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DATA 6560 – Sports Analytics

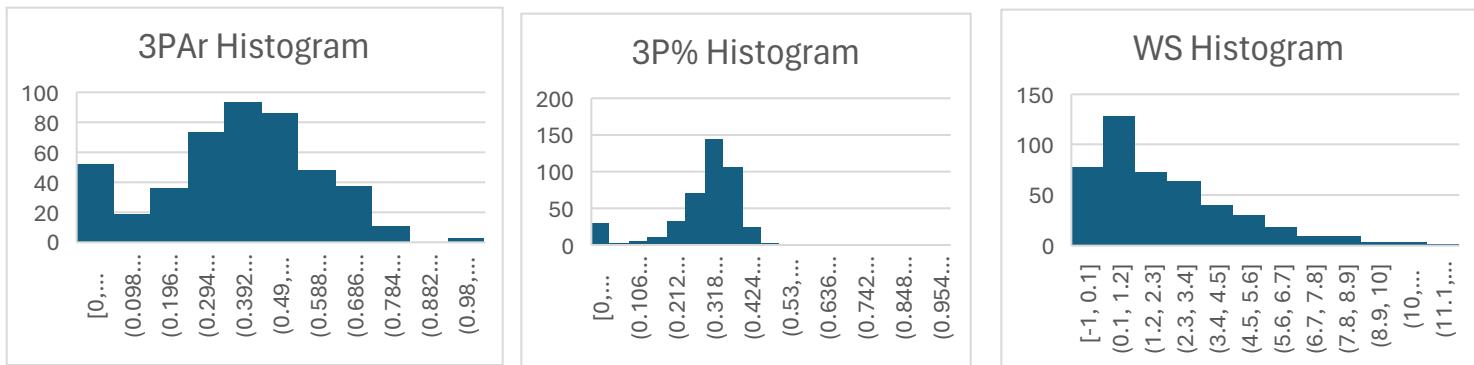
1 Dec 2025

Exploratory Data Analysis Memo

The Value of 3pt Shooting as Players Age

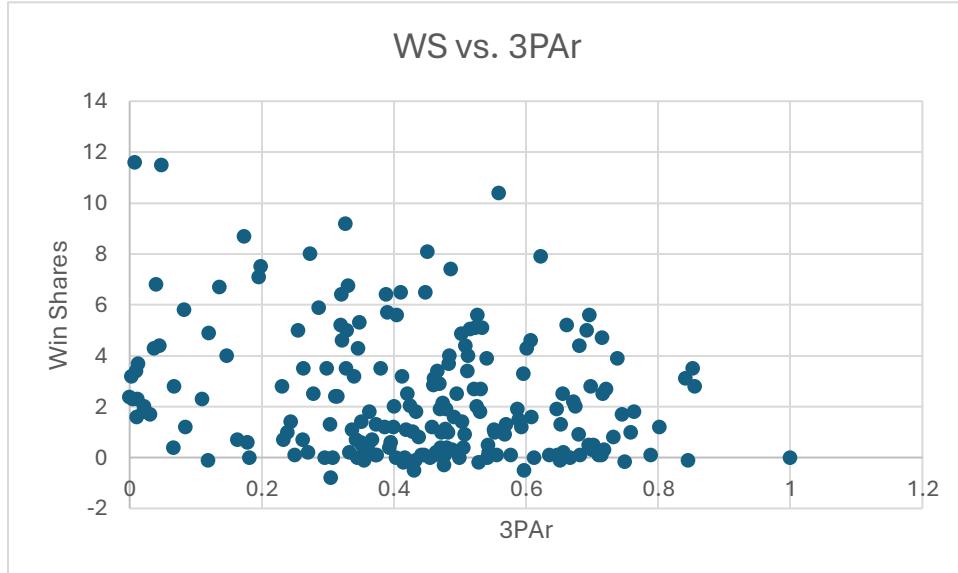
This project will give NBA executives insight into how to value aging players based on their 3-point shot, ultimately unlocking a player's full potential. The project will evaluate the relative value of the 3-point shot at each age and should yield a monetary value of this shot by age. The data being evaluated is solely from the 2024-2025 NBA Season and includes all games and eligible players (before filtering). Through the steps outlined in the pre-processing pipeline, this data is refined to eliminate outliers and filters are applied. Any player that played under 15 games is filtered out, as well as Lebron James, Nikola Jokic, and Shai-Gilgeous Alexander (their data skews all relationships).

