
Measuring Consistency in NHL Forwards Performance

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Predictability and Reliability

Student A

Test 1	85%
Test 2	85%
Test 3	85%
Average	85%

Student B

Test 1	75%
Test 2	85%
Test 3	95%
Average	85%

Goal

How to measure consistency?

Who are the most consistent players?

Is there value in consistency?

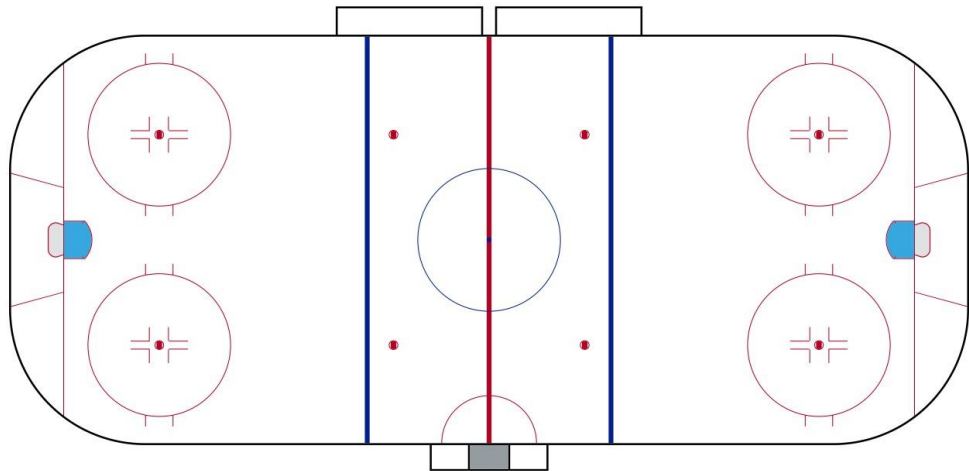
Background

What is Hockey?

- 5 on 5, plus goalies

Key Variables

- Even strength goals (EVG)
- Even strength assists (EVA)
- Shooting percentage (S%)



The Data

Player performance data from Hockey-Reference
2016-17 to 2023-24 season

Testing Metric “Stickiness”

The R^2 values are marginally significant, suggesting correlation and allowing us to use these metrics

Response	Explanatory	$R^2_{EVGoals}$	$R^2_{EVAssists}$	$R^2_{ShotPerc}$
2023	2022	0.162	0.167	0.130
2022	2021	0.129	0.272	0.059
2021	2020	0.188	0.234	0.109
2020	2019	0.069	0.353	0.048
2019	2018	0.214	0.227	0.084
2018	2017	0.179	0.216	0.111
2017	2016	0.046	0.097	0.062

Z-Score

$$Z = \frac{x - \mu}{\sigma}$$

Compute z-score for every player regarding each metric and season

Standardize our metrics onto the same scale for other analyses

Principal Component Analysis

Determine weights of each metric

Normalize the weights to a sum of 1 for proper weighting

Apply normalized weights to metrics for a combined metric

Weighted Mean Change

Calculate the difference in some statistic from one season to the next

A variable to weight each season

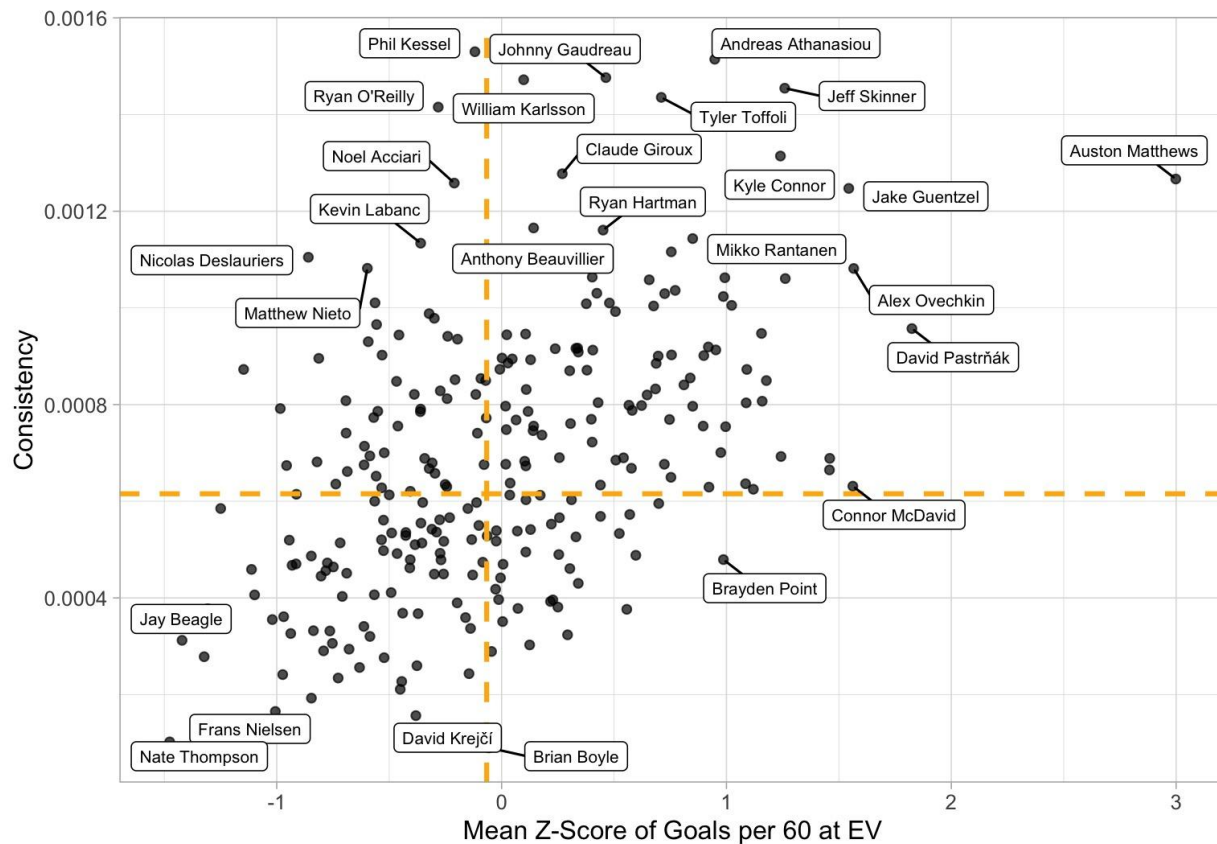
$$(Weight_1 + Weight_2) * (\Delta x) + (Weight_2 + Weight_3) * (\Delta x) + \dots + (Weight_{n-1} + Weight_n) * (\Delta x)$$

