessing your mental energy and attention."

Tapping into our innate desire to learn can aid all sorts of big-picture enterprises—harnessing the drive and determination of massive numbers of people through judicious use of gamelike characteristics, which, with the aid of gameful design, can help solve big problems. In some instances the by-product of playing a game or engaging in an action yields something beneficial. In others it's merely taking an activity that people already engage in and incenting their behavior with gamelike properties. The key, Howe says, is recognizing that "play is learning." When we play a game, "we learn its system, and the fun of the game is actually learning," she says. "Once we've learned the system, once we've mastered it, once we've finished the game, it becomes 'unfun.'"

In this section on gameful design we'll look at our brains and why they respond so well to play, as well as learn about ways that marketers, movie directors, and game designers hack our brains to induce us to do their bidding. We'll search for a workable definition of games, try to figure out what makes a game good, and differentiate between games and game mechanics. We'll visit with a man who combines the best of what humans and computers do well to organize millions of people to achieve great things, check out an automobile factory outside of Phoenix, Arizona, that cocreates its flagship product by combining the collective wisdom of thousands of car buffs with professional car designers, and look at an entrepreneur who has designed an intriguing crowd-based work flow to make invention accessible to all.

All of these rely on the organization of massive numbers of people, made possible by the same game mechanics that enabled Tom Sawyer to persuade his friends not only to whitewash the fence—for free—but to *want* to.

THIS IS YOUR BRAIN ON GAMES

I first became interested in games and their use in nongaming environments after stumbling across a video of a speech by game designer Jesse Schell, which he presented to a crowd of four hundred or so attendees at the 2010 DICE (design, innovate, communicate, entertain) Summit, the video-game industry's answer to TED. Organizers had invited the forty-year-old game designer and Carnegie Mellon professor dressed in a crinkly button-down shirt and chinos to share insights about his work a Disney Imagineering, where he had helped design large-scale theme-park rides such as Pirates of the Caribbean. But "the Mouse" would have his head if he violated any nondisclosure agreements, so the day before his speech, on the flight from Pittsburgh to Las Vegas, he sketched out something radicall different, which he titled "Beyond Facebook." Later he changed it to "Design Outside the Box."

"There are all these ways that games are creeping into places we didn't think about," he said. Thi was already happening, and the games were altering human behavior. What were American Express points and frequent-flier miles but games that reward loyalty? Weight Watchers? A game with points Fantasy football? A game stacked on top of a game that "leeches off a game." In the Ford Fusion, there's a game installed in the dashboard to incentivize fuel economy. The more gas you save, the more the plant grows. "They put a virtual pet in your car," Schell said in his speech, "and it changes the way people drive."

Sensors have gotten so cheap they are being embedded in all sorts of products. Pretty soon, every soda can and cereal box could have a built-in CPU, screen, and camera, along with Wi-Fi connectivit And at that point, the gaming of life takes off. "You'll get up in the morning to brush your teeth and the toothbrush can sense that you're brushing," Schell said. "So, 'Hey, good job for you! Ten points'' from the toothpaste maker. You sit down to breakfast and get ten points from Kellogg's for eating your Corn Flakes, then grab the bus because you get enviro-points from the government, which can b used as a tax deduction. Get to work on time, your employer gives you points. Drink Dr Pepper at lunch, points from the soda maker. Walk to a meeting instead of grabbing the shuttle, points from your health-insurance provider. Who knows how far this might go? Schell said.

He offered some pretty psychedelic scenarios, like one in which you recall a dream from the previous night where your mother was dancing with a giant Pepsi can: "You remember the REM-tertainment system, which is this thing you put in your ear that can sense when you enter REM sleep, and then [it] starts putting little advertisements out there to try and influence your dreams." If the ads take hold, you win big points for discounts at your local grocery store. "Then there's your office mate," Schell continued, "and he's like, 'Check out this new digital tattoo'" that he got from Tatoogl AdSense, and when you show him yours, you realize you're both wearing Pop-Tart ads. You get paid for the ads, plus thirty additional points just for noticing.

