The background of the slide is a soft-focus photograph of a tennis ball and a racket. The ball is bright yellow-green and positioned in the upper left. A blue and white striped racket lies diagonally across the frame, extending from the bottom left towards the top right.

Data Visualization in Tennis

Peter Tea

Introduction



Canadian Tennis explosion



Visualizing tennis talent with
interactive Choropleth maps



Visualizing serving strategies of
top Tennis players



Canadian Tennis Stars

- Andreescu (Age 19); 2019 US Open Champion; 5th WTA
- Raonic (Age 28); 2016 Wimbledon Runner Up; 31st ATP
- Auger-Aliassime (Age 19); 21st ATP
- Bouchard (Age 25); 2014 Wimbledon Runner Up; 220th WTA rank
- Shapovalov (Age 20); 15th ATP



Which Country contributes the most Tennis Talent?

Ranking scores - merit-based method where ranking points are awarded to players who win



3 types of tournaments in a tennis season:

Grand Slams

Masters 1000

ATP tour 500/250

Ranking Points

For each player, final ranking scores considers 4 grand slams, 8 Masters 1000 and the best 6 results from ATP tour 500/250s

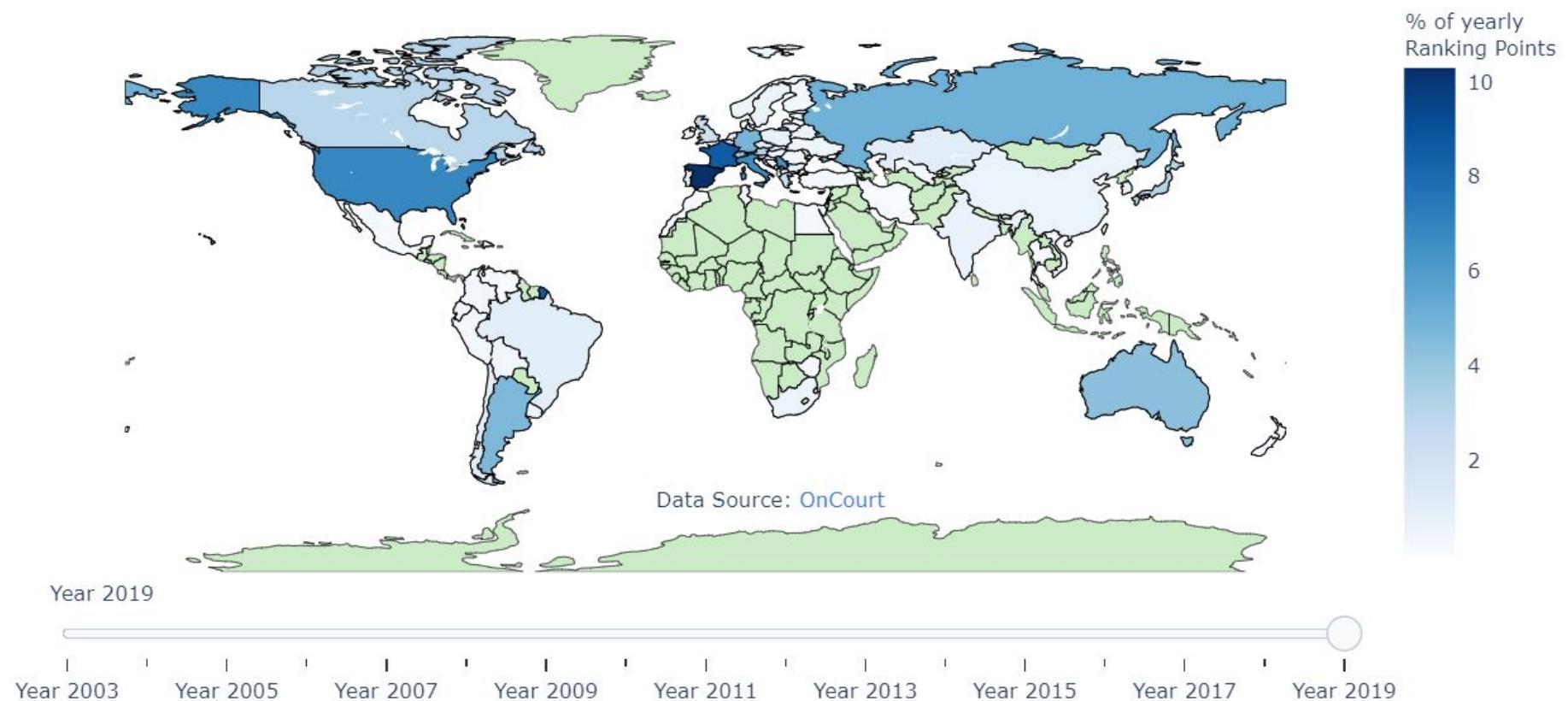
	W	F	SF	QF	R16	R32	R64	R128	Q
Grand Slams	2000	1200	720	360	180	90	45	10	25
Nitto ATP Finals*	*1500								
ATP Tour Masters 1000	1000	600	360	180	90	45	10(25)	(10)	(1)25
ATP 500	500	300	180	90	45	(20)			(2)20
ATP 250	250	150	90	45	20	(5)			(3)12

