THE PATHS WE TAKE:
A PLAYER TRACKING ANALYSIS OF NHL SHOOTOUTS

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Abstract

In the NHL, the shootout takes place if a tie remains at the end of overtime by pitting a single shooter against the opposing goalie in a mano a mano bid to seal the game. Given how important each point is in the standings, finding a competitive advantage in these scenarios could be the difference between making the playoffs and ending the season early. Research on shootouts has typically measured shooting success rates based on eventing data and observable aspects of the shootout attempt. We consider these along with tracking the paths and changes in shooter speed and acceleration during their attempt.

Dataset

- The data are made up of a set of 1,154 shootout attempts from the 2017-2018 and 2018-2019 NHL regular seasons and were collected using computer vision techniques with tracking data.
- The features comprise shooter and goalie spatiotemporal and trajectory information along with contextual attributes such as player and goaltender handedness, dekes, goal information, and contexts such as shootout rounds and scores.

Methods

- The trajectories were smoothed with spline interpolation and clustered into 6 groups with functional cluster centres modelled as Bézier curves.
- Clustering was run on shooter paths from the blue line to the shot or deke location, as this allowed for more tracks to be clustered.
- The grouped trajectories were analyzed along with the remaining shot features to determine optimal skating paths and derive new insights based on where skaters travel on their shootout attempts.

VGK 1 | TBL 0

**Slow — Fast**

☒ = Saves ⬡ = Goals
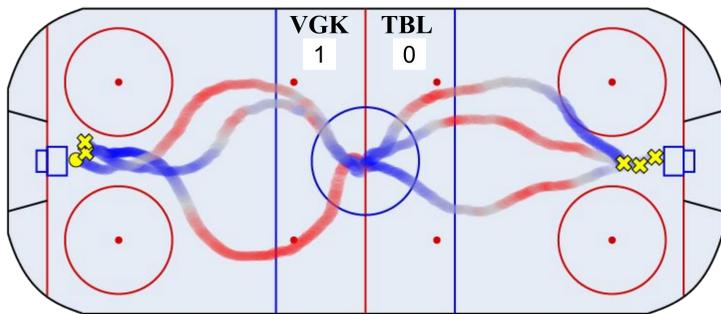
On the left: Player trajectories from a shootout game between the Tampa Bay Lightning (0 for 3) and the Vegas Golden Knights (1 for 3) in February 2019.

On the right: 10 of Jonathan Huberdeau's shootout attempts from the last two NHL seasons. The attempts that were saved are shown heading toward the left, whereas goals are shown scoring on the net on the right.

