Beyond the Save: Metrics That Matter for Relief Pitchers

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Imagine…

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A Closer has a Good Amount of Saves and Low Amount of Blown Saves, but has Minimal Appearances With a Score Difference Smaller Than 3.

The Save Statistic

"He Didn't Vote for me Because he Didn't Believe in the Save Statistic"

-John Franco on Hall of Fame Voter

Despite Holding the All-Time LHP Saves Record, John Franco Fell Off the Ballot After Just One Year

Saves Don't Just Allow us to Evaluate RPs, They can Change the Trajectory of a Full Career

The Save Statistic is Losing its Credibility, it is Past Due for Some Modifications

Relief Pitcher Metrics Have Flaws

We Were Able To:

1. Redefine the Save Metric

2. Create New RP Metrics

Data

baseballr

2021-2024
Pitch by Pitch
via Statcast and
Triple-A Data

FanGraphs

Season Pitching
Statistics

Baseball Reference

Season Batting
Statistics via
baseballr

Designing a New *Save*

Inspiration

GOAL

Measure Performance Relative to the Pressure of a Given Situation for *ALL* Relief Pitchers, *NOT* Just the Final Pitcher

Tom Tango's Leverage Index	Measures the Importance of a Specific Event by Assessing How Much it Influences the Change in Win Probability
Variables	Uses Base State, Outs, Innings, and Score to Calculate Win Probability
Flaws	Does NOT Account for Batter Quality

Case Study

New Leverage Index

$$| x\Delta WE | / | Avg \ x\Delta WE |$$

NYY: 3	BOT
LAD: 2	10

Tom Tango Leverage: 10.79
Our Leverage: 8.77

Oct 25, 2024

AB: Freddie Freeman

LAD: 1	BOT
SDP: 1	11

Tom Tango Leverage: 6.38
Our Leverage: 2.74

Aug 25, 2021

AB: Joe Musgrove

Methodology

WE Model

Pitcher's Win Expectancy Based on:
- Base Situation
- Number of Outs
- Inning
- Score
- Batter wOBA
- Total Runs Scored
- Tying/Winning Run at the Plate (0/1)
- Walk-Off Opportunity (0/1)

WP Model

Swing in WP Model that Looks at Probability of Each Event Occurring

WE Model With Season Avg Regression to the Mean for batters with < 100 PAs:

$$\frac{[(\text{Stat} * \text{PA}/100) + (\text{Stat Avg} * (100 - \text{PA})]}{100}$$

RE Model

Saves Run Expectancy Model:
- Base Situation
- Exit Velo (for BIP)
- Barrel
- Attack Zone
- Batter wOBA
- BB Type (per PA)
- Max Possible Runs

Leverage Performance Above Avg (LPAA)

Conditions:

Condition	Formula
0 Score	$(LI_{pre} - LI_{post}) * (\text{Max Possible Runs} - \text{xRuns Allowed})$
≥ 1 Scores	$- \lvert (LI_{pre} - LI_{post}) * \text{xRuns Allowed} \rvert$
Final Batter Of Game	$(LI_{pre}) * (\text{Max Possible Runs} - \text{xRuns Allowed})$
Walk-Off	$- \lvert (-LI_{pre}) * (\text{xRuns Allowed}) \rvert$

Recall:

New LI

$\lvert x\Delta WE \rvert / \lvert \text{Avg } x\Delta WE \rvert$

LPAA Leaderboards

LPAA Top Performers

2023

Pitcher		Appr.	LPAA
Brock Stewart		28	53.203
Cionel Pérez		65	43.376
Julian Merryweather		69	42.589
Trevor Richards		56	41.823
Joel Payamps		69	40.965

2024

Pitcher		Appr.	LPAA
Mason Miller		55	95.226
Kevin Kelly		68	58.618
Raisel Iglesias		66	55.579
Kirby Yates		61	52.676
Josh Hader		71	50.470

Launching New Metrics

New Ideas to Consider

GOAL

Accurately Assess Unique Challenges that Relief Pitchers Face that are Different from Starting Pitchers

Challenges

Entering the Game in an Unfavorable Situation (ex: Runners On, Strong Batter at the Plate, etc.)