To start evaluating the data, I looked at the distributions of major categories that I would be investigating. The following histograms show the distributions of 3Par (3Pt attempt rate), 3P% (3P shooting percentage), and WS (Win Shares).

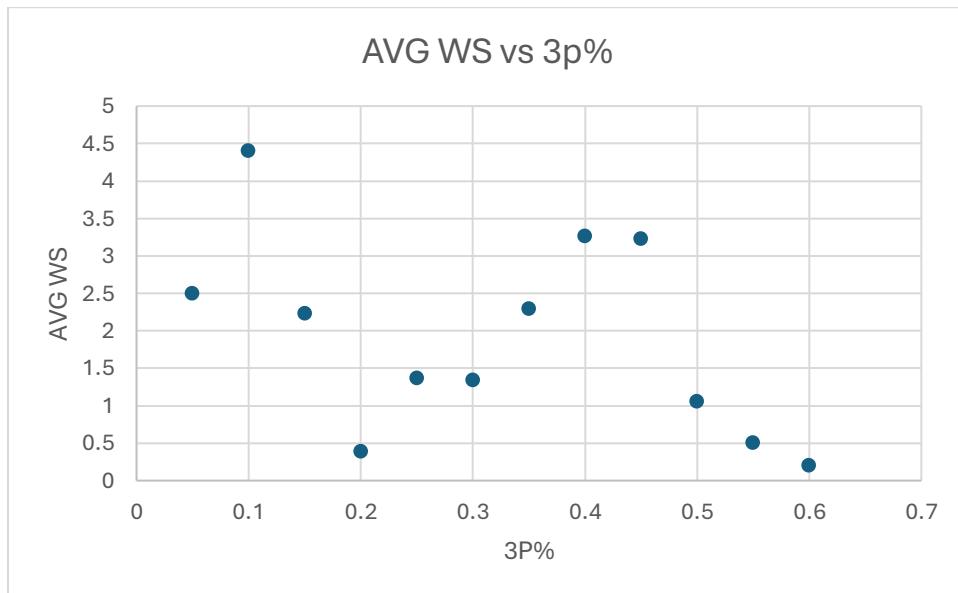


As expected, the 3Par and 3P% form a normal bell curve, however the distribution for WS is a bit skewed. While this may seem concerning, it is actually what we should expect. Most players are around 1-2 win shares, and if there were any players that were costing their team more than 2 or 3 losses (significantly poor performances), they wouldn't be on the team long. On the other hand, players with higher win shares (and better performances) obviously will not be cut from the team, thus their data exists in the histogram.

After the distributions were confirmed, some basic trends had to be evaluated. One of the first trends I looked at was Win Shares vs. 3P Attempt Rate. As the chart below shows, there is no correlation between the two, indicating that 3PAr has little to no effect on WS.



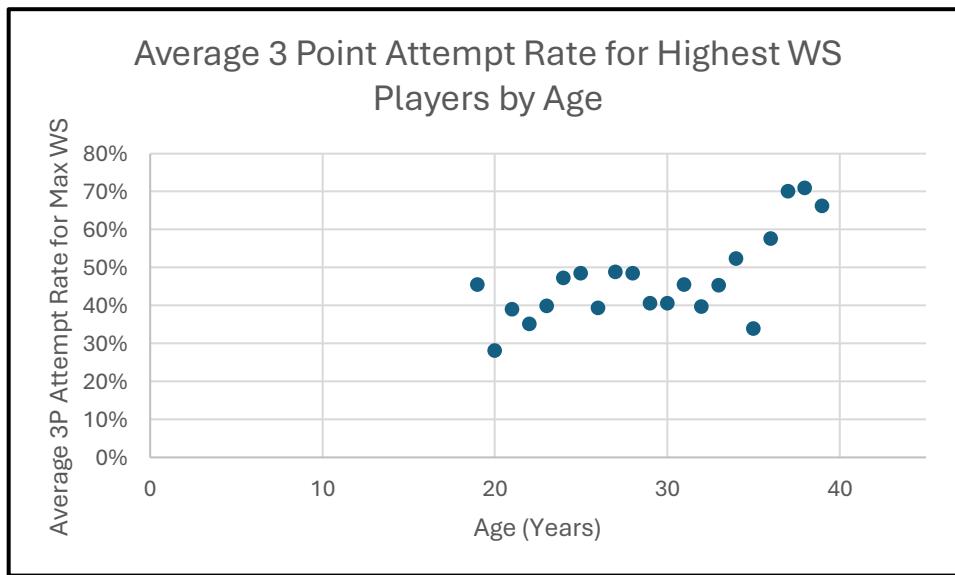
Another relationship that was examined was the WS vs 3P%, which also yielded no relationship. The WS's were averaged amongst each 5% interval of 3pt shooting percentage.