Saves 8 | Goals 2

J. Huberdeau
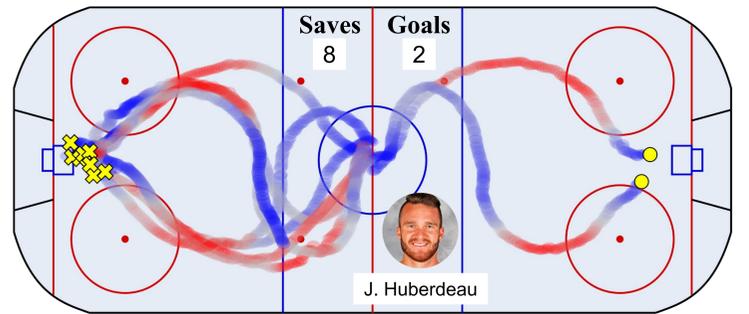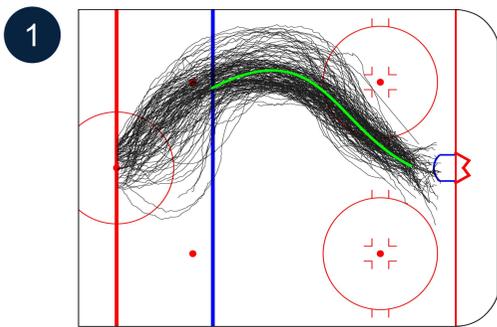
Clusters

Cluster 1 consists of attempts where the shooter takes a wide path crossing the blue line near the left face-off dot, and attacking the net from the goalie's right-hand side.
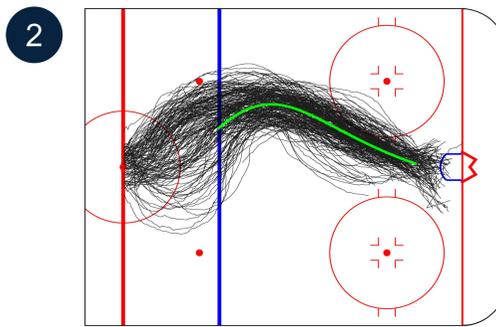
Cluster 2 is similar to Cluster 1, however these paths are narrower, with players staying inside the face-off dots and taking more direct approaches from the goalie's right.
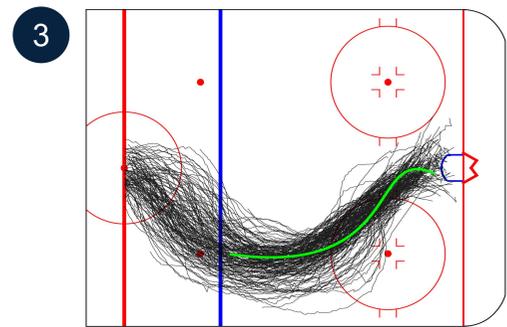
Cluster 3 is almost a mirror of Cluster 1, with players approaching wide and from the goalie's left. There is, however, a curve at the end driving in towards the net.
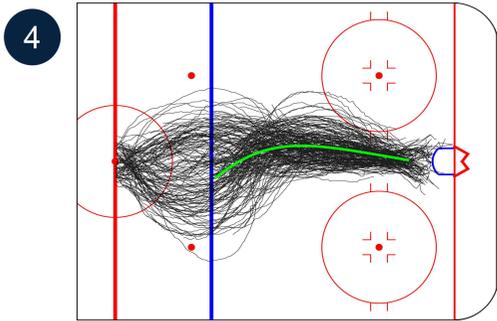
Cluster 4 has the straightest route as the shooters take a slight curve, but don't skate as wide or change the angles on the goalie nearly as much as the other clusters.
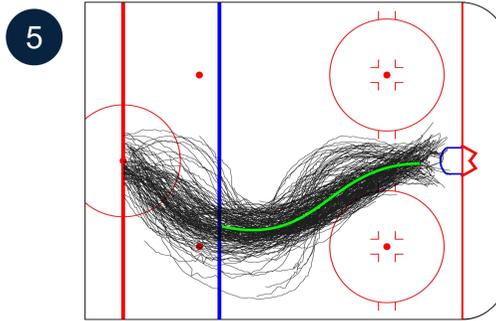
Cluster 5's routes attack from the goalie's left side, but are narrower than Cluster 3. These are similar to a mirror of Cluster 2, but also feature a curve at the tail.
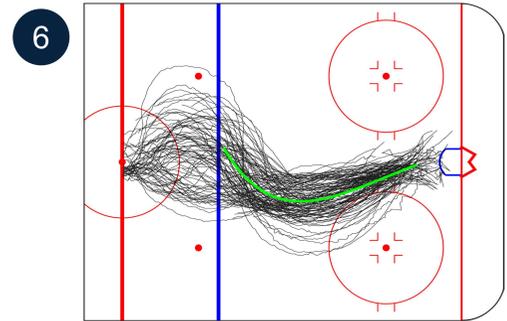
Cluster 6 consists of a slight but meaningful curve to the goalie's left, appearing similar to Cluster 5, but with trajectories traveling more in the centre of the ice.

Clusters Results

Cluster	1	2	3	4	5	6	Total
Description	Wide Left	Narrow Left	Wide Right	Down the Middle	Narrow Right	Right Dip	
Num. of Attempts	173 (15.0%)	243 (21.1%)	188 (16.3%)	212 (18.4%)	219 (19.0%)	119 (10.3%)	1,154
Shooting %	32.9%	32.9%	30.9%	27.8%	25.6%	32.8%	30.2%
Left-Hand Sh %	31.7%	29.7%	30.0%	24.2%	25.0%	33.7%	28.7%
Right-Hand Sh %	33.6%	34.9%	34.2%	31.0%	26.9%	26.7%	32.3%
Best Shooter*	M Cammalleri (4/5)	M Scheifele (4/5)	A Matthews (4/8) P Byron (4/8)	T Bozak (5/8)	C Atkinson (3/5)	A Galchenyuk (2/5)	V Hedman (4/5) M Cammalleri (4/5) M Scheifele (4/5)
Worst Shooter*	R Ellis (1/6)	J Silfverberg (0/5)	J Voracek (2/5) M Zuccarello (2/5)	D Perron (0/5)	C Mittelstadt (2/6)	K Fiala (0/5)	J Silfverberg (0/6) J Slavin (0/6) J van Riemsdyk (0/6) M Koivu (0/6)
Best Goalie*	F Andersen (5/6)	B Holtby (5/5) C Hellebuyck (5/5) P Rinne (5/5)	T Greiss (8/9)	F Andersen (8/8) P Rinne (7/7) J Howard (6/6)	J Howard (6/6) C Hellebuyck (5/5) A Khudobin (5/5)	F Andersen (5/5)	M Subban (13/13)
Worst Goalie*	M Smith (2/5)	A Raanta (1/5)	M Smith (2/5)	M Jones (2/6)	H Lundqvist (2/5)	P Rinne (4/7)	M Condon (3/8)
Frequent Shooter	A Panarin (5/8)	M Zibanejad (5/10)	A Matthews (4/8)	T Seguin (5/9)	K Shattenkirk (4/7)	F Nielsen (1/8)	K Turris (6/15)
Frequent Goalie	J Markstrom (6/9)	M Jones (8/11)	M Jones (6/10)	H Lundqvist (8/10)	J Markstrom (10/12)	P Rinne (4/7)	J Markstrom (34/47)
* denotes the best and worst shooters/goalies with a minimum of 5 attempts taken/faced for that cluster							

The results table to the left features a breakdown of each of the 6 clusters, looking at success rates, shooter handedness, best and worst performers, as well as the most frequent shooters and goalies in each group.

- Right-handed shooters performed better overall than left-handed (although it's worth noting this was mostly against left-gloved goalies as well).
- Based on the clusters, changing the angles for the goalie and skating to the side of one's backhand appear to give shooters a higher chance of scoring.
- At the player level, 5 of the 6 most frequent shooters performed above average in their respective clusters, however, Frans Nielsen was 1-for-8 in his *Right Dip* attempts.