Practice Perfect by Doug Lemov

PREFACE: WHY PRACTICE? WHY NOW?

The three of us are first and foremost teachers. And though this book is for readers in a wide variety of fields, it began some time ago as a book for and about teachers. Still, if you are a parent or a manager or a coach or a mentor or a leader in your organization, you'd have a hard time convincing us you weren't a teacher anyway, so perhaps the book was always destined to become something broader. But in the end, because we are teachers first and foremost, this book tends to see the world from an educator's perspective.

So forgive us if we begin by saying something strange about teaching, which is that we are optimistic—humble, but optimistic. We are optimistic not only because we still believe that the greatest, most gratifying work in the world is teaching someone how to factor a quadratic equation, field a ground ball, run a meeting, read a nineteenth-century novel, or examine an elderly patient with insight and compassion. We are also optimistic because we think that the teaching profession is on the brink of greatness. Teachers around the country feel attacked and cornered in a climate marked, they say, by the overlap of political turmoil and austerity budgets. But when those temporary aberrations fade, we will be left with a series of creative tensions that just may reshape the profession, giving it for the first time a clear way to study and learn from itself, and providing it the tools to get better in ways we'd never before considered. This will happen not just through practice but also in the use of data and analytical tools to find out and capitalize on what teachers do best—"Bright Spots," in the words of Chip and Dan Heath, who wrote the Foreword to this volume and whose work inspires us and so many

others.

We are also humble, though, because we have made many mistakes—several of them public and some more embarrassing than others—in learning what we think can be a small part of the equation that reframes teaching. We are humbled because we believe humility—constantly facing the likelihood that our work could and should have been better—to be the way to do our work in this world. We are humbled so much that we almost didn't dare write this book. And yet we did, because we think it can help, within the teaching profession and well beyond.

This book is about what the three of us—Doug, Erica, and Katie—learned in responding to the struggle for talent in one very important sector of the economy, public education, and in attacking one very critical social problem, the achievement gap between children of privilege and children of poverty. But it's also about what this experience led us to observe about developing talent in other sectors of our lives and other sectors of society. So while we believe this book has important lessons for the field of education specifically, and while we often write about examples from our work in schools and in training teachers, we believe it is also relevant to a wide range of organizations and people who want to get better, who must get better. We also think this book is applicable beyond education because we have each gone through the process of applying what we've learned in the hothouse of our professional lives to the world of our personal lives. Having redesigned the trainings we provide for teachers over and over to wring incremental improvement, we constantly see the issues we faced in that struggle as we try to raise our own children to be caring and positive as people and skilled as mathematicians and musicians and soccer players. We see the issues as we try to develop our own skills at skiing and home repair, at knitting, managing people, and most recently, at writing books. The first step is getting better *at* getting

better.

In these cases we see the role that a humble and overlooked servant could play in spinning straw into gold. That servant is the underestimated concept of *practice*. Generally seen as mundane and humdrum, poorly used and much maligned, or too familiar to be interesting, practice is often considered unworthy of deep, sustained reflection and precise engineering.

We had each separately been working for years on how to help people get better at teaching: Doug as a teacher and school leader, who later delved into his study of champion teachers that would become the highly successful and instructive text, *Teach Like a Champion*; Erica as a teacher, grade team chair, and then founding dean of students, who came to the techniques in *Teach Like a Champion* as a young school leader hungry for a common language to use with developing teachers; and Katie, who came to the team having spent 15 years as a teacher, principal, and consultant to charter schools. She found the collection of techniques in the "Taxonomy" (as it was known before the book's publication) a revelation: it made outstanding teaching replicable. In the fall of 2008 Erica and Katie joined Doug's team to develop ways to train other school leaders in these techniques. The techniques in *Teach Like a Champion* were aimed at transforming the lives of all teachers and students, whether they were in district schools, private schools, or charter schools. But what was surprising was how many people—coaches, parents, tutors, medical faculty, and professors of higher education—saw other applications. So when we looked closer at practice, we looked for broader applications and drew from fields that were much more developed on the topic of practice than teaching.

Along the way, at the recommendation of our colleague Paul Bambrick-Santoyo, we read Daniel Coyle's *The Talent Code* about various hotbeds of talent throughout

the world that have shown us the key elements that lead to talent development. We took away many useful lessons from this book, not the least of which was the central role of practice in the development of talent. We read Gladwell, Gawande, Dweck, and Willingham, trying to better understand how we could take the techniques of champion teachers and develop them in others. We were completely convinced by, and perhaps obsessed with, practice, but we lacked a practice manual. So we revised our practice activities, going on instinct and searching for what worked. Our conversations always came back to practice: What does effective practice look like? What separates true practice from repetition or performance? And what were the key design principles to ensure that practice truly made performance better? And so we arrived at the work before you: a collection of 42 rules to shape and improve how you use practice to get better.

We begin these rules by asking you to rethink your preconceived notions about practice. We address this first because these notions lay the foundation for practice. In the next three chapters we present practical rules for how to set up practice and use the power of modeling and feedback. In the fifth and sixth chapters we look at how to build and maintain a team that embraces practice and leverages its power. Success—for individuals, for organizations, for communities, even for nations—is the struggle for talent. More specifically, it is the struggle to attract talent and the struggle to develop talent, to make people better. Though this has perhaps always been true, the lines of this struggle have never been as starkly drawn as they are today, when local competition is global, when talent is more urgently required throughout every seat in an organization, and where specialization yields higher standards for individual effectiveness. The rules in this book will assist you in developing talent in a highly competitive world, and help you get better at getting better—one practice at a time.

INTRODUCTION

THE POWER OF PRACTICE

Everybody has the will to win; few people have the will to prepare to win.

—BOBBY KNIGHT

It's a funny thing. The more I practice the luckier I get.

—ARNOLD PALMER

John Wooden is a legend. The coach of UCLA's basketball team for 27 years, he was anointed "Greatest Coach of the 20th Century" by ESPN and the greatest coach ever—in any sport—by the *Sporting News*. Wooden led his teams to ten national championships in 12 years, won 88 consecutive games, and achieved the highest winning percentage (.813) of any coach in NCAA basketball history—all while building an enduring reputation for developing the character of his players at least as much as their skill. It's not surprising that in the decades since Wooden retired, his influence has spread far beyond the basketball court. Books by and about Wooden apply his insights to life, learning, and business as much as to basketball.

Regardless of any interest in sports, people study Wooden's methods for the alchemy that turns struggle into triumph. And yet the great majority of students of his work fail to replicate Wooden-like results. Why? Our answer, based on what we—Doug, Erica, and Katie—discovered in our efforts to help promising teachers

become great teachers, is that most people fail to realize the power of the one thing that is arguably the secret of Wooden's success: old-fashioned practice, efficiently run, well-planned, and intentionally executed.

If you were to ask Wooden what made his teams so successful, he would likely describe a series of unacknowledged moments in otherwise empty gymnasiums: his players practicing shooting without a basketball, say. Or perhaps he'd describe his evenings in his office scripting the next day's practice, noting where the racks of basketballs should be placed so time was never wasted looking for a ball. John Wooden doted on practice to a degree that was legendary. He began—surely to much eye rolling—by practicing things that every other coach would have considered unworthy, if they'd have considered them at all: how to put on socks and sneakers, for example.[1] He timed his practices to the minute, husbanding every second to ensure its precise and careful allocation. He kept a record of every practice on note cards, which he filed away for future reference: what worked; what didn't; how to do it better next time. Unlike many coaches, he focused not on scrimmaging—playing in a way that *replicated* the game—but on drilling, that is playing in ways that intentionally *distorted* the game to emphasize and isolate specific concepts and skills. He followed a logical progression, often starting his instruction on topics like shooting by having players work without the ball and building to increasingly challenging applications. He repeated drills until his players achieved mastery and then automaticity, even if it meant not drilling on more sophisticated topics. At the point where other coaches might decide their teams had learned a skill, Wooden's teams were just beginning their work. And he always insisted that his players practiced doing it—whatever "it" was—right.

