Analyzing Consistency Among NHL Forwards Performance

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Background & Data

Background

Consistency, the quality of being able to maintain high or low level performance, is the hallmark of athlete importance and investment.

Goal

Measure performance consistency among forwards in hockey

Data

8 seasons (2016-17 to 2023-24) of combined advanced, basic, miscellaneous and time on ice performance statistics data from Hockey-Reference

Methods

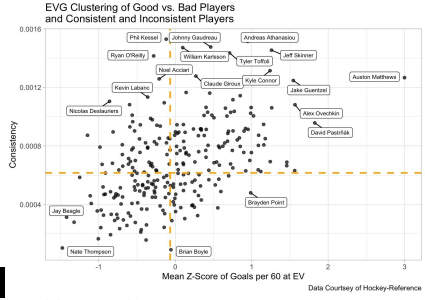
Transform metrics(EVG, EVA) into per 60 minutes metrics → Standardize Metrics, i.e calculate Z-scores → Determine weights for z-scores of individual metrics using PCA for one combined metric → Calculate the Weighted Mean Change

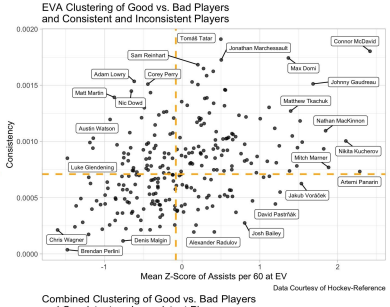
The **Weighted Mean Change of** overall trend in a player's offensive performance consistency is given by

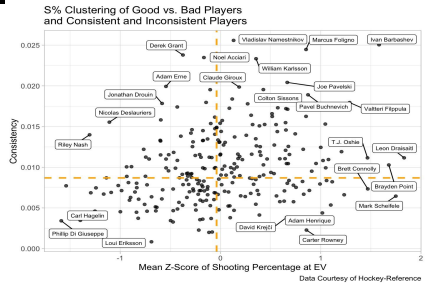
$$\frac{(Weight_1 + Weight_2)\ * (\Delta x) + (Weight_2 + Weight_3)\ * (\Delta x) + \ldots + (Weight_{n-1} + Weight_n) * (\Delta x)}{Sum\ of\ Weights}$$

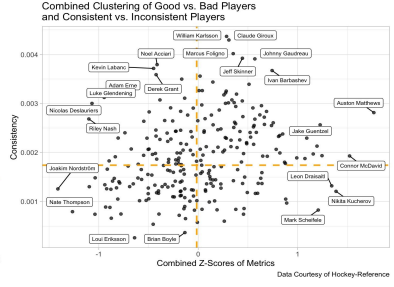
where Δx is the absolute difference of a metric from one season to the next and the weights are games played for a single season. For instance, the weighted mean change of even strength goals of a player is the difference in EVG from one season to the next, weighting it by games played.

Results









Players are clustered into 4 quadrants of different consistency and skill levels through individual metrics and a combined metric:

1) Bottom right - high skill, consistent
2) Top right - high skill, inconsistent
3) Bottom left - low skill, consistent
4) Top left - low skill, inconsistent

There is a correlation between salary and performance, therefore, teams value performance more than consistency.

Top 5 Players in Offensive Performance and Consistency

Player	Mean_Total_zscore	Weighted_Means_Change	Salary
Mark Scheifele	1.2066578	0.0008275	8500000
Logan Couture	0.4605859	0.0008584	8000000
Nikolaj Ehlers	0.8895559	0.0009704	6000000
Brett Connolly	0.8795580	0.0010505	3500000
Jonathan Huberdeau	0.5746333	0.0011661	10500000

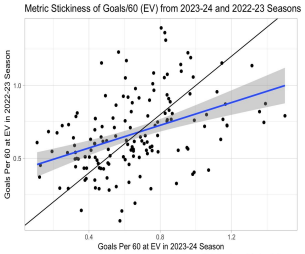
Correlation Table Between Salary and Consistency & Salary and Performance

	Adjusted.R.Squared	Variable1	Variable2
Cap_WMC	0.0184667	Cap Hit	Consistency
Cap_Zscore	0.3436713	Cap Hit	Performance

Metric Stickiness

The graph to the right shows the correlation of EVG from the 2023-24 and 2022-23 seasons.

The correlation suggests the metric is not completely random, but fairly predictable year-to-year.



Response	Explanatory	$R^2_{EVGoals}$	$R^2_{EVAssists}$	$R^2_{ShotPerc}$
2023	2022	0.175	0.307	0.084
2022	2021	0.136	0.231	0.107
2021	2020	0.135	0.211	0.162
2020	2019	0.146	0.218	0.054
2019	2018	0.147	0.238	0.098
2018	2017	0.109	0.162	0.104
2017	2016	0.098	0.101	0.123

The R^2 values are marginally significant and allow us to further analyze the metrics.

Discussion

Limitations

- Few performance metrics for defensemen and goalies
- Poor quality performance metrics measuring other abilities

Future work

- Measure consistency from a game to game basis
- Consider defensemen and goalies
- Potential predictive modeling

Acknowledgements

Special thanks to Katerina Wu, Caleb Pena, Luke Zulyak, Quang Nguyen, and CMU Stats Department for their guidance and feedback throughout the span of the project.