Evaluating Prospect Decision-Making and Pass Quality with Pass Value Added

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Introduction

A player's hockey sense and IQ are highly debated topics, especially when tracking potential for development in an OHL-level prospect. While these are largely determined by "eye-test" evaluations of a prospect's positioning, passing and awareness, this paper seeks to establish an analytical method to assess a player's decision-making on the ice.

Using the coordinate and event data provided by Stathletes, combined with Expected Goal (xG) processes—specifically those curated by Ken Krzywicki in his 2010 Shot Quality research, I developed a metric to determine the **Pass Value Added (PVA)** from a player's decision to pass. The statistic measures the xG value added for completed passes leading to shots. PVA asks: did the pass result in a better scoring opportunity than where the pass originated from?

Data Preparation

The majority of predictive goals model use a variety of variables in their calculations, including score state, giveaways and shot type, with the two overarching factors being distance and angle from the goal. I reasoned that in the specific scenario of a pass decision, the predictive onus on the passing player relies on only three of these variables:

1. **Distance from goal**
2. **Angle on goal**
3. **Strength**

In order to do this, five additional variables were drawn from the dataset. Firstly, X and Y coordinates were adjusted to relate to the opposing team's goal, rather than the offensive teams left defensive zone. Secondly, an absolute angle was drawn from these coordinates, effectively placing every event on the right side of the ice in relation to the goal, in order to keep angle data equivalent. Distance from the goal was calculated using the Pythagorean Theorem from the adjusted coordinates. Lastly, a simplified

regression model was then calculated using the shot angle and distance in order to aggregate a relative shot quality metric.

Expected Goals as a Proxy

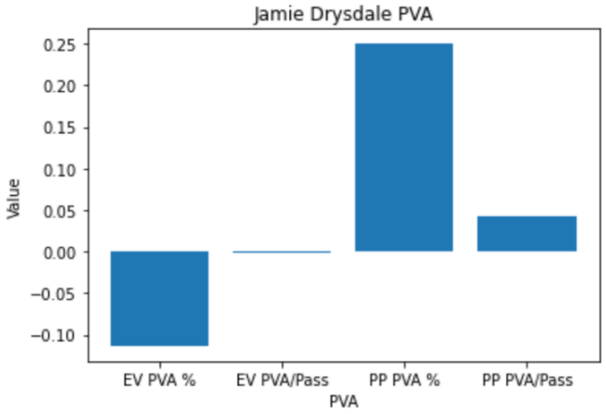
The final adjustment to note in regard to the research is the lack of a truly predictive expected goals model for the data in question. While the first xG model for the OHL surfaced just recently in an article by GTAnalysis, I opted to utilize a simplified version of Krzywicki's logistic regression model developed from the NHL 2009-10 season as a proxy for a predictive xG model trained from OHL data. While this may not be ideal when searching for exact xG metrics, PVA is built upon relativity and the simplified regression works well to aggregate distance and shot angle into relative shot quality values.

Introduction to Pass Value Added

On September 20th, 2019, the Erie Otters play the Sudbury Wolves. 10 minutes into the first period, Jamie Drysdale (131, 64) is walking the blueline in the Wolves' zone on an Otters power play. At this point, Drysdale has a relative shot quality of 0.046—a poor chance. Rightly so, Drysdale spies an open Otters' player and passes to Connor Lockhart (155, 23) who shoots the puck. From this spot, Lockhart has a relative shot quality of 0.10—a fine chance shooting from the top of the left circle. Drysdale has a made a common hockey decision for a defenseman quarterbacking a power play—moving the puck from his perch at the top of the umbrella to an open shot off the wing. In doing so, he generates a much better scoring opportunity than he had, gaining value of 0.054 from his pass.

Drysdale's complete PVA metrics for the 2020 dataset are show below. As expected, he generates tremendous passing value from the power play, with over 75% of his passes for a shot adding value. At even strength, however, he generates negative PVA passes 62% of the time. Despite this, his positive PVA passes heavily outweighed his negative PVA passes on aggregate, with an approximately even PVA/Pass ratio,

suggesting that his positive passes generated very strong chances, while his negative passes were only incrementally worse in their resulting shot quality.