Though we remember him for the championships, what ultimately made Wooden great was practice. Every iteration of teaching and explaining and

executing again and again was a tiny bit better than anyone else's. The culture in which those drills took place—what players were thinking as they stood in lines—was a little bit more humble, selfless, relentless. The compounded effect of these tiny differences was a dynasty.

Author and sportswriter Daniel Coyle's book *The Talent Code* is just one of several recent efforts to understand the tradition of intentional practice that Wooden helped establish. In the book, Coyle describes how the compounded effect of better practice accounts for the rise of seemingly inexplicable "hot spots" of talent around the globe. What seems like talent, it turns out, is often better practice habits in disguise. How could it be, for example, that a single tennis club in a freezing climate—a club Coyle describes as "rundown" and with just one indoor court—has, since its founding, produced more top-20 women players than all of the tennis clubs in the United States put together?

The answer is Larisa Preobrazhenskaya, the gray-haired, track-suit-wearing majordomo whose players follow the adage that practice makes permanent—that if practice drives actions into muscle memory, it's better to do it slow and right than fast and not quite right. Like John Wooden, she practices fewer things better, and with diligence. She is unapologetic about asking her athletes to imitate others, an approach that many coaches too often dismiss as demeaning. Via these simple obsessions, Coyle tells us, Preobrazhenskaya has almost single-handedly changed Russia's perception of itself. The initial success of her players caused an explosion of interest in tennis in Russia that fed the practice mill with aspiring players and produced success on such a massive scale that it appeared to be a statistical impossibility. Today Russia sees itself as a tennis nation made of players who believe they can do just about anything.

Again and again Coyle shows that the aggregation of seemingly trivial

improvements in practice can create otherwise inexplicable densities of talent sufficient to change a society and its conception of what is possible. Brazil's passion for soccer makes it an international power, but its passion for *futsal*, a soccer derivative featuring small-sided games in an enclosed space using a less elastic ball, yields as many as six times the touches per hour for a developing Brazilian player, Coyle points out, than for a similar player in some other nation. The game's space limitations reward skills learned to speedy automaticity. "Commentators love to talk about how 'creative' Brazilian players are—but that's not quite right. The truth is, they've been practicing that creativity for their entire lives," writes Coyle. The humble details of their practice separate Brazil from every other soccer-obsessed nation on Earth.

For its part, the United States remains a competition-loving culture. We love the heroic upset, the last hurrah of the aging veteran, the final ticking seconds as the game comes down to the wire. We watch games and follow teams and players, sometimes to the point of obsession (especially if our kids are playing), but if we really wanted to see greatness—to cheer for it and understand what made it happen—we'd spend our time watching practices instead. We would pay a lot more attention to how drills were designed, to a culture of humility and perseverance among the players, to whether there was enough practice, or indeed —as we will soon discover—whether there was any practicing at all.

Imagine for a moment what it would be like if we could manufacture "hot spots" like the one Coyle describes among Russian tennis players. Imagine if we could cause a spike in performance sufficient to change a society's perception of what it is possible to achieve by and for its people. Imagine if we could apply it not just to our own soccer and tennis programs but also to things far more important than sports: to running better hospitals and schools, to a thousand endeavors across the

economy where entrepreneurs and managers create value for the people who rely on and benefit from their products and services.

This book is not really about sports, then, though we are confident that you will be able to apply its conclusions in that setting if *you* are all about basketball or soccer or skiing. Our purpose in writing this book is to engage the dream of "better," both in fields where participants know they should practice, but could do it more effectively, and also in endeavors where most people do not yet recognize the transformative power of practice. Deliberately engineered and designed, practice can revolutionize our most important endeavors; in that, we speak from at least a bit of experience.

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Our own journey to understanding the power of practice began with an ad hoc study of great teachers in our nation's high-poverty public schools: work outlined in Doug's book *Teach Like a Champion*. This study revealed that positive outliers—teachers who were anomalously and sometimes breathtakingly successful in the face of adversity—were a lot like John Wooden. They were the most likely to focus on small and seemingly mundane aspects of their daily work.

Great teachers obsessed on things like how efficiently they used time in the classroom. They fought a running battle for seconds and minutes by paying careful attention to how (and how quickly) their students lined up or passed out papers. They perseverated on the words they used to explain a concept. This struck us as ironic. The teachers whose students had best mastered the higher order, the abstract, and the rigorous—a deep reading of symbolism in *Lord of the Flies*, or reliably solving equations with two unknowns—were those teachers most likely to obsess on things that others thought unworthy of attention. There was more to it

than that, obviously. Great teachers did more than obsess on the efficiency of their classroom—their questions were artful; their assignments, demanding—but there was a clear tendency among positive outliers to see the power of the humdrum, the everyday. Think here of John Wooden on the first day of practice, teaching his players to put their socks on correctly. So many of the great teachers, we realized, also had a socks-first mentality. We glimpsed their excellence and wanted to help everyone get a piece of it. So we set out to show teachers in our schools how to get better by studying the ways great teachers taught. In the process, we learned a lot about practice, what makes it work and what makes it not work very well. One of the first things we noticed was something we now call the "get it/do it gap."

During our first workshops we would show teachers one short video clip after another of superstar colleagues demonstrating a particular technique. We would analyze and discuss, and then, once our audience understood the technique in all of its nuance and variation, we went on to the next technique. Evaluations were outstanding. Participants told us they had learned useful and valuable methods to apply. But then we noticed something alarming. If we surveyed the same participants three months later, they were not quite as upbeat. They still knew what they wanted their classes to be like, but they were unable to reliably do what it took to get there. When they tried to fix one thing, something else went wrong. It was difficult to concentrate on a technique with so much else going on. Just knowing what they should be doing was not enough to make them successful.

We realized that our workshop participants, on returning to their classrooms, were trying to do the equivalent of walking onto center court at Wimbledon and learning a new style of backhand in the midst of a match. Of course they weren't winning. Tennis players know that refining your backhand means hitting hundreds or thousands of strokes before a match begins. They know that there is

no way to make the thing you need in order to get better—hundreds of balls hit to your backhand at just the right height with an increasing level of difficulty—happen predictably in a match. In the match there is no way to ensure that when opportunities to apply the skill come you will have enough brain power available to think about it. Instead, you might find yourself scrambling left to right across the baseline and trying to read your opponent's reaction—the backhand itself practically an afterthought.

We realized we would have to do two things. First we would have to approach teaching like tennis. We would have to practice, right then and there in the workshops, even if it meant cutting the number of techniques we taught. Like Wooden, we'd have to do fewer things better. And we would have to shift from training teachers directly to training their coaches: principals and mentor teachers who had the power to build and orchestrate practice on a regular basis. We had to make the design of our practice an explicit part of our training. So our workshops went from being about what the techniques were to how to practice them. A single workshop, we realized, wouldn't really make people better unless it caused them to practice key skills multiple times—or to learn to practice and be able to begin a yearlong cycle of practice.

