

Welcome to Admitted Student Day!

February 2, 2018



DEPARTMENT OF MATHEMATICS AND STATISTICS

College of Science and Engineering



Quantifying Thrill

2017 World Series: Game 5

- Best-of-seven series tied, 2-2

	1	2	3	4	5	6	7	8	9	10	R	H	E
 Los Angeles Dodgers	3	0	0	1	3	0	1	1	3	0	12	14	1
 Houston Astros	0	0	0	4	3	0	4	1	0	1	13	14	1

WP: Joe Musgrove (1-0) • LP: Kenley Jansen (1-1)
Winning Run scored with 2 outs

2011 World Series: Game 6

- Texas leading series, 3-2

	1	2	3	4	5	6	7	8	9	10	11	R	H	E
 Texas Rangers	1	1	0	1	1	0	3	0	0	2	0	9	15	2
 St. Louis Cardinals	2	0	0	1	0	1	0	1	2	2	1	10	13	3

Which game was more exciting?

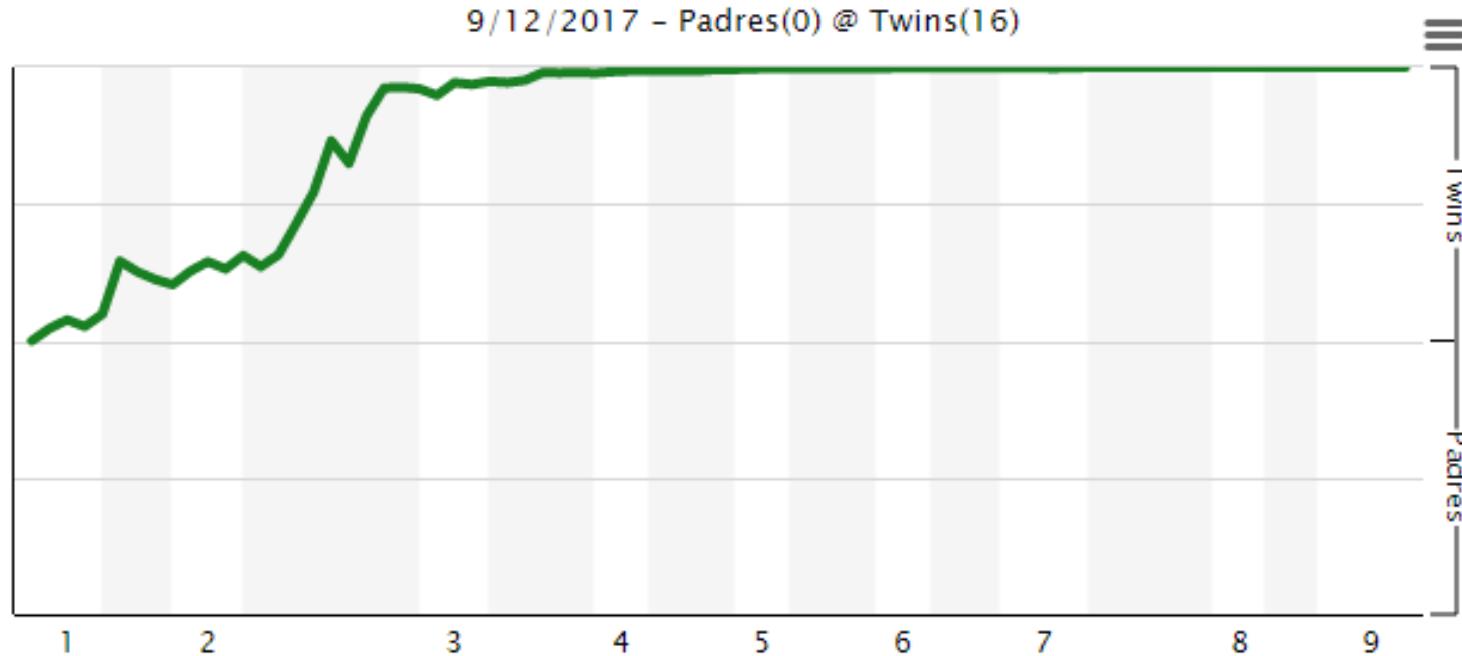
Houston's Win Expectancy following event

Win Probability
Added (WPA)

The screenshot shows a baseball play log from Fangraphs. The columns include: Pitcher, Player, Inn., Outs, Base, Score, Play, LI, RE, WE, and WPA. The WPA column is highlighted with a red arrow pointing to it.