While these initial comparisons didn't yield any concrete relationships, I decided to dig deeper on the 3PAr (3 Point attempt rate) and WS comparison and break it down by age. Using a pivot table, I was able to map the WS distribution by 3PAr for each age. As seen from the conditional formatting, the highest concentration of win shares increasingly is associated with higher 3PAr as players age. For example: For players age 38, 82.61% of all win shares came from players who shot between 60-70% of their shots from behind the arc. For players age 26-30 (prime years), most win shares were held by players shooting between 30-50% of their shots from behind the arc.

Percentage of WS	Age	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	Grand Total	
% of shots from 3																								
0-0.1		0.00%	40.70%	23.37%	14.45%	8.98%	10.50%	12.09%	32.97%	5.62%	10.52%	21.01%	25.36%	12.47%	29.13%	14.19%	14.45%	0.00%	6.82%	0.00%	0.00%	6.56%	15.40%	
0.1-0.2		0.00%	23.26%	5.49%	24.13%	9.29%	1.68%	4.00%	-0.11%	8.96%	10.12%	2.86%	0.00%	16.78%	0.00%	0.00%	0.00%	65.56%	0.00%	0.00%	0.00%	0.00%	7.71%	
0.2-0.3		0.00%	0.00%	12.40%	9.10%	34.55%	10.15%	2.93%	0.00%	2.99%	1.00%	4.54%	18.71%	6.35%	3.51%	11.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	7.90%
0.3-0.4		51.43%	4.07%	4.88%	23.70%	8.66%	15.09%	18.67%	4.51%	27.12%	28.86%	30.25%	11.15%	5.44%	27.48%	37.16%	0.00%	0.00%	19.70%	0.00%	0.00%	0.00%	0.00%	16.53%
0.4-0.5		42.86%	22.67%	27.85%	13.87%	14.93%	17.03%	21.96%	43.30%	27.60%	8.92%	21.01%	8.99%	29.02%	5.99%	10.14%	18.36%	0.00%	25.00%	0.00%	2.90%	0.00%	19.45%	
0.5-0.6		5.71%	4.65%	23.17%	11.85%	12.32%	39.72%	22.22%	9.67%	9.80%	14.73%	8.57%	22.84%	0.00%	20.87%	2.03%	57.03%	34.44%	1.52%	0.00%	0.00%	0.00%	17.65%	
0.6-0.7		0.00%	1.18%	2.64%	0.29%	6.68%	2.65%	11.02%	9.23%	0.96%	9.02%	7.06%	6.29%	17.01%	13.02%	10.14%	7.03%	0.00%	33.33%	100.00%	82.61%	93.44%	8.73%	
0.7-0.8		0.00%	3.49%	0.20%	0.00%	4.59%	3.18%	4.27%	0.44%	10.27%	12.02%	4.71%	6.65%	12.93%	0.00%	12.16%	3.13%	0.00%	0.38%	0.00%	14.49%	0.00%	4.79%	
0.8-0.9		0.00%	0.00%	0.00%	2.60%	0.00%	0.00%	2.84%	0.00%	6.69%	4.81%	0.00%	0.00%	0.00%	2.70%	0.00%	0.00%	13.26%	0.00%	0.00%	0.00%	0.00%	1.83%	
Grand Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%		

To further clean up and visualize this relationship, I weighted the 3PAr to find the average 3PAr with the highest win share distribution per age. The results from this metric tell us that as players age, the highest win shares are contributed by players with higher 3 point attempt rates.



This relationship is very significant to my project because it validates that the 3Pt shot increasingly adds value as players age, thus supporting the claim of my project.

While this is a great basis, I will still need to do further work in the coming checkpoints. This includes:

- Running regression models at each age to determine the P value of the 3PAr and 3P% and 3P makes with respect to WS contribution
- Determining a monetary value per WS in the 2024-2025 NBA Season
- Determining which 3Pt attribute to assign a monetary value to (likely the one with the highest P-Value)