

BETTER ALL THE TIME

How the “performance revolution” came to athletics—and beyond.

BY JAMES SUROWIECKI



A focus on incremental gains has led to big advances, from sports to manufacturing.

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In the summer of 1976, Kermit Washington was in trouble. He was a power forward in the N.B.A., and had just finished his third season with the L.A. Lakers. He had been a highly touted player coming out of American University, where he averaged twenty points and twenty rebounds a game and was a second-team All-American. But with the Lakers his performance had been less than mediocre. The problem was that Washington didn't know how to play basketball all that well. He had picked up the game late (in high school, he'd warmed the bench), and never learned the skills necessary to thrive as a big man in the N.B.A. In college, Washington's size (he was six feet eight) and athleticism had allowed him to dominate other players, who were typically smaller and weaker. But in the pros, where most players were big and strong, Washington's lack of skill caught up with him. By his third season, his playing time had diminished sharply, and he feared that his career was on the line.

What Washington did next changed the N.B.A.: he called a man named Pete Newell and asked for help. Newell had been a legendary college coach, and was working for the Lakers as a special assistant. But his coaching skills were being wasted, because, as David Halberstam wrote in “The Breaks of the Game” (1981), N.B.A. players didn’t want to admit that they “still had something to learn.” That summer, Newell put Washington through a series of grueling workouts, and schooled him in the basics of footwork, positioning, and shooting. The following season, Washington improved in every aspect of the game. The next summer, he worked with Newell again, and got better still. Washington was suspended for part of the 1977-78 season after he landed a devastating punch on another player during an on-court brawl, but his performance as a player continued to improve. By the end of the decade, he had become an All-Star. Other basketball players, seeing Washington’s progress, started to ask if they could work with Newell, too, and within a few years there was so much demand for his services that he opened a training camp. During the next two decades, many of the N.B.A.’s greatest forwards and centers made the pilgrimage to work with the man who had saved Kermit Washington’s career.

Professional athletes had always worked out, of course. But, historically, practice was mainly about getting in shape and learning to play with your teammates. It was not about mastering skills. People figured that either you had those skills or you didn’t. “There is an assumption that a player arrives in the league in full possession of all the basic skills,” Halberstam wrote, describing the N.B.A. in the late seventies. “Either that, or he sinks.” Bob Petrich, a defensive end for the San Diego Chargers in the nineteen-sixties, told an interviewer that most N.F.L. players of his era even scorned the idea of lifting weights. “Most of the guys had this mental attitude that if you’re not good enough the way you are, then you’ll never be good enough,” Petrich said. The prevailing philosophy was “What you are is what you are.”

Today, in sports, what you are is what you make yourself into. Innate athletic ability matters, but it's taken to be the base from which you have to ascend. Training efforts that forty years ago would have seemed unimaginably sophisticated and obsessive are now what it takes to stay in the game. Athletes don't merely work harder than they once did. As Mark McClusky documents in his fascinating new book, "Faster, Higher, Stronger" (Hudson Street), they also work smarter, using science and technology to enhance the way they train and perform. It isn't enough to eat right and put in the hours. "You need to have the best PhDs onboard as well," McClusky says. This technological and analytical arms race is producing the best athletes in history.

The arms race centers on an obsessive scrutiny of every aspect of training and performance. Trainers today emphasize sports-specific training over generalized conditioning: if you're a baseball player, you work on rotational power; if you're a sprinter, on straight-line explosive power. All sorts of tools have been developed to improve vision, reaction time, and the like. The Dynavision D2 machine is a large board filled with flashing lights, which ballplayers have to slap while reading letters and math equations that the board displays. Football players use Nike's Vapor Strobe goggles, which periodically cloud for tenth-of-a-second intervals, in order to train their eyes to focus even in the middle of chaos.

Training is also increasingly personalized. Players are working not just with their own individual conditioning coaches but also with their own individual skills coaches. In non-team sports, such as tennis and golf, coaches were rare until the seventies. Today, tennis players such as Novak Djokovic have not just a single coach but an entire entourage. In team sports, meanwhile, there's been a proliferation of gurus. George Whitfield has built a career as a "quarterback whisperer," turning college quarterbacks into N.F.L.-ready prospects.

Ron Wolforth, a pitching coach, is known for resurrecting pitchers' careers—he recently transformed the Oakland A's Scott Kazmir from a has-been into an All-Star by revamping his mechanics and motion.