After work, you go shopping. Points. Your daughter gets good grades in school and practices the

piano? More points. You plop down on your sofa for some television, and "it's just points, points, points, points," because eye sensors ensure that you actually watch the ads. In the meantime, you cha with other viewers, play games designed around the ads, and tally more points. It's crass commercialization run amok, Schell conceded, but "this stuff is coming. Man, it's gotta come. What going to stop it?"

The applause was nothing compared to the reception his speech received online. The video went viral, downloaded millions of times. Om Malik, founder of the blog GigaOM and an astute observer all things tech, called it "the most mind-blowing thing I've seen in a long, long time." Others viewed Schell's prediction that in the near future we might collectively exist in a giant Skinner box as abjectly sinister: "the most disturbing presentation of the year" and a "tech nightmare" that would doom us to lead our lives inside the massive multiplayer game of life. My interest gets piqued when something engenders such polarizing reactions.

I meet Schell six months after his DICE speech. He greets me with a grimace and complains of cluster headaches as he takes me to his office at the Entertainment Technology Center (ETC) at Carnegie Mellon University in Pittsburgh. He looks taller in person and guides me through the ETC geekorama, showing me full-size R2-D2 and C-3PO *Star Wars* robots, a Commodore 64 console, wal covered with photos of movie stars and video game characters, and a student lounge that seems to have been designed by the folks who created the original control deck of *Star Trek*'s USS *Enterprise*.

ETC is a feeder farm to the top companies in gaming—Disney, Zynga, Electronic Arts, and many others, including Schell Games. One alum was a lead designer on Zynga's *Mafia Wars*; Schell refers to another as "the Alan Greenspan of *Farmville*" because she sets prices for everything from the seed to tractors and land. Asi Burak, class of 2006 and now copresident of Games for Change, led the project for *PeaceMaker*, an award-winning game inspired by real events in the Middle East conflict. Jessica Trybus founded Etcetera Edutainment, which was spun out of Schell's program in 2005 and provides game-based learning software for businesses and organizations, and her first employee was another ETC grad, Eben Myers.

Schell, whose official title is assistant professor of the practice of entertainment technology ("My business card is six inches long," he says), is a juggler and a magician who has been designing games all his life. Ultimately, it all boils down to this: "A good game," he says, "gives us meaningful accomplishment, clear achievement that we don't necessarily get from real life. In a game, you've beaten level four, the boss monster is dead, you have a badge, and now you have a super laser sword. Real life isn't like that, right?"

No, it's not. A game is, at its root, a structured experience with clear goals, rules that force a player to overcome challenges, and instant feedback. Everyday life is usually anything but. Because games offer clearly articulated rewards for each point players score and new level they achieve, they trigger the release of dopamine, a hormone in the brain that encourages us to explore and try new things. Since we like the feeling we get when our brains are awash in it, we'll do whatever it takes to get it, over and over. We also miss it in the event we run low. That's when our cravings are dashed an we experience disappointment. You find out you didn't make the swim team, your boss didn't approv your raise, or your local bakery ran out of your favorite chocolate chip muffin. Video and computer games, as well as slot machines, are particularly good dopamine generators. In fact, video games uncork almost double the levels experienced by humans at rest. They provide "threshold effects," in which prizes or level changes are dribbled out to keep us hooked. It's the same system that drives compulsive gamblers and cocaine addicts.

As a kid in New Jersey, Schell and his younger brother would play Monopoly with two boards or

three dice just to see what would happen. He would change the rules of tag, so that neighborhood kids would have to hide and seek people. When his parents' marriage hit a rough patch the two boys would wander a local mall unsupervised, Schell gravitating to the Atari 400s and Commodore 64s on displa at JC Penney, dedicating hours to testing programs he cut out of computer magazines. "That was where I learned to type," he says. At thirteen he designed his first computer game, *Fish on a Lake*. "You put your hook in the water and measure success by how many fish you caught," he says. After his mother whisked him and his brother to Springfield, Massachusetts, after the divorce, Schell fell into hacking. He also continued to create more games: one helped his brother with math homework, while another was based on *Doctor Who*.

