RAR: A Transparent Metric for Measuring Player Value in Runs

By Kaleb Jordan

Introduction

When evaluating baseball players, traditional metrics like WAR (Wins Above Replacement) have become a gold standard. While WAR is powerful, it's also complex and often confusing to understand. The models behind WAR incorporate park factors, defensive adjustments, and expected outcomes from granular data, making it hard for many casual fans and analysts to trace exactly where a player's value comes from.

I set out to build an alternative: a transparent, reproducible statistic that estimates **how many runs a player contributes to their team over a season** through hitting, baserunning, and fielding. This metric, which I call **RAR (Runs Above Replacement)**, is built from public data gathered from Baseball Savant and basic baseball logic. RAR is not meant to replace WAR. Instead, it complements it by offering a more interpretable framework for cumulative run contribution.

What RAR Measures

RAR estimates total **runs contributed** above what a replacement-level player would provide in the same number of plate appearances (or defensive outs). It's additive, position-adjusted, and centered around the three pillars of a player's value:

1. **Batting runs**
2. **Baserunning runs**
3. **Fielding runs**

From this, we subtract a **replacement-level adjustment** to contextualize performance.

RAR Formula

Here's the core logic behind RAR:

RAR = Batting Runs + Baserunning Runs + Fielding Runs - Replacement Adjustment

Each component is calculated using publicly available stats:

1. Batting Runs

We use simplified linear weights to value each offensive event:

$$Bat\ Runs = 0.9 \times 1B + 1.25 \times 2B + 1.6 \times 3B + 1.95 \times HR + 0.7 \times (BB + HBP + IBB + CI) - 0.25 \times Outs - 0.35 \times K$$

Where:

- Outs = AB - H - K (Since strikeouts are already captured with a distinct -0.35 weight, I excluded them from the general "outs" penalty to ensure they're not penalized twice.)
- CI = Catcher's Interference
- IBB = Intentional Walks

2. Baserunning Runs

$$Baserunning\ Runs = 0.2 \times SB - 0.4 \times CS$$

3. Fielding Runs

$$Fielding\ Runs = Statcast\ Fielding\ Run\ Value + Positional\ Adjustment$$

Positional Adjustment Table

Position	Runs per 4,350 Outs
Catcher	+12.5
First Base	-12.5
Second Base	+2.5
Third Base	+2.5
Short Stop	+7.5
Left Field	-7.5
Center Field	+2.5
Right Field	-7.5

Positional adjustments are scaled by the share of defensive outs a player logged at their primary position, assuming 4,350 team defensive outs per season. For example: 1,000 outs at shortstop with a +7.5 run positional value would yield ~1.72 runs.

4. Replacement-Level Adjustment

$$Replacement\ Level\ Adjustment\ = (PA \div 600) \times (-20)$$

This assumes replacement-level players contribute ~20 fewer runs per 600 PA.