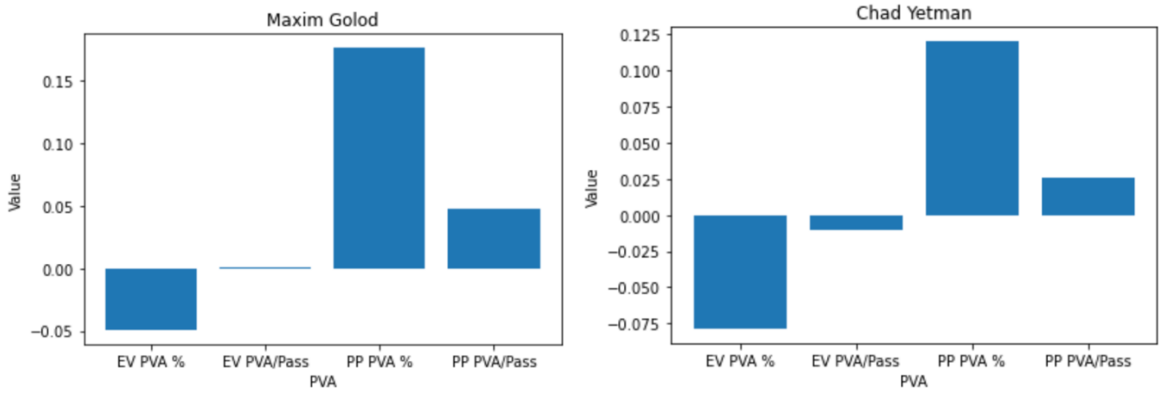
PVA as a Tool for Player Comparisons

Two 2019-20 Erie Otters forwards provide an ideal opportunity for player comparisons in scouting, especially when attempting to distinguish between similar players in later rounds of drafting. Maxim Golod (ANA) and Chad Yetman (CHI) were two undrafted Otters with strong overage seasons in the OHL in 2019-20, establishing themselves as legitimate prospects for the 2020 Entry Draft.

PLAYER	MAXIM GOLOD	CHAD YETMAN
GP	63	61
G	25	43
A	53	31
P	78	74
Central Scouting	213	NR
NHL Status	ANA - FA, 2020	CHI - 172nd, 2020

In comparing Golod and Yetman, it becomes apparent that PVA generation in even strength play is relatively difficult—it is rare for the majority of one's passes to generate more relative quality isolating for distance and angle, as defensive positioning is key to understanding offensive play. Layered attacks and finding seams will play a role in a player pass decision, which is where a holistic xG model could help. Regardless, the

PVA comparisons between Golod and Yetman provide a strong basis of understanding for their passing decisions.



As shown above, Golod converts 45% of his passes for shots into positive added value at even strength, and holds a positive PVA/Pass, which using the same logic as in the Drysdale case, suggests he creates high value plays in his positive passes.

Yetman does not convert passes into quality shots at the same rate as Golod, nor does he average positive PVA for his passing at even strength. On the power play Yetman makes strong PVA plays, yet Golod still outstrips him in this scenario, generating double the amount of PVA per pass, and at higher percentages overall.

Utilizing PVA for Scouting

Using the Golod. v. Yetman case we can see how Pass Value Added metrics can be combined with visual scouting to develop a thorough understanding of a player's offensive zone decisions. It is reasonable that in two similar players in age, style and talent, scouts will need to be able to differentiate between each prospect's qualities in order to form strong opinions for management during the draft. A scout watching both play throughout the season would probably describe each as a skilled offensive player, perhaps ranking Yetman as a goalscoring winger and Golod as a smaller playmaking prospect.

From here, Pass Value Added provides a quantitative groundwork for some of these assumptions. From the data, Golod makes higher quality passes at higher rates than Yetman, both on the power play and at even-strength. This alone cannot determine a player's offensive instincts, but in coordination with a scouts' experience in viewing, can alter or support the conclusions that they have made for each player, and perhaps even determine a decision around the table at pre-draft meetings. When evaluating a prospects offensive awareness, a scout can provide PVA analysis as an analytical basis for their offensive passing abilities and use these insights to forward the scouting process.

Future Steps

Pass Value Added provides data for one of many scenarios in which hockey players make critical game decisions, both on and off the puck. The metric alone could benefit from the addition of a rigorous xG model for junior hockey. The model could also be improved with multiple on-ice coordinates, building out a robust picture of play positioning in given scenarios. The addition of zone entry analysis and plays for rebounds or off the end boards could aid in building a more complete model for offensive decisions.

Conclusions

Pass Value Added is just the tip of the iceberg in quantitative analysis of on-ice passing and decision-making. However, as demonstrated above, it can be used as a significant tool in describing player passing and shot quality creation in the offensive zone. In regard to scouting, metrics such as PVA can be used to offset the plethora of visual information a scout gathers and provide measurable data to aid in the evaluation of a player's offensive potential.

Links

Code

Krzywicki's xG (2010)