He was learning what makes a game a game. What he couldn't have known then is that he was really after "flow," a mental state that game players enter when they're completely immersed in wha they are doing and lose track of time. In sports, it's referred to as the "zone," when a basketball playe feels like he can't miss a shot or Tiger Woods smokes the field in the first round at Augusta then hits double bogeys the next day. It's a powerful state of mind that overrides all manner of other feelings. In 2003, two researchers at the University of Southern California studied the impact of violent video games on brain activity. Test subjects climbed into an MRI machine and played a popular shoot-'em- up. These machines are cramped, uncomfortable, and noisy. Most people having an fMRI want to get out of the machine as soon as possible. But the test subjects were content to remain crammed inside for an hour or more as long as they could keep playing.

The originator of the term "flow," Mihaly Csikszentmihalyi (pronounced *CHEEK-sent-me-HIGH ee*), a professor at Claremont Graduate University, has made it his life's work to explore what drives human creativity and happiness. He believes it stems from "enjoyment," and has isolated eight components he says contribute to it. They include the chance to complete the task, concentrate on what we do, seek clear goals and receive immediate feedback, achieve "deep, effortless involvement, so engaged worries slip away," and have a sense of control over our actions. Through all of this, "concern for the self disappears, yet sense of self emerges stronger." He also found that most "optim experiences are reported to occur within sequences of activities that are goal-directed and bound by rules—activities that require the investment of psychic energy, and that could not be done without th appropriate skills." That means it has to offer challenge.

Flow is a state that anyone who has ever played a game knows all too well. Such is the power of games to influence behavior. Games and their mechanics are, Schell says, "a powerful psychological magnet that can connect into anything that we do." Really, though, humans' reward circuitry is a product of evolution. Our brains are tuned for survival, and our ancestors living in the wild learned to identify dangerous predators passed on their genes to future generations, while those that couldn't, didn't. As a result, our brains evolved so that we earn a dash of biochemical pleasure through a hormone called dopamine and experience a sense of accomplishment each time we predict the next sequence in a series of events—such as the number of minutes between sightings of a prowling lion. Sounds a bit like a game, doesn't it?

As Gary Marcus, a research psychologist at New York University and director of the NYU Infant Language Center, wrote in *Kluge: The Haphazard Evolution of the Human Mind*, "Our pleasure cente consists not of some set of mechanisms perfectly tuned to promote the survival of the species, but a grab bag of crude mechanisms that are easily (and pleasurably) outwitted." He cites "pleasure technologies" (a term coined by Steven Pinker) such as movies, music, and video games as forms of entertainment that effectively trigger our reward systems, "culturally selected," he argues, "to tap int loopholes in our preexisting pleasure-seeking machinery."

In other words our brains can be hacked, something that directors of romantic comedies and marketers take full advantage of. It's amazing how much influence our environment can have withou our being aware. I have photos of me when I lived in Japan and traveled around Asia for a couple of years in my early twenties, and recall my parents wondering if I'd turned Japanese, since my eyes ha taken on a somewhat almond shape. Once, in my third-grade music class, we were subjected to Edva Grieg's "Peer Gynt Suite" when one of my classmates tossed a wadded-up note at another kid. The teacher stopped playing the record—not to yell at him but to point out that he had thrown the note, a his friend caught it, in perfect time to the rhythm of the music.

Several studies show that background music in a store or restaurant can affect what and how muc you buy, and how quickly you move through. One study had researchers from the University of Leicester, England, construct flag-draped displays of French and German wines and play French and German music. Customers purchased forty bottles of French wine and only eight German bottles on days when French music played, versus only twelve bottles of French and twenty-two bottles of German wine when German music blared over the supermarket's speakers. Another, dating from 198 found that slow music resulted in a 38.2 percent increase in sales compared to faster-tempo songs, because customers moved more slowly through the store. Muzak, a company synonymous with sickl sweet elevator music, reported that customers in a supermarket walked 30 percent more slowly and spent 12 percent more than when there was no music. Other studies chimed in with findings that four that slow music causes restaurant patrons to stay longer and order more food, while fast music lesse the length of time it takes to drink a can of soda.