Then there's the increasing use of biometric sensors, equipped with heart-rate monitors, G.P.S., and gyroscopes, to measure not just performance (how fast a player is accelerating or cutting) but also fatigue levels. And since many studies show that getting more sleep leads to better performance, teams are now worrying about that, too. The N.B.A.'s Dallas Mavericks have equipped players with Readiband monitors to measure how much, and how well, they're sleeping.

All this effort may sound a bit nuts. But it's how you end up with someone like Chris Hoy, the British cyclist who won two gold medals at the London Olympics in 2012, trailed by a team of scientists, nutritionists, and engineers. Hoy ate a carefully designed diet of five thousand calories a day. His daily workouts—two hours of lifting in the morning, three hours in the velodrome in the afternoon, and an easy one-hour recovery ride in the evening—had been crafted to maximize both his explosive power and his endurance. He had practiced in wind tunnels at the University of Southampton. He had worn biofeedback sensors that delivered exact data to his trainers about how his body was responding to practice. The eighty-thousand-dollar carbon-fibre bike he rode helped, too. Hoy was the ultimate product of an elaborate and finely tuned system designed to create the best cyclist possible. And—since his competitors weren't slacking, either—he still won by only a fraction of a second.

You might think that this pressure to improve reflects the fact that the monetary rewards for athletic success have become immense. There's something to this. It has become economically rational to invest a lot in player training. Forty or fifty years ago, professional athletes routinely had other jobs in the off-season. Willie Davis, a

future N.F.L. Hall of Famer, taught mechanical drawing at a high school. Lou Groza, a legendary kicker, sold insurance. Today, athletes spend the off-season working on their game.

Yet money isn't the whole story. We've seen similarly dramatic improvements in performance over the past few decades in fields where money doesn't play a huge role. In the nineteen-seventies, there were only two chess players who had Elo ratings (a measure of skill level) higher than 2700. These days, there are typically more than thirty such players. Analyses of great players' games from even thirty years ago uncover moves that, by today's standards, are clear blunders. Thanks to the advent of powerful computer programs, players can now practice daily against relentlessly good opponents. They can review and analyze games (not just their own but those of other great players) more quickly and efficiently. They can instantaneously compare the consequences of potential moves. All this has led to fewer mistakes and better tactics, as chess theory has grown increasingly sophisticated.

The quality of classical musicians has improved dramatically as well, to the point that virtuosos are now, as the *Times* music critic Anthony Tommasini has observed of pianists, "a dime a dozen." Even as the number of jobs in classical music has declined, the number of people capable of doing those jobs has soared, as has the calibre of their playing. James Conlon, the conductor of the Los Angeles Opera, has said, "The professional standards are higher everywhere in the world compared to twenty or forty years ago." Pieces that were once considered too difficult for any but the very best musicians are now routinely played by conservatory students. And, if anything, the rate of improvement in technical skill has been accelerating. Music programs are better at identifying talented young musicians, training methods have improved, and the pressure of competition—with so many talented musicians competing for so few slots—keeps pushing the over-all standard of performance higher.

That's actually the biggest change in performance over the past few decades—it's not so much that the best of the best are so much better as that so many people are so extraordinarily good. In fact, McClusky points out that in some sports, particularly in track and field, the performance curve at the top is flattening out (possibly because we're nearing our biological limits). But the depth of excellence has never been greater. In baseball, a ninety-m.p.h. fastball used to be noteworthy. Today, there are throngs of major-league pitchers who throw that hard. Although a Wilt Chamberlain would still be a great N.B.A. player today, the over-all level of play in the N.B.A. is vastly superior to what it was forty years ago. There are exceptions to this rule—free-throw percentages, for instance, have basically plateaued in the past thirty-five years. But, as the sports columnist Mark Montieth wrote after reviewing a host of games from the nineteen-fifties and sixties, "The difference in skills and athleticism between eras is remarkable. Most players, even the stars, couldn't dribble well with their off-hand. Compared to today's athletes, they often appear to be enacting a slow-motion replay."

What we're seeing is, in part, the mainstreaming of excellent habits. In the late nineteen-fifties, Raymond Berry, the great wide receiver for the Baltimore Colts, was famous for his attention to detail and his obsessive approach to the game: he took copious notes, he ate well, he studied film of his opponents, he simulated entire games by himself, and so on. But, as the journalist Mark Bowden observed, Berry was considered an oddball. The golfer Ben Hogan, who was said to have "invented practice," stood out at a time when most pro golfers practiced occasionally, if at all. Today, practicing six to eight hours a day is just the price of admission on the P.G.A. Tour. Everyone works hard. Everyone is really good.

"I hope you sat me next to someone who wants to hear all about my bathroom renovation."

