

Pressure Point Patterns: A Look Into Tennis Tactics at the French Open

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Abstract

- In tennis, mental skill is just as important as physical ability.
- This project explores how elite players handle pressure situations (i.e., important points) to gain an edge over their opponents.
- Shot trajectory data - with precise ball coordinates - from the 2019-2023 French Open tournaments was used.
- Key findings:**
 - On serve, elite players tend to stick to their strengths and even play more aggressively under pressure (depending on their opponent).
 - On return, elite players generally adopt a more conservative approach to their current strategy.

Data

- Trajectory data before transformation:**

```
{{"x": -11.3, "y": 1.1, "z": 2.607, "position": "hit"}, {"x": -11.3, "y": 1.1, "z": 2.607, "position": "peak"}, {"x": -0.283, "y": -2.827, "z": 0.033, "position": "bounce"}, {"x": -1.367, "y": -4.261, "z": 0.058, "position": "last"}}
```

- Trajectory data after transformation:**

Position	x	y	z
hit	-11.300	1.100	2.607
peak	-11.300	1.100	2.607
bounce	-0.283	-2.827	0.033
last	-1.367	-4.261	0.058

- Data preview of the most relevant variables (using Roger Federer’s 2021 R32 match against Dominik Koepfer):**

serverId	receiverId	game_score	set_score	match_score	atp_importance	atp_is_important	breakPoint
Dominik Koepfer	Roger Federer	15-15	5-6	1-1	0.0712242	FALSE	FALSE
Dominik Koepfer	Roger Federer	15-30	5-6	1-1	0.1119237	TRUE	FALSE
Dominik Koepfer	Roger Federer	30-30	5-6	1-1	0.1043578	TRUE	FALSE
Dominik Koepfer	Roger Federer	30-30	5-6	1-1	0.1043578	TRUE	FALSE
Dominik Koepfer	Roger Federer	30-40	5-6	1-1	0.1938073	TRUE	TRUE
Dominik Koepfer	Roger Federer	40-40	5-6	1-1	0.1043578	TRUE	FALSE
Dominik Koepfer	Roger Federer	40-30	5-6	1-1	0.0561927	FALSE	FALSE
Roger Federer	Dominik Koepfer	0-0	6-6	1-1	0.1530140	TRUE	FALSE

Summary Stats

Total Matches	Total Points	Total Important Points	Percent Important	Total Shots
180	45672	7848	17.2%	185702