Pitcher	Player	Inn.	Outs	Base	Score	Play	LI	RE	WE	WPA
D Keuchel	C Taylor	1	0	__	0-0	Chris Taylor singled to center (Grounder).	0.87	0.48	46.4 %	.036
D Keuchel	C Seager	1	0	1__	0-0	Corey Seager struck out looking.	1.46	0.85	49.7 %	-.033
D Keuchel	J Turner	1	1	1__	0-0	Justin Turner walked. Chris Taylor advanced to 2B.	1.15	0.50	46.2 %	.036
D Keuchel	E Hernandez	1	1	12__	0-0	Enrique Hernandez walked. Chris Taylor advanced to 3B. Justin Turner advanced to 2B.	1.96	0.88	40.1 %	.060
D Keuchel	C Bellinger	1	1	123	0-0	Cody Bellinger struck out swinging.	2.60	1.54	47.5 %	-.074
D Keuchel	L Forsythe	1	2	123	0-2	Logan Forsythe singled to left (Liner). Chris Taylor scored. Justin Turner scored. Enrique Hernandez advanced to 3B.	2.87	0.74	30.5 %	.170

- By graphing win expectancy over course of game, we get an idea of how “exciting” a game is.
- A typical, “boring” game (9/12/17, Twins beat Padres 16-0):

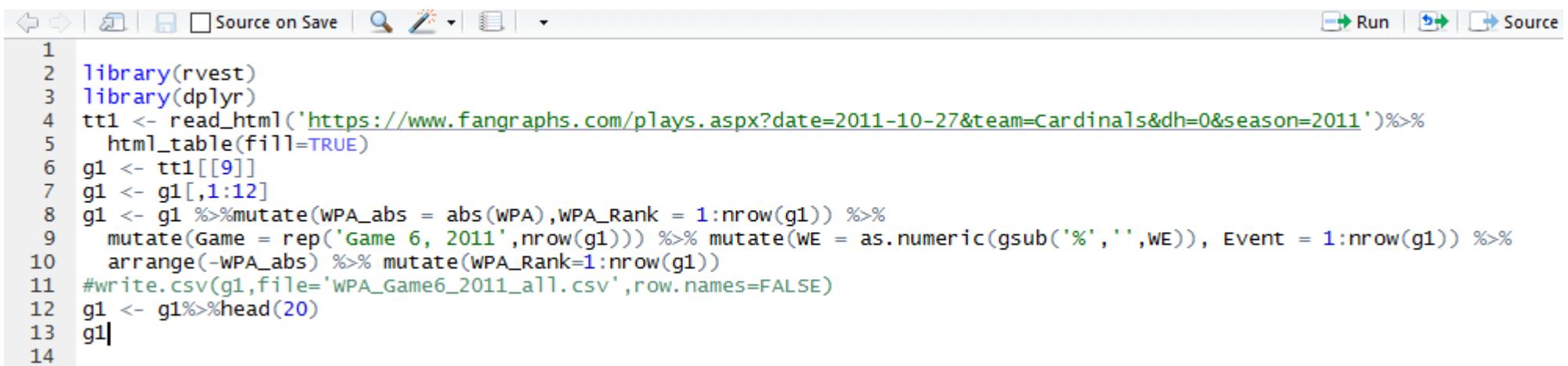


Comparing World Series games

Step 1: Scrape data from both games from Fangraphs



Pitcher	Player	Inn.	Outs	Base	Score	Play	LI	RE	WE	WPA
D Keuchel	C Taylor	1	0	—	0-0	Chris Taylor singled to center (Grounder).	0.87	0.48	46.4 %	.036
D Keuchel	C Seager	1	0	1—	0-0	Corey Seager struck out looking.	1.46	0.85	49.7 %	-.033
D Keuchel	J Turner	1	1	1—	0-0	Justin Turner walked. Chris Taylor advanced to 2B.	1.15	0.50	46.2 %	.036
D Keuchel	E Hernandez	1	1	12—	0-0	Enrique Hernandez walked. Chris Taylor advanced to 3B. Justin Turner advanced to 2B.	1.96	0.88	40.1 %	.060
D Keuchel	C Bellinger	1	1	123	0-0	Cody Bellinger struck out swinging.	2.60	1.54	47.5 %	-.074
D Keuchel	L Forsythe	1	2	123	0-2	Logan Forsythe singled to left (Liner). Chris Taylor scored. Justin Turner scored. Enrique Hernandez advanced to 3B.	2.87	0.74	30.5 %	.170
D Keuchel	L Forsythe	1	2	1_3	0-3	Logan Forsythe advanced on caught stealing with error to 2B. Enrique Hernandez scored on error. Error by Yulieski Gurriel.	1.34	0.48	23.5 %	.070



```
1 library(rvest)
2 library(dplyr)
3 tt1 <- read_html('https://www.fangraphs.com/plays.aspx?date=2011-10-27&team=Cardinals&dh=0&season=2011')%>%
4   html_table(fill=TRUE)
5 g1 <- tt1[[9]]
6 g1 <- g1[,1:12]
7 g1 <- g1 %>% mutate(WPA_abs = abs(WPA), WPA_Rank = 1:nrow(g1))%>%
8   mutate(Game = rep('Game 6, 2011', nrow(g1)))%>% mutate(WE = as.numeric(gsub('%', '', WE)), Event = 1:nrow(g1))%>%
9   arrange(-WPA_abs) %>% mutate(WPA_Rank=1:nrow(g1))
10 #write.csv(g1,file='WPA_Game6_2011_all.csv',row.names=FALSE)
11 g1 <- g1%>%head(20)
12 g1
13 g1
14
```

