

How Katie Ledecky became better at swimming than anyone is at anything

By **Dave Sheinin** June 24, 2016

In many of her biggest races, Katie Ledecky is leading before she even touches the water.

In the 800-meter freestyle finals at the 2012 London Olympics, which produced her first Olympic gold medal; in six of her nine individual swims at the 2015 world championships, where she pulled off an unprecedented sweep of the 200 through 1,500 freestyles; in the 800 free finals at the 2014 Pan Pacific championships, a world record; and the finals of both the 400 and 800 free at 2012 U.S. Olympic trials — in all of those races, and in many others, Ledecky was the first swimmer off the blocks, her “reaction time” (the interval between the starter’s gun and the instant her feet leave the blocks) fastest in the field, at anywhere from .66 to .73 of a second.

It is not a skill Ledecky, a 19-year-old from Bethesda, needs or even particularly cares about. There isn’t much benefit in beating opponents off the blocks by a couple hundredths of a second when you typically win your core events by several seconds, or even tens of seconds. And while fast starts are a part of her practice routine, it is only in the larger context of the first 15 meters — dive, entry, underwater kicks, breakout — as a whole.

But as a symbol of Ledecky’s sheer athletic brilliance, her dominance of the nearly meaningless first movement of a distance race is illustrative. Getting off the blocks fast requires some combination of hard work, athleticism, intense focus and perfectionism. And try as people might to find some simple explanation for Ledecky’s historic dominance of swimming — whether physiological, mystical or chemical — the truth is more complex, and it lies somewhere in that recipe.

“This is a one-in-a-billion human being,” said Washington Capitals and Wizards owner Ted Leonsis, a longtime friend and associate of Ledecky’s family. “She has a very special family, and she’s an incredibly gifted person — with a high, high self-actualization and self-awareness, otherworldly good instincts and intelligence, a gifted physiognomy, plus an incredible drive to be the best. And it’s all natural.

“How did this happen? It’s hard work, obviously. But there’s something that drives this young woman to be the best.”

As Ledecky prepares to launch herself into the U.S. Olympic trials in Omaha, with the 2016 Rio de Janeiro Olympics looming just six weeks in the distance, she already may be the most dominant athlete in sports, as measured by the gap between her and everyone else in her discipline. At the 2015 worlds, against the best competition the globe could offer, she

won the 1,500 freestyle by more than 14 seconds and the 800 free by more than 10. When she set the most recent of her 11 world records, in the 800 free at a meet in Austin in January, her margin of victory was 17.81 seconds.

Usain Bolt is occasionally beaten. Serena Williams doesn't win every Grand Slam title. Stephen Curry goes 5 for 20 now and again. But Ledecky has swum in 12 individual finals at major international meets, and has never lost.

"She's the greatest athlete in the world today by far," said Michael J. Joyner, an anesthesiologist and researcher for the Mayo Clinic in Rochester, Minn., specializing in human performance and physiology. "She's dominating by the widest margin in international sport, winning by 1 or 2 percent. If [a runner] won the 10,000 meters by that wide a margin, they'd win by 100 meters. One or 2 percent in the Tour de France, over about 80 hours of racing, would be 30 or 40 minutes. It's just absolutely remarkable."

The people who coach her, train with her and race against her are quietly bracing for another monster summer from Ledecky, with the question not a matter of wins and losses but how much faster she can possibly go.

"If she never goes faster, she's already an all-time incredible performer," said David Marsh, head coach of the 2016 U.S. women's national team. "But the reality is, knowing she has her sights set on Omaha and Rio, I think we may see some great swims."

She is already considered the best female swimmer in the world at the moment, but with a representative showing in Rio — where she has a legitimate shot at five medals, including four golds, with perhaps a world record or two sprinkled in — she would, before the age of 20, enter the conversation of the best ever.

"We're fortunate to be living in this age in our sport, the Ledecky era," said Chuck Wielgus, executive director of USA Swimming. "I don't think we've ever seen anybody like Katie before. And I think in the future we're going to look back, and the sport's history will be divided into pre-Katie and post-Katie. She'll be this iconic figure by which all future distance and middle-distance swimmers will be measured."

'Gallop' or a 'giddy-up'

Once the swimmers emerge from below the surface and begin their strokes, no more than 15 meters from the wall, it is typically easy to find Ledecky: She is usually already in the lead. Most distance swimmers are worried they will run out of gas by the end of the race, so they conserve at the start. Ledecky is the opposite.

"I'm always afraid I'll get to the end and have too much left," she said. "I'm trying to manage myself so I don't kill myself [at the start]. It's about finding a balance. And it's about having the confidence to know you've done the work so you can get in there and race the whole 800 or 1,500."

You can pick out Ledecky also by her form, reminiscent of either — take your pick — Secretariat or Michael Phelps.