It's worth pausing for a moment here to reflect on just how strange it was to build workshops for teachers around the idea of practicing. Even though teachers, like other professionals such as doctors or lawyers, are required to continually engage in professional development, they do not engage in what people in other performance professions might call "active practice." By "performance profession" we mean any work, like sports or music or surgery, that happens in real time. If a teacher's performance during a given class is less than what she wanted, she cannot get it back. She cannot, as say a lawyer working on a contract

might do, stop in the middle of her work and call someone to ask for advice. She can't give it her best shot and then, as we are doing as we write, go back and tinker and revise and have the luxury of being held accountable for a final product that reflects actions taken and reconsidered over an extended period. Teachers "go live" four or five times a day. And yet unlike other performance professionals, they don't call what they do to prepare "practice"; they call it "professional development." If we asked a roomful of teachers how often they practiced for what they did in their "game"—how often they rehearsed the questions they ask students, or the way they start class—most would look at us funny. Teachers listen, reflect, discuss, and debate, but they do not practice.

What is the effect of all this listening, reflecting, and debating? Our education system makes huge investments in helping teachers improve their knowledge and skills. A recent policy brief by the Consortium for Policy Research in Education estimated that between 3 and 6 percent of total school spending was allocated to professional development, for example.[2] Assuming the annual budget figure for public elementary and secondary schools alone is $500 billion per year, this comes out to $20–$30 billion every year. It is an investment that yields questionable results. "Teachers typically spend a few hours listening and, at best, leave with some practical tips or some useful materials. There is seldom any follow-up to the experience and subsequent in-services may address entirely different sets of topics," notes the policy brief. "On the whole, most researchers agree that local professional development programs typically have weak effects on practice because they lack focus, intensity, follow-up, and continuity." In other words, what we do to train teachers fails to make them better teachers.

Then as now, this fact was a cause for intense reflection for us. The organization where we work, a nonprofit called Uncommon Schools, runs inner-city public

schools that have closed the achievement gap for poor and minority students, preparing them for college at a rate far in excess of what's previously been accomplished. While we set out to help run a system of schools that would set the standard for high performance, particularly with kids who were otherwise cut off from opportunity, we were keenly aware of the words of former British prime minister Tony Blair's chief education adviser, Sir Michael Barber, and his colleagues in their report for McKinsey on the world's best school systems: "The quality of an education system cannot exceed the quality of its teachers." While the endeavor to make schools better remains something of a national drama, it has resulted in invective, blame, and tension but little evidence of large-scale improvement. If we can't make our schools better, it must be somebody's fault: teachers, parents, some group of politicians or intriguers, perhaps even the students themselves.

Our nation's schools, having more than doubled their annual per pupil expenditures since 1970, have achieved precious little improvement against previous performances—a reduction in outcomes, in fact, if you ask the makers of the SAT. We Americans confront results that place us far below nations with the best school systems, and we wring our hands; but we can't seem to do much about it. Teachers, in your three authors' experience, are for the most part eager to learn and develop throughout their careers, but the plain fact is that we don't help them to do so. The cost, in lost opportunity, is immense.

In this sense, our work as educators is perhaps not that different from yours: you seek to execute a plan that can transform some aspect of daily life and bring immense value to you, your family, your community, and society. You seek to make a positive outlier out of your local youth soccer program, or the quality of care in your city hospital, or the way your managers develop people. If you seek to

do something great, you most likely live a battle for talent—for smart and capable people who can do great things at scale.

In education, as in so many fields, the long-run battle for talent is more about growing it than attracting it. The broader struggle to change educational outcomes isn't, for the three of us, about whether we can get a limited number of game-changing teachers to teach 30 kids in our organization rather than some other organization, but about whether we can help more and more teachers perform like their game-changing peers—and reach thousands more kids. Winning is less about attracting the best parts of the talent pie than about growing the pie. The degree to which we can improve people at every skill level quickly and reliably is the measure of our success at closing the achievement gap or any of a thousand other worthy objectives.

Over time, we have been able to engineer and reengineer our training activities to improve the quality of practice within them. We are lucky in this regard in that we run workshops where we invite the best school leaders and teachers from top-performing schools to join us. These workshops are a hot house for improving the quality of our own coaching and training. The game plan is to stand up in front of a room full of a hundred or so top teachers and try to teach them about teaching. Imagine being hired to play pickup basketball in front of the LA Lakers to show them a few things that might take their game up a few notches. It had the tendency to focus our minds on every action and decision and whether it really worked. Between the mission and the setting we felt the pressure to make every minute outstanding.

Our workshops and our schools were full of people who wanted to be better teachers and were willing to work for that. We had things to teach them that could make them better. But too often we failed to do so. Here's an example: one

technique that differentiated great teachers from the merely good was the way they used nonverbal interventions to correct behavior during their teaching. The idea was that using words to correct students who were in danger of becoming off task required teachers to interrupt the thread of instruction in their classroom. A teacher stopped to correct one student, and two others became distracted—a death spiral. Champion teachers solved this dilemma by using nonverbal correction. Colleen Driggs, a legendary teacher at our school in Rochester, New York, taught her students nonverbal signals to correct the three or four behaviors most likely to occur when their attention was slipping. When Colleen pointed to her eyes, it meant that students should "track the speaker"—look at the student who was talking so they would stay engaged in the conversation. When Colleen clasped her hands in front of her, it was a reminder to sit up straight. If Colleen made a brief hands-down gesture, it was a reminder for students to put their hands down while another student was talking, the idea being that if your hand remains up you are thinking about what you want to say and not really listening to your peer.

Teachers loved the video of Colleen teaching and correcting nonverbally. It seemed brilliant and obvious at the same time, and teachers were excited to try it themselves. Back at our offices we set up a sort of teaching lab to try out different practice activities. Several of us played students. We misbehaved. And while we did so, we sent a brave teacher I'll call "Jen" to the front of the room to try to teach a lesson. She did some good work, but we learned that practicing successfully was much harder than it looked. It was hard to remember to make nonverbal interventions in the moment. Jen went back to old habits under duress. Plus, we hadn't let her think through in advance how she'd handle the behaviors. Trying to decide what to do in the moment distracted her and caused her to make other

mistakes. Our misbehaviors were either too frequent or too soon so that Jen never really got to the heart of her lesson. We were having such a great time channeling misbehaving students that when corrected we'd keep ratcheting things up so that there was always another thing for Jen to try to fix. She'd struggle through an interaction, think of a better response, and repeat the role play, but this time we'd model different behaviors. She never got to practice her fix. Control was always just beyond her grasp.

In the debrief Katie nailed the issue. "What Jen just did was practice failing," she said. "She practiced but she didn't really glimpse what success feels like. She's just ingrained failure even more deeply." We quickly realized one of our first rules of practice—one of the most violated yet important—which we'll discuss in the first chapter: practice should involve people practicing success, even if it means, as it did in this case, simplifying the activity. We began simplifying by making the off-task behavior predictable. Only two people were allowed to be off task. And we told Jen who they were. Now she could allocate her energy to making effective corrections. Then we realized that we needed to let Jen plan not just *any* response but the *right* response. After all, Colleen had done that in her video: she had identified the three most common behaviors beforehand and planned a gesture to correct each. So we added a preliminary activity in which the teacher got a list of typical off-task behaviors (for example, a student staring out the window; a student with her head down on the desk). Jen first had to plan what gesture she'd use to correct the student. Then she practiced making the gesture a few times. Next, she faced the class, but with the students doing the exact behaviors she'd just prepared for in a predictable order. She practiced using what she'd learned, and we made the practice more "realistic" (complex and difficult) only when she was ready for more. Eventually we added other pieces: a coach to give feedback; the

requirement that Jen practice using the feedback right away by redoing the activity. We also added variables we could adapt if teachers found this activity too hard or if they were successful right away.

As we began to use this activity in workshops, we could instantly see the difference: not only in people's reactions to the workshops but in their classrooms. Teachers not only successfully implemented the techniques (we could see it clearly when we videotaped them), but they began to adapt the techniques in new and even more effective ways, which we in turn learned from and added to the trainings we offered.