Comparing World Series games

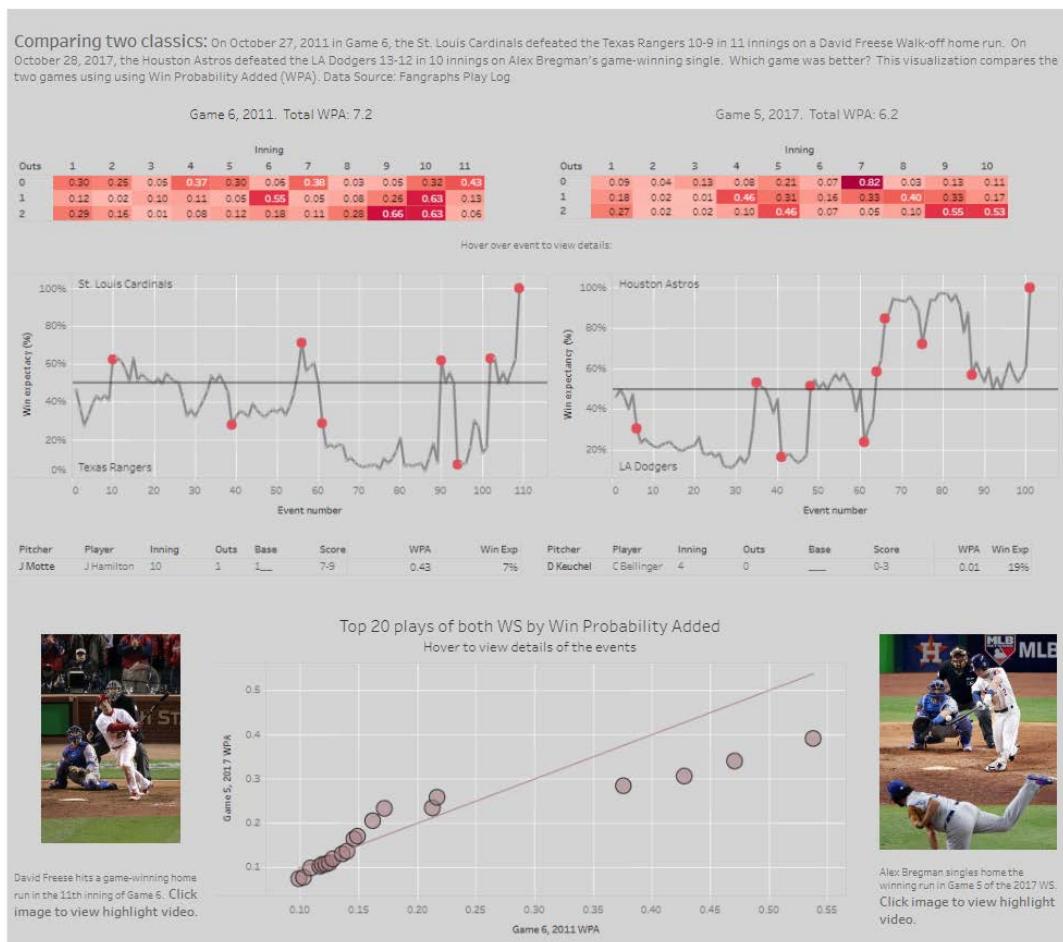
Step 2: Write to “nice” format (e.g., Excel)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Pitcher	Player	Inn.	Outs	Base	Score	Play	LI	RE	WE	WPA	RE24	WPA_abs	WPA_Ran	Game	Event
D Keuchel	C Taylor		1	0 _	0-0	Chris Taylor	0.87	0.48	46.4	0.036	0.37	0.036	50	Game 7, 2	1
D Keuchel	C Seager		1	0 1 _	0-0	Corey Seager	1.46	0.85	49.7	-0.033	-0.35	0.033	58	Game 7, 2	2
D Keuchel	J Turner		1	1 1 _	0-0	Justin Turner	1.15	0.5	46.2	0.036	0.38	0.036	51	Game 7, 2	3
D Keuchel	E Hernandez		1	1 12 _	0-0	Enrique Hernandez	1.96	0.88	40.1	0.06	0.66	0.06	30	Game 7, 2	4
D Keuchel	C Bellinger		1	1 123	0-0	Cody Bellinger	2.6	1.54	47.5	-0.074	-0.79	0.074	20	Game 7, 2	5
D Keuchel	L Forsythe		1	2 123	0-2	Logan Forsythe	2.87	0.74	30.5	0.17	1.74	0.17	9	Game 7, 2	6
D Keuchel	L Forsythe		1	2 1_3	0-3	Logan Forsythe	1.34	0.48	23.5	0.07	0.83	0.07	24	Game 7, 2	7
D Keuchel	Y Puig		1	2 _2 _	0-3	Yasiel Puig	0.72	0.31	25.5	-0.02	-0.31	0.02	73	Game 7, 2	8
C Kershaw	G Springer		1	0 _	0-3	George Springer	0.82	0.48	23.5	-0.021	-0.23	0.021	71	Game 7, 2	9

