Analyzing The Most Clutch NBA Player Today: Insert Bum Here

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# Loading Data

library(readr)

## Warning: package 'readr' was built under R version 3.4.4

library(tidyverse)

## Warning: package 'tidyverse' was built under R version 3.4.2

## Loading tidyverse: ggplot2  
## Loading tidyverse: tibble  
## Loading tidyverse: tidyr  
## Loading tidyverse: purrr  
## Loading tidyverse: dplyr

## Warning: package 'tidyr' was built under R version 3.4.2

## Warning: package 'purrr' was built under R version 3.4.2

## Conflicts with tidy packages ----------------------------------------------

## filter(): dplyr, stats  
## lag(): dplyr, stats

library(stringr)

## Warning: package 'stringr' was built under R version 3.4.4

data2014 <- read\_csv("data2014.csv", col\_types = cols(  
 .default = "f",  
 Time = col\_skip(),  
 Minutes = col\_integer(),  
 Seconds = col\_integer(),  
 Away = col\_character(),  
 Away\_Points\_Added = col\_integer(),  
 Away\_Score = col\_integer(),  
 Home\_Score = col\_integer(),  
 Diff\_Abs = col\_integer(),  
 Diff\_Home = col\_integer(),  
 Diff\_Away = col\_integer(),  
 Home\_Points\_Added = col\_integer(),  
 Home = col\_character()  
))

## Warning: Duplicated column names deduplicated: 'Diff\_Home' =>  
## 'Diff\_Home\_1' [21]

## Warning: 2208 parsing failures.  
## row col expected actual file  
## 105 Minutes an integer #VALUE! 'data2014.csv'  
## 105 Seconds an integer #VALUE! 'data2014.csv'  
## 106 Minutes an integer #VALUE! 'data2014.csv'  
## 106 Seconds an integer #VALUE! 'data2014.csv'  
## 106 Away\_Score an integer Score 'data2014.csv'  
## ... .......... .......... ....... ..............  
## See problems(...) for more details.

data2015 <- read\_csv("data2015.csv", col\_types = cols(  
 .default = "f",  
 Time = col\_skip(),  
 Minutes = col\_integer(),  
 Seconds = col\_integer(),  
 Away = col\_character(),  
 Away\_Points\_Added = col\_integer(),  
 Away\_Score = col\_integer(),  
 Home\_Score = col\_integer(),  
 Diff\_Abs = col\_integer(),  
 Diff\_Home = col\_integer(),  
 Diff\_Away = col\_integer(),  
 Home\_Points\_Added = col\_integer(),  
 Home = col\_character()  
))

## Warning: Duplicated column names deduplicated: 'Diff\_Home' =>  
## 'Diff\_Home\_1' [21]

## Warning: 2016 parsing failures.  
## row col expected actual file  
## 116 Minutes an integer #VALUE! 'data2015.csv'  
## 116 Seconds an integer #VALUE! 'data2015.csv'  
## 117 Minutes an integer #VALUE! 'data2015.csv'  
## 117 Seconds an integer #VALUE! 'data2015.csv'  
## 117 Away\_Score an integer Score 'data2015.csv'  
## ... .......... .......... ....... ..............  
## See problems(...) for more details.

data2016 <- read\_csv("data2016.csv", col\_types = cols(  
 .default = "f",  
 Time = col\_skip(),  
 Minutes = col\_integer(),  
 Seconds = col\_integer(),  
 Away = col\_character(),  
 Away\_Points\_Added = col\_integer(),  
 Away\_Score = col\_integer(),  
 Home\_Score = col\_integer(),  
 Diff\_Home = col\_integer(),  
 Diff\_Away = col\_integer(),  
 Diff\_Abs = col\_integer(),  
 Home\_Points\_Added = col\_integer(),  
 Home = col\_character()  
))