All around us are similar commercial influences. If you look closely, you'll be amazed at how we are being constantly manipulated by our surroundings: the playful label of that expensive facial cleanser, the choice of materials for that new phone, the inscrutable smile of a fashion model in a photo—all are subtle catalysts intended to trigger responses in our brain. They are not games, of course, but they share similar characteristics to the elements that make a game enjoyable.

It's a sun-drenched afternoon in Berkeley, California, in 2010, and to learn more about the subtle power that products have over us I am touring the shops at a local mall with A. K. Pradeep, founder and CEO of a neuromarketing firm, which claims to possess the ability to tap into your brain (or, as Woody Allen called it, "my second favorite organ"). Swizzle-stick thin and topped with unruly jet-black hair, the forty-eight-year-old Pradeep is nattily dressed, from his spectacles to his black jacket and red-and-black silk shirt—he favors Gucci—all the way down to his shiny boots. I first met him a few months earlier at a neuromarketing conference in New York City, where he had come to unveil Mynd, the latest version of the company's portable, wireless electroencephalogram (EEG) scanner. It sported twenty prongs that rest on your head like a crown of thorns, capturing, amplifying, and transmitting brainwaves via Bluetooth to an iPhone, iPad, or other smart device.

Pradeep urges me to try one, then points to my brain waves, represented by colorful bars jouncing on the iPad screen. "Good news," he cracks. "You're alive." Then Pradeep reels off volumes of info i a single breath, covering the human brain's hundred-thousand-year history and the business and scientific rationale for neuromarketing, while simultaneously plugging his book, *The Buying Brain*. I is a mesmerizing and exhausting performance, Pradeep speaking with the speed and percussive enunciation of an auctioneer. That morning I had awoken at 5:30 a.m. to get work done before makin cinnamon toast for my daughters' breakfast, tuna sandwiches for lunch, and hustling them out the do so my wife could take them to school. I am tired. Eventually my mind wanders, thinking about how nice a cup of coffee would be.

Pradeep admonishes me. "Are you falling asleep?" he asks, peering at my brain waves on the iPa

screen.

"No, no," I say.

But he knows I'm lying.

At the mall in Berkeley, Pradeep stops in front of a Victoria's Secret plate-glass window and points out the ambiguous expression of a lingerie model on a poster. He explains that the brain is constantly looking out for our survival and is therefore always ready to measure another person's intent. Is that stranger happy? Angry? Sad? When an expression is not easy to decipher, we do a database search through our collection of faces—curious, worried, nervous, threatening—to choose which is closest to the one we see, and match it. "If the expression is easy to decipher, I hardly glance," he says. "But if the expression is relatively hard to decipher, she makes me open the cupboa of memory." Contrast this with the nearby Bebe store, where Pradeep shakes his head at the headless mannequins in the window. "Now that's what I call a crime against humanity. Money down the drain

Inside the Apple store, we pause at a desktop computer and he explains why it's better to put images on the left side of the screen and text on the right: "That's how the brain likes to see it," he says. "If you flip it around, the right frontal looks at the words and has to flip it over the corpus callosum to the left frontal lobe. You make the brain do one extra step, and the brain hates you for that." It's also why you see stores touting prices that end in .99. Our eyes see the lower number first, which tells us it's a bargain even when it's not.

Pradeep loves Apple because he believes the company has elevated basic design to high art. He shows me an iPad. Pradeep claims the brain loves curves but detests sharp edges, which sets off an avoidance response in our subconscious. In the same way our ancestors stood clear of sticks or jagge stones fashioned into weapons, we avoid sharp angles, viewing them as potential threats. NeuroFocus has performed several studies for retailers and food manufacturers and found that test subjects prefer in-store displays with rounded edges over those with sharper edges. In one instance, when these new rounded displays were rolled out to replace traditional store shelving, sales rose 15 percent.

