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92

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How Data Analytics and the 3-point Shot Changed the NBA Forever

Professional basketball has been a hotspot for data analytics over the past 10-15 years. In this review, I intend to show the progression of that and the historical milestones leading to the interest.

When distilled to its fundamentals, basketball has limited options for any player at a given time. A player with the ball may either move (dribble), pass, or shoot. An offensive player without the ball can move to a better space on the floor (RULE NO. 4: Definitions, 2018). A defensive player can guard the player with the ball, a player without the ball, or an area of the floor. Unlike other team sports, all basketball players are equal in the eyes of the rules. Any player holding the ball has access to all actions. Maximizing the output each time your team possesses the ball is paramount to winning games (Sandholtz et al., 2019). Ways to maximize the value of a possession have evolved over the years.

The tallest men on the floor dominated the 1950s, 1960s, and 1970s (Nourayi, 2019). In that era, all shots were equal. A dunk was worth the same number of points as a shot from 30 feet away from the basket. The law of the land was to pass the ball to the center, standing as close to the goal as possible, and let him take close, high-percentage shots. This was the most efficient way to play the game. The defense has a reactionary component and lags the offense. The defense collapses to stop offenses when shots are made close to the basket. When shots are made further away, the defense moves out to counter.

The NBA introduced the 3-point shot in 1979 to little fanfare (Abraham, 2019). The intent was to incentivize teams to spread the offense, increase the pace of play, and increase scoring (Nourayi, 2021). In its inaugural season, teams attempted only 2.8 3-pointers per game.

(NBA League Averages - per Game, 2022). This number slowly increased to almost 10 attempts/game in 1994. To further increase the pace of play and improve scoring, before the 1994-1995 season, the NBA moved the 3-point line closer to the basket. This was reverted only three years later (Nourayi, 2019).

Before one can maximize a possession, one must first calculate the value of a possession and determine what variables increase or decrease that value. Ceverone et al. set out to do this in 2014. Using player data and spatial tracking, they showed how possession valuation changed throughout a possession and a game. Using that data, they were able to gauge a player's decision-making. Having that information can help a coach put their players in an optimal situation and can show players opportunities for future improvement (Ceverone et al., 2016).

Following their work from 2014, in 2016 Ceverone et al described a model for maximizing the value of a possession as the categorization and valuation of "floor real estate." They make the argument that a player owns the section of the floor on which they stand. They suggest that, assuming players are rational actors, movement from one spot to another to "own" a more valuable piece of real estate. By tracking player movement and outcomes, it is possible to quantify the most (and least) valuable areas on the court for a given player, lineup, or team. This can help improve your offensive or defense against the quantified entity (Ceverone et al., 2016).

We determined the value of a possession, determined how to increase the value, and quantified that value based on the position on the court. Now it is important to show where we can derive the most value purely in terms of shots taken. In 2006, the Houston Rockets hired Daryl Morey as the general manager (Neel, 2008). Morey was a very untraditional and unconventional pick for the role. He did not have a background in basketball. His experience was in data analysis. Inspired by Bill James's concepts of SABRmetrics (used to derive advanced

statistics for baseball) (Wikipedia contributors, 200b) and Billy Beane's "Moneyball" system in Oakland (Lewis, 2004), Morey set out to build a basketball team. Using data-driven decision-making, Morey started acquiring unconventional players (Fedor Indutny, 2016). While never winning a championship, Morey constructed a phenomenally successful team in Houston.

Morey, and other executives like him, brought the idea of advanced statistics to the business side of decision-making in the NBA. They took box score stats and used statistics and analytic tools to build models to look at things like shot valuation. Shot valuation is the idea that shooting efficiency (scoring the most points possible with the fewest shots) be paired with spatial analysis to describe where on the court a given player will be the most efficient scorer (Lu, 2015). For example, a player that makes 50% of their 2-point shots has the same efficiency as a player making 33% of their 3-pointers. This is where the value of 3-point shooters and optimizing their utilization came into the collective consciousness of the NBA.

All these concepts came together on a nationally televised game that changed the NBA on a fundamental level. On Wednesday, February 27th, 2013, Stephen Curry scored 54 points on 18 of 28 shooting (1.93 pts/shot) (*Curry Erupts for 54 but Warriors Fall to Knicks*, 2013). Before that evening, Curry was a second-tier player. He did not make the All-Star roster two weeks before that game. During the 2012-2013 season, teams averaged 7.7 made per game and 21.5 attempts (35.8%). Curry scorched that by being more accurate and scoring the most 3-pointers in the league that year (and the most ever made in a single season at that point). Curry averaged the same volume of made 3-pointers as the average NBA team (*2012-13 Golden State Warriors Roster and Stats,* 2022). Curry's team, the Golden State Warriors, drafted another young player, Klay Thompson, to fill a similar role based on analytics (Treutlein, 2011).

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