## Warning: Duplicated column names deduplicated: 'Diff\_Home' =>  
## 'Diff\_Home\_1' [21]

## Warning: 2112 parsing failures.  
## row col expected actual file  
## 110 Minutes an integer #VALUE! 'data2016.csv'  
## 110 Seconds an integer #VALUE! 'data2016.csv'  
## 111 Minutes an integer #VALUE! 'data2016.csv'  
## 111 Seconds an integer #VALUE! 'data2016.csv'  
## 111 Away\_Score an integer Score 'data2016.csv'  
## ... .......... .......... ....... ..............  
## See problems(...) for more details.

data2017 <- read\_csv("data2017.csv", col\_types = cols(  
 .default = "f",  
 Time = col\_skip(),  
 Minutes = col\_integer(),  
 Seconds = col\_integer(),  
 Away = col\_character(),  
 Away\_Points\_Added = col\_integer(),  
 Away\_Score = col\_integer(),  
 Home\_Score = col\_integer(),  
 Diff\_Home = col\_integer(),  
 Diff\_Away = col\_integer(),  
 Diff\_Abs = col\_integer(),  
 Home\_Points\_Added = col\_integer(),  
 Home = col\_character()  
))

## Warning: Duplicated column names deduplicated: 'Diff\_Home' =>  
## 'Diff\_Home\_1' [21]

## Warning: 1920 parsing failures.  
## row col expected actual file  
## 119 Minutes an integer #VALUE! 'data2017.csv'  
## 119 Seconds an integer #VALUE! 'data2017.csv'  
## 120 Minutes an integer #VALUE! 'data2017.csv'  
## 120 Seconds an integer #VALUE! 'data2017.csv'  
## 120 Away\_Score an integer Score 'data2017.csv'  
## ... .......... .......... ....... ..............  
## See problems(...) for more details.

data2018 <- read\_csv("data2018.csv", col\_types = cols(  
 .default = "f",  
 Time = col\_skip(),  
 Minutes = col\_integer(),  
 Seconds = col\_integer(),  
 Away = col\_character(),  
 Away\_Points\_Added = col\_integer(),  
 Away\_Score = col\_integer(),  
 Home\_Score = col\_integer(),  
 Diff\_Home = col\_integer(),  
 Diff\_Away = col\_integer(),  
 Diff\_Abs = col\_integer(),  
 Home\_Points\_Added = col\_integer(),  
 Home = col\_character()  
))

## Warning: Duplicated column names deduplicated: 'Diff\_Home' =>  
## 'Diff\_Home\_1' [21]

## Warning: 1505 parsing failures.  
## row col expected actual file  
## 106 Minutes an integer Q 'data2018.csv'  
## 107 Minutes an integer e 'data2018.csv'  
## 107 Away\_Score an integer Score 'data2018.csv'  
## 108 Diff\_Home an integer #VALUE! 'data2018.csv'  
## 108 Diff\_Away an integer #VALUE! 'data2018.csv'  
## ... .......... .......... ....... ..............  
## See problems(...) for more details.

data2019 <- read\_csv("data2019.csv", col\_types = cols(  
 .default = "f",  
 Time = col\_skip(),  
 Minutes = col\_integer(),  
 Seconds = col\_integer(),  
 Away = col\_character(),  
 Away\_Points\_Added = col\_integer(),  
 Away\_Score = col\_integer(),  
 Home\_Score = col\_integer(),  
 Diff\_Home = col\_integer(),  
 Diff\_Away = col\_integer(),  
 Diff\_Abs = col\_integer(),  
 Home\_Points\_Added = col\_integer(),  
 Home = col\_character()  
))

## Warning: Duplicated column names deduplicated: 'Diff\_Home' =>  
## 'Diff\_Home\_1' [21]

## Warning: 1988 parsing failures.  
## row col expected actual file  
## 122 Minutes an integer #VALUE! 'data2019.csv'  
## 122 Seconds an integer #VALUE! 'data2019.csv'  
## 123 Minutes an integer #VALUE! 'data2019.csv'  
## 123 Seconds an integer #VALUE! 'data2019.csv'  
## 123 Away\_Score an integer Score 'data2019.csv'  
## ... .......... .......... ....... ..............  
## See problems(...) for more details.

data <- bind\_rows(data2014,data2015, data2016, data2017, data2018, data2019)

