



# Similar Games Won

Yankees - \$125 million

Oakland - \$44 million



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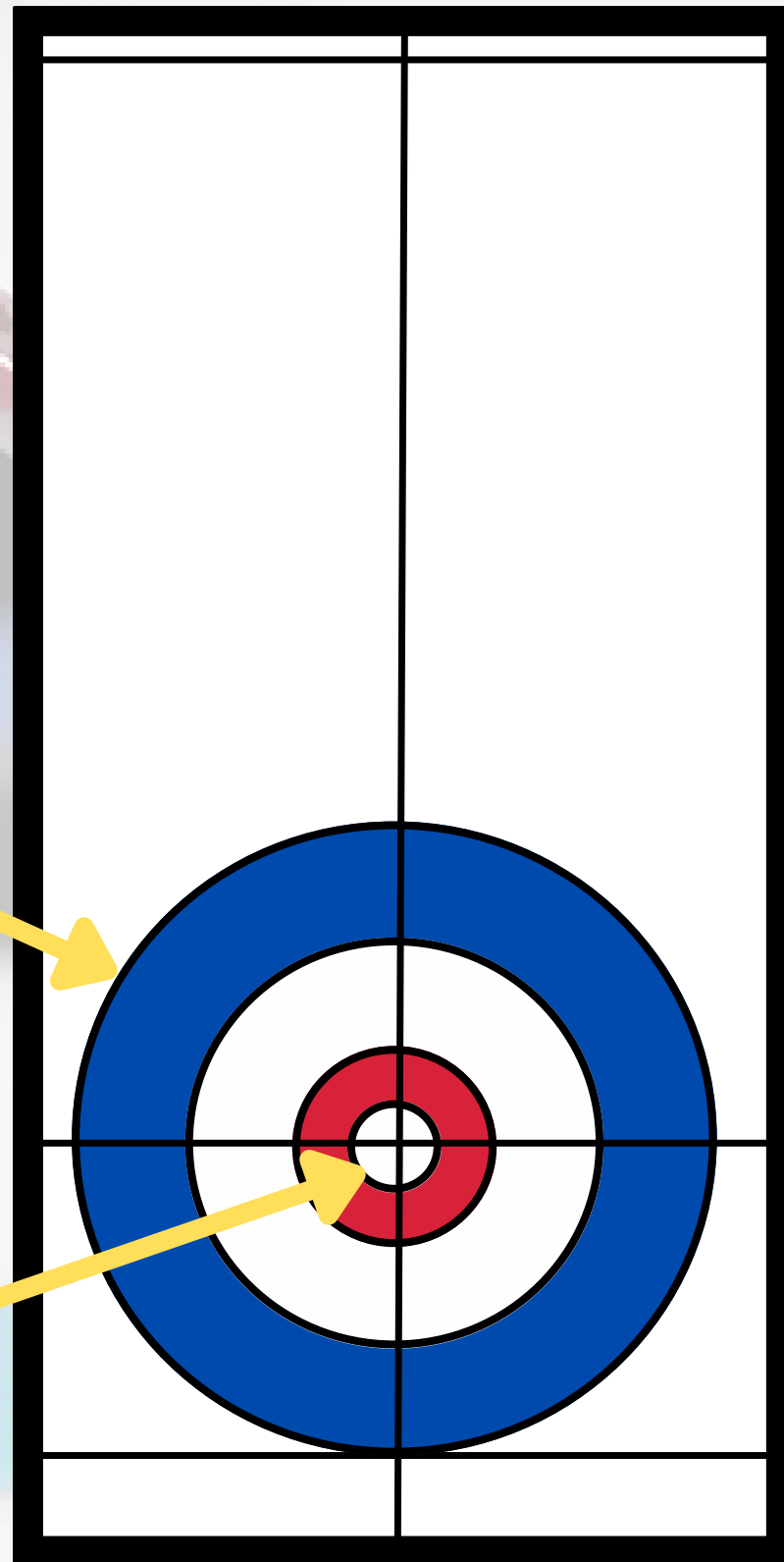
# Rock and ice meet big data: How Olympic curlers use stats to win

The 500-year-old sport of curling is leveraging modern technologies to get a better picture of each side's strengths and weaknesses – a growing trend that many pro sports have increasingly used to identify undervalued players and better inform coaching decisions.



# What is curling?

- Winter sport played on ice
- Two teams of four alternate throwing stones
- Players slide stones down the ice and try to get close to the "button"
- The "skip" stands in the "house" and decides what each player should do with their stone
- After 16 stones (8 per team) have been thrown, the team with the stone in the house that is closest to the button gets to score points
- That team earns one point for each stone that is closer to the button than their opponents



House

Button



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# ROBYN RITCHIE

U of M Graduate

MSc (Soccer Analytics)

2022 NFL Big Data Bowl Winner

2022 (Hockey) Big Data Cup Winner

SFU PhD Candidate (Curling Analytics)