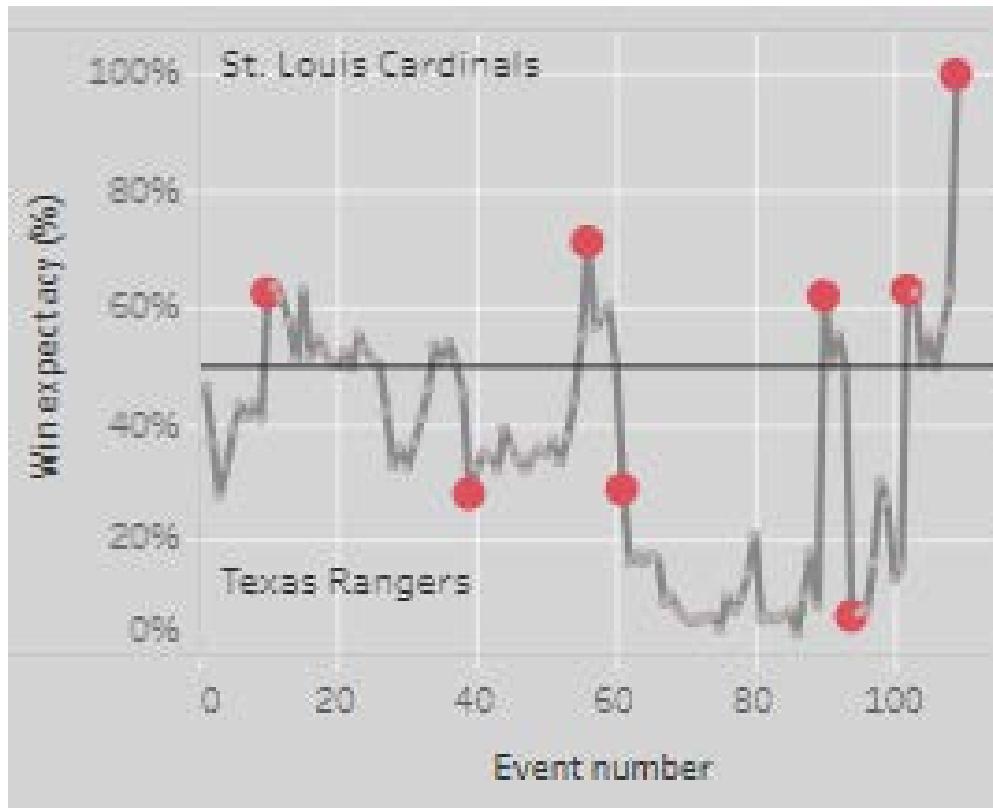
Comparing World Series games

Step 3: Visualize!

Comparing two classics: On October 27, 2011 in Game 6, the St. Louis Cardinals defeated the Texas Rangers 10-9 in 11 innings on a David Freese Walk-off home run. On October 28, 2017, the Houston Astros defeated the LA Dodgers 13-12 in 10 innings on Alex Bregman's game-winning single. Which game was better? This visualization compares the two games using Win Probability Added (WPA). Data Source: Fangraphs Play Log



Game 6, 2011:



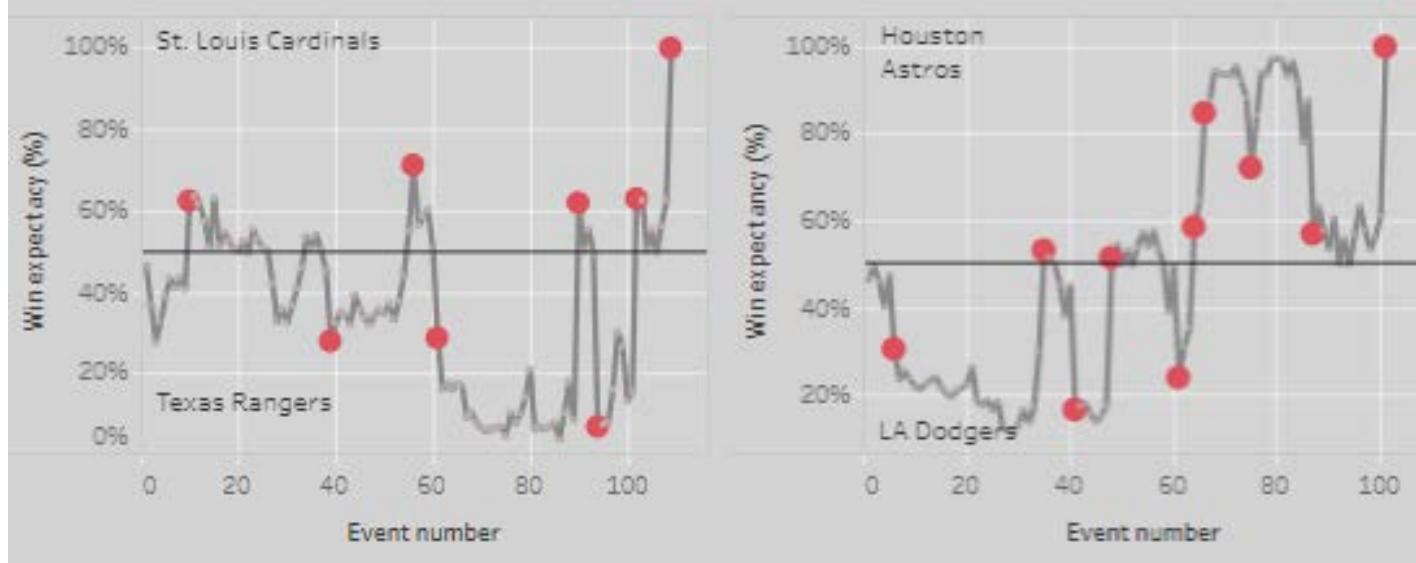
Game 5, 2017:



● = “Exciting Event” (WPA > 15%)

Game 6, 2011

- 8 “exciting events”
- Total WPA: 7.2



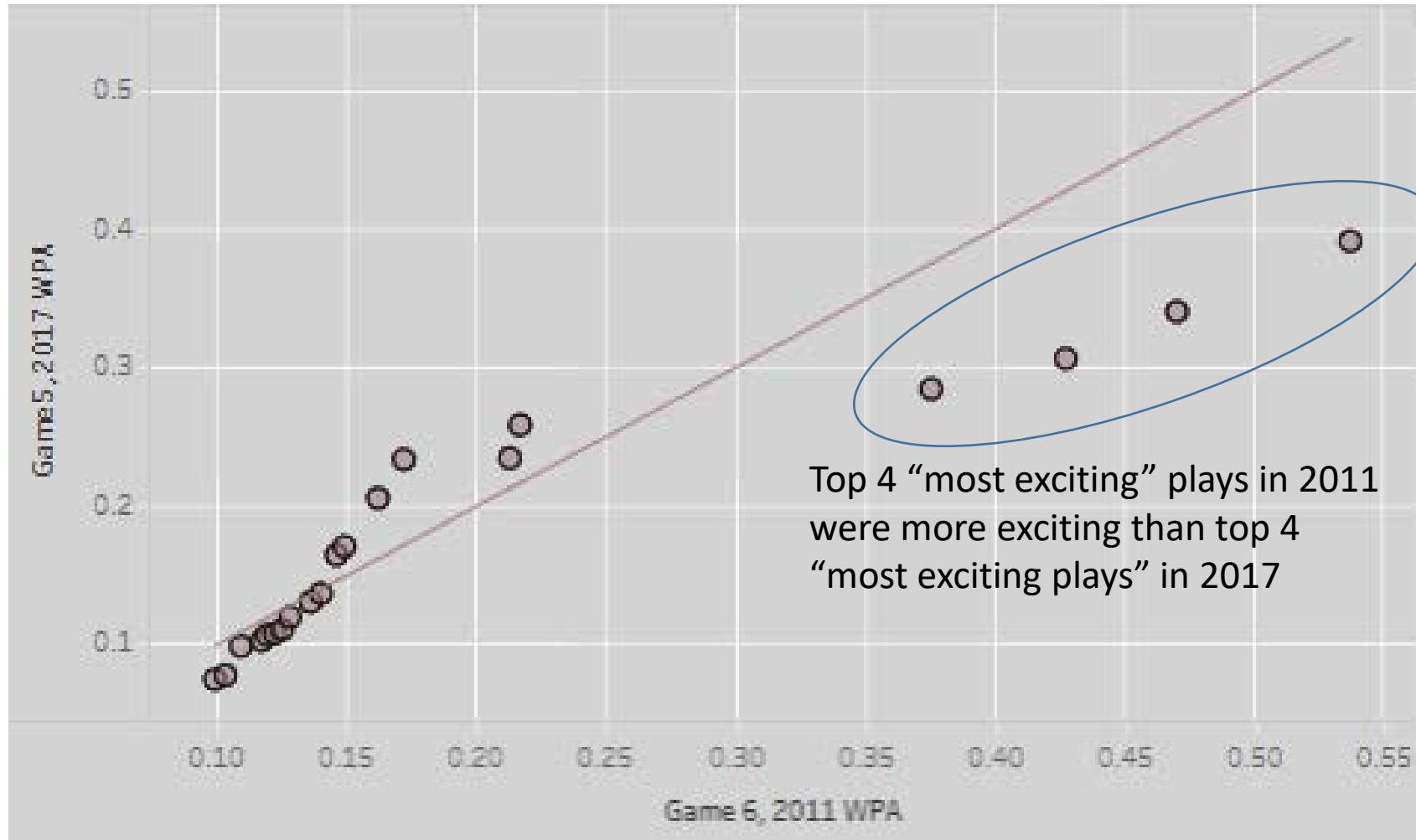
Game 5, 2017

- 10 “exciting events”
- Total WPA: 6.2

● = “Exciting Event” (WPA > 15%)

