



# Football V

Produced by Dr. Mario | UNC STOR 390



# State and Value Analysis



- ❖ Use Data Science to Appreciate the Sport
- ❖ Case Study 2006 Super Bowl
  - ❖ Indianapolis Colts vs Chicago Bears
  - ❖ Tony Dungy vs Lovie Smith
  - ❖ Peyton Manning vs Rex Grossman
  - ❖ Final Score: 29 – 17
  - ❖ Peyton Manning's Only Super Bowl
- ❖ Book Uses State and Value Approach to Appreciate the Game





# State and Value Analysis



- ❖ Play-by-Play Logs for Each NFL Game
  - ❖ Down Before the Play
  - ❖ Yards to Go For a 1<sup>st</sup> Down Before the Play
  - ❖ Yard Line Before the Play
  - ❖ Was the Play a Run or Pass
  - ❖ The Ball Carrier on the Running Play
  - ❖ Where the Runner was Positioned
  - ❖ Quarterback and Intended Receiver
  - ❖ Classification of Pass Distance
  - ❖ Result of the Play Measured by Down, Distance to 1<sup>st</sup> Down, and Yard Line





# State and Value Analysis



## ❖ Example of Data Used by Textbook

Play Number	Start Down	Start Yards to Go	Start Deadline	End Down	End Yards to Go	End Yardline	Start Value	End Value	Delta
1	1	10	34	1	10	47	0.769	1.67	0.898
2	1	10	47	2	6	51	1.667	1.78	0.113
3	2	6	51	3	6	51	1.78	1.25	-0.53
4	3	6	51	1	10	58	1.25	2.47	1.215
5	1	10	58	2	2	66	2.465	3.19	0.725
6	2	2	66	3	1	67	3.19	2.92	-0.273
7	3	1	67	1	10	69	2.917	3.35	0.43
8	1	10	69	2	14	65	3.347	2.13	-1.219
9	2	14	65	3	13	66	2.128	1.5	-0.63
10	3	13	66	1	10	80	1.498	4.37	2.872







# State and Value Analysis



## ❖ Example of Data Used by Textbook

Play Number	Run or Pass?	Runner	Run or Pass Location	Quarterback	Receiver
1	P		Short	P. Manning	R. Wayne
2	R	D. Rhodes	RE		
3	P		Short	P. Manning	R. Wayne
4	P		Short	P. Manning	B. Utrecht
5	P		Short	P. Manning	M. Harrison
6	R	D. Rhodes	LT		
7	R	D. Rhodes	LT		
8	P			P. Manning	
9	R	D. Rhodes	RT		
10	P		Short	P. Manning	D. Rhodes





# State and Value Analysis



## ❖ Focus on Value Measures

Play Number	Start Down	Start Yards to Go	Start Deadline	End Down	End Yards to Go	End Yardline	Start Value	End Value	Delta
1	1	10	34	1	10	47	0.769	1.67	0.898
2	1	10	47	2	6	51	1.667	1.78	0.113



Value of Starting State  
Value of Ending State

How is This Useful?



# State and Value Analysis



## ❖ On First and 10, Is Running More Effective Than Passing?

- ❖ Filter Data Based on 1<sup>st</sup> and 10 Situations
- ❖ Split Data Into Running and Passing Plays
- ❖ Colts Ran 222 Times and Averaged 0.119 Points Per Run
- ❖ Colts Passed 204 Times and Averaged 0.451 Points Per Pass
- ❖ Interesting: Colts Ran More than Passed But Won the Game
- ❖ Shows the Importance of Looking at More Granular Data When Making a Sports Argument

## ❖ Are Runs More or Less Effective Than Passes?

- ❖ Passing Plays Averaged 0.416 Points
- ❖ Running Plays Averaged 0.102 Points

## ❖ Clearly, They Should Pass Every Time. Any Problems Here?





# State and Value Analysis



- ❖ Which Runner Was More Effective?
  - ❖ Joseph Addai Averaged 0.134 Points Per Run
  - ❖ Dominique Rhode's Averaged 0.041 Points Per Run
- ❖ Which Receiver Was More Effective?
  - ❖ Passes to Reggie Wayne Averaged 0.67 Points (140 Passes)
  - ❖ Passes to Marvin Harrison Averaged 0.56 Points (152 Passes)
- ❖ Where Could These Analyses Be Problematic?







# Football Decision Making



❖ Now Check Out the 2010 San Diego Chargers



## The 2010 Chargers

were a  
modern tragedy.

**SBNATION | DORKTOWN**





# Final Inspiration

I want to be the greatest at mediocrity.

- Mahatma Mario