Flaws

Current Metrics (like ERA) Assume RPs have 0 Responsibility for These Runners, Which is NOT Entirely True

Considerations

RPs Enter These Situations to Prevent Runners from Scoring. How Much Blame Should we Place for Giving up These Runs?

Methodology

Exp. Runs on Entering State

Find the Number of Runs we Expect a Pitcher to Give Up Based on the Situation he is Entering

- Base Situation
- Number of Outs
- Batter wOBA
- GIDP Possibility (0/1)
- SF Possibility (0/1)

Note: Metric is Calculated on a Half Inning Basis (Initial Base Situation Reset) for Better Comparison to Other Relievers

Methodology

Exp. Runs in an Outing

Find the Number of Runs we Expect a Pitcher to Give Up During his Entire Outing of a Game

- Initial Base State
- Number of Outs Made
- Batters Faced
- Batter wOBA
- Strikeouts
- Barrels & Exit Velo
- Max Possible Runs
- Attack Zone
- BB Types

Note: Metric is Calculated on a Half Inning Basis (Initial Base Situation Reset) for Better Comparison to Other Relievers

Runs Saved Above Expected (RSAE)

RSAE = $xRuns_{Game\ Situation}$ - Runs Allowed

xRSAE = $xRuns_{Game\ Situation}$ - xRuns Allowed

Sum of Each Metric Divided by Total Outs, Then Multiplied by 3 for a Full Inning Comparison

RSAE : Runs Saved Above Expected Per 3 Outs
xRSAE : Expected Runs Saved Above Expected Per 3 Outs

