

Statistics in Sports: Life as an NFL Statistician

September 24, 2015





Statistics in Sports

- Sports Statistic – Ryan Tannehill threw for 359 yards against Jacksonville.
- Sports Analytics – Ryan Tannehill completed 9 of 14 (65%) of passes on throws 11+ yards past the line of scrimmage against Jacksonville.
- Sports Statistics – We project that Ryan Tannehill will complete 50% of 11+ yards passes against Buffalo.



Statistics in Sports

Analytics



Statistics



“To a Statistician hindsight is foresight.”

-Alex Corris



Moneyball Evolution

- Early Stages:
 - Bill James started the *Bill James Baseball Abstracts* in 1977 as an annual publication of advanced baseball statistics.
 - The Statistics in Sports chapter of the American Statistical Association was created in 1992.
 - The book *Moneyball* was published in 2003, written by Michael Lewis, chronicling the Oakland A's use of analytics during the 2002 season.
 - Simultaneously Dean Oliver published a book titled *Basketball on Paper: Rules and Tools for Performance Analysis*.



Moneyball Evolution

- More Recently:
 - Journal of Quantitative Analyses in Sports was founded in 2005 to showcase academic work in sports statistics.
 - MIT Sloan Sports Analytics Conference started in 2007 bringing statisticians, coaches, players and front office executives together annually.
 - 175 attendees in 2007
 - 3,200 attendees in 2015
 - The movie *Moneyball* starring Brad Pitt and Jonah Hill was released in 2011.



Moneyball Evolution

- Today:
 - MLB: Most teams have an analytics department, and almost all team have at least one math/stat individual.
 - NBA: Most teams have at least one analytics individual, probably about half have an analytics department.
 - NFL: Probably about half have an analytics team.
 - NHL: Probably about half have at least one analytics individual (few full teams/departments).
 - This past offseason was dubbed “the summer of analytics” in the NHL.



Moneyball Evolution

- Today:
 - Media: ESPN, CBS Sports, FOX Sports, etc. all now have large statistics departments and are reporting more advanced stats.
 - Fantasy: Statistics is used to project player stats in all the major fantasy leagues, and to determine player “cost” in new leagues like *Draftkings* and *Fanduel*.
 - Business: Statisticians are being hired to analyze data on ticket pricing, vendor placement, and other aspects on the business side of organizations.



Careers in Sports Statistics

- My Path:
 - Majored in Mathematics at St. Lawrence University (minors in statistics, psychology).
 - While there I worked with the assistant coach of the hockey team.
 - PhD in statistics from Iowa State University with a dissertation on utilizing statistics in sports.
 - While there I worked as a graduate student volunteer with the basketball team.



Careers in Sports Statistics

- Advice:
 - Take advantage of the opportunities being a student at Nova can provide.
 - Computer Science! Adding a minor or coursework in computer science separates your resume from the pack.
 - Utilize course projects to work on sports data... and get your work out there.
 - Attend and submit your resume to the Sloan Sports Analytics Conference in February.

Dolphins Analytics Department



- Formed last July under then new GM Dennis Hickey to “support football operations through statistical analyses and research”.
- Dolphins Analysts:
 - Dennis Lock (Director of Analytics)
 - Tom Pasquali (Football Analyst)
 - Dave Regan (Sports Science Analyst)

Dolphins Analytics Department



- Three Major Aspects:
 - Player Personnel
 - Coaching
 - Sports Science



Basketball Example

- Example: Evaluating NBA players on their ability to score.
- Taking all shots in 2012/2013 as our “sample” we model each shot i from player j as

$$y_{ij} \sim \text{Bern}(p_{ij})$$
$$\text{logit}(p_{ij}) = \text{logit}(\bar{p}_{ij}) + \beta_j$$