Over the course of that first afternoon, the next months, and finally over several years, we honed our practice activities into tools that could help make teachers better, at scale. Somewhat unexpectedly, this made teachers happy. At first they were a bit skeptical about practicing—some of them were a lot skeptical. After all, it's awkward and makes you a bit self-conscious at first. But after a few rounds teachers could see themselves improving, both in the practice and in their classroom afterwards, and this had a powerful psychological effect. They realized that the things that happened in their classroom were within their control, that they owned what happened. Success had taught them that they could fix things, step by step. And they wanted more. Further, they enjoyed getting to work with peers in a collegial setting. Practicing together made teaching a team sport.

In the end, success and camaraderie overwhelmed any initial reluctance and embarrassment. Most teachers came to like practice and in many cases started to invent their own ways to practice. Two of our best reading teachers, Maggie Johnson and Nikki Frame, decided to get together for ten minutes a day to practice how to handle one of teaching's great problems: what to say when a student gives you an unexpected wrong answer to your question during class discussion. The

solution was simple: Maggie would read questions from her lesson plan to Nikki. Nikki would give her best estimation of a wrong student answer, and Maggie would have to respond on the spot. Then they'd switch roles. At first it was hard, but they laughed and brainstormed better responses and then took it again from the top. Ten minutes a day for three, four, five weeks: at this point the difference was overwhelmingly obvious. They not only had become good at handling unexpected responses in their classes; they were confident and poised both before and after. They could relax and concentrate on the nuances of student answers and the subtleties of the text. Practice at one skill—handling the unexpected answer—had helped them to make room for improvements on a more advanced skill.

Over the years we have distilled what we've learned from dozens of situations like these—often by error, occasionally by success, almost always with the wisdom and acuity of the wise and insightful teachers in our schools and our workshops—into a set of rules, which we share in this book.

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While Daniel Coyle's *The Talent Code* shows how practice has the power to transform individual performance and that individual performance in turn has the power to transform institutions, another recent book reveals how the power to transform can be applied to seemingly intractable or hopelessly complex social problems. In *Switch*, Dan and Chip Heath, a team of two brothers, one a professor of organizational behavior at Stanford, the other a senior fellow studying entrepreneurship at Duke, set out to reveal how, over and again, massive complex problems don't always require massive complex solutions. In fact identifying simple, repeatable actions that can be quickly mastered (like getting mothers to

buy skim milk instead of whole) can turn the tide on seemingly resistant social phenomena (the rise of obesity). And this creates an opportunity. Many of these simple behaviors are a matter of habit. You pick up the milk you choose because it's the milk you choose. A tiny bit of practice choosing different milk leads to a massive and lasting change.

Perhaps the most compelling story in the book is of an effort to eliminate chronic malnutrition among the poorest people in Vietnam. The effort began by studying what the Heath brothers call "bright spots": the things that despite all the barriers and problems still work. They note that while many poor children grow up malnourished, many do not; so volunteers were sent to study what poor families with healthy children fed them. Turns out they ate tiny shrimp and wild field greens their mothers gathered, even though others scorned the food or walked by without knowing its value. At first other families were reluctant to follow their lead—they didn't know where to find the ingredients; they had never cooked with them before. Their habits were a barrier. But when case workers caused families to practice cooking with those ingredients, not just once but until they were familiar with it, the results were astounding. A simple change had been enough to tip the nutritional balance in the favor of thousands of families. Practiced intentionally, very simple actions could solve a massive problem and unleash a wholly unexpected power to achieve great things.

This raises an important question, which we address explicitly: Whom is practice for? Our initial response is, simply, everyone. Everyone should practice. And it is worth looking at this notion "everyone" a lot more closely. We often start workshops with a photo of Lionel Messi—by universal acclaim the best soccer player in the world—engaged in a drill during practice.

It should be obvious that a professional soccer player practices. But in most

professions outside the hypercompetitive world of professional sports and perhaps a few others—music comes to mind—we assume that practice is something that stops when you get good. Practice implies a judgment. It assumes a lack of competence. But of course this isn't true. Lionel Messi, whose work ethic is remarked on constantly, assumes that practice is a driver of his success and a key ingredient in continuing it. But there's more to the picture than the not-surprising surprise that the best still practice. It's what Messi is practicing that matters too. Perhaps we assume that for Messi practice means playing games of soccer over and over—scrimmaging, in short—so that he applies his prodigious skill to anticipate the game in all of its complexity; yet, in this photo, it is a drill he is working on, one that isolates some small aspect of his game so he can intentionally improve it. The difference between drill and scrimmage is important; it's one of the rules we discuss in the first chapter. A scrimmage replicates the game, and a drill distorts it for a purpose. Most people assume that the higher you go on the competency scale, the less drilling you need to do and the more scrimmaging. In fact, we argue, the opposite is true.

Consider the experience of surgeon and author Atul Gawande, who recently undertook a personal project, which he documents in a recent *New Yorker* article, to see how much he could improve as a surgeon. "I've been a surgeon for eight years," writes Gawande. "For the past couple of them, my performance in the operating room has reached a plateau. I'd like to think it's a good thing—I've arrived at my professional peak. But mainly it seems as if I've just stopped getting better." His logical response was to hire a coach to observe him and give him feedback. "Professional athletes use coaches to make sure they are as good as they can be," he explains, "but doctors don't. I'd paid to have a kid just out of college look at my [tennis] serve. So why did I find it inconceivable to pay someone to

come into my operating room and coach me on my surgical technique?" But Gawande's decision meets with a level of skepticism and concern that reveals our collective prejudice that practice is only for the novice or the struggling practitioner. Patients and peers see the coach standing in the back of the operating theater and assume something must be amiss. Otherwise why would he be there?

In fact, using a coach to review and refine his work boosted Gawande's performance dramatically. Let's look at one small area that Gawande's coach, Dr. Osteen, zeroed in on:

> Osteen also asked me to pay more attention to my elbows. At various points during the operation, he observed, my right elbow rose to the level of my shoulder, on occasion higher. "You cannot achieve precision with your elbow in the air," he said. A surgeon's elbows should be loose and down by his sides. "When you are tempted to raise your elbow, that means you need to either move your feet"—because you're standing in the wrong position—"or choose a different instrument."

The advice was helpful, but for Gawande to use it to maximum benefit, he'd have to remember it in the midst of a complex procedure—perhaps breaking the thread of his concentration—and make the change there in the game. His first efforts to work with lowered elbows may well have corresponded to an implementation dip, the idea that as you try to incorporate a new technique your performance goes down slightly until you get good at it. Was it risky to endure that dip during surgery on a real patient?

What if Gawande and his coach had set up a drill where Gawande simulated procedures and executed them with his elbows down? Just an hour or so might have built muscle memory that could have implemented the advice of his coach

effectively and at lower risk. Despite Gawande's fairly exceptional humility and desire to improve, the potential of using practice to maximize his coach's advice goes unconsidered.

Now consider how many more professions and activities are like teaching or surgery, where practice, with its potential to drive improvement—to create a culture of constant improvement—goes unharnessed. Imagine observing a meeting between a colleague who reports to you—a fellow lawyer perhaps—and a client. As you observe, you (like Gawande's coach) see some good things and some areas for improvement. What if you were working in an organization that supported coaching, feedback, and practice? What if you could give your colleague feedback after the meeting? Perhaps you'd say, "Try asking more questions. A lot more. That will help you understand the specifics of the case"—she should ask more questions so she understands the specifics of the case, for example. You engage your colleague in a discussion where she might recall the exact moments in which she could have done so. She might remember to do so on her next meeting, which would be an improvement. But she might not. And what if the meeting is critical or urgent, and she can't risk a mistake? How much better would the outcome be if you first role-played to diagnose her strengths and weaknesses and then had her practice asking more questions, until she was asking not only more but better questions to draw out the best information from the client and make the client feel supported? Finally, if you had conducted the "client meeting" practice session with not only one lawyer but several, they might have learned from each other and developed their skills at the same cost in resources and time as developing one employee. And they probably would have improved more by watching each other, learning from each other's strengths and weaknesses.