## Warning in bind\_rows\_(x, .id): Unequal factor levels: coercing to character

## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector  
  
## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector

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## coercing into character vector  
  
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## coercing into character vector  
  
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## coercing into character vector  
  
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## coercing into character vector  
  
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## coercing into character vector  
  
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## coercing into character vector  
  
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## coercing into character vector  
  
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## coercing into character vector  
  
## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector  
  
## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector  
  
## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector  
  
## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector  
  
## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector  
  
## Warning in bind\_rows\_(x, .id): binding character and factor vector,  
## coercing into character vector

Fourth\_Plus <- c("4","OT1","OT2","OT3","OT4")  
  
data <- data %>%  
 filter(Quarter %in% Fourth\_Plus)

Add variable showing logical if play was home or away:

data$Is\_Home <- if\_else(data$Play == data$Home\_Court,"Home", "Away")

data$Play <- ''  
  
#combine away and home play details into one column  
for(i in 1:nrow(data)) {   
 if (is.na(data$Away[i])) {  
 data$Play[i] <- data$Home[i]  
 } else {   
 data$Play[i] <- data$Away[i]  
 }   
}  
  
#log shot results per play  
data$Shot\_Result <- NA  
data[which(str\_detect(data$Play, ".\*misses.\*")), "Shot\_Result"] <- 0  
data[which(str\_detect(data$Play, ".\*makes.\*")), "Shot\_Result"] <- 1  
  
  
#Extract Player  
  
data$Player <- str\_extract(data$Play, "\\b\\p{Lu}\\.\\s\*\\w+")  
data$Shot\_Length <- str\_extract(data$Play, "..\\sft.\*")  
data$Shot\_Length <- str\_extract(data$Shot\_Length, ".\\d")  
  
  
#is dunk? might help to illinate from clutch SHOOTING as opposed to clutch playing  
  
data$Is\_Dunk <- str\_extract(data$Play, " 2-pt dunk")  
data$Is\_Dunk <- if\_else(is.na(data$Is\_Dunk), "No", "Yes")  
  
#is three?  
data$Is\_Three <- str\_extract(data$Play, " 3-pt jump shot")  
data$Is\_Three <- if\_else(is.na(data$Is\_Three), "No", "Yes")  
  
#is free throw  
data$Is\_FT <- str\_extract(data$Play, " free throw")  
data$Is\_FT <- if\_else(is.na(data$Is\_FT), "No", "Yes")  
  
#score differential  
data$Away\_Score <- as.numeric(data$Away\_Score)  
data$Home\_Score <- as.numeric(data$Home\_Score)  
  
for(i in 1:nrow(data)) {   
 if (is.na(data$Away\_Points\_Added[i])) {  
 data$Points\_Added[i] <- data$Home\_Points\_Added[i]  
 } else {   
 data$Points\_Added[i] <- data$Away\_Points\_Added[i]  
 }   
}

## Warning: Unknown or uninitialised column: 'Points\_Added'.

#margin at time of shot  
for(i in 1:nrow(data)) {   
 if (data$Is\_Home[i] == "Home") {  
 data$Lead[i] <- data$Home\_Score[i] - data$Away\_Score[i]  
 } else {   
 data$Lead[i] <- data$Away\_Score[i] - data$Home\_Score[i]  
 }   
}

## Warning: Unknown or uninitialised column: 'Lead'.

data$Points\_Added[which(is.na(data$Points\_Added))] <- 0

# Filter Last 6 Years Playoff Data

clutch\_analysis <- data %>%  
 filter(Shot\_Result == 0 | Shot\_Result == 1) %>%  
 filter(Lead < 1 & Lead > -4, Quarter %in% Fourth\_Plus) %>%  
 filter(Is\_FT == "No") %>%  
 select(Year, Round, Game, Player, Home\_Score, Away\_Score, Diff\_Abs, Lead, Quarter, Minutes,Seconds,Shot\_Result,Points\_Added,Shot\_Length,Is\_Dunk,Is\_Three,Is\_FT, Is\_Home, Home\_Court, On\_Road, Play)  
  