Her mechanics, common among male swimmers but almost unheard of among women, is often described as a "gallop" or a "giddy-up" stroke, or is said to have a "hitch." Ledecky has called it a "loping" stroke. Essentially, instead of a steady,

metronomic beat — left, right, left, right — her stroke is syncopated: short left, long right, short left, long right. She breathes almost exclusively to the right side.

“Her stroke is like a man’s stroke,” said Connor Jaeger, a 2012 Olympian and the silver medalist in the 1,500 free at the 2015 world championships. “I mean that in a positive way. She swims like a man.”

Yuri Suguiyama, Ledecky’s coach from age 10 to 15, taught her that stroke in the spring of 2011 — about 15 months before she would win gold in London. To hear Ledecky tell the story, it was more or less accidental: She was doing a drill where she was asked to reduce her number of strokes per lap and had to lunge — or gallop — to reach the wall.

“He said, ‘Ooh, that stroke looked really good,’” Ledecky recalled. “‘Let’s try to hold that for a whole 125.’”

But it was no accident, according to Suguiyama.

“She was swimming more like a classic female distance swimmer,” he recalled. “She would breathe to both sides. She had kind of a sporadic kick, or what we call a two-beat kick. And I don’t know — I just didn’t like the way she swam. . . . I think I was watching [video of] a Phelps race from 2007. His legs were moving the entire time. He had a nice little hitch, or a gallop, and I was like, man, Katie could swim that way. . . . It just takes advantage of the aggression and the kind of fury that she swims with.”

If the best female swimmer in the world swims one way, it would make sense for others to try to copy her. But it isn’t that easy. The gallop stroke requires tons of core strength, the sort many male swimmers possess but few females do.

“We found that it’s a very hip-driven stroke, and I have really good rotation and rhythm with my hip rotation, and I get a lot of power out of my hips,” Ledecky said. “So that stroke kind of maximizes that.”

The question of Ledecky’s overall athleticism is something of a running joke in her inner circle.

When Bruce Gemmell first began coaching Ledecky in the fall of 2012 — taking over after Suguiyama left for a job at the University of California following the London Games — he was surprised to find out she couldn’t do three unassisted pull-ups or run a nine-minute mile. When he had Ledecky undergo a battery of physical-assessment tests at the U.S. Olympic Training Center in Colorado Springs, one of the first sentences of the opening summary, according to Gemmell, referred to her as “remarkably unremarkable.”

“She has to have enormous lung capacity,” mused Jack Roach, USA Swimming’s consultant for athlete and coach relations. “But we don’t measure that. You don’t really need to.”

Out of the pool, though, there is nothing outwardly obvious about Ledecky that would suggest she is among the best athletes on the planet. At 5 feet 11, 150 pounds, she is tall for the general populace but only slightly above average for elite swimmers. She towers over some U.S. teammates, but looks up to Missy Franklin (6-2), Allison Schmitt (6-1½) and Dana Vollmer (6-1), among others. She lacks Phelps’s famously extreme physiology — the enormous wingspan, long torso and double-jointedness.

“There’s no magic bullet,” Gemmell said. “She doesn’t have this incredible wingspan. She doesn’t have webbed feet. You look at Katie, just like with Michael, and you realize the differentiator is between the ears. And their hearts. Their appetite for competition, their unwillingness to lose, and their embracing the challenge. And not just the challenge on competition day, which is a huge part, but the challenge of the training grind.”

Ledecky, he said, “has the nerves of an assassin.”

Gemmell has said her overall athleticism is “borderline poor” — but that would appear an exaggeration, at a minimum. Longtime Team USA fixture Jon Urbanchek, who has produced 44 Olympians over a 50-year career, recalled a recent impromptu contest in Colorado Springs where Ledecky and Conor Dwyer — a 2012 Olympic gold medalist and the top-ranked American in the 200 and 400 freestyles — competed to see who had the highest “box jump,” a test of vertical leaps.

Ledecky got as high as 39 inches, Urbanchek said, and Dwyer strained to get to 41.

“He had to work his ass off just to beat her by two inches,” Urbanchek said.

Urbanchek sounds like equal parts swim coach and spiritual guru when asked to describe Ledecky in the water.

“She swims like she’s one with the water,” he said. “She doesn’t fight with the water. She has very good balance, amazing rhythm, beautiful rotation and a great feel for the water. She’s like a little torpedo.”

Targeting a ‘race pace’

Gemmell is often asked to speak at coaching clinics about training Ledecky, with everyone in the audience hoping to glean an answer to the same question: How does she do it? Gemmell likes to joke that his entire talk could be wrapped up in just a few sentences: “She’ll do anything to be the best. She’s tough as nails. Any questions?”

The U.S. swim community is notably open in regards to training methods; Gemmell will gladly share details of Ledecky’s weekly practice schedule, drill by drill, set by set, with anyone who asks.