If you were able to do these things and, over time, do them outstandingly well,

you would have an efficient way to develop people for the most important tasks across your organization, your team, your school, wherever you want to help yourself and others get better. You would have an advantage that might allow you to achieve—as many of the organizations that have attended our workshops have begun to do—positive, even exceptional results. You might even end up like one of the 32 franchises in the National Football League. In that hypercompetitive sector of the economy, where talent is so valuable that its allocation is regulated by a complex array of protocols—a draft, a salary cap, restricted free-agency, to name a few—coaches watch practice film at least as intently as they do game film. Consider this description from a recent *Washington Post* article profiling the approach used by Redskins head coach Mike Shanahan, an NFL legend:

> By the time [quarterback] Rex Grossman lined up . . . three video cameras manned by three cameramen rose 60 feet in the air on three massive orange lifts. . . . The play . . . appeared on a white sheet of paper with burgundy headings that listed every play to be practiced that day. Anders Beutel, the assistant equipment manager and Grossman's de facto center in such drills, held a copy of the practice script. High above the field . . . the team's video director held another copy of the script, because every play of every practice is recorded from multiple angles.

Organizations that operate in the most intense competitive settings have come to realize that practice time is the most valuable time they have, and logically this shows up in how they use video. As video has gotten exponentially easier and cheaper to produce, its use has exploded, but changes in its use are telling. In its first iteration people videotaped games in order to understand performance; in the second generation they film practices instead. The latter, they find, are more important in driving results.

■ ■ ■

In the following chapters you will find 42 rules for making your own practices the most valuable endeavors they can be. These rules were hard won: they are based not only on our years of working with teachers but on our readings and research, our own experiences and those of our children as they have strived to grow and learn, and on constant discussions about how to help people do things better. We believe in the power of small things, so you will notice that the rules sometimes go into technical detail; but we are convinced that paying attention to such detail will yield the same outstanding results for you that it has for us—perhaps even better.

In the first chapter we'll look at common assumptions about practice and as a starting point ask you to reconsider them. The second chapter will focus on design principles for running effective practices. The third looks at the role modeling can play in increasing the effectiveness of practice sessions, and the fourth explores the important role of feedback. The fifth chapter considers practice as a social activity and therefore one that both expresses and relies on a culture of openness, transparency, and humility. What comes after practice, and how decisions about hiring, evaluation, and implementation make the work you do more effective, is the focus of the sixth chapter, and in the final chapter we reflect more extensively on the application and importance of practice in achieving better results in professional endeavors.

RETHINKING PRACTICE

Malcolm Gladwell's widely read book *Outliers* is, you could argue, a study of the number 10,000. That's the amount of practice, in hours, necessary to become world-class at just about anything, he argues. Gladwell details how the "10,000 hour rule" helps to explain the rise of experts from Bill Gates to the Beatles. Exceptional talent equals an exceptional quantity of practice—10,000 hours to be exact. But of course what you do in practice matters as much as, if not more than, how much you practice. "A kid who practices hours of sloppy pick-up basketball every day is going to develop less than a kid who practices really well for two hours a day with good instruction and feedback," Michael Goldstein, one of the best teacher trainers in the country, recently told us. John Wooden seems to concur, offering would-be coaches this singular advice: "Never mistake activity for achievement."

On the basketball court, in the classroom, and in a thousand other places, you can work hard without getting very far. During practices, coaches urge hustle and effort, but they aren't enough, a fact that is especially challenging because hard work is so easy to see. Like a shiny, bright, and brilliantly distracting object, it draws our attention. We overrate hard work in evaluating the effectiveness of practice. "Bustling bodies making noise can be deceptive," Wooden wrote. Hustle and bustle can distract us from noticing when we're not actually that productive. This is just one of the ways that this chapter asks you to reexamine assumptions and truisms about how practice works.

Let's begin by looking at a youth sports practice. It is a brisk evening and a group

of nine-year-old soccer players are bustling about on a patch of turf. The drill they're doing requires them to dribble the ball through a set of cones, then pass the ball underneath a bench as they run to one side of it, meeting the ball on the other side. Once they do this they move into a square of cones where they tap the ball back and forth between both feet quickly ten times. Next they race off to a new set of cones where they tap the top of the ball with alternating feet. The sequence ends with their dribbling in for a shot on goal. At first glance, the drill seems first-rate. It offers constant activity and continuous variation plus the opportunity to practice a myriad of skills. Busy bees! A closer look, however, reveals that what these players are doing may not lead to much improvement. It's not enough to just be busy.

Consider the part of the drill in which players tap the ball back and forth between both feet, for example. One of the keys to doing the activity correctly is to bend the knees slightly, as one of the coaches points out when she introduces the drill. However, you observe that many of the players complete the activity with their knees locked. Some appear to pass the ball fairly well, but in reality they are practicing doing it wrong, getting better at standing up straight instead of flexing their knees. Every time they run through the drill, they get more and more familiar with the feel of playing with their knees locked. As they do so, they get further and further from their goal. Now think of all the skills contained within these drills and all the ways players might be doing them wrong—shooting with a loose ankle or pushing the ball too far ahead on the dribble, and so on. Activity? Yes. Achievement? Not so much.

Surely the practice we just described isn't all that bad, but it could be much better. Training and development of an organization's talent that is "merely good" is not enough to make individuals or an organization significantly better than

anyone else. Even a higher quantity of "good" practice won't really set your organization apart. To be significantly better you need to be significantly more productive in every minute that you practice. You need to be great. Fortunately, great is often not that far from good, and even small changes can increase by a striking degree the rate at which people develop.

Michael Goldstein applies this idea to teacher training. He observed to educator-writer Jay Mathews recently that less practice of better quality could yield more preferable results than more practice of lesser quality: "A rookie teacher who simply student teaches or acts as an assistant teacher might simply be repeating the WRONG moves." Imagine the benefits to the teaching field, Goldstein wonders, if the same amount of practical learning could be accomplished in a practice lab at one fifth the cost of a typical field placement, or at the same cost with five times the learning. And imagine the squandered investment. We send teachers out to "practice" the job in settings where there's not much supervision or specificity about what and how; not much feedback and oversight. We know the cost of training is immense, but for all we know, it doesn't help at all. Couldn't a similar argument be made about the training of doctors and lawyers and a thousand other professionals?

In the rules that follow we'll rethink eight assumptions many people hold about practice (and see the summary table at the end of the chapter). Reexamining assumptions can help you dramatically improve the quality of what you do to get your team ready for the game, a key meeting, a challenging work situation, an artistic performance, or a medical procedure. In all of those cases better practice will help you to win.

In reading this chapter, your goal need not be to turn what you do for practice upside down all at once so much as to tinker and improve it, piece by piece, to find

what works better, until what you have is a killer app for improving people. See if this works. If so, keep it. You can be skeptical and still test new ideas, then decide whether each one is the right change to drive results. So choose an idea, maybe even a handful, and see where that takes you. These rules will start you on your journey.