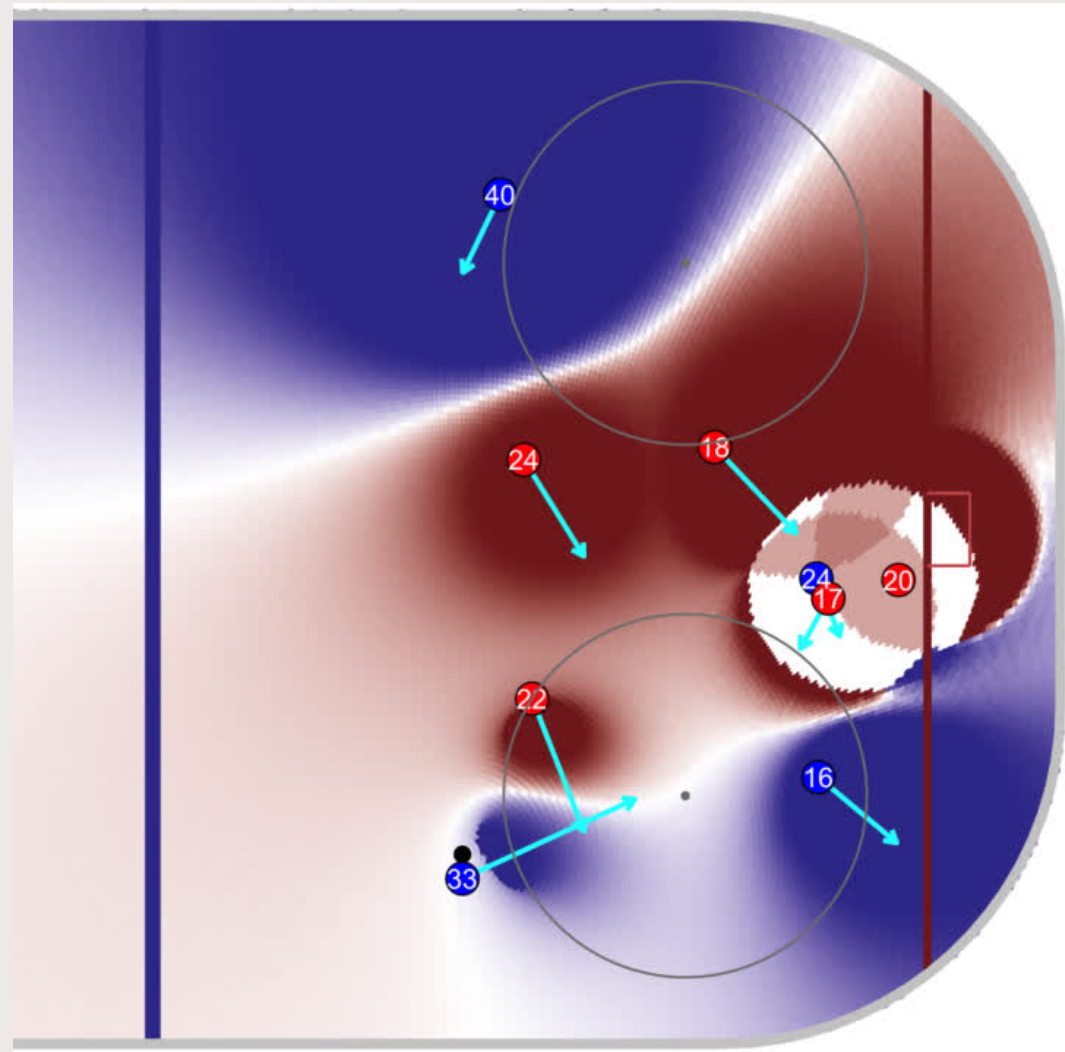
Sports Data Scientist - Swish Analytics



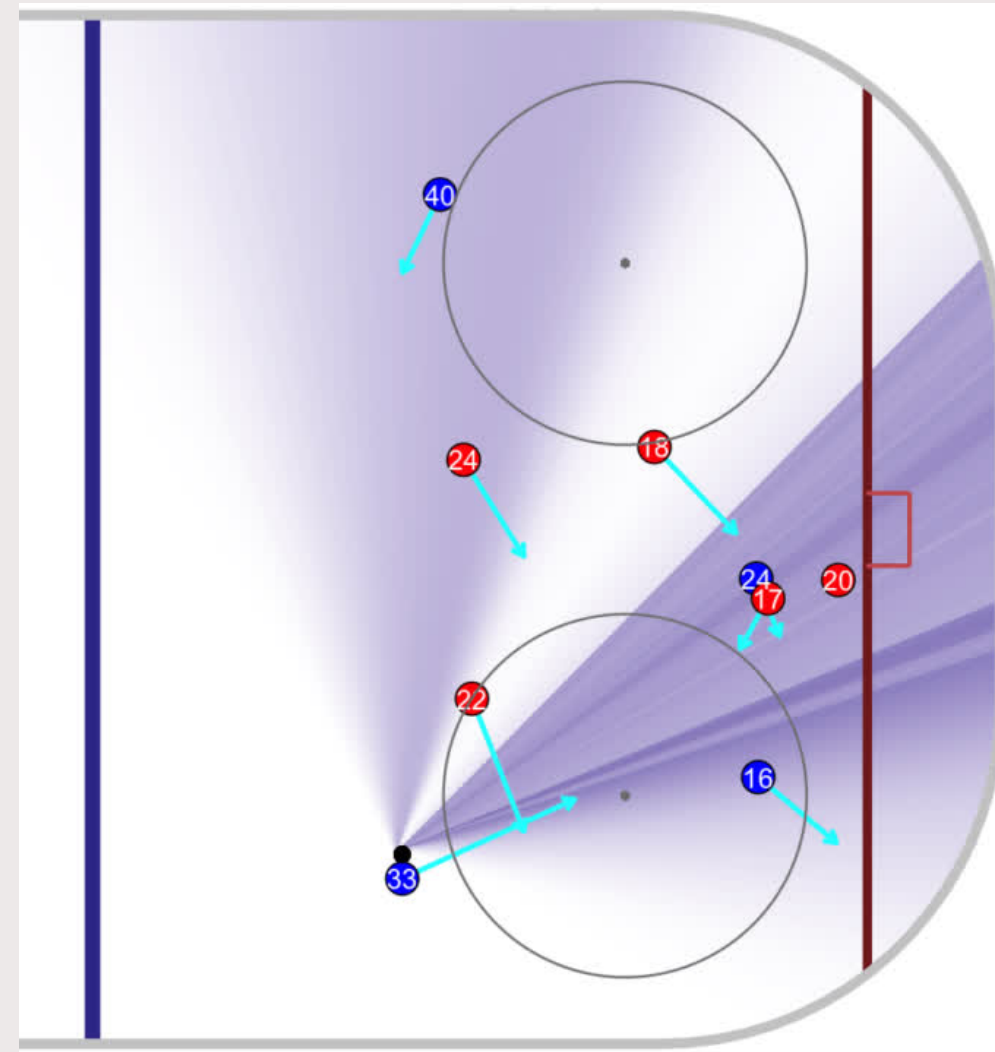
Swish Analytics

# Big Data Cup - Women's Olympic Hockey

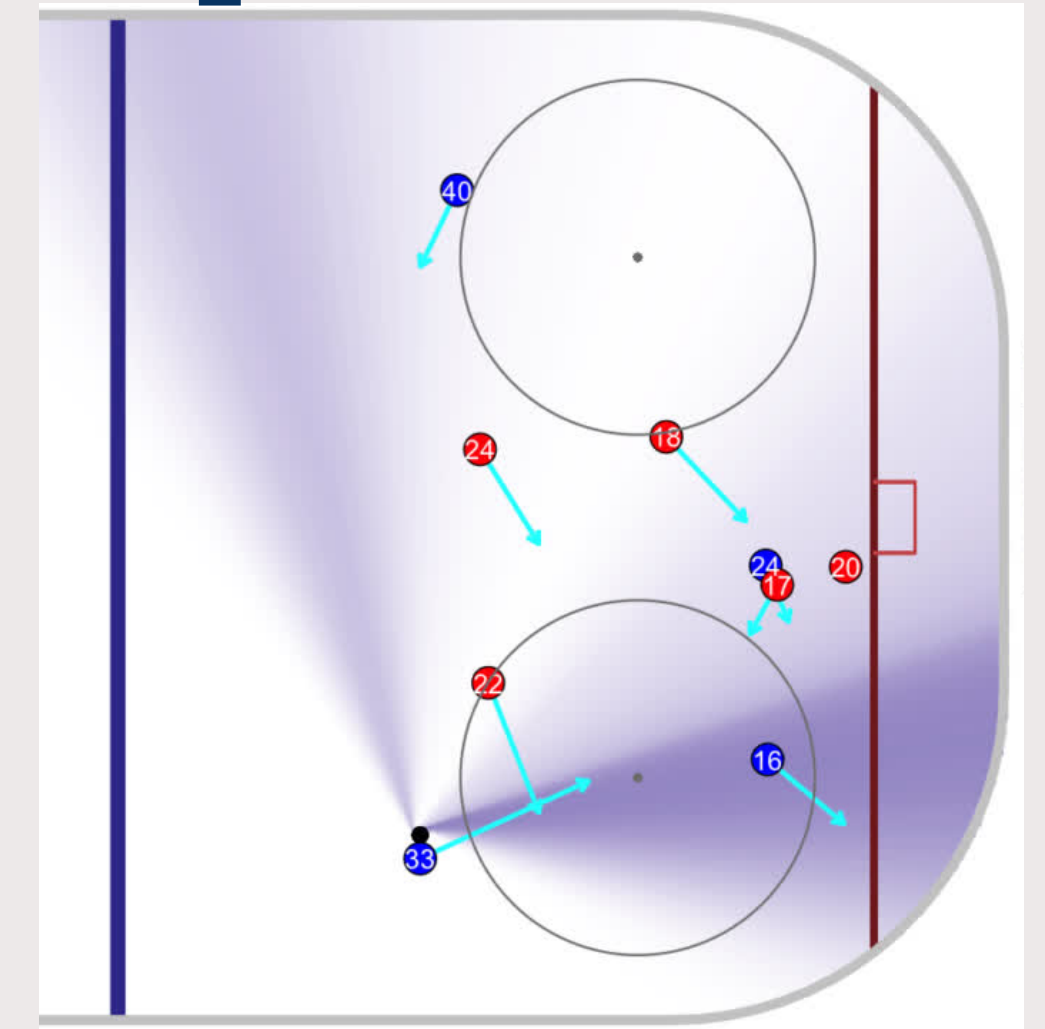