Interactive Choropleth maps

- A thematic map, where regions are shaded in proportion to some measurement/statistic (eg: ranking points)
- Easy way to visualize how a measurement varies across geographic regions

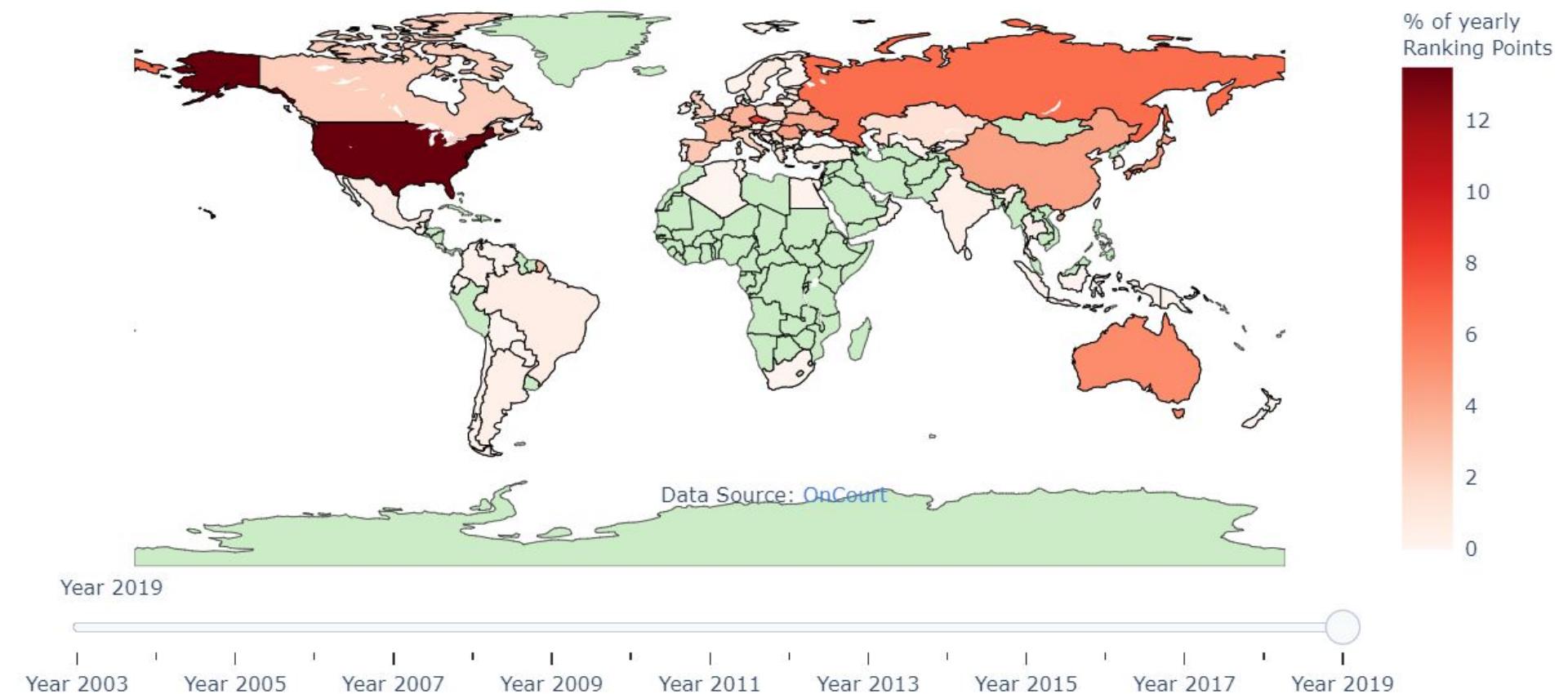
ATP World

Country contribution to ATP Ranking Points



WTA World

Country contribution to WTA Ranking Points



Other metrics for Tennis success?