RULE 1 ENCODE SUCCESS

We are fond of saying "practice makes perfect," and indeed the title of this book plays on the connection between practice and perfection. But it is more accurate to say that practice makes permanent. In practice you can master a skill thoroughly or not at all, and what you master can be the correct method or one where your knees are locked. Either way, what you do is likely to become encoded —it will be instilled in muscle memory or mental circuitry and become habit—for better or worse. Practice all the wrong moves and your team will execute the wrong moves when it's time to perform. Practice without intentionality and you will perform without much intentionality. A critical goal of practice, then, should be ensuring that participants encode success—that they practice getting it right—whatever "it" might be. While that may sound obvious, practice that encodes failure is common. There are a lot of reasons for this, but two seem especially pervasive. First, we can fail to observe our practices carefully and strategically enough to see whether participants are getting things right, and second, we can put participants in situations that make failure likely in a mistaken effort to steepen the learning curve. In a minute we'll tell you a bit more about those two pitfalls but first, a brief digression on the topic of romanticizing failure.

Someone you know, maybe your Uncle Lou, tells a version of this story. He will be thinking back to the days when he was just learning to (a) write a legal brief, (b) ride a bike, (c) dance the tarantella, or (d) shingle a roof, and say, "By God, I tried it a hundred times. Got it wrong the first ninety-nine, but I picked myself up. Eventually I got it." Your Uncle Lou may be right that he learned that skill pretty well, and the struggle may have been invaluable to him—but just because a great many things have been learned via Uncle Lou's method does not mean that it is the most efficient and effective way to learn in general. Uncle Lou may have learned at a cost, in time and effort, that was ten times what was necessary. Which means that the real story could equally have been how good he might have been if he'd learned more efficiently. If your job or your passion is to make success systematic, to train people to do something better than anyone else—value investment cash flows, teach public school children, field ground balls cleanly—be skeptical of stories that romanticize failure. While failure may build character and tenacity, it's not as good at building skills.

Let's look more closely at those two common reasons why practice encodes failure. The first comes about because running effective practice requires a systematic attentiveness to participants' rate of success. "You haven't taught it until they've learned it," Wooden liked to say, and the best teachers test to see how much students have learned—a process called "checking for understanding"—every few seconds. They realize that lack of understanding builds on itself and gets harder to fix the longer you wait, so they are always asking themselves, "Are students getting it? Am I sure?" In the case of practice, systematic observation of participants to ensure that they can do what you tried to teach them should include not just checking but acting on the results. Practice should be designed so that a participant who fails to succeed at an activity tries it over again. This can be

within the activity's original setting (they go back to the front of the line) or in an impromptu one-on-one session ("Let's try that a few times standing right over here, Charles"). Checking for mastery requires responding to failure to remediate it as quickly and as positively as you can. But it also means thinking differently. It means thinking about participant performance as data. If you were running a practice session and three participants got the activity wrong followed by one who got it right, you might be tempted to think, "Good, they finally got it." It's just as plausible that the correct response would be, "Uh-oh. Only one out of four of them got it." In other words, the news is cause for concern, not celebration. In the soccer practice we described at the beginning of the chapter, players encoded dribbling a soccer ball wrong and therefore got better at doing it wrong. One contributing factor was the drill's design, which made it difficult for coaches and players to be attentive to whether success was happening—to check for mastery. With five different activities going on at once there was probably too much for the coaches to process with the kind of systematic, data-driven focus that checking for mastery requires. Every time they turned, there was a new thing to be looking for: locked ankles, bent knees, being up on toes. The result was lack of awareness about participants' level of mastery of each task. The complexity of the drill increased the likelihood that failure went undiagnosed—and thus continued.

Another source of encoded failure is the tendency of coaches to double down on difficulty in the hope that this will steepen the learning curve. If hitting a hundred pitches in the backyard will make your daughter a better hitter, it's easy to think that hitting a hundred 60-mile-per-hour pitches in a batting cage will make her better even faster, but that's not true. Facing pitches that are moderately above her current ability level is likely to allow your daughter to apply small corrections to what she does and see whether they work. It allows her to get more efficient with

her technique. However, if the pitches are too fast and result in her consistently missing the ball, she's likely to start reaching desperately to make contact, disrupting the things she already does well and trying random rather than productive adaptations. Straining fruitlessly at the streaking ball, she risks developing new bad habits.

Cognitive scientist Daniel Willingham observes in his book *Why Don't Students Like School?* that people learn fastest when the problem solving they are asked to do requires them to make small and steady leaps, when problems are challenging but not sink-or-swim-ish. If the task is accelerated too much, learning slows down. What's more, Willingham observes, people like solving problems when they are presented in a gradual and incrementally more complex way, which means people are actually happy when they are learning well. But this means that failure can also be costly. It may cause participants to give up. Only by immense forces of will do they keep going when they get it wrong time and again. The fact that Uncle Lou remembers his desperate, knocked-down-99-times struggle to learn so vividly only suggests that it was perhaps the only time in his life when he endured such a struggle.

Finally, it is important to consider what we mean by success. While we want participants to experience primarily success during practice, the ideal success rate still isn't 100 percent—if that's the case, then the activity isn't hard enough. You want a success rate that's high enough to be reliable: most of the participants get it right most of the time. If you start a process with a significant amount of error, don't stop until your participants have begun to encode success. If the error is persistent and prevalent, ask yourself whether there needs to be so much of it. Why not redesign the process instead, eliminating complexity or variables to make the task temporarily simpler, breaking a chain of skills down to focus on just

one, or slowing things down so there's time to process the complexity and then speeding it up later on? As a rule of thumb, we use the following goal for practice: you want your participants to complete the fastest possible right version of the activity. If they aren't able to do it right, slow down and work back up to the original task. A corollary of this is to do the most complex possible right version your participants are able to sustain with consistent—if imperfect—success. If they aren't able to do it right, eliminate complexity until you start to see mastery. Then build back up from there.

Encode Success

- Engineer practice activities so that the success rate is reliably high; if the activities are especially challenging, ensure that they end with a period of reliable success so your participants practice getting it right.
- Check for mastery constantly. If activities don't result in reliable success, simplify temporarily so that participants start successful; then add complexity.
- Focus participants on the "fastest possible correct version" or the "most complex right version possible" for any activity.

RULE 2 PRACTICE THE 20

The 80/20 rule, commonly cited among economists to explain a wide variety of events, is sometimes known as the "law of the vital few." It's a pattern that holds true again and again: 80 percent of results turn out to come from 20 percent of the sources. Your business digs into the data and finds that 80 percent of its profits come from 20 percent of its customers. Or in seeking to understand those

high-value customers, the company finds that 80 percent of the useful information comes from 20 percent of the data points. Even though you spend a ton of money gathering the rest of the data, it doesn't actually help you that much.

The law of the vital few relates to practice as well. It suggests that to become great, you should focus more on practicing the 20 percent of things that most create value than the other 80 percent of things you could plausibly spend time on. You'd practice that 20 percent of things obsessively—80 percent of the time, some would argue—eschewing things of lesser value and becoming, metaphorically (or literally), the football team that runs five plays so well that even when everyone in the stadium knows they're coming, they're still unstoppable. With practice you'll get stronger results if you spend your time practicing the most important things.