WPA of top-20 “most exciting plays” from each game

Game 5, 2017



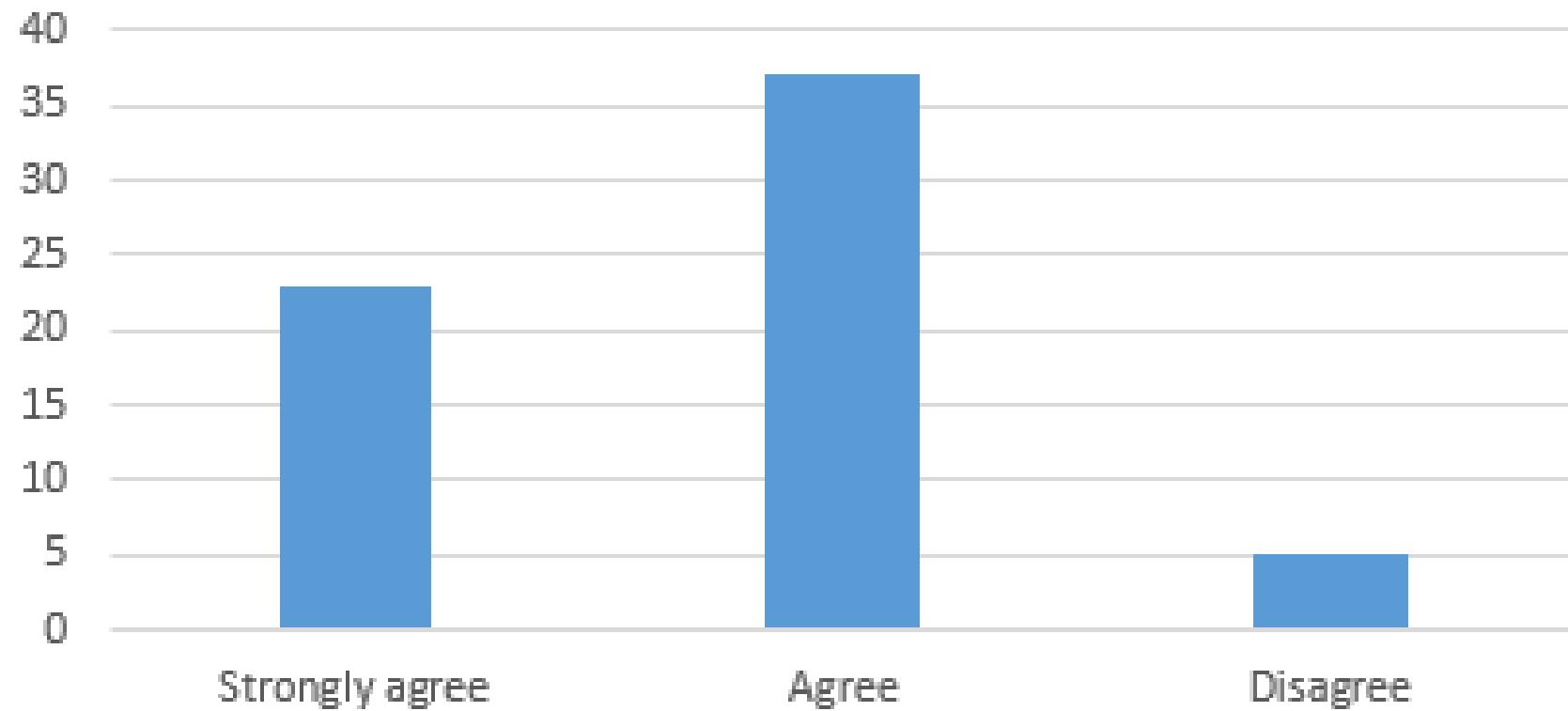
Game 6, 2011

Quantifying Student Satisfaction

(or lack thereof)

Top Hat helped me understand the material.	What did you like BEST about in-class group homework?	What did you like LEAST about in-class group homework?
Strongly agree	The group part	The kid next to me who didn't do anything
Disagree	I would have struggled so hard alone	Sometimes I felt weird asking people I didn't know to explain why they got the answers that they did
Agree	It allowed me to discuss my questions/confusion with my classmates and my professor so I got a better understanding of the topic.	Randomly assigned groups
Agree	I liked that we did all homework in class and that everyone's idea helped solve the problem.	Not being able to choose own groups every time, some of the random people wouldn't write what group said and then we would get them wrong.
Strongly agree	You didn't just have to weather the storm alone you had people do it with you to help you better understand the content.	Nothing
Agree	Getting to work together and think through the problems together	Being assigned into groups and then one person not helping the group at all
Strongly agree	Ask question right away	Some people didn't participate
Strongly agree	I liked choosing groups because I work with people who were at my same level, and sometimes peers can explain concepts in a different way than the professor which is helpful.	Randomly assigned groups because sometimes you get stuck with people who don't anything, so you are basically doing the homework by yourself.
Agree	If you don't get it	Because we have a time frame, everyone tries to finish the homework as fast as possible. When I didn't understand anything, I would feel bad for asking questions because I didn't want to hold my group back and cause us to meet outside of class to finish the homework.
Agree	I thought the homework was often times challenging and I think it would have been very difficult to do own my own, when working in groups we were all able to contribute our best knowledge on things. Also I liked how sometimes the groups were random because the group I was with when we got to chose our groups wasn't the smartest.	I thought it was very hard and didn't represent what we had learned in lecture very well.
Strongly agree	I was able to discuss thoughts and problem-solving with my peers.	People sometimes suck.
Agree	Being able to bounce ideas off of someone else.	Usually the person typing does most of the work and some people literally say nothing the whole time.