- # of players in the top 100
- # of consecutive weeks a player holds top rankings
- Prize Money won
- Player rankings are based only on how deep a player goes into a tournament (it does not consider the quality of opponents defeated)



Serving Strategies in Tennis

- *70% of all points are won in 4 shots or less*
- All points begin with a serve
- Belief: Tennis players adjust their second serve by sacrificing power for more consistency and accuracy

How to keep score in Tennis matches

- Points → Games → Sets → Match!
 - 0 Points — Love
 - 1 Point — 15
 - 2 Points — 30
 - 3 Points — 40
 - 4 Points — Game (Need to win by 2)
- Grand slam matches are played best out of 5 sets

Point-Game-Set-Match

Point - Smallest unit of scoring. Starting at love (0 points), points increment from 15-30-40-game

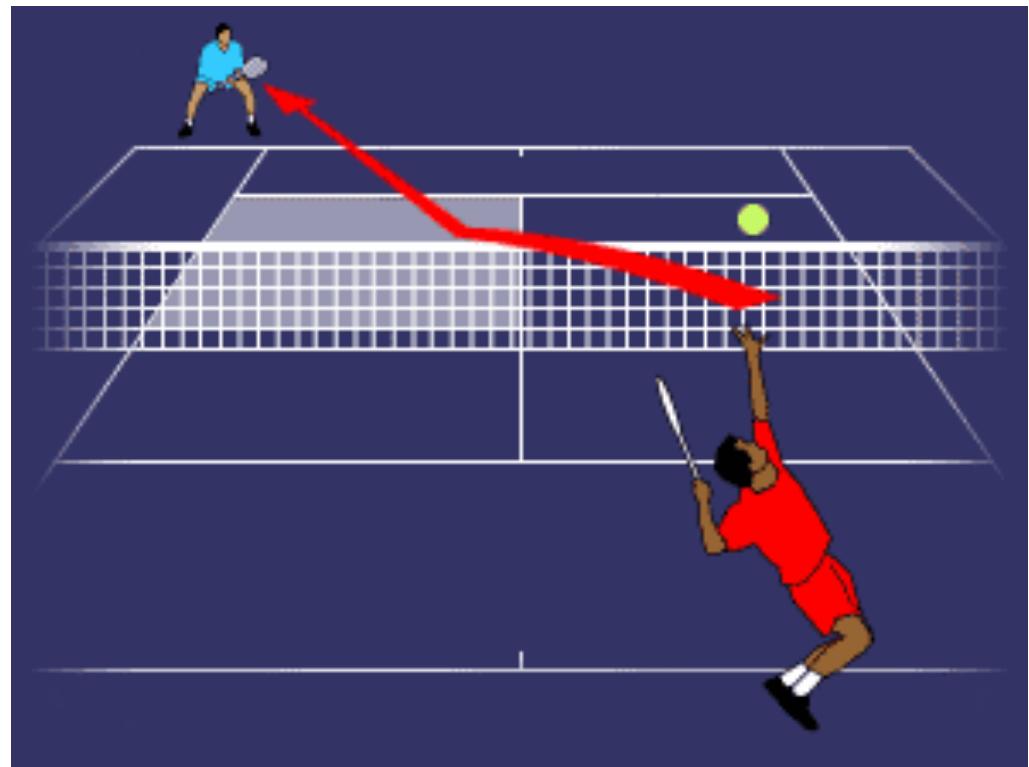
Game - A game consists of 4 points, just as long as the leading player has at least a 2-point advantage

Set - A set is won when a player wins 6 games with a lead of at least 2 games

Match - Whichever player/team wins the majority of sets wins the match. A typical match is always an odd number, often either 3 or 5 sets