Value of Scaling RSAE

Distribution of Outs per Appearance
Total Appearances: 63665 | Maximum 3 IP

Variance in Metrics

FIP

Variance of FIP for Relievers and Starters

ERA

Variance of ERA for Relievers and Starters

WHIP

Variance of WHIP for Relievers and Starters
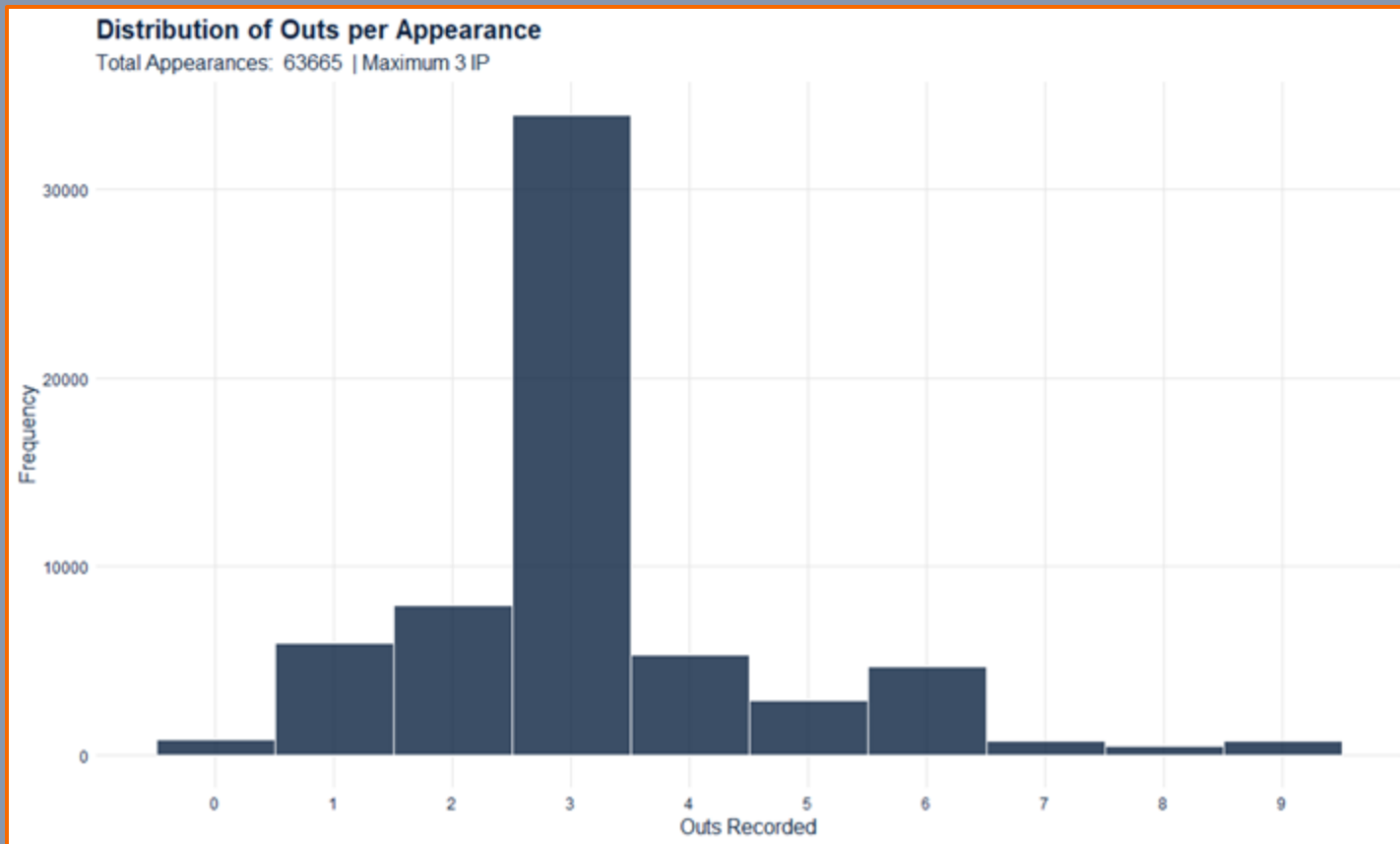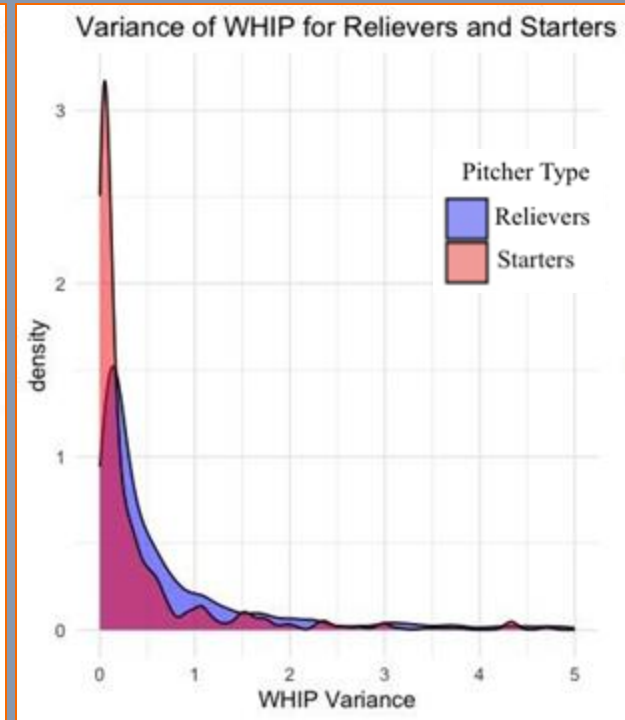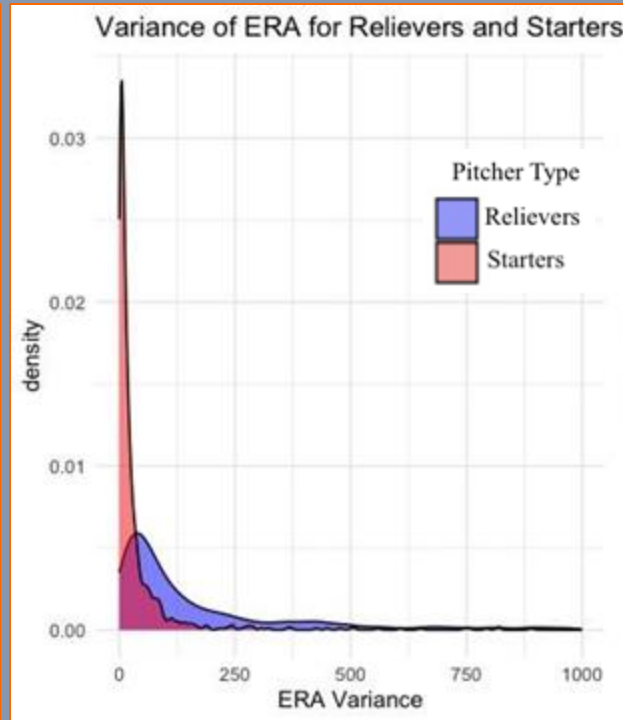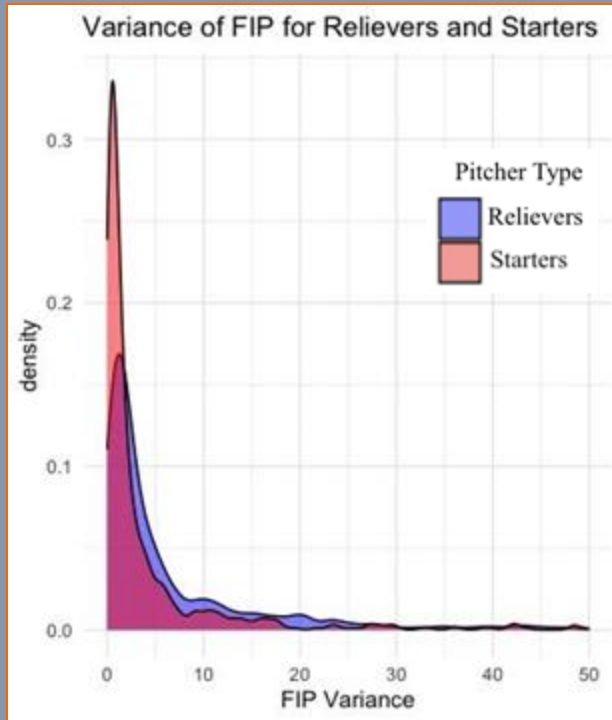
RSAE Leaderboards

