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Serena Williams, Measured

Reading level 13 · 1720 words

At the 2013 Australian Open, Serena Williams hit a serve that the speed gun read as 128.6 miles an hour, 207 kilometers an hour. In a later round she hit another at exactly the same speed. Afterward she called it her fastest serve that went in, adding that she had hit harder ones that went, in her words, to the sky. That remark is a small lesson in measurement. A serve speed is a reading taken at one instant, by one instrument, of a ball that also had to land inside a box. A career total is likewise a count made under one set of rules. This book takes three numbers attached to Serena Williams, a speed, a title count and a recovery study, and asks what each one actually measures.

Who measures a serve? Sports Illustrated reported in 2016 that a company called SportsMEDIA Technology runs the speed radar at many ATP events. The equipment is not the same at every tournament, and that is the first catch. Tennis.com reported in 2020 that the ATP, the WTA and the ITF keep no official serve-speed rankings, because speed is not captured on every court and the technology differs from event to event. Every list of fastest serves is therefore a compilation. On the Tennis.com list built from that company's data in May 2020, Sabine Lisicki's 131 miles an hour from 2014 was first and Serena's 128.6 was fourth. The Australian Open's list from 2024 has two serves, at 220 and 214 kilometers an hour, above Lisicki's, and it puts Serena tied for seventh. Her number did not change. The lists did.

What does the number mean? A courtside display shows the speed of the ball as it leaves the racket. By the time the serve reaches the returner, air resistance and the friction of the court have taken away roughly half of it. One instructor's video averages, reported by Popular Mechanics in 2007, followed a 120-mile-an-hour serve down to about 82 before the bounce. It was 65 after the bounce and 55 at the opponent's racket. Those are one analyst's averages and not official data, but the direction is not in doubt. Sports Illustrated reported that a serve of 141 miles an hour crossed the 78 feet from baseline to baseline in slightly more than a third of a second. That is just what 78 feet at a constant 141 miles an hour gives, about 0.38 seconds, so a real flight, with drag, takes longer.

At contact the physics is brutally brief. Popular Mechanics reported in 2007 that on a 120-mile-an-hour serve, the ball stays on the strings for about five milliseconds, sliding up to five inches across them while the strings stretch about an inch. The rules fix a ball's mass between 56.0 and 59.4 grams. Take 58 grams leaving the strings at 120 miles an hour, or 53.6 meters per second. Its momentum is then about 3.1 kilogram-meters per second, delivered in 0.005 seconds. That implies an average force of roughly 600 newtons, about the

weight of a 60-kilogram person pressing on the strings. The peak force is higher. This is our own arithmetic from sourced inputs, not a measurement of Serena's serve, and it treats the ball as starting from rest at the top of the toss.

The force comes from the whole body. Biomechanists describe the serve as a kinetic chain, in which each segment's speed adds to the next, like the cracking of a whip. A review in the Aspetar sports medicine journal puts the legs and trunk at 51 to 55 percent of the kinetic energy and force that reach the hand. It also reports a calculation: a 20 percent loss of trunk energy would need a 33 percent faster shoulder to make up. A 2022 review of the research lists the main contributors: leg drive, hip and trunk rotation, arm extension and shoulder internal rotation, helped by height, arm length and lean mass. It also reports that long or repeated match play can reduce serve speed.

Correlation studies add numbers, and limits. Among 21 elite junior players at the Tennis Australia National Academy, peak serve speed rose with the peak force of an isometric mid-thigh pull, a strength test. The correlation was 0.87. It rose with jump height too (0.77). Among 12 male competitive players, shoulder internal rotation strength correlated with radar-measured serve speed at 0.67. A correlation of 0.87 is strong, but in the junior study body height correlated with serve speed at 0.80, so with 21 players the study cannot separate strength from size. Neither study shows that training one quantity raises serve speed. They show which measurements travel together in a small group of athletes.

One short conference paper from Chengdu Sport University (2015) measured Serena's own serves: first serves by her and Simona Halep at the 2014 China Open, filmed by two video cameras about 20 meters away. Serena's average toss reached 3.12 meters, against Halep's 3.53. Her average contact point was 2.61 meters, which is 1.49 times her height and close to the 1.5 that the authors say elite players reach. Speeds rose in order from shoulder to elbow to wrist to racket head, the order of a whip. Take the paper's absolute joint speeds with care, though. It reports a racket-head speed of 22.3 meters per second, about 50 miles an hour, far below the speed at which the ball itself leaves. Its 8-hertz smoothing filter also blurs any motion quicker than about an eighth of a second, which includes the strike.