The story of how sports has changed isn't just a story of individuals taking a new approach to their jobs. Teams, too, have learned. They're better at scouting and screening players, at getting and keeping them in shape, and at using analytics to get the most out of those players. When the Cleveland Browns won the N.F.L. title fifty years ago, they had only five assistants; today, most N.F.L. teams have fifteen or more. Coaches can specialize, and focus more intently on those small details which cumulatively add up to better performance. Technology—such as the new SportVU system, which has put fleets of high-definition cameras in fifteen N.B.A. arenas—has provided a flood of data about what's happening on the court or the field, and teams are smarter about using “Moneyball”-style analytics to improve tactics and strategy. Montieth, reviewing those fifties and sixties basketball games, found the perimeter defense, especially, to be “laughable,” and the offense not much better. “Half the shots would be booed by today's fans, who would find it difficult to accept 15-foot hooks or a steady stream of off-balance jumpers,” he writes. “Coaches hadn't yet come up with offenses sophisticated enough to create what are considered good shots today.”



Training methods are also far more rational and data-driven. When John Madden coached the Oakland Raiders, he would force players to practice at midday in the middle of August in full pads; Don Shula, when he was head coach of the Baltimore Colts, insisted that his players practice without access to water. Today, teams are savvier about maximizing the benefits of practices, and sometimes that means knowing when not to practice. The Portland Trail Blazers, pioneers in using data to protect players' health, will sometimes tell a lagging player to lay off practicing, lest he injure himself. To coaches of

Madden and Shula's generation, this would have sounded like mollycoddling. But last season the Trail Blazers had the healthiest team in the N.B.A.

A key part of the “performance revolution” in sports, then, is the story of how organizations, in a systematic way, set about making employees more effective and productive. This, as it happens, is something that other organizations started doing around the same time. Look at what happened in American manufacturing, a transformation that also has its origins in the nineteen-seventies. At the time, big American companies were in woeful shape. In the decades after the Second World War, they had faced almost no foreign competition, and typically had only a few domestic rivals. That made them enormously profitable but complacent about quality and productivity. The result was that, by the early nineteen-seventies, American productivity growth was stalling, while American products were often defect-ridden and unreliable. One study, in 1969, found that a third of the people who bought a new American car judged it to be in unsatisfactory condition when it was delivered.

This state of affairs became untenable when high-quality Japanese products started to appear in American markets. Japanese companies had, since the late nineteen-forties, completely overhauled their approach to the assembly line. Where American companies preferred to churn products out and then test them to see if they were defective, Japanese companies, drawing from the ideas of American management consultants such as W. Edwards Deming and Joseph Juran, embraced the idea that quality was about catching mistakes when (or just before) they happened, rather than repairing defects after the fact. Japanese workers had the authority to stop assembly lines if they saw a potential problem, and regularly met in small groups to talk about quality improvement. At the same time, Japanese firms emphasized what came to be known as “lean production,” relentlessly looking to remove waste of all kinds from the production

process, down to redesigning workspaces, so workers didn't have to waste time twisting and turning to reach their tools. The result was that Japanese factories were more efficient and Japanese products were more reliable than American ones. In 1974, service calls for American-made color televisions were five times as common as for Japanese televisions. By 1979, it took American workers three times as long to assemble their sets.

The prospect of losing all their business to foreign competitors persuaded American companies to change their ways. They borrowed as liberally from the Japanese as the Japanese had from Deming. By the nineteen-eighties, manufacturing productivity had rebounded, and it has risen steadily ever since. (Factories are also much safer than they once were: the rate of injuries in manufacturing is now less than half what it was just twenty years ago.) Product quality, at least when it came to products manufactured in the developed world, took an even greater leap. Although products are more complex today, they're also typically more reliable. The average age of a car on the road today is almost double what it was in 1970. And, the recent spate of recalls notwithstanding, the average number of problems reported in J. D. Power's annual survey of new-car buyers has fallen sharply over the past twenty-five years. In manufacturing, just as in professional sports, the gap between top and bottom has narrowed. In 1987, the worst model had 3.3 more problems per car than the best. In 2012, that number had shrunk to 0.8. Lemons, for the most part, have become a thing of the past.

The ethos that underlies all these performance revolutions is captured by the Japanese term *kaizen*, or continuous improvement. In a *kaizen* world, skill is not a static, fixed quality but the subject of ceaseless labor. This idea is more applicable to some fields of endeavor than to others—it's easier to talk about improved performance in sports or manufacturing, where people's performance is quantifiable, than in writing or the fine arts—but the notion of

continuous improvement has wide relevance, leading to dramatic advances in fields as disparate as airline safety and small-unit performance in the military. Which raises a question: what are the fields that could have become significantly better over the past forty years and haven't?