Tennis Serving Rules

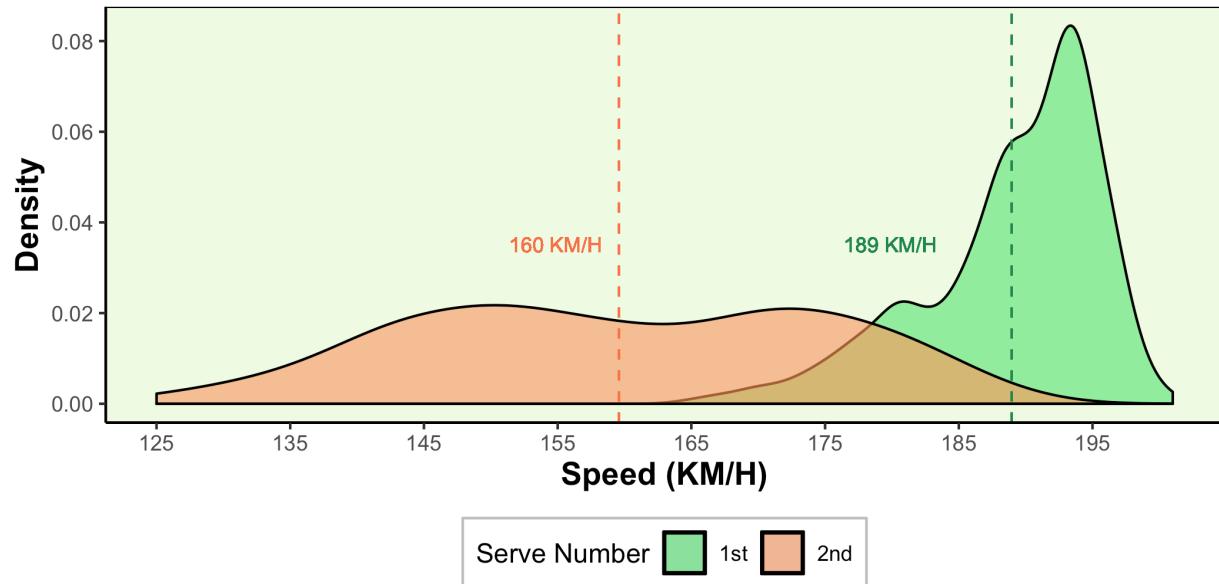
- Server has only **two opportunities** to serve legally
- The serve must pass over the net and hit the service court that is **diagonally opposite** the server
- Serving **faults**: Foot faults (feet must be behind baseline)
- **Let serves**:
 1. The served ball touches the net, **and** lands in the correct court
 2. The ball is served when the receiver is not ready
- When it is a let serve, that particular serve does not count and the server shall serve again



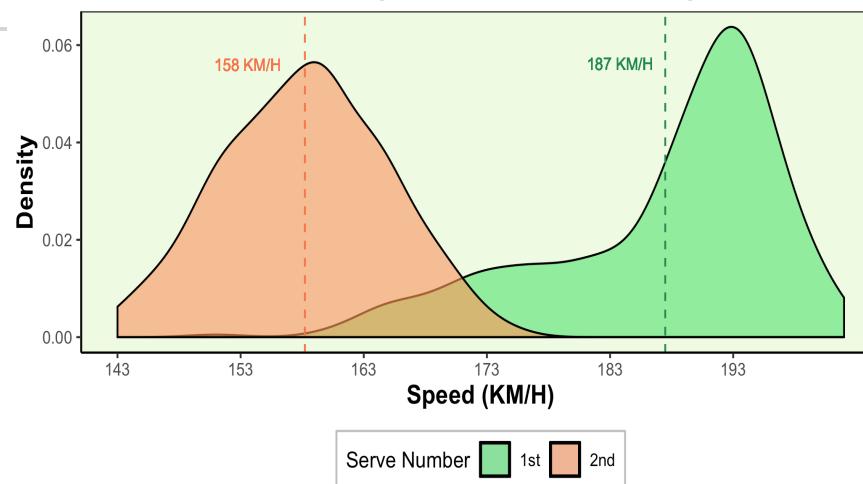


2019 ATP Wimbledon

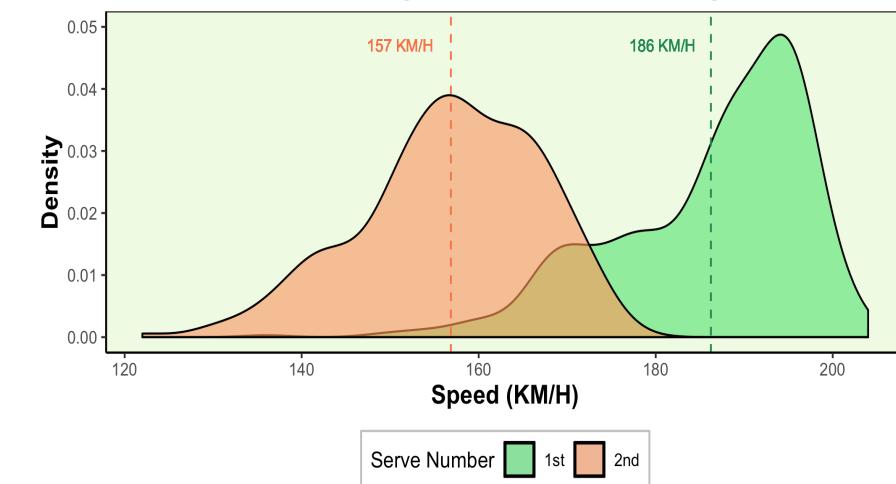
Djokovic Wimbledon 2019
1st Serve Speed vs. 2nd Serve Speed