Probability of Success

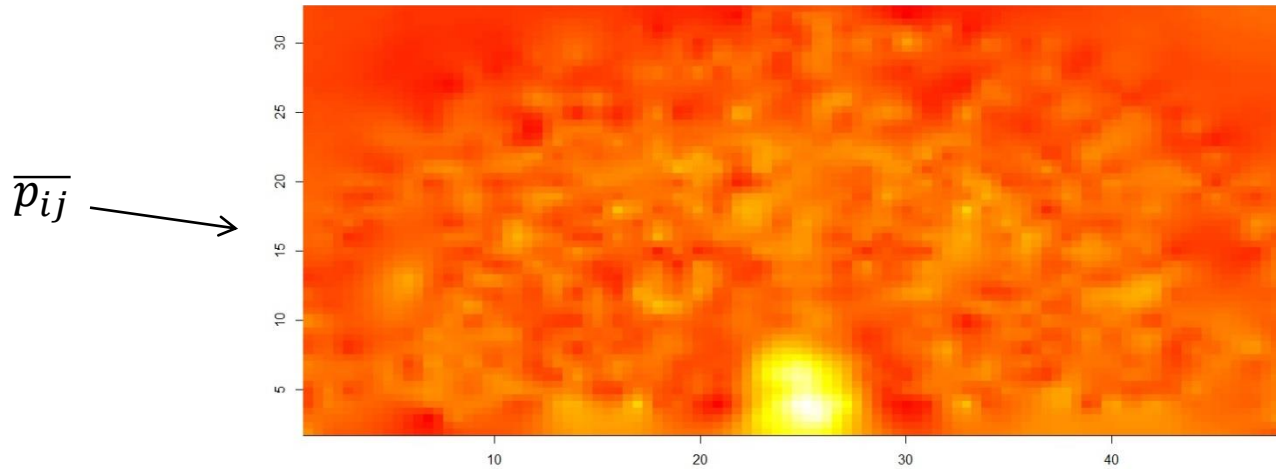
Average Probability of Success at that location

Effect of Shooter j

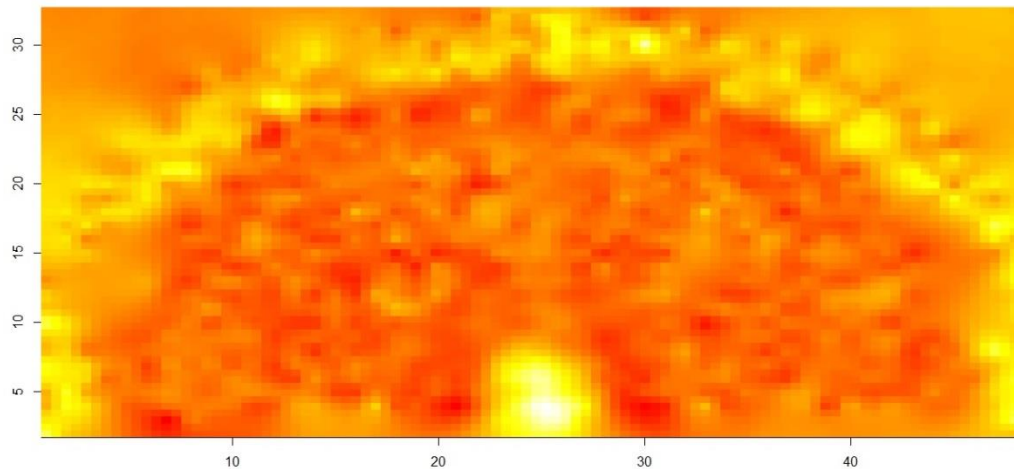


Basketball Example

Average Probability of Success by Shot location



Expected Points by Shot Location





Basketball Example

- Miami Heat 2012/2013:

Miami Heat			
Player	β_j	Shot Attempts	Effect
L. James	0.090	1344	+121
C. Bosh	0.076	906	+69
D. Wade	0.044	1082	+48
R. Allen	0.026	642	+17
S. Battier	0.039	358	+14
M. Miller	0.043	230	+10
M. Chalmers	0.018	525	+9
U. Haslem	0.001	249	0
R. Lewis	-0.001	246	0
C. Anderson	-0.032	123	-4
N. Cole	-0.060	419	-25



Basketball Example

- Top 5 Shooters: Kyle Korver, Keven Durant, Lebron James, Serge Ibaka, Dirk Nowitski
- Notable non-significant/negative shooters: Carmelo Anthony, Russel Westbrook, James Harden, Paul Pierce, Brandon Jennings
- Worst Shooter: Ricky Rubio



Thank You!

- Some Cool South Florida Based Analytics:
 - LeBron James in Cleveland was worth an estimated 27 wins above replacement a season, LeBron James in Miami was worth about 15.
 - In 2014 among all WR with at least 50 receptions Jarvis Landry caught the highest percentage of passes thrown <10 yards (81%), and Kenny Stills caught the highest percent of passes thrown > 10 yards (72%)
 - By my College Basketball Power Index the Miami Hurricanes were the biggest snub of last years NCAA tournament (ranked 36th).