Sum of Weights

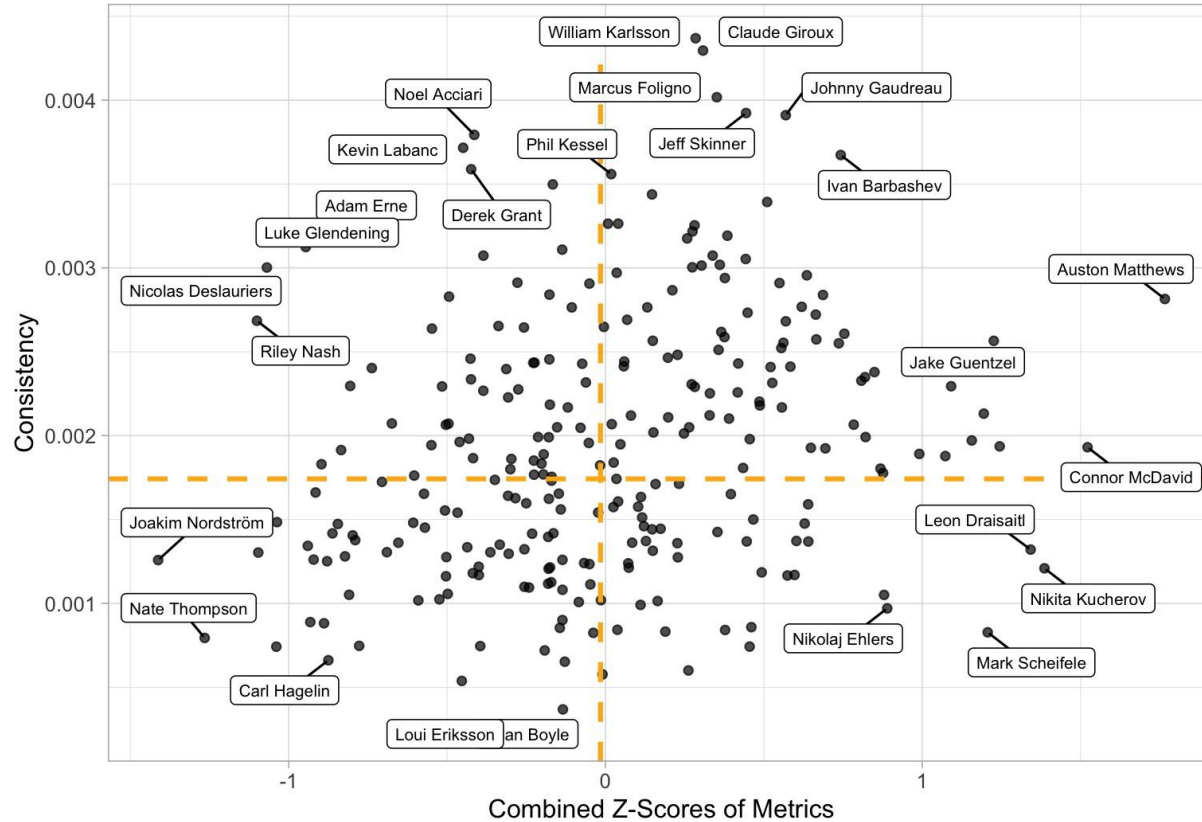
For our case...

- Weight: games played in a season
- Δx : difference in a metric from one season to another

Even Strength Goals Clustering, Point Consistent & Good



Overall Offensive Ability Clustering



Data Courtesy of Hockey-Reference

More Value in Performance than Consistency

Correlation Table Between Salary and Consistency & Salary and Performance

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

Limitations

- Open source NHL data continues to be tracked more accurately
 - Potential issues when comparing season to season data
- Few performance metrics for defensemen and goalies
- Poor quality performance metrics for measuring other abilities

Future Work

- Measure consistency from a game-to-game basis
- Consider defensemen and goalies
- Potential Predictive Modeling