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One of the most counterintuitive but valuable things we've realized about practice is that the value of practicing something *increases* once you've mastered it. Most people say, when participants get to proficiency, "Good, they know how to do that. Now let's move on." But if you are practicing one of those most important skills—one of the 20 percent of skills that drive 80 percent of results—don't stop when your participants "know how to do it." Your goal with these 20 percent skills is excellence, not mere proficiency. Keep going so that what you develop is automaticity, fluidity, and even, as we'll discuss later, creativity. Being great at the most important things is more important than being good at more things that are merely useful. Xavi Hernandez, one of the top soccer midfielders in the world, makes this point in an interview in England's *Guardian*. Xavi describes a single practice activity that characterizes Spanish soccer and explains its dominance. "It's all about *rondos*," he says, referring to a game in which four or five players pass a ball rapidly around the outside of a square and one or two players pursue

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the ball. "*Rondo, rondo, rondo*. Every. Single. Day. It's the best exercise there is. You learn responsibility and not to lose the ball. If you lose the ball, you go in the middle. Pum-pum-pum-pum, always one touch." The drill is so useful that players do it over and over—at the expense of something new. The value of the drill doesn't decrease as they get better at it; it increases. And in the end the fact that the Spanish have a specific name for this drill expresses its importance—and, incidentally, the usefulness of naming drills to allow participants to discuss them more efficiently. To be, like the Spanish, the best in the world and to develop a competitive advantage, be alert for the times, when participants learn something in an especially valuable type of practice, when it would be more productive to say, "Good, let's keep practicing this until we're truly great."

So how do you find the 20 percent of the things that are the most important to practice? You may know these things already from experience. If so, great. If not, data can be an excellent source of insight. What do your customers tell you they appreciate? What do your employees say makes them value their managers? What math skills most lead to mastery of algebra a year from now? What procedures in the operating room are most common—or are most likely to lead to errors, which could be eliminated?

If clear data are not available, consider harnessing the wisdom of crowds. We're stealing the phrase here from the book of the same name by *New Yorker* financial columnist James Surowiecki, who points out that aggregating the opinions of multiple people often yields an accurate analysis of a challenging situation—even if none of the people is an "expert." In one example, a missing submarine is found in the midst of thousands of square miles of open ocean by averaging the guesses of multiple scientists as to its location. No individual was close, but the average of all individual opinions was stunningly accurate.

If you're struggling to identify your 20 percent of things—if you don't know what the five most important things for a budding saxophonist to practice are—assemble a group of relatively informed people and ask them to name their top five. Using the five most frequently cited ideas as your answer won't be perfect, but it will be darned good and will allow you to begin practicing each topic to excellence. The goal is not to be good at basic skills and then move on. The goal, again, is to be great at the most important things.

It's worth noting that the 20 percent will change over time and thus require periodic reassessment. Assessing your 20 percent is also a smart way to use data. Tim Daly, president of The New Teacher Project, recently did this to revise the way his organization trains teachers. Daly realized that teachers TNTP placed in schools often never succeeded if they failed to learn to manage classroom behavior within the first two months. He asked his team to redesign training, dramatically reducing the number of topics on which new teachers received training and focusing on the skills they would need to establish a classroom culture until that goal was achieved. This change allowed them to spend 80 percent of their time on 20 percent of the skills and to better prepare their teachers for success. After that there would be more time, they realized, to practice skills that would be more important over the long run—a new 20 percent.

Your first instinct may be that organizing practices around the 80/20 rule will cause you to spend more time planning. The short answer is that you're probably right. You can't decide on Friday at 2 P.M. what you'll do for professional development that afternoon with your teachers; you can't decide each afternoon while driving to your daughter's basketball practice what you'll do at practice that day. The longer answer, however, is more nuanced. You have to build a map of your goals from the outset. And you have to design extremely high-quality

activities for each of your 20-percenters that get progressively more complex. On the other hand, once you've done that, you'll no longer waste time preparing a smorgasbord of activities that you'll use briefly and discard. You invest in developing better activities that you will use over and over. In the end this may save you work.

Practice the 20

- Identify the 20 percent of things you could practice that will deliver 80 percent of the value.
- Practice the highest-priority things more than everything else combined.
- Keep practicing them: the value of practice begins at mastery!
- Save time by planning better in advance.
- Engage participants by repeating productive drills with minor variations instead of constantly introducing new ones.

RULE 3 LET THE MIND FOLLOW THE BODY

A colleague of ours, a teacher we'll call Sarah, spent a lot of time practicing giving directions to her students. She did this because students had sometimes struggled to follow her directions and several observers suggested that one reason might be the directions themselves: what Sarah asked her students to do was sometimes not so clear. So Sarah practiced, first writing out sequences of concrete, specific observable directions, a technique known as *What to Do* (described briefly at the end of this book). Then Sarah practiced saying aloud the directions she'd written

as if she were delivering them to her class. She did this both on her own and with colleagues, and made revisions based on the surprising amount of insight she gained from hearing the words aloud. During the period of time when she was practicing her directions, she tried to make the skill a habit—that is, her natural way of thinking—so she practiced in every setting she could think of, even if only briefly.

A few weeks later, Sarah asked a colleague to observe her class. Afterwards, her colleague's first question was to ask Sarah herself how she thought it had gone. The good news, Sarah observed, was that the class had gone relatively well. Students had been orderly and productive, so at least she hadn't been embarrassed. But she apologized: she hadn't had a chance to try many *What to Dos* except at the beginning of class. She didn't demonstrate the skill she'd been practicing. Perhaps the observation had been a waste of time. Her observer had seen something totally different, however. She had seen Sarah use *What to Do* time and again when students needed a quick correction to help them back on task. Sarah, in short, had been using the thing she had practiced without even realizing it.

Sarah had made a habit of a skill through practice; in the game, when her mind was processing other things, it relied on the new habit without her realizing it. This experience may well be familiar to musicians and athletes and others who practice regularly. Once you have learned a skill to automaticity, your body executes, and only afterwards does your mind catch up. Customer service representatives who are trained to be calm with angry customers don't get any less frustrated in an adversarial situation; rather, they have normalized an emotionally constant response by practicing it. They do it without thinking, and this is exactly the point: the best way to get employees to behave calmly in the face

of difficulty is not to ask them to consciously choose to exude calm during tense calls; it is, rather, to practice being calm in tense situations over and over so that it happens automatically.

In *Incognito: The Secret Lives of the Brain*, science writer David Eagleman describes not only the ways our brains do things we are not fully aware of, but the critical importance of our brains relying, entirely unconsciously, upon behaviors we've learned by rote. In one example, he describes research conducted on amnesia patients, whom researchers had learn and practice a video game. Because they had no short-term memory, they were unable to recall playing the game, but when they played again their scores improved at the same rate as those with fully functioning memories. The takeaway: You don't have to be aware of your knowledge to use it.

In fact, awareness often gets in the way. It is not a quirk of survival but a necessity that, speeding down the highway, your foot moves to the brake pedal well before your conscious brain has time to get involved in analyzing the decision. For people who perform for a living, the imperative of training the mind to execute unconsciously is also strong. Eagleman describes the ironic fact that "a professional athlete's goal is to not think." Rather, his goal is to develop "economical rote algorithms" during practice so that "in the heat of battle the right maneuvers will come automatically." Consider hitting a baseball. It takes about 0.4 seconds for a serious fastball to reach the plate. "Conscious awareness takes longer than that: about half a second," writes Eagleman, so most batters are not consciously aware of the ball's flight. The entire process happens before the batter becomes aware of it. Success is based on habits the batter has built but cannot consciously manage in the moment when they are most needed.

A synergy of conscious problem solving and automaticity developed through

practice. This phenomenon is evident every time you drive. Not only do unconscious habits you've burned into your memory determine many of your actions, but while all of this is happening you may engage in some of your deepest and most reflective abstract thinking. While you are executing a series of complex skills and tasks that were at one time all but incomprehensible to you, your mind is free to roam and analyze and wonder. If you use practice to build mastery of a series of skills, and if you build up skills intentionally, you can master surprisingly complex tasks and in so doing free your active cognition to engage with other important tasks.