Results and Interpretation

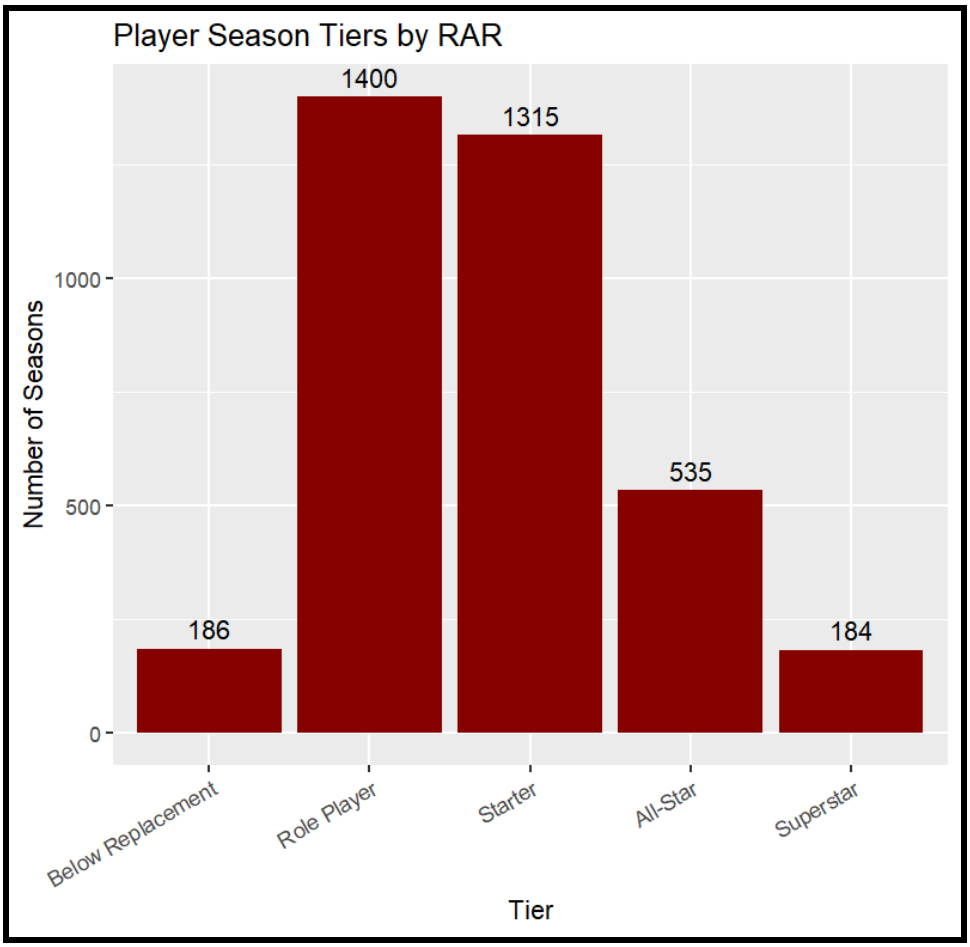
After applying this model to 3,620 player-seasons with ≥100 PA from 2016-2024 (excluding 2020), we get a right-skewed RAR distribution, as expected:

- **Mean RAR:** ~66 runs
- **Median RAR:** ~57.0 runs
- **Top end:** MVP-caliber seasons surpassing 215 RAR

We categorized players into tiers:

RAR Range	Tier
≥150	Superstar
105–149	All-Star
50–104	Starter
10–49	Role Player
<10	Replacement Level

These tiers align with real-world roster roles. Most players cluster in the “role player” and “starter” buckets, with elite production reserved for a few. As the chart shows, most player seasons fall between 10–104 RAR — role players and starters — consistent with how real rosters are constructed. Very few reach superstar status, and only ~5% fall below replacement.



Top 10 Best Seasons by RAR

Player	Year	Batting Runs	Baserunning Runs	Fielding Runs	Replacement Adjustment	RAR
Aaron Judge	2024	238.45	2.0	-2.25	-23.47	261.67
Aaron Judge	2022	216.45	2.0	3.73	-23.20	245.38
Mike Trout	2018	201.65	4.0	8.60	-20.27	234.52
Joey Votto	2017	221.60	0.6	-12.39	-23.57	233.38
Ronald Acuña Jr.	2023	202.90	9.0	-9.72	-24.50	226.68
Bobby Witt Jr.	2024	181.90	1.4	19.17	-23.63	226.10

Cody Bellinger	2019	191.85	1.0	5.69	-22.03	220.58
Mookie Betts	2018	189.35	3.6	7.01	-20.47	220.43
Mike Trout	2016	190.45	3.2	3.79	-22.70	220.14
Juan Soto	2021	203.60	-1.0	-5.67	-21.80	218.73

Strengths of the Model

- **Transparency**: Every piece of the formula is visible, replicable, and interpretable.
- **Modularity**: Each component can be swapped out or adjusted (e.g., different linear weights).
- **Accessibility**: No proprietary data required; everything is built from public stat leaderboards.

Limitations and Future Work

- No park or league adjustments
- Fielding values rely on raw run value, not granular data (like Outs Above Average)
- Baserunning is simplified (no extra bases taken, etc.)

Future extensions could incorporate:

- Park factors
- League normalization
- Sprint speed, home/away splits, or aging curves

Conclusion

RAR offers a clean, cumulative view of player value in terms of runs. It is not WAR, and it isn't trying to be. Rather it is a teaching tool, an exploration framework, and a launchpad for analysts who want to see how players create value in a season. By breaking performance into transparent, additive components, RAR helps make sabermetrics more accessible without sacrificing meaning.

Contact Information

Email: kalebjordan888@gmail.com