

Current advanced metrics for first base defense, like Defensive Runs Saved (DRS), Ultimate Zone Rating (UZR), and Outs Above Average (OAA), could be enhanced by quantifying key aspects such as saving errant throws (high, wide, or scooped out of the dirt), stretching (extension), and the value of executing a double play rather than just securing the easy out. While DRS and UZR lack in terms of accounting for actual distance traveled to the ball (instead relying on predetermined positioning), they do include double plays made and, in DRS's case, how bunts are played. OAA, on the other hand, calculates the distance traveled to the ball and doesn't assume positioning, but it lacks the value-added component of successfully turning a double play, which should be considered.

To quantify the value of saving errant throws, we could track past data and record all infield throws to first base, capturing the ball's three-dimensional velocity, acceleration, and location for throws in the air. This would allow us to measure the probability of making the play from a given angle. We could implement a plus-minus system where first basemen are credited $1 - P(\text{Success})$ for a successful play and debited $P(\text{Success})$ for a failed one. For throws that bounce, the relevant variables would include the number of hops and the velocity/acceleration off the final hop, since that's the one being fielded. This model would compare performance to historical averages. Importantly, "Success" here would be defined purely as catching the ball cleanly, independent of whether an out was recorded—since the first baseman has no control over the runner's speed and time it took for the fielder to make the play. To address small sample sizes, we would create thresholds to cluster similar plays based on these variables in order to compare against the "average success rate".

When it comes to stretching to secure outs, though this might provide minimal added value, I'd still be interested in modeling it. This could be done by calculating the total time from bat-to-ball to fielder, and then to a designated point in front of the first baseman. We could then compare this to the expected time the runner would reach the base based on their sprint speed, looking specifically at throws landing within a zone corresponding to the first baseman's body frame (e.g., shoulders to knees where a first baseman would be extending). By analyzing close plays over multiple seasons, we could determine whether stretching meaningfully contributes to outs recorded and could compare first baseman to the average through the use of the same method proposed in the saving errant throws section.

Additionally, I believe none of the current metrics properly account for the first baseman's role in turning double plays. DRS's rGDP (Double Play Runs saved above average) measures double plays turned versus double play opportunities, but it once again overlooks variables like distance to the ball, time taken to reach it, and the speed of the runner. While OAA incorporates these variables, they overlook the added value of successfully achieving the double play. Therefore, a more comprehensive metric would include the difficulty of double play successfully accomplished, in which the difficulty would determine the value rewarded to the fielder. This metric would also reward getting an out on a further runner (runner progressing towards second or third base) where the full double play wasn't successful as it still lowers the expected run value for the opposing team. Furthermore, the first baseman should be penalized for attempting a double play and failing to record any outs. This would once again be calculated according to the +/- system as stated earlier and therefore, would be comparable to the average first baseman.

Although I initially considered adding an OAA-like metric for foul pop-ups, further research shows these are already accounted for in OAA, which is reassuring as these are some of the toughest plays for first basemen in any given game.

Finally, any proposed metric needs to be converted from outs to runs to better capture defensive value. This could be done using Statcast's Fielding Run Value, which converts infield OAA to runs, typically assigning around 0.75 runs per out recorded, or in the case of the double play, the reward could be weighted by expected run value difference from a successful play whether there were one or two outs recorded (to keep it context neutral this base-out state an assumption could be made such as runner at first no one out rather than using the actual state during which the play occurred, or just average all the expected run differences for double plays and the value of just getting the lead runner).

These enhancements would provide a more complete and accurate picture of a first baseman's defensive value, facilitating better assessments and informed decision-making when evaluating players at this position. Incorporating these metrics with another range statistic, such as OAA or Fielding Run Value (once converted to runs), would create a standardized and comparable framework. As an employee of the Phillies, this approach would enable me to determine the best defensive first baseman in baseball with greater precision, ensuring that critical aspects of the position, such as saving errant throws and executing double plays, are properly accounted for in the analysis.