But the fact is, plenty of individualized coaching goes on. Swimming fast is much more than jumping in the water and pumping your limbs. And distance swimming has evolved from the days when training consisted of slogging through some 100,000 mindless meters in the pool each week. Nowadays, most swimmers, Ledecky included, do 55,000 to 70,000, but harder and faster — quality over quantity.

Ledecky’s magic number is 1.36 seconds. That’s the target stroke rate — for one stroke “cycle,” left hand to left hand — at which Gemmell tries to keep her churning at practice. It has another name: “race pace.” In an actual race, the target rate may vary depending on the distance: from the 1.4 range in the 1,500 to the 1.2s in the 200. But in training, the “sweet spot,” as Gemmell puts it, is 1.36, and he is constantly walking the edge between pushing her to her limits and taking her too far.

“There are days she fails catastrophically,” he said. “She fails in practice more than anybody in her [training] group, because she’ll start out like, ‘This is the pace I need to swim in the race, so I need to replicate it in practice.’ And she’ll go six

repeats like that, and the tank goes empty and she just falls off. But you know what? She'll come back the next day and try it again. And on the third day, she'll nail it. And she's been doing this since the first day I walked on the deck with her."

Stroke rate is especially important in the first 100 meters .

"Other swimmers, they either lose [their stroke rate] or they don't have the confidence to start out with it," he said. "You've seen her dive in, and by the time the race is 100 meters in, it's over. Why can she do that? She can do that because she practices it — over and over and over again. Every day, twice a day a lot of days."

Increasingly, video and data analysis have become part of elite swim-coaching. Ledecky, like other national team members, can watch high-quality video of her races within minutes of pulling herself out of the water, and by the time Gemmell gets back to his hotel, he typically will have received an email from USA Swimming's data team showing each of Ledecky's 50-meter splits, her stroke rate for each 50 and her cycles (or number of strokes) per lap. Ledecky is a faithful student of data and video analysis — to the point where it surprises those producing the videos and data sheets.

"She's proven to be the best in the world, but she's still looking to get better," said Russell Mark, USA Swimming's high-performance consultant based in Colorado Springs. "I wouldn't be offended if someone as good as her was like, 'Hey, I'm just going to train and keep doing what I'm doing.' But she's still attacking these opportunities to get better."

Mark's video analysis has helped Ledecky in particular with her turns, which had been a weakness for much of her career. A good deal of the improvement in her 800, for example — as she has shaved her own world record from 8:11.00 to 8:07.39 to 8:06.68 in the past two years — can be attributed to her improved turns. And with better turns, she has been able to reduce the number of cycles she needs, from 330 to 323½ to 319 in the above world-record swims.

"I don't think we've seen her best yet," Mark said, "as incredible as that is to say."

Eyebrow-raising records

Inevitably, someone during the Rio Olympics will offer another explanation for Ledecky's dominance: that she is doping.

It happened a year ago in Kazan, Russia, during the world championships, with a German television commentator saying he was "more than suspicious" about Ledecky, and his colleague chiming in that other swimmers are suspicious as well. When those same commentators interviewed Ledecky on the pool deck, one of them asked her about unspecified "questions" about her prowess.

"I trained for it," she shrugged. "I worked hard for it."

People who know Ledecky — who know of her solid Catholic upbringing, her humility outside of the pool and especially her intense training regimen — scoff at any notion of her using performance-enhancing drugs.

"I would stake my life that she's not doping," said Rowdy Gaines, a three-time Olympic gold medal winner and now a commentator for NBC. "There's no way. It's not in her vocabulary. She just has a gift."

Ledecky's career trajectory shows none of the telltale jumps that might indicate PED use. According to Mario J. Costa, a professor of sports sciences who studies the biophysics of swimming at the Polytechnic Institute of Guarda in Portugal, Ledecky's annual improvement in the 800 free between ages 11 and 16 — the age when she first started swimming distance events through the age when she set her first world records — averaged about 3 percent, except for a spike of 9.94 percent between 12 and 13, explained by the onset of puberty.

Costa, in an email, compared that trajectory with those of other female distance swimmers and concluded that Ledecky's is "within the thresholds that are supposed for swimmers of her age."

By studying Ledecky's stroke rates and the distance she travels per stroke — and noting the similarities to those of sprinters — Costa and a fellow researcher, Tiago Barbosa of Nanyang Technological University of Singapore, concluded that the secret to her success was simply in bringing an entirely different mind-set to distance swimming.

"What we have been seeing in the last few seasons," Barbosa wrote in an email, "is Katie building up energetic pathways that are often associated with short-distance events, but using them in longer distances."

That is a conclusion that resonates with Ledecky and her coach. Gemmell encourages his distance swimmers to think of themselves as sprinters who simply sprint for longer distances.