Serve speed also depends on the court. The ITF sorts surfaces by a measured Court Pace Rating into five categories. Most clay courts fall in the slowest, a rating of 0 to 29, and most natural grass courts in the fastest, 45 or more. The rules also offer a way to compensate with the ball: a fast Type 1 ball is intended for slow courts, and a slower, slightly larger Type 3 ball for fast ones. Wimbledon sows its courts with perennial ryegrass cut to 8 millimeters, and the club's own fact sheet says the soil, not the grass, largely sets the bounce. At Roland-Garros the red surface is a 2-millimeter layer of crushed brick over 7 to 10 centimeters of limestone. Serena won seven Wimbledon titles, three at Roland-Garros, six at the US Open and seven at the Australian Open.

The title count has the same problem. The WTA's 2026 records guide lists Margaret Court first for all time, with 24 singles majors, and Serena second, with 23. It calls Serena the Open Era record-holder. The Open Era began in 1968, or 1969 at the Australian Open, when prize money and professionals came in; before that, professionals were banned from the biggest events. Court's 24 is 13 before the Open Era and 11 after. Eleven of the 24 came at the Australian Championships. Seven of those came before 1968. Its amateur-era draw was about 32 women, most or all of them Australian, and it has had a 128-player draw only since 1986. The WTA also credits Serena with 39 major titles overall, counting 14 in doubles and 2 in mixed doubles. Which count matters depends on the question being asked.

Analysts try to adjust. The author of the Tennis Abstract blog weights each title by the strength of the opponents the champion had to beat. For the Australian Open he compares each year's draw with that year's Wimbledon and US Open. His 2021 version gave Williams 22 and Court 20. A 2022 post gave Williams 22 and Court 21. He writes that the exact numbers do not matter. The two sides of the old argument are plain. One says that 24 is more than 23 and that players should be judged against their own eras. The other says that 11 of Court's titles came in Australia before it was a mandatory stop on the tour.

Recovery is measured too, on people other than Serena. A review in the British Journal of Sports Medicine says Grand Slam matches can last more than five hours in the men's game. It adds that match play causes physical, muscular and mental changes that can build up over consecutive days. In a laboratory, 12 men played two matches, one at about 34 degrees Celsius wet-bulb-globe temperature and one at about 19. A point lasted about 7.1 seconds in both, but the players took about ten seconds longer between points in the heat. In another study, nine men ran a treadmill version of a four-set match at 36 degrees and 50 percent humidity. An ice-filled towel, or wetting the skin in front of a fan, during the breaks held down how far their core temperature rose.

Sleep has been tested with serves. In a one-week study of 12 college tennis players, about two extra hours of sleep a night, 8.85 hours against 7.14, raised serving accuracy from 35.7 percent to 41.8 percent. There was no control group and the sample was small, so the result is suggestive and not proof. A 2019 review of sleep and athletes lists tennis serve accuracy among the things sleep extension can improve. None of these studies followed Serena. Their subjects included college students and men in a laboratory. Her own training is mostly unrecorded. In 2021 she told reporters she was always practicing, and added, "I don't show what I do."

In 2026 the same questions return. On June 9, after 1,375 days away, she won a doubles match at Queen's Club with Victoria Mboko, 7-6, 6-2. ESPN reported service winners of up to 120 miles an hour. On June 30, at Wimbledon, she lost her first singles match back, in three sets, and hurt her knee during it. On September 4 she and her sister lost a doubles match at the US Open after leading 5-0 in the last tie-break. Days earlier, on August 31, she had said

she would probably play singles again, though not for good, and that she had entered only doubles because she had not had time to recover. The 2022 review of serve research ends by saying that effective recovery and monitoring appear essential, though it studied other players. What the scoreboard will read when she does play singles again is the one number nobody has measured yet.

Questions

1. Why do lists of the fastest serves disagree?

A. Players refuse to be measured
B. No official body keeps the rankings, and the technology differs by event
C. Serves are not timed at tournaments

2. Why is a serve's speed at the returner lower than the number on the scoreboard?

A. The returner stands too close
B. The ball loses its fuzz
C. The scoreboard measures it as it leaves the racket, and air and the court slow it

3. Why can the junior study not prove that strength makes a serve faster?

A. Body height also correlated with speed, and 21 players are too few to separate the two
B. The players did not serve
C. Radar guns do not work indoors

4. In the sentence 'Every list of fastest serves is therefore a compilation,' what does compilation mean?

A. A race
B. An official record
C. A list gathered from several sources

5. How can Court's 24 and Serena's 23 both be records?

A. Court's is the Open Era record and Serena's is for all time
B. Court's is the all-time record and Serena's is the Open Era record
C. They count different surfaces

Words to know

correlation: measures moving together
drag: air resistance
momentum: mass times speed
compilation: gathered list

Answer key: Serena Williams, Measured

1. B. No official body keeps the rankings, and the technology differs by event
2. C. The scoreboard measures it as it leaves the racket, and air and the court slow it
3. A. Body height also correlated with speed, and 21 players are too few to separate the two
4. C. A list gathered from several sources
5. B. Court's is the all-time record and Serena's is the Open Era record