Nadal Wimbledon 2019
1st Serve Speed vs. 2nd Serve Speed



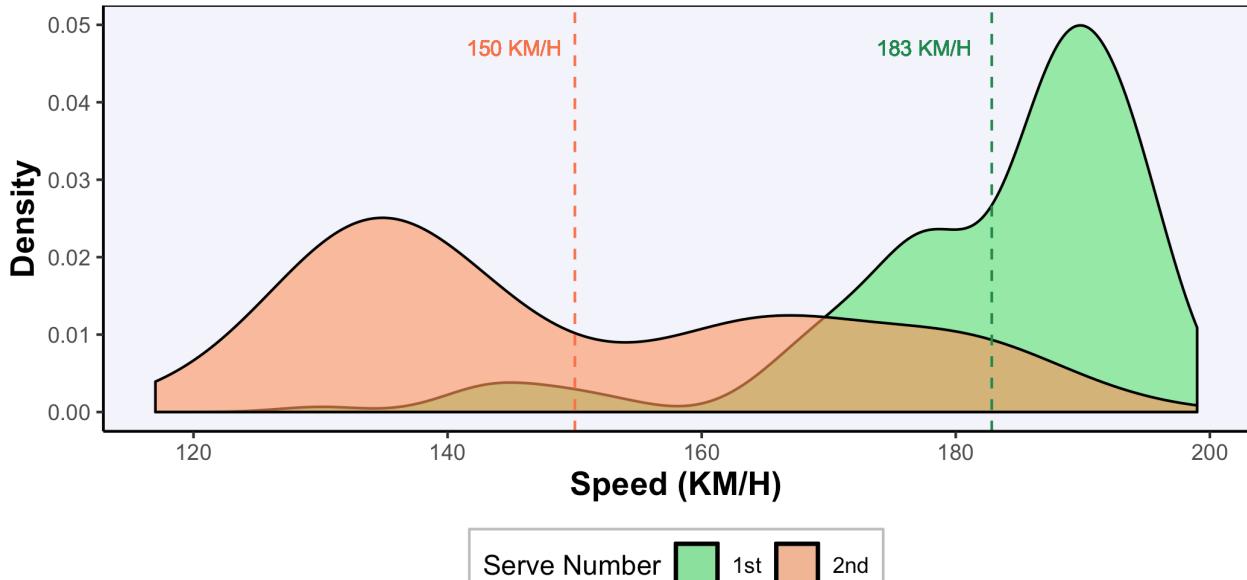
Federer Wimbledon 2019
1st Serve Speed vs. 2nd Serve Speed