Case 1 - Rafael Nadal Serve Locations

Rafael Nadal Serve Locations - Important Points - 2022 Title Run

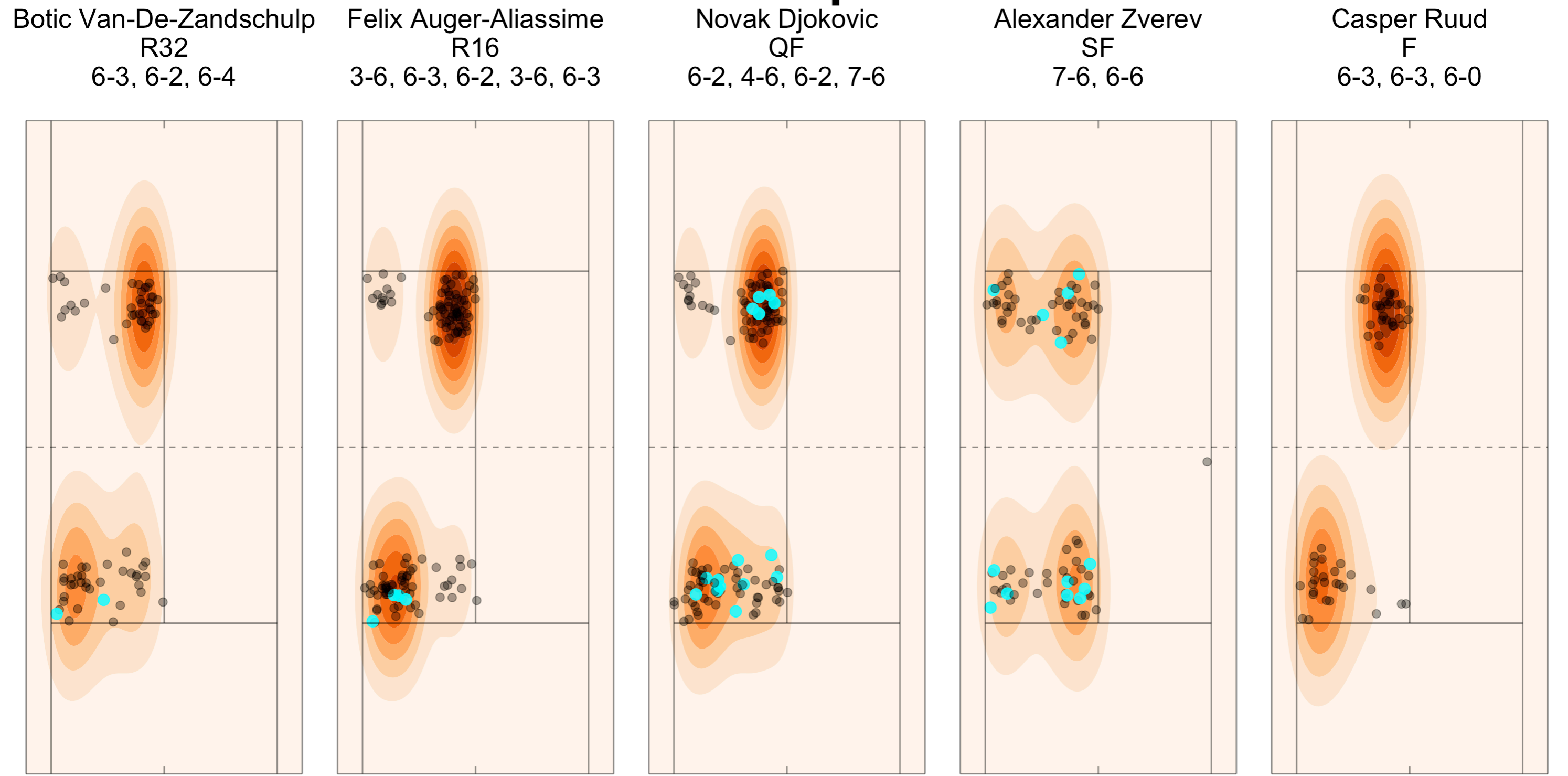


Figure 1: Blue dots represent serve locations on important points, grey dots represent serve locations on non-important points. Dots above the dashed line represent Deuce side serves, dots below the dashed line represent Ad side serves

- Nadal primarily targets his opponent’s backhand.
- For important points, Nadal generally follows the same serving strategy, with more aggressive serve locations (closer to the lines).
- Against strong returners (e.g., Djokovic and Zverev), Nadal’s serve locations are less predictable.