## Rink Control



## Best Pass



## Expected Pass



<https://weplay.netlify.app/>  
**Whockey Evaluation of the Play**

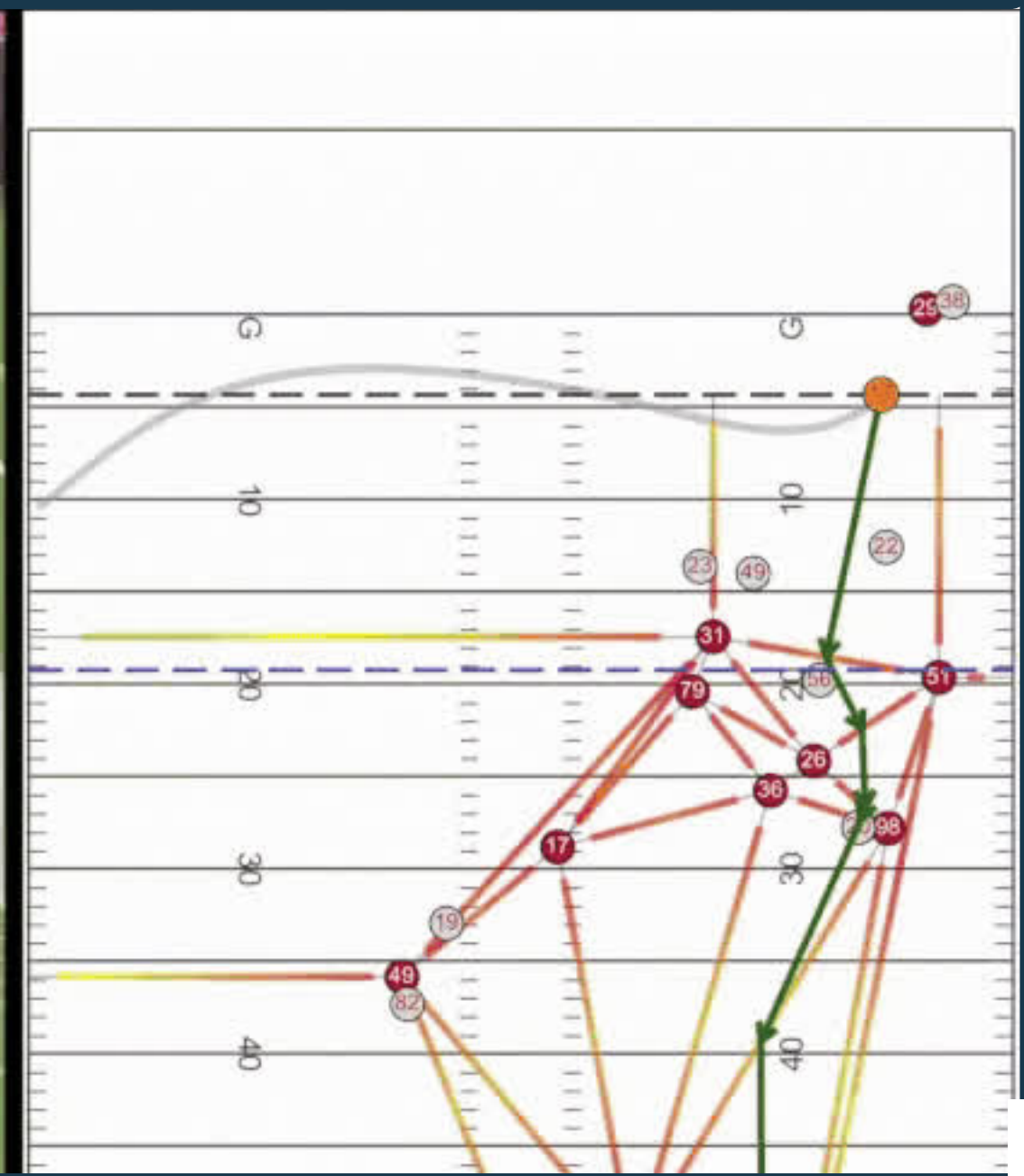
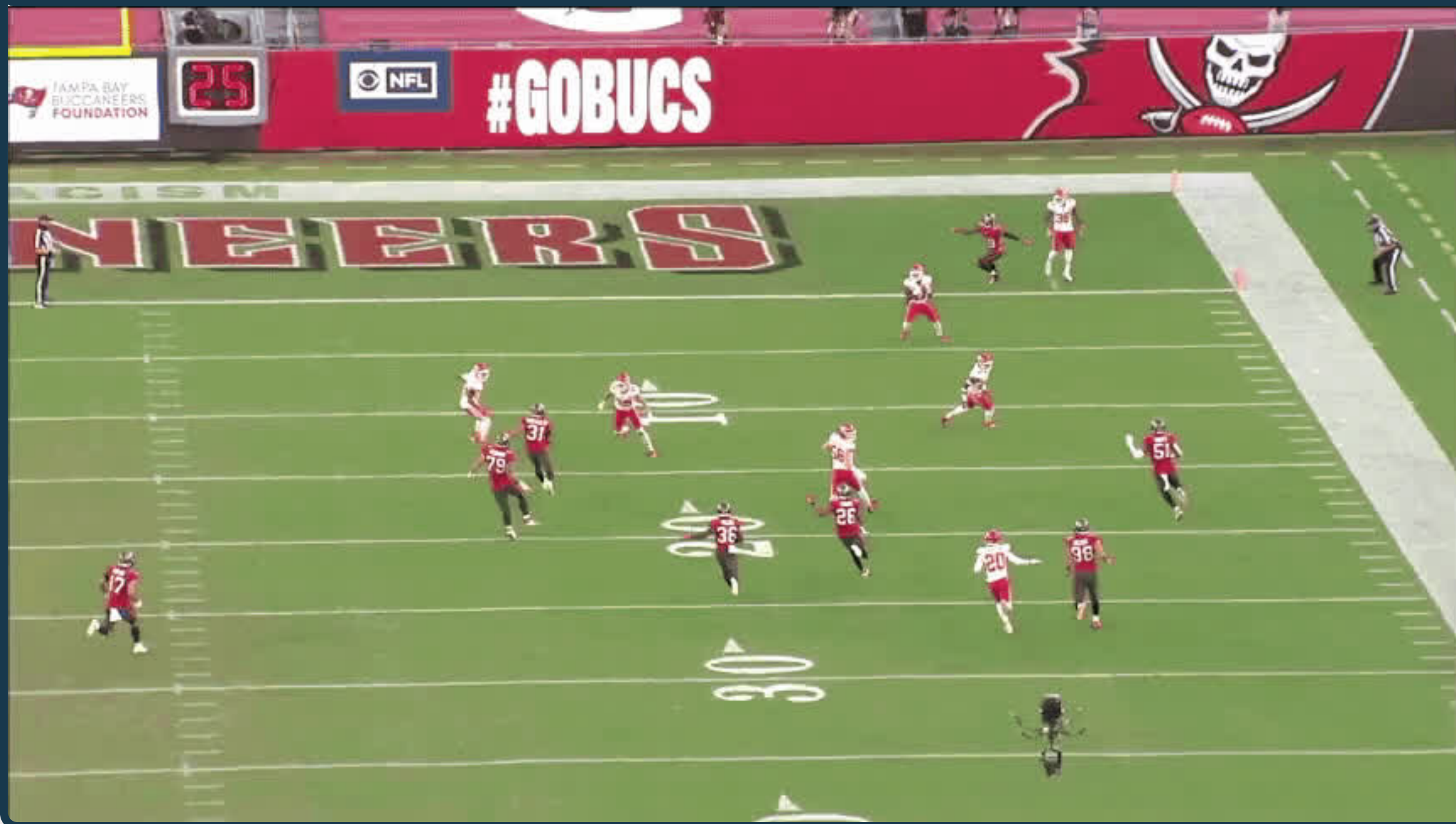


