

## Zone Entries from Behind the Mask:

### How Zone Entries affect the Goaltending position

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## Introduction:

Zone Entries have long been talked about as a way that produces more efficient shot generation, specifically when entries are controlled. This analysis looks at the question: How do zone entries affect the people whose job it is to keep those shots out of the net? We will drill down into Zone Entry variables and their subsequent events to see which may have the biggest impact on a Goaltender and their ability to play the position. Through many discussions with varying hockey minds and reading of publications, others and I have associated these events with how they benefit the attacking team rather than flipping our point of view and trying to understand how much more difficult these events make a Goaltender's job. The more high danger events are described in a publication by Steve Valiquette (1), founder of Clear Sight Analytics, that we be leveraged throughout this analysis.

## Approach:

The dataset is Women's Hockey Event data provided by Stathletes where we focus on 5v5 regulation time events. This was further refined to show any shot attempt that occurred within 4 seconds of a zone entry as defined by Stathletes. Going forward the events occurring before the shot may be referred to as "goaltending complexities". The main data points we focused on were as follows

- Stathletes' provided shot details:
  - Detail 3: Traffic on shot Indicator
  - Detail 4: One Timer Indicator
- Metrics created with the available data:
  - Entry Angle: Angle from zone entry point to center of attacking goal.
  - Shot Angle: Angle from shot point to center of attacking goal.
  - Angle Delta: Difference between Entry Angle & Shot Angle, will think of this as a goaltender's "degrees of movement"
  - Entry "Speed": How fast the attacking team was able to climb the ice, measured in feet per second from puck recovery to zone entry.
  - Entry Location: Blue Line was divided into 5 equal sections.
  - Possession Start Zone: Where the attacking team's possession started.
  - Event prior to Shot Ind:
    - non\_ci: Shot came from the same side of the ice as the entry *with no* pass between entry and shot.
    - non\_RR\_pass: Shot came from the same side of the ice as the entry *with a* pass between entry and shot.
    - RR\_pass: Shot came from the opposite side of the ice as the entry *with a* Royal Road pass between entry and shot.
    - cross\_ice: Shot came from the opposite side of the ice as the entry *with no* pass between entry and shot.
  - High Level xG (*drawn from Royal Road study (1)*): An aggregate of the following probabilities based on event preceding shots
    - Royal Road pass: 22% of all goals
    - Screen/Traffic: 10%
    - One Timers from same side of Royal Road: 9%
    - Royal Road Carry: 8%

- Deflected Shots: 8%

## Findings:

First, looking through the lens of entry speed we saw that the 15-20 feet per second bucket was the best performer in terms of creating goaltending complexities. We see the greatest number of Royal Roads passes, screened shots, and one timers. This grouping could include breakout and regroup play where teams are entering the zone with some speed but with enough control to complete passes throughout the possession leading up to the shot. This could also explain the higher number of screen as the defense may be in a better structure to defend the entry leading to d-men clogging up shooting lanes. Additionally in the second figure, this same speed bucket creates the most east to west puck movement off entries and can intuitively say that will create more movement from the goaltender as well.

EVENTS BY ENTRY SPEED							
SPEED_BUCKET	ONE_TIMERS	SCREENS	ROYAL_ROAD_PASSES	ROYAL_ROAD_CARRIES	SAME_SIDE_ONET	XG	XGPEREVENT
0 to 5	0	5	0	1	0	0.58	0.10
5 to 10	0	1	1	1	0	0.40	0.13
10 to 15	1	4	1	3	1	0.86	0.10
15 to 20	3	6	6	1	3	2.08	0.13
20 to 25	2	3	2	2	1	0.98	0.12
25 to 30	1	1	0	2	0	0.26	0.09
30 to 35	0	0	1	0	0	0.30	0.30
NA	0	0	0	1	0	0.08	0.08



Building off the above figure we look at east to west puck movement immediately after a zone entry. Following a similar trend as the speed chart we see effectiveness in the middle of the bucket range. A highlight here is the 10-20 bucket shows 3 Royal Road Passes and Carries showing shots don't need to cover an extreme range of ice from east to west in order to create difficulties for the goaltender.

EVENTS BY DEGREES OF MOVEMENT PER SECOND							
DPS_BUCKET	ONE_TIMERS	SCREENS	ROYAL_ROAD_PASSES	ROYAL_ROAD_CARRIES	SAME_SIDE_ONET	XG	XGPEREVENT
0 to 10	3	17	1	1	1	2.16	0.11
10 to 20	0	0	3	3	0	0.90	0.15
20 to 30	2	2	3	1	2	0.94	0.12
30 to 40	1	1	2	2	1	0.70	0.12
40 to 50	1	0	1	1	1	0.30	0.10
50 to 60	0	0	1	0	0	0.30	0.30
NA	0	0	0	3	0	0.24	0.08

Pivoting to entry location we do see a relatively even distribution in xG per event between the location zone. Screened shot coming from the middle of the ice should be no surprise as d-men are mostly likely positioned between themselves and the goaltender. There is a skew in Royal Road passes in the outside-left zone which would seem riskier and less efficient than passes coming from an area closer to the center of the ice.

EVENTS BY ENTRY LOCATION							
ENTRY_LOCATION	ONE_TIMERS	SCREENS	ROYAL_ROAD_PASSES	ROYAL_ROAD_CARRIES	SAME_SIDE_ONET	XG	XGPEREVENT
middle	0	8	1	1	0	1.10	0.11
middle_left	1	2	3	1	1	1.02	0.15
middle_right	1	4	1	3	1	0.94	0.10
outside_left	4	2	6	4	3	1.92	0.13
outside_right	1	4	0	2	0	0.56	0.09

## Action Points & Next Steps:

Through these views it is clear that zone entries that combine speed as well as methodical play upon entry create high danger plays that make the goaltender's job more difficult. Referring to methodical play, it may not be making the longest, fastest pass across ice but rather one with the combination of north/south speed and east/west quickness that moves the goaltender in maybe just the slightest amount to affect their positioning. When looking at entry location, it may not be the worst thing to be forced to the outside by a defender as this could open up east/west action to create a higher danger shot.

I believe this analysis could be enhanced with player tracking data layered in as it could possibly include a goaltender's depth and angle relative to the net to get an even deeper understanding of how those Entry variables effect positioning. In addition, a proper xG model could tell the story a better as the

nuances of the women's game (better body/stick positioning) may discourage some of the events happening before the shots.

## Appendix:

Code can be found on GitHub:

[https://github.com/cbattinieri/hockey\\_analytics/blob/main/big\\_data\\_cup\\_EDA.Rmd](https://github.com/cbattinieri/hockey_analytics/blob/main/big_data_cup_EDA.Rmd)

(1): [https://cdn1.sportngin.com/attachments/document/0137/7547/The\\_Royal\\_Road\\_-\\_Scoring.pdf](https://cdn1.sportngin.com/attachments/document/0137/7547/The_Royal_Road_-_Scoring.pdf)