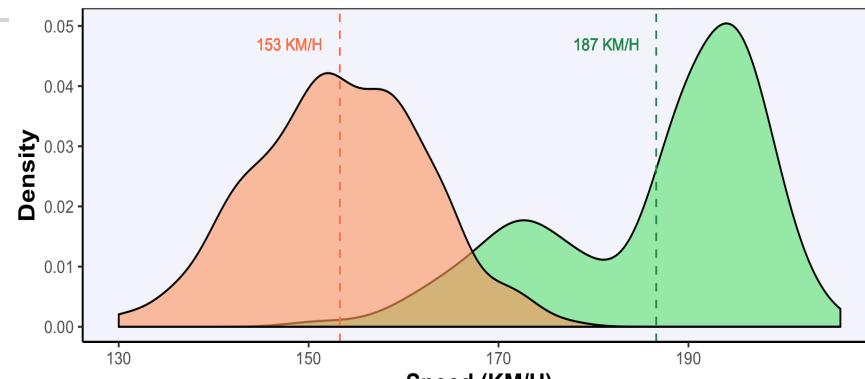


2019 ATP US Open

Djokovic US Open 2019
1st Serve Speed vs. 2nd Serve Speed

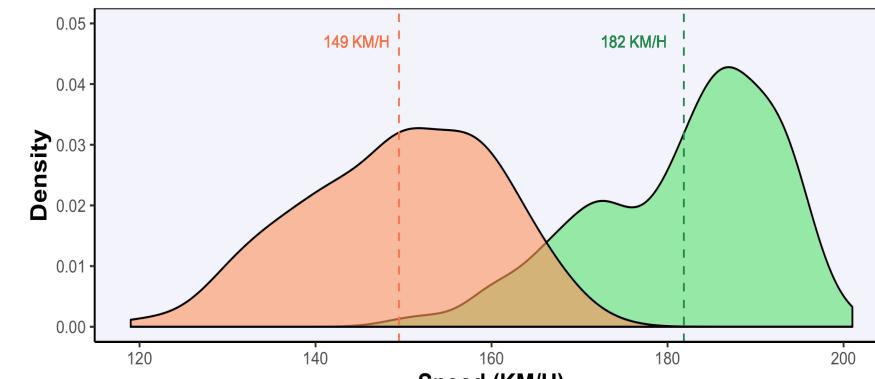


Nadal US Open 2019
1st Serve Speed vs. 2nd Serve Speed



Serve Number 1st 2nd

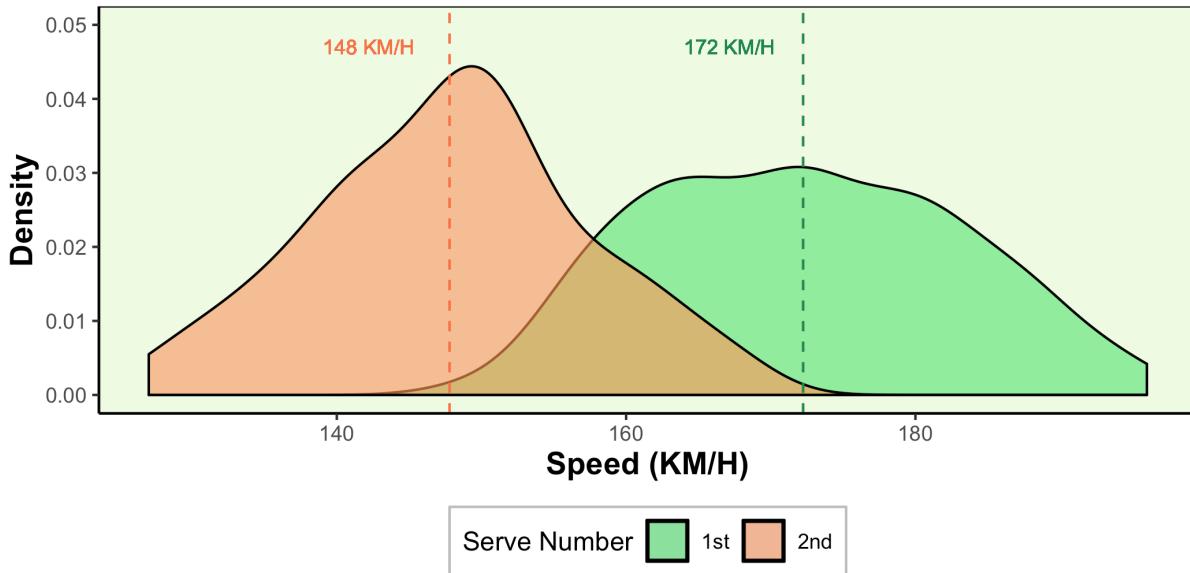
Federer US Open 2019
1st Serve Speed vs. 2nd Serve Speed