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# NFL BIG DATA BOWL

## Optimal Path - Mecole Hardman's 5 yards return



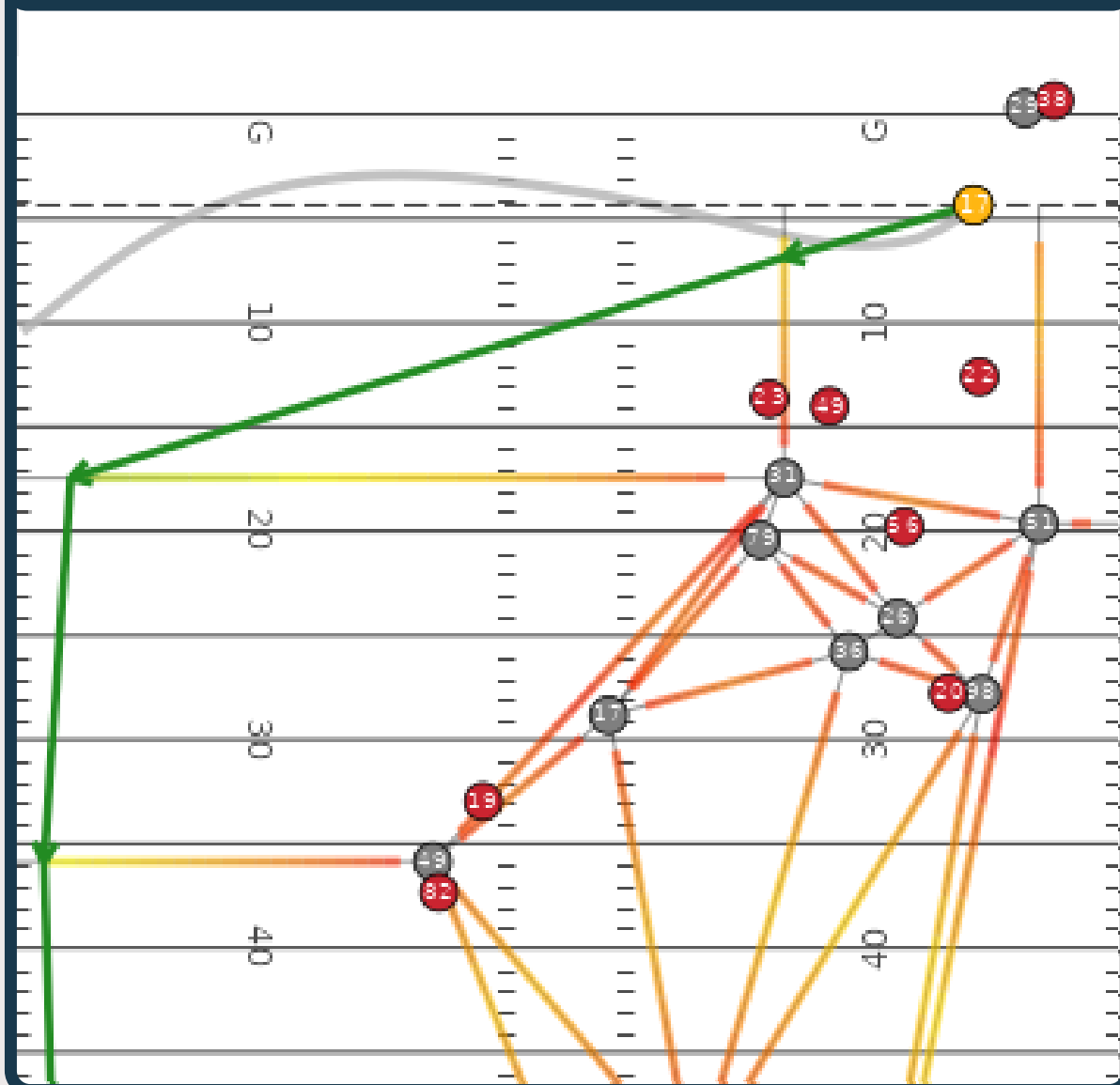
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# NFL BIG DATA BOWL

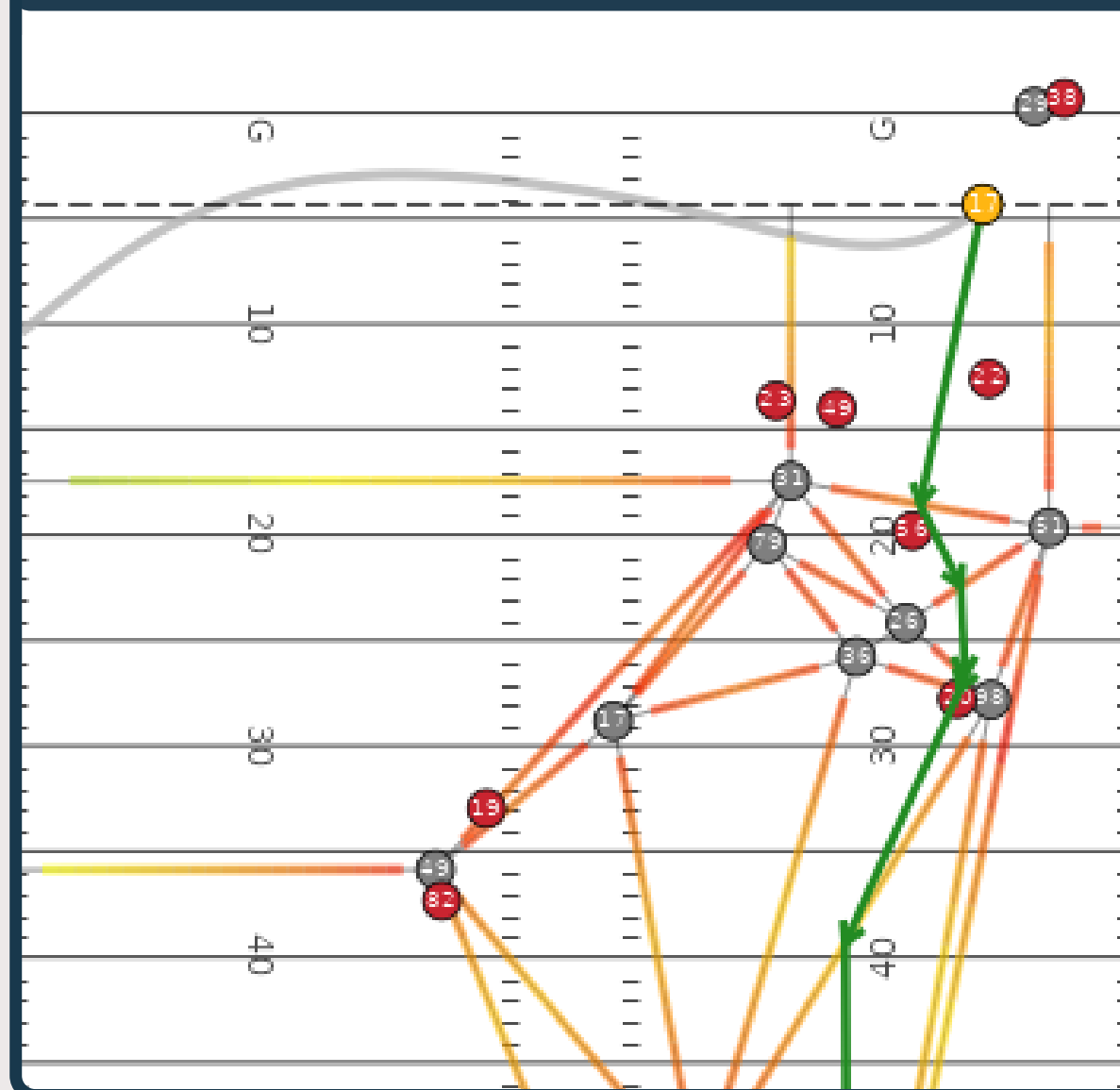
[https://rr-sportsstats.shinyapps.io/path\\_generator/](https://rr-sportsstats.shinyapps.io/path_generator/)