Case 2 - Iga Swiatek Serve Locations

Iga Swiatek Serve Locations - Important Points - 2023 Title Run

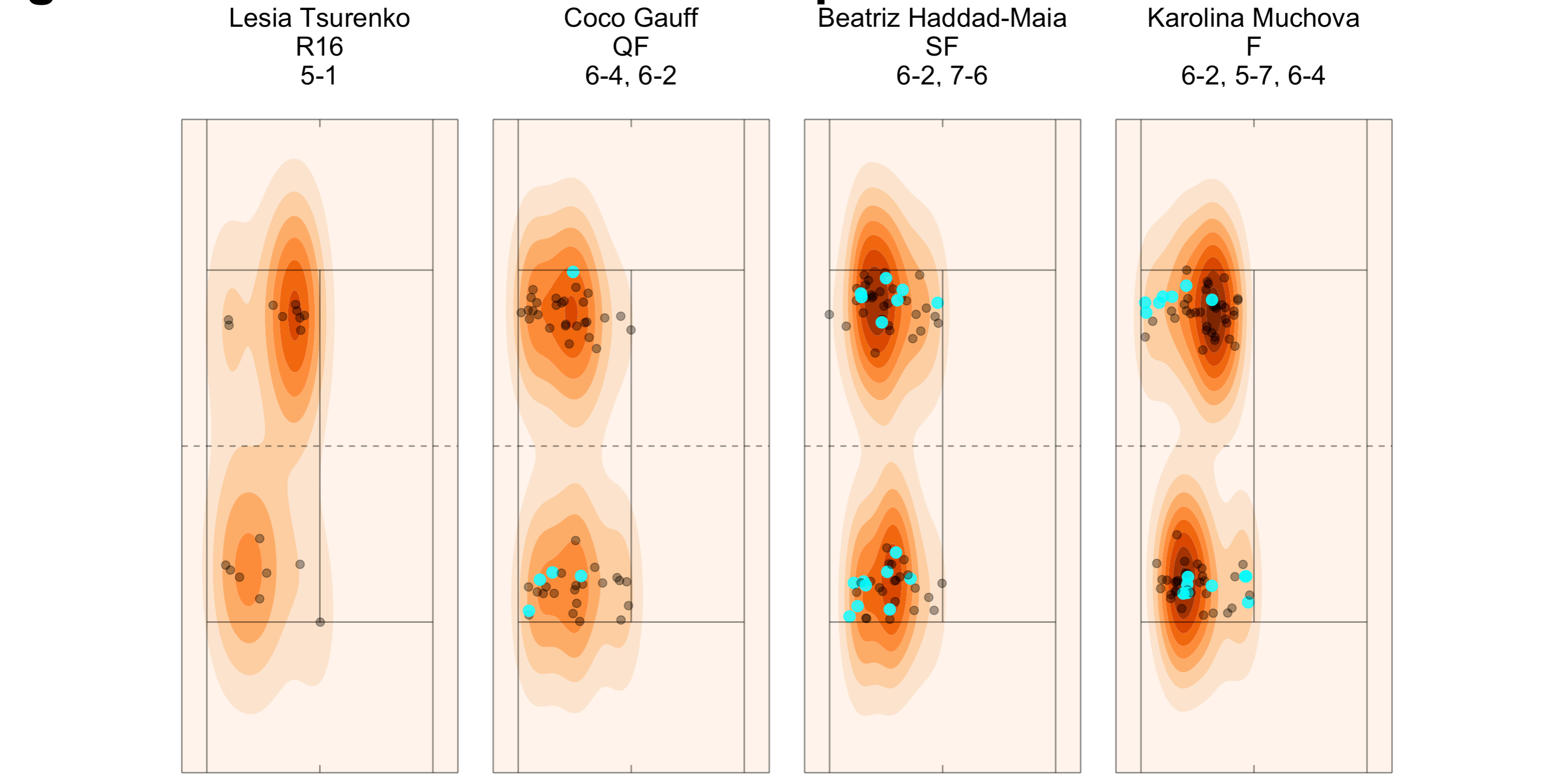


Figure 2: Blue dots represent serve locations on important points, grey dots represent serve locations on non-important points.

- Swiatek’s primary strategy is serving to the middle of the service box, providing more *margin for error* while taking away her opponent’s angles on the return.
- On important points she implements the same strategy with more aggressive serve locations (closer to the lines).