"I'd say I'm a distance swimmer," Ledecky said, "with a sprinter's mentality."

Lately, however, Ledecky no longer has to pretend to be an elite sprinter. In the past two years, she has been strategically creeping downward in distance, becoming a worldwide force first in the 200 — which she began racing seriously in 2014 and quickly came to dominate — and lately in the 100, as well. The career-best 53.75 she swam in the latter, in Austin in January, ranks second among American women this year and ties for 12th in the world, putting her in position to make the U.S. 4x100-meter freestyle relay for Rio.

In this era of specialization, where freestylers are generally either distance swimmers or sprinters — but rarely both — Ledecky's breadth is viewed within the sport as a staggering development.

"It's unprecedented in our sport," Gaines said. "Nobody has ever had this range. Janet Evans was slow as molasses in the 100."

Jaeger, who swims the 200 free through 1,500 free — but almost never the 100 — said the reason why few swim such a range of distances is because distance swimming and sprinting are at odds physiologically.

"The training you need to do a 1,500 well is only going to hurt you at the shorter distances," he said. "Your physiological system that helps you sprint is going to be hurt the more distance training you do. It's not that one is being neglected; it's actually being counteracted. For her to do 100, 200, 400, 800 and 1,500, with all these different physiological systems, it's crazy."

From wall to wall

Even at the end of a grueling race such as the 800 freestyle — roughly a half-mile of “sprinting” at a pace of roughly 1:01 per 100 meters — Ledecky is able to switch to a faster gear.

When she set her most recent world record in the 800 in Austin in January, laps two through 13 (out of 16 total) saw her stroke rate remain steady between 1.38 and 1.41. But over her last three laps, the final 150 meters of the race — with her lead at more than 14 seconds — it dropped : to 1.36, 1.35 and finally, on the final lap, 1.29. But as she lowered her stroke rate, she gained efficiency — the distance traveled per stroke. Outside of the first 50, where she had the benefit of the diving start, every lap of Ledecky’s swim, including the last three, featured either 20 or 20½ cycles, and (again excluding the first) her final 100 was her fastest of the race, at 59.31 seconds.

“It’s very hard for a woman to be able to switch gears like that,” said British distance champion Rebecca Adlington, a two-time Olympic gold medalist who lost to Ledecky in London. “Katie has this power I could never find. She has reset the bar.”

Gemmell long ago abandoned hope of finding female swimmers who could push Ledecky in practice, so she trains at home almost exclusively with men. That arrangement may be the closest thing to a “secret” behind her success. Great athletes often rise to the level of their competition, and Ledecky’s daily competition features some of the best male distance swimmers in the country.

Though she sometimes loses to them, she also sometimes beats them — and more to the point, the outcome matters to her. It has made her perhaps the most ruthless closer in the sport.

In races, at least at the longer distances, Ledecky rarely has anyone within half a pool-length of her at the end. But rather than coast into the wall, she explodes into it. This is by design.

Sports Daily newsletter

Sports news with a focus on D.C. area teams.

[Sign up](#)

“You watch her in Rio this summer: I guarantee you, whether she wins or not, she’ll win the last 15 meters of the race,” Gemmell said. “She practices that every day. We’re doing repeat 50s in practice, and she’s the one who’s putting her head down, powering into the wall, trying to get her hand to the wall first. And seven out of eight of the other great athletes in the pool are just finishing their repeat the same way they swam the other 35 meters.

“If you watch a practice with her, you’ll see her come to the wall 40 times in practice with the same effort and energy she finishes a 200 free in trials. Do that 48 weeks out of the year, and do that six to 10 times a week, and do that 20 to 40 times a practice, and it’s going to be real easy for her to do it in the last 15 meters of an Olympics.”

Gemmell reacts with a combination of bemusement and annoyance when people try to divine the “secret” to Ledecky’s success, as if it’s some sort of mathematical formula that can be solved by anyone with a Speedo and a pair of goggles.

A few weeks ago, a website called SwimmingScience.net promoted on Twitter a story called “40 Must Do Katie Ledecky Training Secrets.” Gemmell couldn’t let that go by unchallenged.

“Tip #41,” he tweeted in reply. “Just do the damn work.”

Dave Sheinin has been covering baseball and writing features and enterprise stories for The Washington Post since 1999. [🐦 Follow @DaveSheinin](#)

The Post Recommends

The Donald Trump transition to the presidency, through the eyes of America’s cartoons

Here is how the nation's visual satirists see everything from the White House meeting to the civic protests.

CNN’s president has fired a warning shot at Donald Trump

Jeff Zucker said it would be a "mistake" for Trump to keep bashing the network.

Hill Republicans want answers. On Wednesday, Trump gave them only more questions — and fresh headaches.

Questions loom about how much of congressional Republicans’ agenda Trump will support — and about torture, border walls and voter fraud.