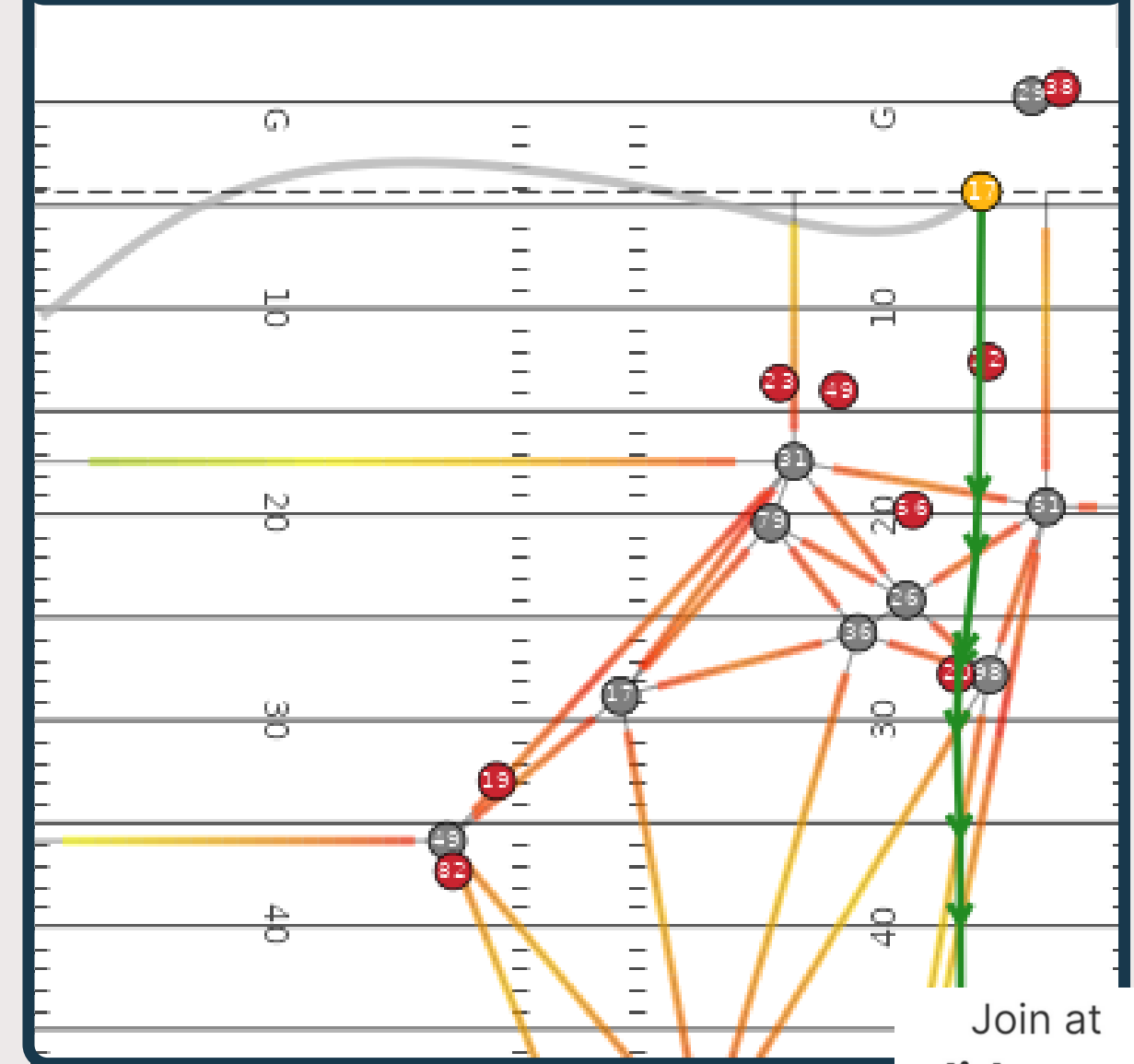
## Risk Factor: 0



## Risk Factor: 0.5



## Risk Factor: 1



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2019 Tim Hortons Brier - Mike McEwen (MB) - Long runback for 1

Share

# GREAT SHOT!



# 2019 Brier

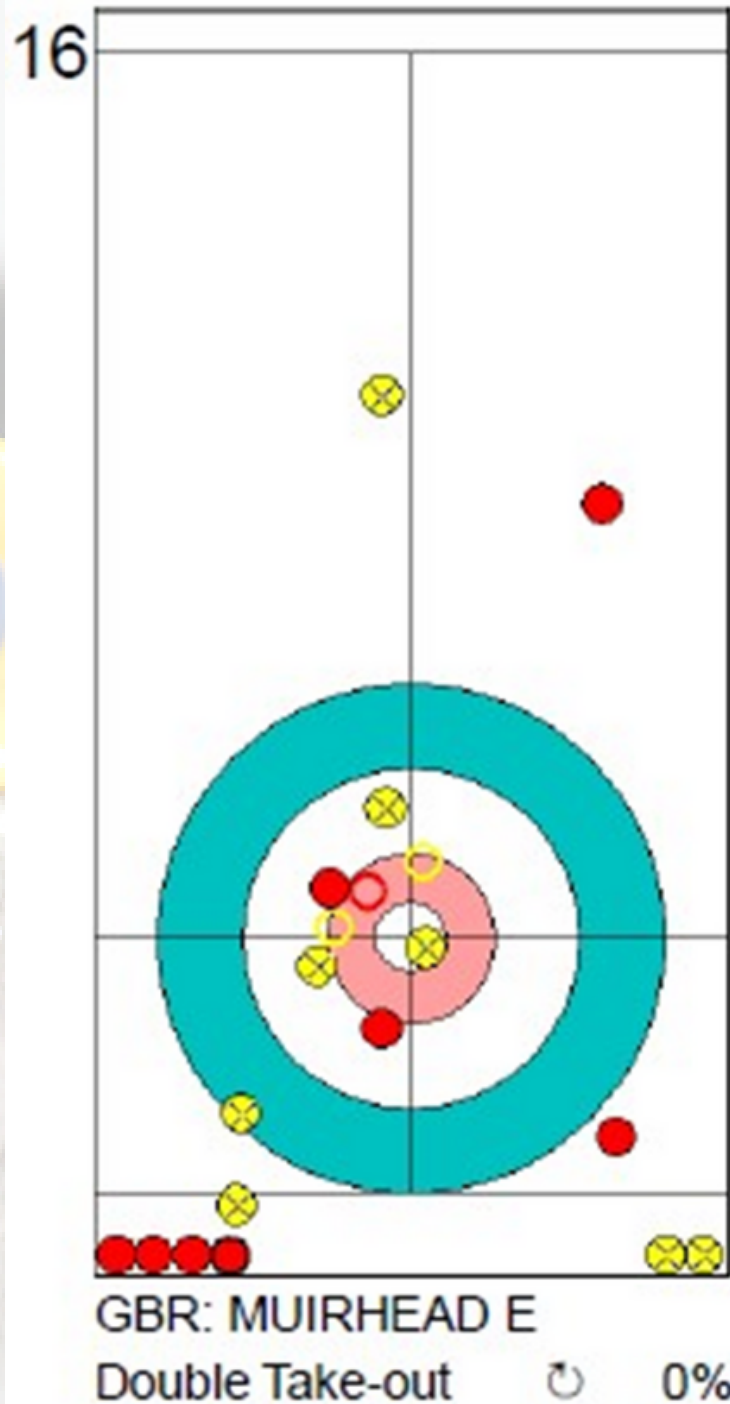
Watch on  YouTube

Join at  
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# Current State of Curling Analytics