Total



Top Hat helped me understand the material. ▾

Top Hat helped me understand the material.	What did you like BEST about in-class group homework?	What did you like LEAST about in-class group homework?
Strongly agree	The group part	The kid next to me who didn't do anything
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Agree	Getting to work together and think through the problems together	Being assigned into groups and then one person not helping the group at all
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Strongly agree	I liked choosing groups because I work with people who were at my same level, and sometimes peers can explain concepts in a different way than the professor which is helpful.	Randomly assigned groups because sometimes you get stuck with people who don't anything, so you are basically doing the homework by yourself.
Agree	?	?
Agree	If you don't get it	Because we have a time frame, everyone tries to finish the homework as fast as possible. When I didn't understand anything, I would feel bad for asking questions because I didn't want to hold my group back and cause us to meet outside of class to finish the homework.
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Agree	Being able to bounce ideas off of someone else.	Usually the person typing does most of the work and some people literally say nothing the whole time.

```
simple_clean <- function(vec) {  
  p0 <- strsplit(vec, " |/")  
  p1 <- do.call(c, p0)  
  p2 <- gsub('\\.', '', p1)  
  p3 <- tolower(p2)  
  p4 <- removewords(p3, words=c('group', 'groups', 'homework', 'got', 'like', 'liked'))  
  return(p4)  
}  
best <- simple_clean(all$best)  
least <- simple_clean(all$least)  
set.seed(23)  
wordcloud(best, scale=c(3,.8), random.order=FALSE, min.freq=5)
```

What did you like BEST about in-class group homework?

A word cloud visualization showing the most common responses to the question "What did you like BEST about in-class group homework?". The words are arranged in a cluster, with larger, bolder words indicating higher frequency.

The words in the cloud include:

- classmates
- done
- something
- can
- things
- outside
- time
- usually
- working
- getting
- nice
- know
- don't
- problem
- bounce
- understand
- explain
- help
- able
- talk
- right
- others
- class
- work
- peers
- material
- ask
- people
- get
- easier
- hear
- material
- questions
- better
- ideas
- together
- helped
- professor
- discuss
- learn
- didn't
- someone
- problems

What did you like LEAST about in-class group homework?

understand
made material
person anything
nothing
felt assigned answers
working
get hard
one finish
time able class
always pick put
work know randomly knew
just sometimes
choose dont members
random better
everyone wasnt
partners

More specifics on our department...

...With this cool dude





Our Alumni

Where are they employed?



Scholarships in Math, MathEd, Stats & DSCI

• Camille Gilbertson Moll Award	\$4000	Math, Stat, DSCI, Science
• Walter Wadewitz Award	\$2400	MathEd majors
• Lorena Jacobson Award	\$3000	Math, Stat, MathEd Majors
• May S Murray Award	\$1000	Math, MathEd Majors
• Judy & Spencer Munkel Award	\$2000	Math, MathEd, Stat Majors
• Gardiner Award Math/Stat	\$1000	Math, Stat, DSCI Majors
• Gardiner Award MathEd	\$1000	MathEd Majors
• Fred & Sandy Olson Award	\$1000	Math, Stat, MathEd,
• Duane & Edina Wolfe Award	\$1000	MathEd Majors
• Bachler Memorial Award	\$800	MathEd Majors
• Math/Stat Alumni Award	\$600	Math, Stat, MathEd, DSCI
• Daniel Rand Award	\$500	Stat and DSCI Majors
• Benchmark Award	\$450	Incoming Stat Major





Social Events – Spaghetti Dinner

Spring Math/Stats Picnic



Spring Award Ceremony

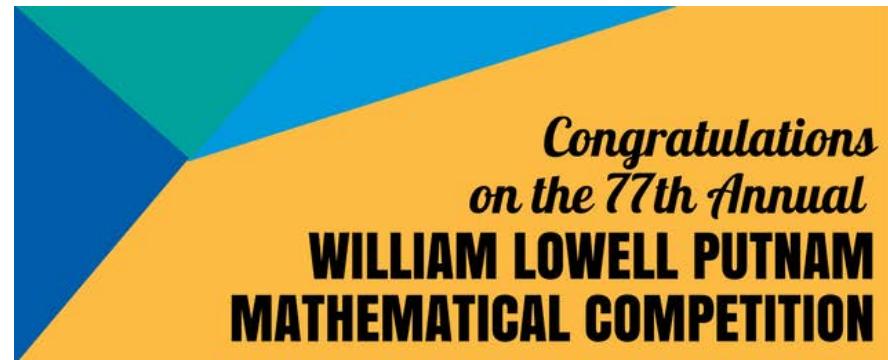


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College of Science and Engineering

Math Competition Participation



North Central Section Team Competition



Wisconsin Mathematical
Modeling Challenge

Math/Stats Student Teaching Supervision

edTPA.