There are obvious examples. Customer service seems worse than it once was. Most companies underinvest in it, because they see it purely as a cost center, rather than a source of potential profits, and so workers are undertrained. Customer-service centers have often been set up to maximize the very things—speed and volume—that make for a poor customer experience. Continuous improvement is of no use if you're not improving the right things. Medicine, too, has not seen the leap in performance one might have expected. Technology has given doctors many more tools, and has materially improved patients' lives. But the number of serious medical errors has remained stubbornly high, as has the amount of wasted spending in the system. Reformers are now calling for a "focus on performance" in medical schools, precisely because it hasn't been a focus in the past.

In one area above all, the failure to improve is especially egregious: education. Schools are, on the whole, little better than they were three decades ago; test scores have barely budged since the famous "A Nation at Risk" report came out, in the early nineteen-eighties. This isn't for lack of trying, exactly. We now spend far more per pupil than we once did. We've shrunk class sizes, implemented national standards, and amped up testing. We've increased competition by allowing charter schools. And some schools have made it a little easier to remove ineffective teachers. None of these changes have made much of a difference.

All sorts of factors, of course, shape educational performance. For one thing, the United States has more poor kids relative to other developed countries, and poor kids do worse on tests, on average, all

over the world. Schools can't make up for that gap entirely. But there is one crucial factor in how kids fare that schools do control; namely, the quality of their teachers. Unfortunately, as two new books, Elizabeth Green's "Building a Better Teacher" (Norton) and Dana Goldstein's "The Teacher Wars" (Doubleday), point out, teacher training in most of the United States has usually been an afterthought. Most new teachers enter the classroom with a limited set of pedagogical skills, since they get little experience beforehand, and most education courses don't say much about how you run a class. Then teachers get little ongoing, sustained training to help them improve. If American teachers—unlike athletes or manufacturing workers—haven't got much better over the past three decades, it's largely because their training hasn't, either.

Some educational reformers in the United States insist that we don't need to worry about training: firing all the bad teachers would be enough. Yet countries that perform exceptionally well in international comparisons—among them Finland, Japan, and Canada—all take teacher training extremely seriously. They train teachers rigorously before they get in the classroom, and they make sure that the training continues throughout their work lives. Green writes about how Japanese elementary-school math teachers rely on *jogyokenkyu*, "a bucket of practices that Japanese teachers use to hone their craft, from observing each other at work to discussing the lesson afterward to studying curriculum material with colleagues." They've developed a vocabulary to describe successful teaching tactics. They spend hours talking about how to improve things such as *bansho*, the art of writing out a math problem (with possible solutions) on a chalkboard in a way that helps students learn. And they get constant feedback from other teachers and mentors.

The key, Green writes, "lay in the fact that no teacher worked alone." This method—with its systematic approach to learning, its emphasis on preparation, and its relentless focus on small details and the need

for constant feedback—sounds like the way athletes train today. The results have certainly been comparable. Finland had lacklustre schools until, in the nineteen-seventies, it revamped its educational system, including the way it recruited and trained teachers. Now its schools are among the highest performing in the world.

There are logistical hurdles to Finland-style reforms in the United States. Because we don't have a national educational system, we have to rely on local governments to make the necessary changes. But the biggest problem is that we're in thrall to what Green calls "the idea of the natural-born teacher," the notion that either you can teach or you can't. As a result, we do little to help ordinary teachers become good and good teachers become great. What we need to embrace instead is the idea of teaching as a set of skills that can be taught and learned and constantly improved on. As both Green and Goldstein detail, school districts in the United States that take teacher training seriously have seen student performance improve, often dramatically. More accountability and higher pay for teachers would help, too. But at the moment most American schools basically throw teachers in at the deep end of the pool and hope that they will be able not only to swim but also to keep all their students afloat, too. It's a miracle that the system works as well as it does. To make gains, schools should take advantage of the training techniques that other countries have mastered: record classes so that teachers can study their own work and that of colleagues; let teachers observe each other; measure performance; and deploy a staff of full-time trainers.

These measures will cost money, although they may not cost more than constantly replacing struggling teachers (not to mention the long-term economic cost of churning out mediocre students). And there will be some teachers who will find all the feedback intrusive. But what's happened in sports over the past forty years teaches that the way to improve the way you perform is to improve the way you

train. High performance isn't, ultimately, about running faster, throwing harder, or leaping farther. It's about something much simpler: getting better at getting better. ♦



James Surowiecki is the author of “The Wisdom of Crowds” and writes about economics, business, and finance for the magazine.

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