RSAE Leaderboards

2023

5th - 95th percentiles of Appr.

2024

Pitcher	Appr.	RSAE
Danny Coulombe	61	0.431
Brock Stewart	28	0.424
Shelby Miller	36	0.424
Sam Hentges	56	0.421
Chris Martin	55	0.421

Pitcher	Appr.	RSAE
Tim Herrin	75	0.411
Cade Smith	74	0.409
Sam Moll	48	0.399
Danny Coulombe	33	0.389
Ben Joyce	31	0.380

xRSAE Leaderboards

xRSAE Leaderboards

2023

5th - 95th percentiles of Appr.

2024

Pitcher		Appr.	xRSAE
Jeff Hoffman		54	0.371
Shelby Miller		36	0.352
Sam Moll		70	0.335
Taylor Rogers		60	0.316
Lucas Sims		67	0.307

Pitcher		Appr.	xRSAE
T.J. McFarland		79	0.357
Danny Coulombe		33	0.353
A.J. Puk		62	0.348
Porter Hodge		39	0.340
Sam Moll		48	0.325

Metric Stickiness
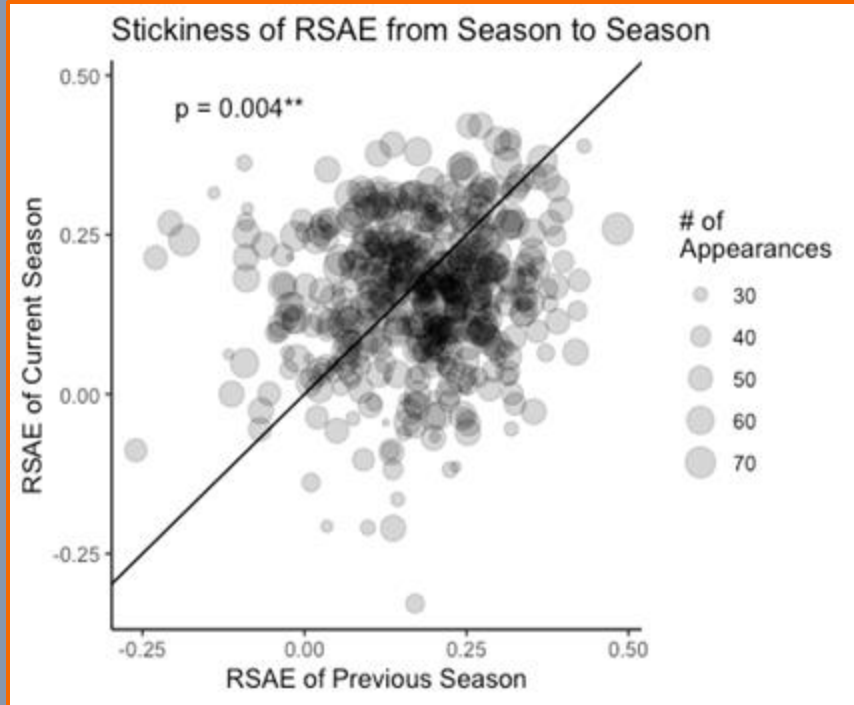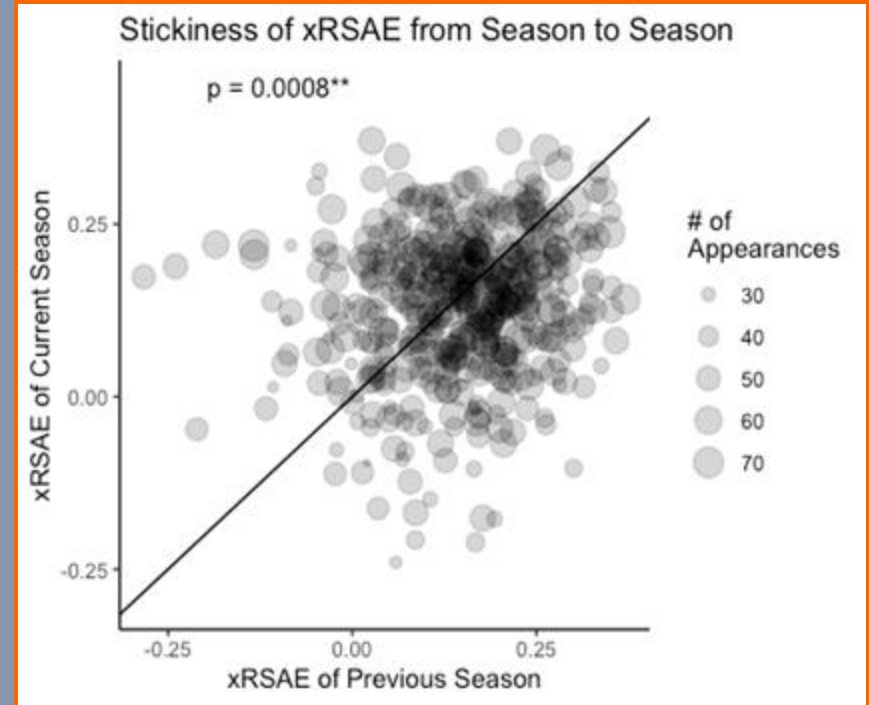
RSAE

xRSAE

Reliever Dashboard

2024 Leaders in New Metrics

Mason Miller

LPAA	RSAE	xRSAE	ERA	FIP
95.226	**.225**	**.214**	**2.49**	**2.18**
1st	*62nd*	*46th*	*55th*	*11th*