Our colleagues Nikki Frame and Maggie Johnson, you may recall, met for ten minutes every morning to practice responding to unexpected student answers. In the course of a few weeks, they managed to master the skill. One of the results was that Nikki and Maggie were left with additional processing capacity during class, which allowed them to focus on intellectually abstract and strenuous tasks.

Imagine how powerful this idea could be if applied in other highly technical or complex settings. Imagine doctors practicing, for a few minutes a few times a week, reacting calmly to agitated patients during examinations. Once they were able to do this with equanimity, it would both limit patient agitation and increase the processing capacity doctors had to listen to and assess their patients. They would solve complex problems at a higher rate by limiting the brain's focus on manageable aspects of the interaction. We will pick up this realization—that rote learning works in synergy with deep thinking—in our next rule, Unlock Creativity . . . with Repetition.

Let the Mind Follow the Body

- Stress learning skills all the way to automaticity so that participants can use them automatically—and before they consciously decide to.

- Build up layers of related automated skills so that participants can do complex tasks without actively thinking about them.
- Automate fundamentals, but also look for more complex and subtle skills that may also respond to automation. It's a false assumption that only simple things can become habits.

RULE 4 UNLOCK CREATIVITY . . . WITH REPETITION

Here's a useful observation from John Wooden that establishes a corollary to Rule 3: "Drilling creates a foundation on which individual initiative and imagination can flourish." If Rule 3 suggested the power of learning things by rote because it allows you to do them with unconscious efficiency, its corollary, Rule 4, focuses on what your conscious mind is doing while your unconscious mind is executing. To examine this, you might ask yourself when in the day you have your most creative thoughts. The answer is likely to be when you are taking a shower, driving your car, brushing your teeth, or jogging; that is, when you are doing some task you have done a thousand times and can complete automatically. What your mind is often doing when you are executing such tasks is thinking creatively. One way to get more creative is to give your mind the capacity to wander a little bit in settings where it had previously been encumbered—that is, by automating skills required in those settings.

Athletes and other performers often describe how, after a certain amount of experience and practice, the game "slows down" for them. What this means is that

at certain points in the game their mind has gotten access to new processing capacity because complex actions have come to require a smaller percentage of available capacity. All of a sudden they can look up and see an open teammate or a new passing lane. This gives us more perspective on the connection between automaticity of high-frequency skills and creativity, a connection that Johann Cruyff makes even clearer.

Cruyff, counted among the five or so greatest soccer players of all time, is often cited for his unparalleled creativity. In a game, he would suddenly flout deeply rooted expectations about what to do in a certain situation and do something entirely unexpected—with devastating effect. In an interview, he was asked to recall players who, in his youth, were better than he was but who failed to succeed. Recalling them, he said, "They were very good players. But at a certain moment it has to be done quicker, where instead of having two meters to control the ball, you have half a meter and if the ball moves half a meter, you've lost it. When there was pressure it was all over. It had to be faster." Cruyff didn't say he had become more creative. Instead, he noted his automaticity at core skills—the 20 percent—under pressure. He was automatic and therefore prone to thinking about other things while executing. Creativity, it turns out, is often practice in disguise, and to get more of it, it often helps to automate other things. If you want to unlock creativity at certain critical moments, you might identify skills required at those moments and automate them in order to free up more processing capacity for creative thinking.

It's worth pausing here to observe that arguing in favor of more drilling would set many American educators on edge. Many educators perceive drilling—which they characterize with the pejorative "drill and kill"—to be the opposite, the enemy, of higher-order thinking. To them, an explicit correlation between

imagination and drilling would be anathema. Learning that asks students to memorize and automate will reduce their ability to generate creative thoughts and make cognitive leaps, such educators might argue.

The problem with that argument is that learning generally doesn't work that way. As cognitive scientists like Daniel Willingham have shown, it's all but impossible to have higher-order thinking without strongly established skills and lots of knowledge of facts. Cognitive leaps, intuition, inspiration—the stuff of vision—are facilitated by expending the smallest possible amount of processing capacity on lower-order aspects of a problem and reapplying it at higher levels. You leap over the more basic work by being able to do it without thinking much about it, not by ignoring it. This synergy between the rote and the creative is more commonly accepted in many nations in Asia. "Americans have developed a fine dichotomy between rote and critical thinking; one is good, the other is bad," write the authors of one study[1] of Japanese schools. But they find that many types of higher-order thinking are in fact founded on and require rote learning. Creativity often comes about because the mind has been set free in new and heretofore encumbered situations.

In business school Doug once worked in a group trying to solve a macroeconomic problem. It came down to an equation made up of dozens of variables scrawled across a whiteboard. Solving it seemed impossible. Then, a member of the team—educated in Eastern Europe, not coincidentally—walked to the whiteboard. "This part of the equation must be negative," he said, circling a series of variables. "This coefficient is negative, and every other value is positive." He then circled two more strings of variables. "These two must be positive, because in this one all of the values are positive and in this one we multiply two negative values. So we have, really, in this equation a negative times two positives.

This must give a negative." He sat down: "Like this, we will all go bankrupt." He had leapt over and across the problem in a way no one else had, not because he ignored the rote work but because he was so facile at it. To skip over the mundane parts you have to know them cold. John Wooden said that "[I] wanted to be as surprised as our opponent at what my team came up with when confronted with an unexpected challenge." What's counterintuitive is Wooden's belief about how you got there. Drilling let players' creativity emerge under pressure.

We began experimenting with the idea that increasing repetition could unlock creativity and individuality in our own teaching workshops and applied this idea to an activity called the "Strong Voice" layup drill. In the activity (described in the back of the book), teachers practice prompting a slouching student to sit up. They cycle through a line playing the roles of teacher, student, and coach (who gives feedback). They practice using nonverbal skills to ensure compliance. The first time we ran the activity, we asked people to go through the line two or three times. What we saw was people doing something and thinking about it at the same time. Participants were completing the task but awkwardly and without adaptation to their own style and manner, so we made some simple changes.

First, we split groups in half. Instead of practicing in groups of eight, they practiced in groups of four. This doubled the repetitions each participant got. On the first try, participants were all over the map in their approaches; people tried using gestures that worked as often as they tried ones that didn't. They made sweeping, almost theatrical hand gestures, for example, that seemed strange and awkward. Over time, successful ideas began to emerge, and as a group they began to "get it," to internalize a vision of what the activity, well implemented, should look like: symmetrical posture and slow, controlled gestures. Variation decreased. People borrowed ideas from one another and began to look like each other. Some

educators might have argued that the drill was causing creativity to decline. But then as we continued to practice, variation began to reemerge. Teachers made subtle changes to their gestures or their tone. Slowly, individuals developed their own style. Some were stricter; some were warmer. Some communicated with hand gestures; others gravitated to facial expression. Variation reemerged. Creativity was back—within a narrower range but with greater effectiveness.

After one workshop in which participants had completed perhaps fifteen iterations of the drill, one teacher made an especially insightful comment. On a final round of the activity, we asked teachers to assume that the student they were correcting was their most motivated and positive student, on a difficult day. "I felt like I was teaching from light," she said. "I was correcting, but it was positive—because I cared about her. I could feel the difference and I started to think, *My gosh, why don't I always teach from the light?*"

The three of us have returned to her observation time and again. We find it inspiring and powerful—in part because it is indicative of the type of people who teach and why we love the work so much, but also in part because it emerged from the meditative nature of practicing a mundane and unheralded moment, over and over. This insight might never have happened without an activity that may have at first appeared banal. Repetition gave rise to meditation and then wisdom.

Unlock Creativity . . . with Repetition

- Automate skills to free participants' cognition to be more creative.
- Look to automate skills at exactly the moments you need creativity most, to free up processing capacity.
- Push participants to reflect later, after they've practiced enough to better understand what they are doing.

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