## Lack of Quality Data

- Data is collected by volunteers watching the live games
  - Adds many types of potential error to the data
- No tracking data
- We can't know what calls were made or discussed without the video or audio of the game
  - Even then, you still may not know
- Each shot is ranked on a discrete scale from 0 to 4
  - not very descriptive
  - judged by volunteers which adds human bias



**Gangneung Curling Centre**  
강릉 컬링 센터  
Centre de curling de Gangneung

PyeongChang 2018  
SAT 24 FEB 2018  
Start Time 20:05

**Curling Women**  
컬링 / Curling  
여자 / Femmes

**Bronze Medal Game - Sheet B**  
3-4위전 - 섯로 B / Match médaille de bronze - Piste B

**Game Results**  
대회 경기결과 / Résultats de la partie

Sheet	Game	Team	LSFE	1	2	3	4	5	6	7	8	9	10	Extra Ends	Total
B	11	GBR - Great Britain	*	1	0	1	0	1	0	0	0	0	0		3
	11	JPN - Japan		0	1	0	1	0	0	0	1	1	1		5

**GBR - Great Britain**

	Shot Success	Game	All
4 S MUIRHEAD Eve	65%	76%	76%
3 V SLOAN Anna	81%	76%	76%
2 ADAMS Vicki	73%	78%	78%
1 GRAY Lauren	89%	82%	82%
A SCHAFFER Kelly	-	-	-
<b>Team Total</b>	<b>77%</b>	<b>78%</b>	<b>78%</b>

Time remaining: 4 minutes 20 seconds  
Time-out: End 10 - GBR stone 7

**JPN - Japan**

	Shot Success	Game	All
4 S FUJISAWA Satsuki	83%	75%	75%
3 V YOSHIDA Chinami	85%	78%	78%
2 SUZUKI Yumi	69%	73%	73%
1 YOSHIDA Yurika	85%	80%	80%
A MOTOHASHI Mari	-	-	-
<b>Team Total</b>	<b>80%</b>	<b>76%</b>	<b>76%</b>

Time remaining: 0 minutes 57 seconds  
Time-out: End 10 - JPN stone 6

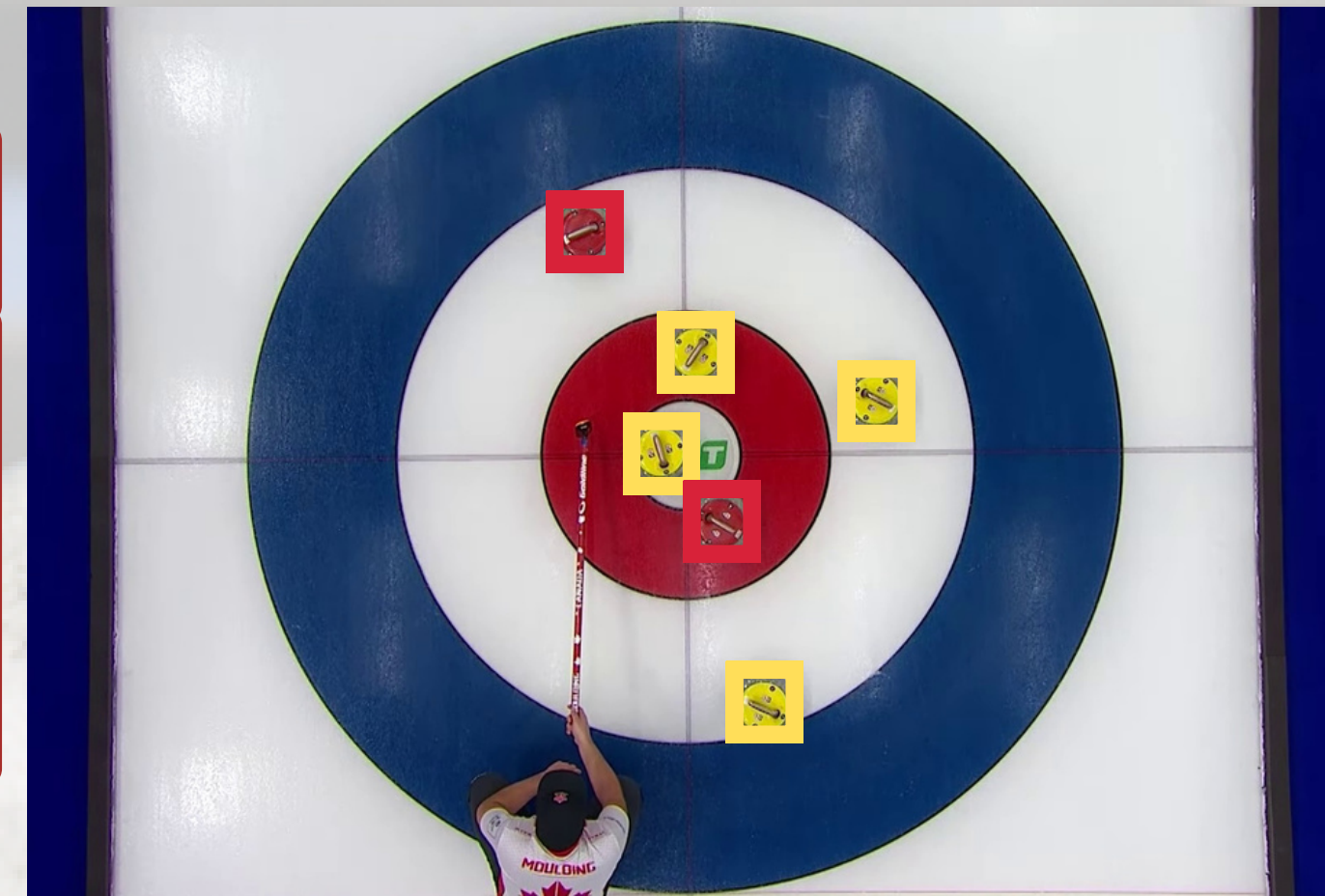
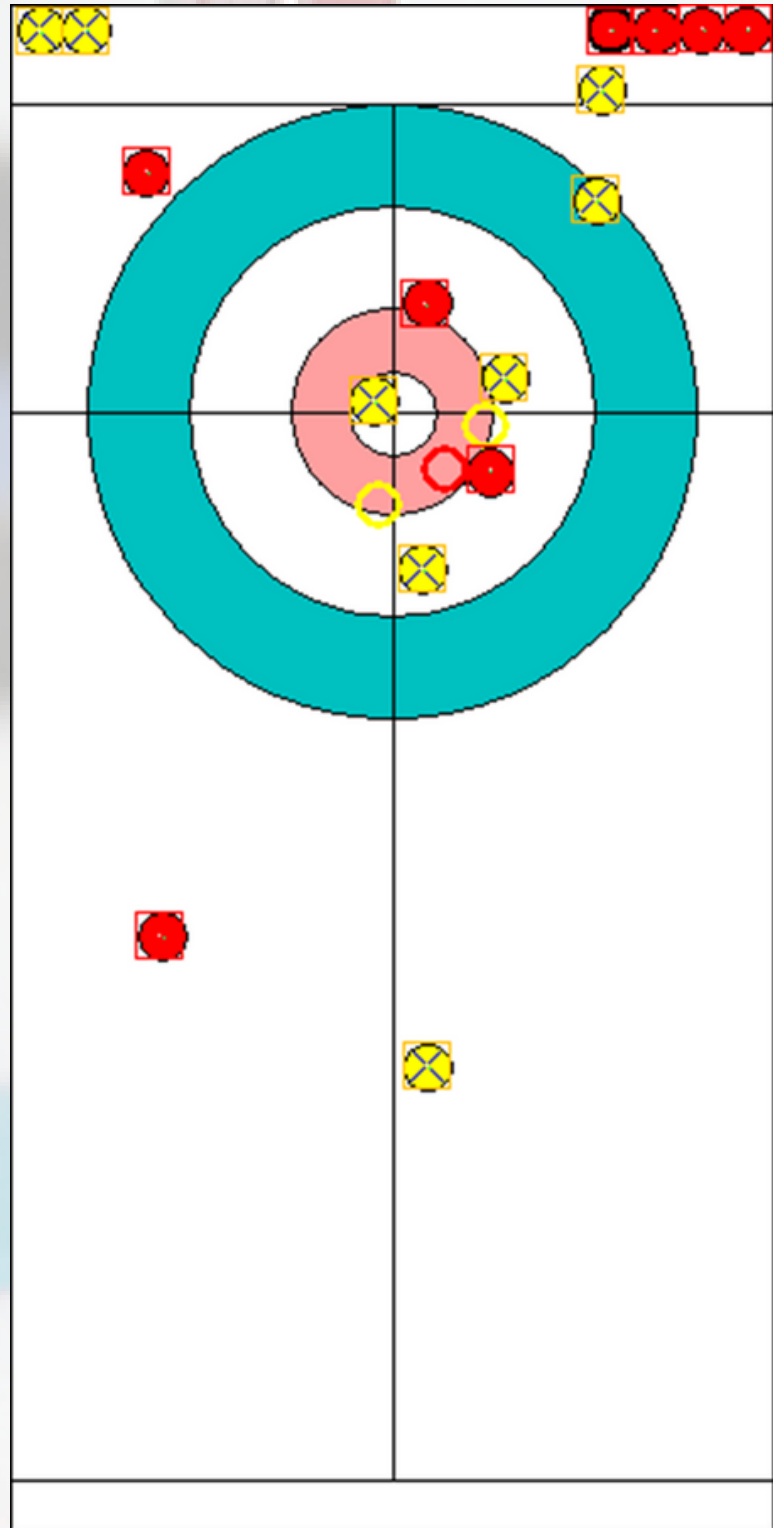
**Shot Success Analysis**