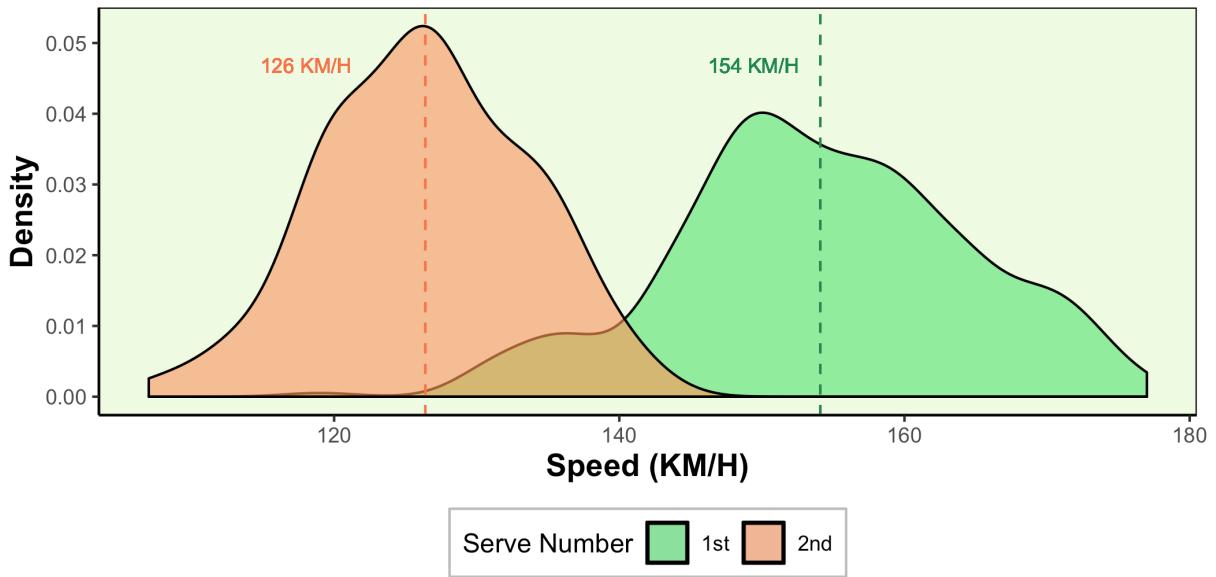
Serve Number 1st 2nd

2019 WTA Wimbledon

Williams Wimbledon 2019
1st Serve Speed vs. 2nd Serve Speed



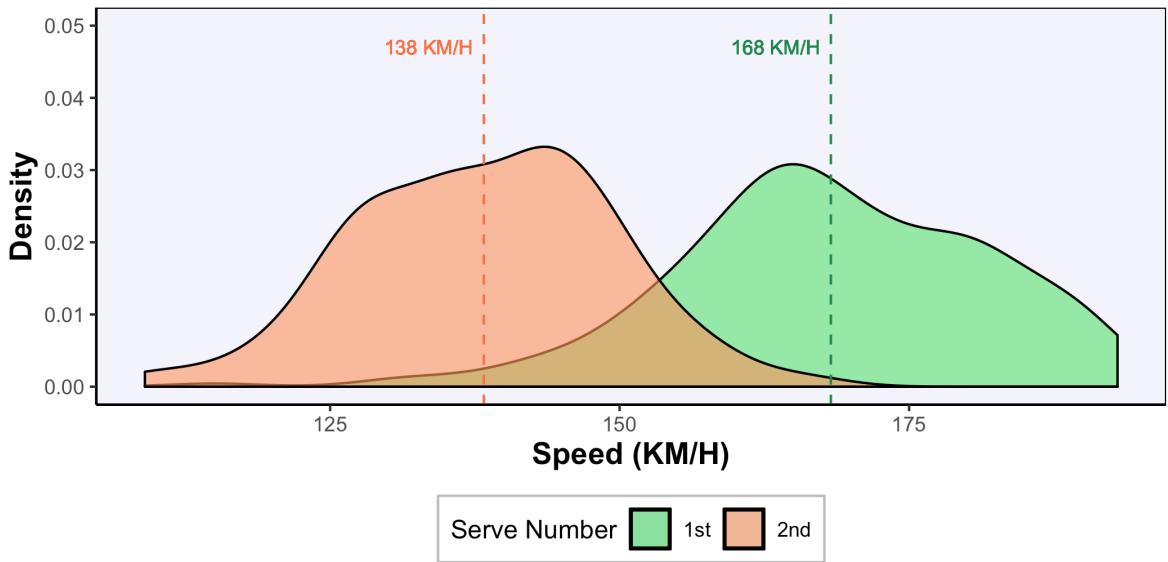
Halep Wimbledon 2019
1st Serve Speed vs. 2nd Serve Speed