Case 3 - Novak Djokovic Return Locations

Novak Djokovic Return Locations - Break Points - 2021 Title Run

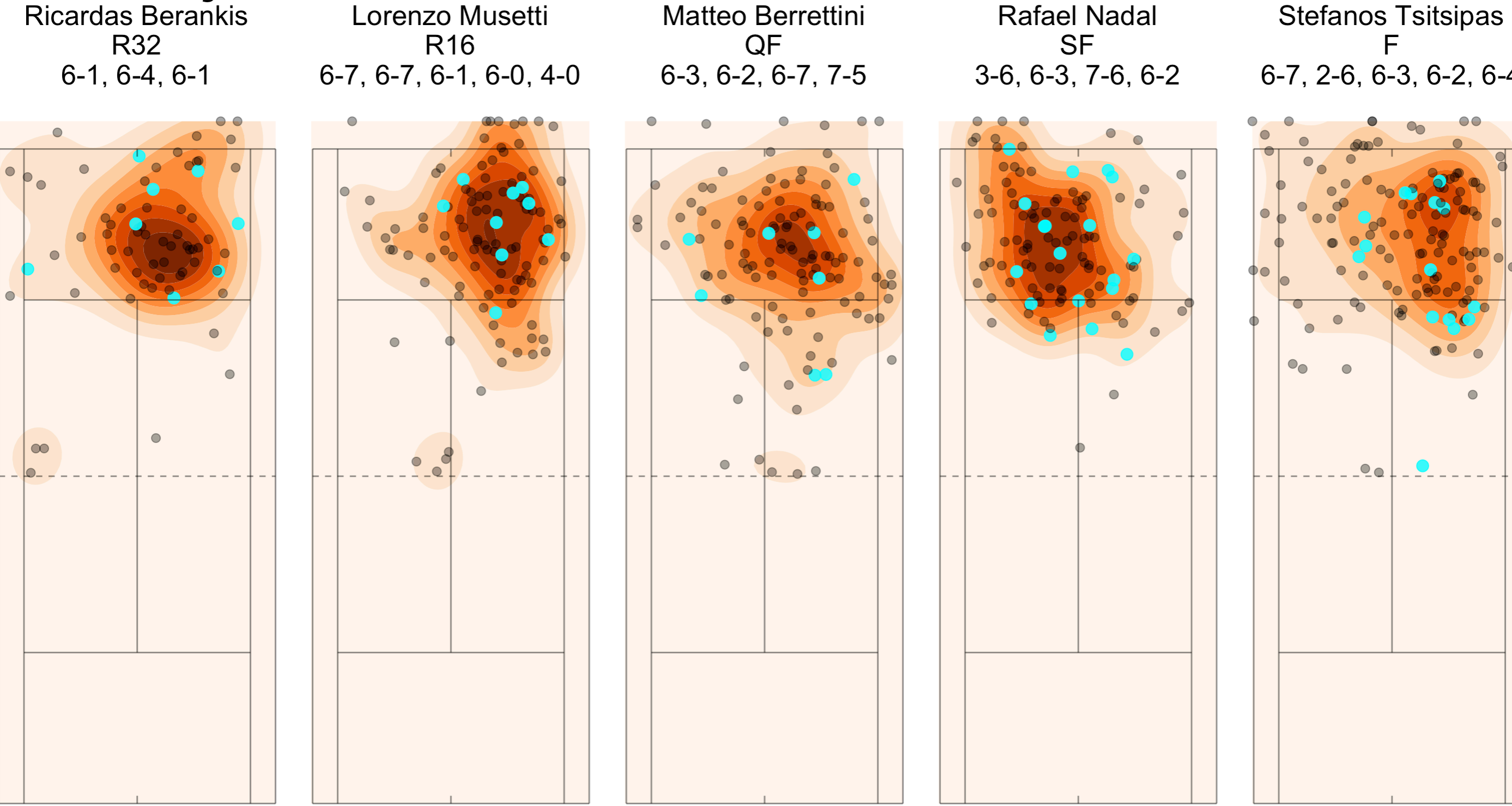


Figure 3: Blue dots represent return locations on break points, grey dots represent return locations on non-break points.

- Djokovic targets most of his returns at his opponent’s backhand with a consistent return depth - this sets him apart from his competitors.
- Djokovic is the best in the world at locking in for pressure situations, he made **all** 58 returns on break point opportunities in the 2021 tourney:

Break Point	Returns Hit	Returns Made	Percent Returns in Play
FALSE	507	439	86.6%
TRUE	58	58	100.0%

Key Takeaways

- Players adapt differently under pressure:
 - On **serve**, Nadal and Swiatek often maintain their strategy but play *more aggressively* on important points.
 - On **return**, Djokovic prioritizes consistency in high-stakes moments.
- Only **~17%** of all points are labeled as important, but they have a disproportionately large impact on match outcomes.
- Shot placement data** allows us to visualize elite players’ serve and return patterns in response to pressure, enabling more nuanced performance analysis.

References

- Kovalchik, S. A. and Reid M. (2018). Measuring Clutch Performance in Professional Tennis. *Statistica Applicata - Italian Journal of Applied Statistics*, 30(2), 255–268. <https://doi.org/10.26398/IJAS.0030-011>
- `atp_importance` values are derived using Kovalchik’s `deuce` package.
- ATP/WTA player data provided by Jeff Sackmann: https://github.com/JeffSackmann/tennis_atp
- Roland Garros tracking data obtained from Infosys Match Centre: <https://www.infosys.com/roland-garros/>