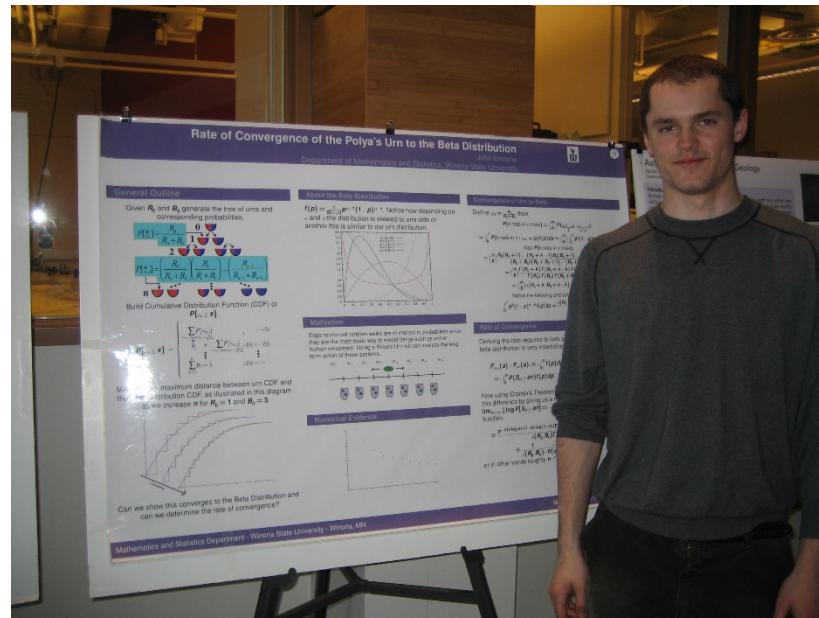
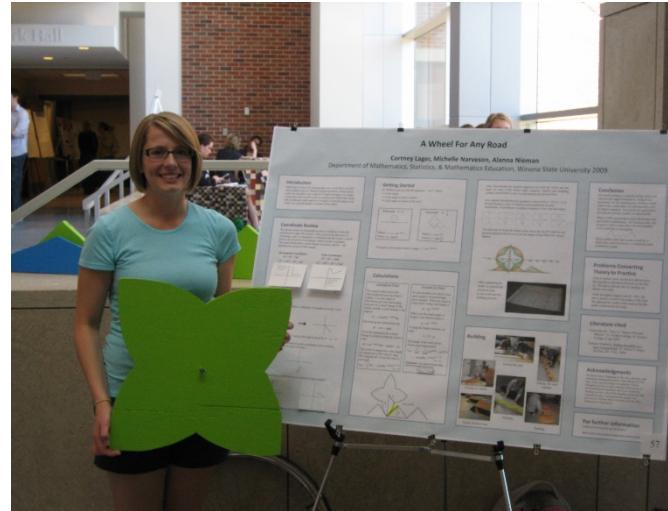
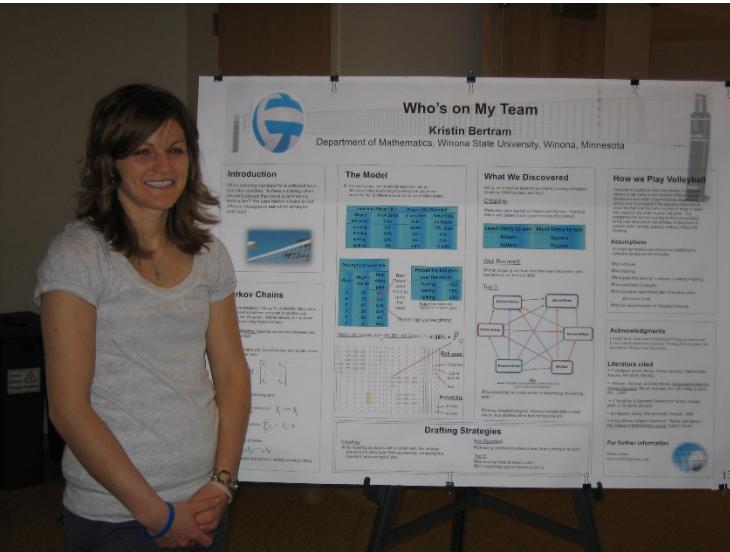
- Student Teaching Seminars
- Support with MTLE Exams
- Support with edTPA
- Practice Job Interviews
- Partnerships with the Local School Districts
- Public Service Loan Forgiveness



DEPARTMENT OF MATHEMATICS AND STATISTICS
College of Science and Engineering



Undergraduate Research



Student Travel Support For Conferences



- PME Conference – Fall and Spring
- MAA Math Fest – Washington DC, Seattle, Chicago ...
- National Council of Teachers of Mathematics – Regional Conferences
- Minnesota Council of Teachers of Mathematics – Duluth

Winona Outdoor Recreation



Winona Arts and Cultural



We Hope to See You in the Fall!



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Mathematics and Statistics



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