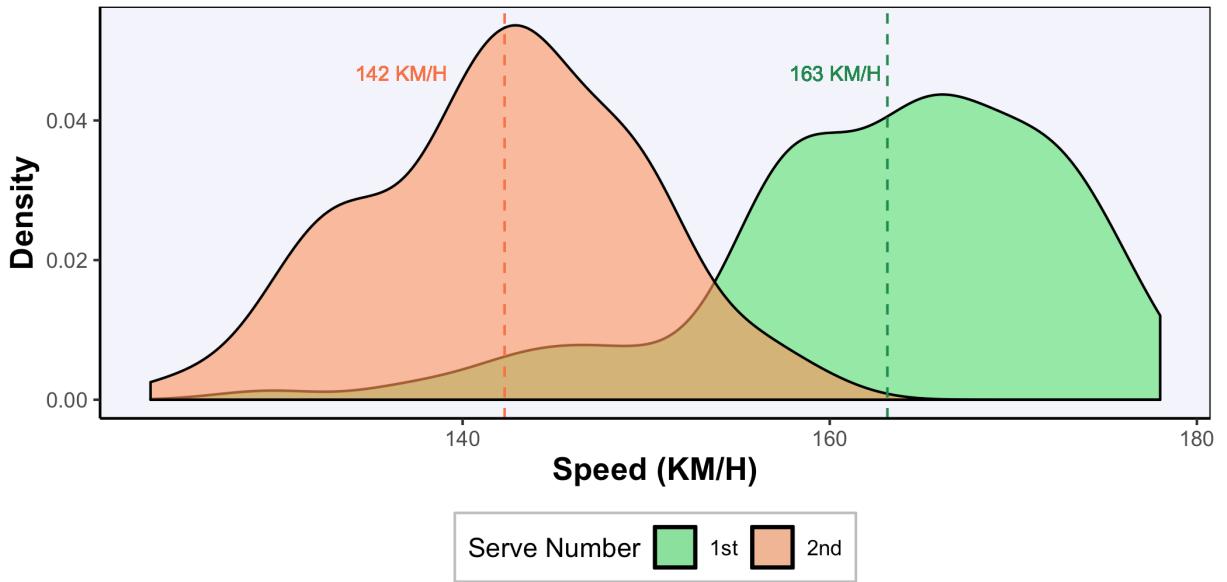
2019 WTA US Open



Williams US Open 2019
1st Serve Speed vs. 2nd Serve Speed



Andreeșcu US Open 2019
1st Serve Speed vs. 2nd Serve Speed



Wimbledon 2019: Win percentages off service games

Player	1 st Serve Speed (KM/H)	2 nd Serve Speed (KM/H)	1 st Serve win percentage	2 nd Serve win percentage
Djokovic	189	160 (- 29)	78 %	59 %
Nadal	187	158 (- 29)	81 %	65 %
Federer	186	157 (- 29)	80 %	65 %
Williams	172	148 (- 24)	72 %	58 %
Halep	154	126 (- 28)	68 %	58 %

How does point outcome change as second serve speed drops?

Player	Change in Serve Speed	Change in Win percentage	Change in Rally length	Change in Distance Run
Djokovic	▼ 29	▼ 19	★ 2.0	★ 6.0
Nadal	▼ 29	▼ 16	★ 1.0	★ 3.0
Federer	▼ 29	▼ 15	★ 1.5	★ 4.0
Williams	▼ 24	▼ 14	★ 1.0	★ 3.0
Halep	▼ 28	▼ 10	▶ 0.0	▶ 0.0

US Open 2019: Win percentages off service games

Player	1 st Serve Speed (KM/H)	2 nd Serve Speed (KM/H)	1 st Serve win percentage	2 nd Serve win percentage
Djokovic	★ 183	▼ 150	★ 78 %	▼ 65 %
Nadal	★ 187	▼ 153	★ 80 %	▼ 62 %
Federer	★ 182	▼ 149	★ 76 %	▼ 54 %
Williams	★ 168	▼ 138	★ 79 %	▼ 62 %
Andreeșcu	★ 163	▼ 142	★ 70 %	▼ 52 %

How does point outcome change as second serve speed drops?

Player	Change in Serve Speed	Change in Win percentage	Change in Rally length	Change in Distance Run
Djokovic	▼ 33	▼ 13	★ 2.0	★ 5.0
Nadal	▼ 34	▼ 18	★ 3.0	★ 9.0
Federer	▼ 33	▼ 22	★ 2.0	★ 5.0
Williams	▼ 30	▼ 17	★ 1.0	★ 4.0
Andreescu	▼ 21	▼ 18	★ 1.0	★ 3.0

Other Tennis Questions

- Somehow incorporate depth of serve into a compound statistic with serve speed. A metric that describes a “good serve” should take into account placement and speed (good placement can throw players off balance)
- Is there a hidden “shift” tactic that a receiver can abuse?
- Estimate career age curves (project player careers)