But curved edges are only one reason for the iPad's success. We also like how the tablet feels, ho sleek and well balanced it is. Signals generated by our palms and fingers, along with lips and genitals take up the most surface area within our brain's sensory zone. The way a product feels in our hands can be a major selling point. It's why we prefer glass bottles to cans, which NeuroFocus product-consumption studies bear out, although it's not just the material, it's also the slender curve of the bottle and the ridges in it. The touch screen, too, is a mental magnet and can induce those hormonal secretions Pradeep likes describing. Why we like these curves no one knows for sure. Perhaps our brains correlate curves with nourishment—that is to say, Mommy. (Calling Dr. Freud.) In men, it could be sexual. One study asked men to view before-and-after pictures of naked women who underwent cosmetic surgery to shrink their waists and add to their derrieres. The men's brains responded as if they had been rewarded with drugs and alcohol. But this response to curves may be even more primal than sex or beer. Another study suggested that men seek women with curves because women's hips and thighs contain higher doses of omega-3 fatty acids, which nurture babies' brains and lead to healthier offspring.

All of these—the music, Apple's curved edges, the mannequin's expression—subtly affect us without us realizing it. Their purpose is, of course, not altruistic. These marketing mechanics are ther to induce us to either buy more or help us forge a closer connection to a product. Now imagine the power of games, which require our active participation, and they have an even greater ability to influence behavior.

"Video games change your brain," University of Wisconsin psychologist C. Shawn Green told

Robert Lee Hotz, a colleague of mine at NYU who penned a piece for the *Wall Street Journal*. So doe playing the piano, learning to read, and wandering London's streets, which work our neural circuits i the way that exercising helps build muscle. Several studies indicate that playing video games, even extremely violent shoot-'em-ups, can influence our behavior in positive ways. Combat veterans who play violent games sleep better and suffer fewer nightmares than soldiers who don't play, lessening symptoms from post-traumatic stress. Researchers at the University of Toronto found that playing video games, even for just a short time, improves a player's visual attention so he can better locate a target secreted among a bevy of distractions in complex landscapes—an important skill for radiologists who read MRIs and X-rays, airport baggage screeners who identify potential dangers in thousands of suitcases and carry-on bags, scientists who interpret satellite imagery, and soldiers: they may have a split second to separate enemy targets from innocent bystanders. Another study found tha players of action-packed games make decisions 25 percent faster than those who don't, without sacrificing accuracy. University of Rochester researchers concluded that regular game players could pay attention to more than six things at once, while most people track four. In a study from Michigan State University's Children and Technology Project and involving almost five hundred children over three-year period, researchers found that the more the kids played video games, the higher they score on a test designed to measure creativity. It should be noted, Holtz reported, that cell phones, computers, and the Internet had no effect on these kids' creativity.

There is ample research to support the idea that doctors who play games are better at certain tasks than those who don't. They improve decision making, vision, hand-eye coordination and reflexes, and provide a more effective and efficient way to learn. One study found that surgeons who play games three hours a week commit 37 percent fewer errors and work 27 percent faster in laparoscopic surgery which requires deft use of a joystick, instruments, and a tiny camera, than doctors who don't. And the more surgeons played video games in the past, the better they performed at surgery, with the top gamer docs committing 47 percent fewer errors and working as much as 39 percent faster than others. A group of surgical residents at Yale who practiced in a virtual-reality simulator known as a MIST V trainer performed gallbladder surgery 29 percent faster than those who did not, while the group that didn't train in the simulator was five times more likely to injure the gallbladder or burn nontarget tissue. In another study, a researcher at Arizona State University reshaped a Wii golf club into a laparoscopic probe and had doctors play games that depended on fine motor coordination. The game players exhibited 48 percent more improvement in performing a simulated laparoscopy compared with a group that didn't play.

A. K. Pradeep's insight into psychological marketing techniques shows that we can harness our knowledge of human behavior in productive ways. The same is true for games: under the right circumstances, channeling their influence can help make us better people.

What Is a Game?

Before we go further, I want to define what I mean by "game," and that's no easy task. Perhaps the broadest definition is an "activity engaged in for diversion or amusement." (Thank you, Merriam-Webster.) But I like to read, listen to jazz, and watch stand-up comedy—all are diversions I engage in for amusement and entertainment, but none are games. Another, from the same source, is "a physical or mental competition conducted according to rules with the participants in direct opposition to each other." But crossword puzzles and solitaire are games, and they don't involve "participants in direct