Team	Player	Draws			Take-outs			Total
		Count	Percentage	Count	Percentage	Count	Percentage	
GBR - Great Britain	4 MUIRHEAD Eve	4	75%	3	75%	7	75%	
	3 SLOAN Anna	1	100%	4	81%	5	85%	
	2 ADAMS Vicki	0	-	2	63%	2	63%	
JPN - Japan	4 FUJISAWA Satsuki	8	78%	4	94%	12	83%	
	3 YOSHIDA Chinami	4	88%	5	90%	9	89%	
	2 SUZUKI Yumi	3	58%	6	71%	9	67%	

# Machine Learning for Data Collection

## Gather Quality Data

- Use Machine Learning techniques to gather stone locations from the PDFs and Broadcast video
  - Edge Detection
  - Haar Cascade





# Canada's (yellow) Shot-By-Shot Win Probability


**WMDCC 2019**  
 Stavanger, Norway  
 SAT 27 APR 2019  
 Start Time 16:00

**World Mixed Doubles Curling Championship 2019**  
 Sarmarka Arena  
**Gold Medal Game - Sheet C**



## Game Results

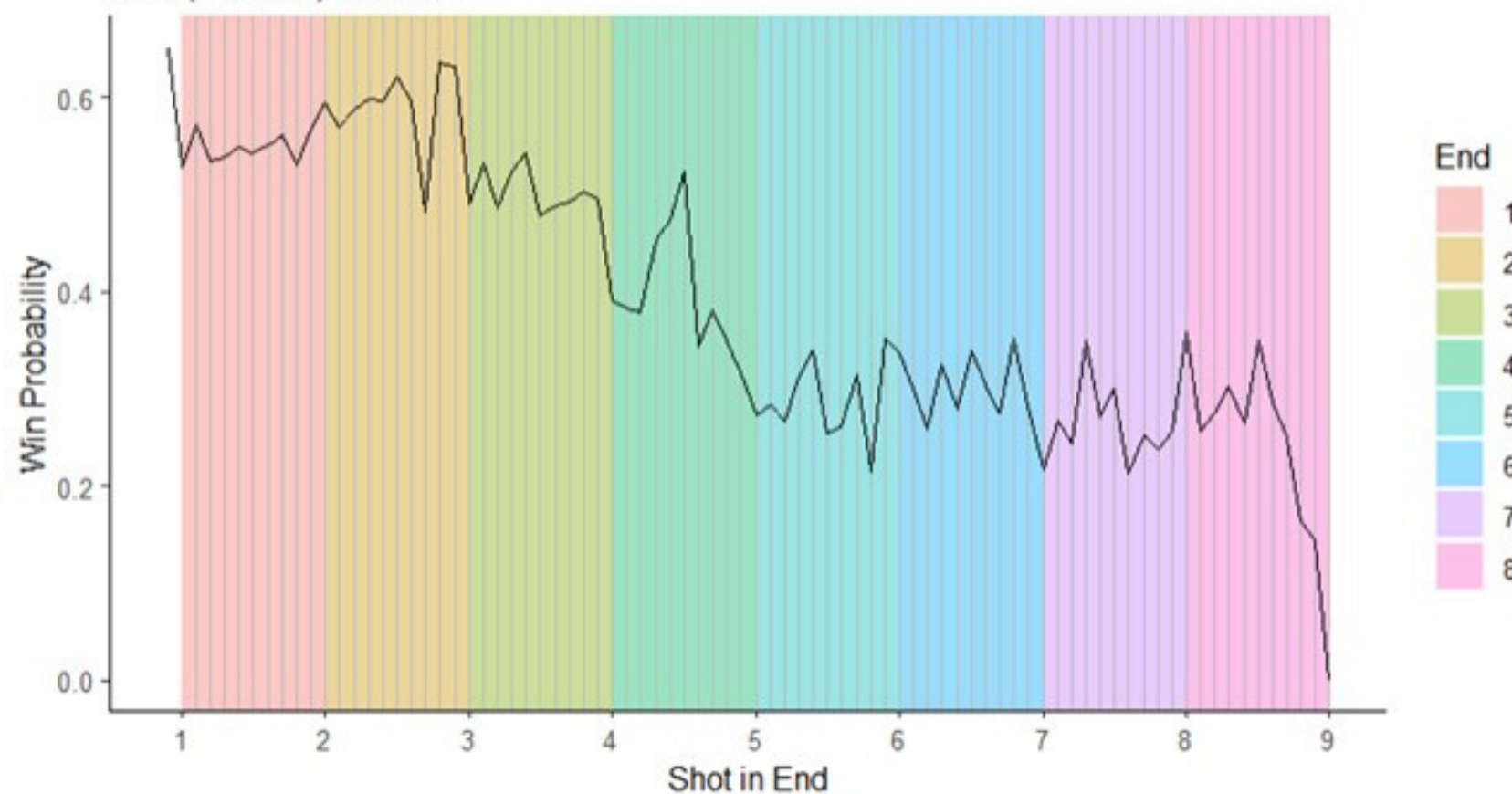
Sheet	Game	Team	LSFE	1	2	3	4	5	6	7	8	Extra Ends	Total
C	11	SWE - Sweden		0	1	1	1	0	2	0	1		6
	11	CAN - Canada	*	1	0	0	0	2	0	2	0		5