Tim Herrin

LPAA	RSAE	xRSAE	ERA	FIP
9.500	**.411**	**.325**	**1.92**	**2.86**
103rd	*1st*	*6th*	*24th*	*51st*
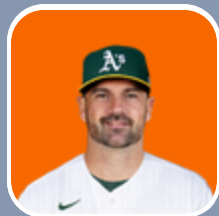
T.J. McFarland

LPAA	RSAE	xRSAE	ERA	FIP
8.219	**.366**	**.357**	**3.81**	**3.82**
108th	*8th*	*1st*	*183rd*	*166th*

Evaluating Rest Days

Rest Day RSAE

Across 2023 and 2024 Seasons

Back-to-Back-to-Back

Pitcher	RSAE
Cam Booser	0.772
Justin Topa	0.682
Matt Brash	0.648
Joe Mantiply	0.601
Jose Ferrer	0.584

Back-to-Back

Pitcher	RSAE
Tim Herrin	0.629
Brock Stewart	0.616
Danny Coulombe	0.588
Sam Hentges	0.534
Adrian Morejon	0.530

1-3 Rest Days

Pitcher	RSAE
Josh Sborz	0.692
José Butto	0.585
Justin Wilson	0.551
Taylor Rogers	0.532
Robert Garcia	0.521

Rest Day Entropy

Entropy: How Unpredictable or Uncertain an Outcome is
High Entropy = More Randomness | Low Entropy = More Consistency

RSAE* = RSAE x Entropy

Top 5

Pitcher	RSAE*
Sam Hentges	0.705
Porter Hodge	0.701
Tim Herrin	0.688
Cade Smith	0.687
Brooks Raley	0.679

Bottom 5

Pitcher	RSAE*
Jimmy Lambert	-1.181
Chase Anderson	-1.173
Jordan Leasure	-1.137
Erasmo Ramírez	-1.071
Mauricio LLovera	-0.989

Impacted Relievers

Underappreciated   2024 *vs* 2023   **Over Appreciated**

1 SV	10 9th App.	58.61 LPAA
0 SV	1 9th App.	23.38 LPAA
3.81 ERA	3 RV	0.366 RSAE
3.83 ERA	2 RV	0.352 RSAE

15 SV 5 BS	34 9th App.	-53.03 LPAA
13 SV 3 BS	23 9th App.	-4.79 LPAA
3.51 ERA	0 RV	-0.114 RSAE
3.86 ERA	0 RV	0.042 RSAE

Limitations + Future Work

Adding The Impact of Good/Bad Defense Into The Metric

How Baserunners Affect Pressure Inflicted on the Pitcher (Good vs Bad, SB Threat, Pickoffs, etc.)

Adding Marginal Effects for Rest Days/ Variance Between Rest Days

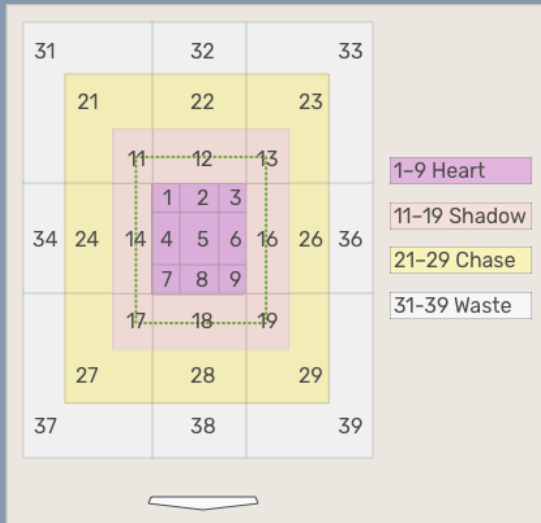Look Into Creating More Specific Metrics Based on the Reliever's Role

Look Into a Simulation Based Approach to Better Predict Leverage

Questions?

Attack Zones

	Swing Rate	Strike Rate
	72%	99%
	52%	47%
	22%	<1%
	5%	0%

xwOBACON

1–9 Heart
11–19 Shadow
21–29 Chase
31-39 Waste