SWE - Sweden		Shot Success	
		Game	All
F	HASSELBORG Anna	81%	80%
M	ERIKSSON Oskar	86%	81%
Team Total		84%	81%

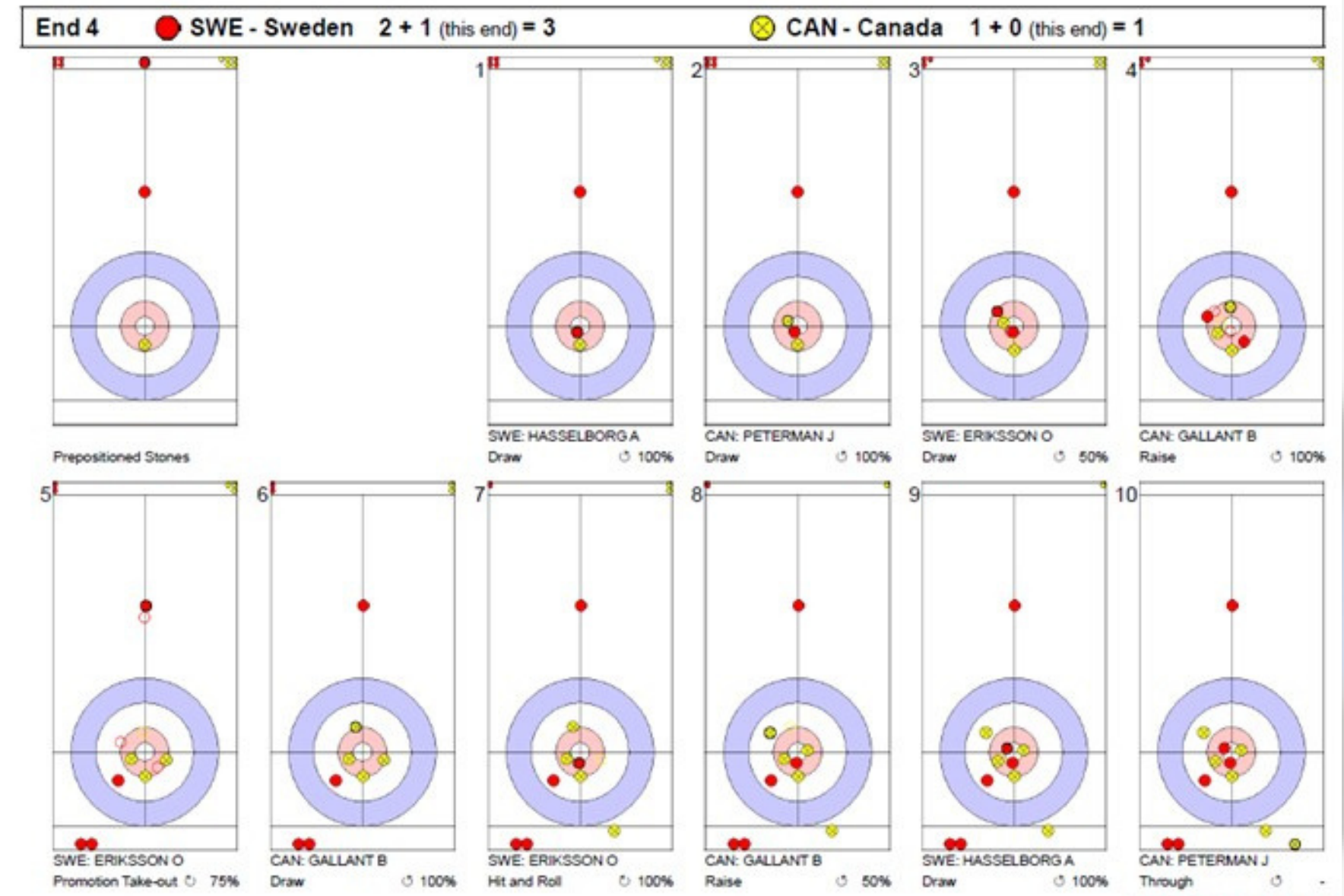
CAN - Canada		Shot Success	
		Game	All
F	PETERMAN Jocelyn	88%	82%
M	GALLANT Brett	71%	80%
Team Total		78%	81%

## Shot-by-Shot Win Probability

CAN (Hammer) vs. SWE

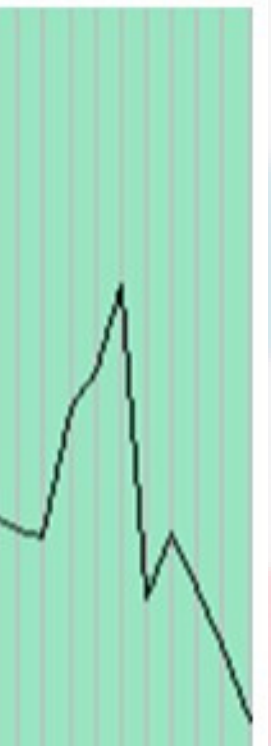


World Mixed Doubles Curling Championship 2019



## Zoom in on 4th End

- Sweden leads shots 1-3
- 4-6 Canada in good position to score
- 7th shot swings back to Sweden
- 8th looks good for Canada
- 9-10th strong positions for Sweden





### Women's Tour Curling 2019-2022 All Games

Ends Remaining	Tied		One Point Game				Two Point Game				Three Point Game			
	Hammer	Steal	Up Hammer	Down Steal	Up Steal	Down Hammer	Up Hammer	Down Steal	Up Steal	Down Hammer	Up Hammer	Down Steal	Up Steal	Down Hammer
Extra Ends	70.00%	30.00%	Nil											
Last End	70.40%	29.60%	86.80%	13.20%	60.30%	39.70%	97.70%	2.30%	84.90%	15.10%	99.60%	0.40%	96.10%	3.90%
2nd Last End	65.60%	34.40%	80.80%	19.20%	66.80%	33.20%	93.20%	6.80%	83.30%	16.70%	95.90%	4.10%	93.70%	6.30%
3rd Last End	61.90%	38.10%	80.90%	19.10%	62.90%	37.10%	90.60%	9.40%	77.00%	23.00%	96.70%	3.30%	88.90%	11.10%
4th Last End	63.70%	36.30%	63.70%	36.30%	73.80%	26.20%	59.30%	40.70%	89.10%	10.90%	76.20%	23.80%	94.50%	5.50%
First End (8 ends)	57.70%	42.30%	Nil											

## Winning percentage in the last end when tied with hammer

Team Rank	Men			Women		
	'17 & '18	'19 & '20	Chg	'17 & '18	'19 & '20	Chg
1-5	89.4	88.3	-1.1	75.9	86.0	+10.1
6-20	84.6	88.2	+3.6	76.2	81.9	+5.7
21-50	79.1	83.5	+4.4	73.2	76.0	+2.8
51-100	74.3	80.3	+6.0	66.0	70.3	+4.3



“There was but one question he left unasked: if gross miscalculations of a person’s value could occur on a baseball field, before a live audience of thirty thousand, and a television audience of millions more, what did that say about the measurement of performance in other lines of work?”