clutch\_analysis$Shot\_Length[which(is.na(clutch\_analysis$Shot\_Length),)] <- 0

# Assign non bums (stars) and current and past star closers

stars <- c("S. Curry", "D. Lillard", "L. James","J. Harden", "K. Durant","K. Leonard", "R. Westbrook", "D. Wade","D. Nowitzki","D. Rose","T. Parker","T. Duncan", "K. Bryant", "A. Davis", "D. DeRozan","D. Mitchell","G. Antetokounmpo", "J. Butler", "J. Embid", "K. Garnett", "K. Irving", "K. Lowry","K. Thompson","K. Towns","K. Walker","N. Jokic","P. George","P. Pierce","V. Oladipo", "M. Ginobli", "B. Griffin", "B. Simmons", "C. McCollum")  
  
stars\_current <- c("S. Curry", "D. Lillard", "L. James","J. Harden", "K. Durant","K. Leonard","R. Westbrook")   
  
stars\_yesterday <- c("D. Wade","D. Nowitzki","D. Rose","T. Parker","T. Duncan", "K. Bryant")

# Who Shoots Most Clutch Shots (Last 6 Years)

clutch\_analysis %>%  
 filter(Minutes == 0 & Seconds < 30) %>%  
 group\_by(Player) %>%  
 summarise(sum =n())%>%  
 arrange(desc(Player))

## # A tibble: 114 x 2  
## Player sum  
## <chr> <int>  
## 1 W. Matthews 2  
## 2 W. Barton 1  
## 3 V. Oladipo 4  
## 4 T. Thompson 1  
## 5 T. Snell 1  
## 6 T. Sefolosha 1  
## 7 T. Ross 3  
## 8 T. Parker 1  
## 9 T. Evans 1  
## 10 T. Ariza 1  
## # ... with 104 more rows

# Create Databases for All Specified Time Frames

cl\_30 <- clutch\_analysis %>%  
 filter(Minutes == 0 & Seconds < 30)  
  
cl\_1 <- clutch\_analysis %>%  
 filter(Minutes == 0 & Seconds < 60)  
  
cl\_2 <- clutch\_analysis %>%  
 filter(Minutes < 2)  
  
cl\_3 <- clutch\_analysis %>%  
 filter(Minutes < 3)  
  
cl\_4 <- clutch\_analysis %>%  
 filter(Minutes < 4)  
  
cl\_5 <- clutch\_analysis %>%  
 filter(Minutes < 5)  
  
#Figure out shots attempted and made by bums per time  
  
cl\_30 %>%  
 filter(!Player %in% stars) %>%  
 summarise(shots = sum(Shot\_Result))

## # A tibble: 1 x 1  
## shots  
## <dbl>  
## 1 67

cl\_30 %>%  
 filter(!Player %in% stars) %>%  
 summarize(n())

## # A tibble: 1 x 1  
## `n()`  
## <int>  
## 1 156

cl\_1 %>%  
 filter(!Player %in% stars) %>%  
 summarise(shots = sum(Shot\_Result))

## # A tibble: 1 x 1  
## shots  
## <dbl>  
## 1 107

cl\_1 %>%  
 filter(!Player %in% stars) %>%  
 summarize(n())

## # A tibble: 1 x 1  
## `n()`  
## <int>  
## 1 237

cl\_2 %>%  
 filter(!Player %in% stars) %>%  
 summarise(shots = sum(Shot\_Result))

## # A tibble: 1 x 1  
## shots  
## <dbl>  
## 1 163

cl\_2 %>%  
 filter(!Player %in% stars) %>%  
 summarize(n())

## # A tibble: 1 x 1  
## `n()`  
## <int>  
## 1 394

cl\_3 %>%  
 filter(!Player %in% stars) %>%  
 summarise(shots = sum(Shot\_Result))

## # A tibble: 1 x 1  
## shots  
## <dbl>  
## 1 232

cl\_3 %>%  
 filter(!Player %in% stars) %>%  
 summarize(n())

## # A tibble: 1 x 1  
## `n()`  
## <int>  
## 1 538

cl\_4 %>%  
 filter(!Player %in% stars) %>%  
 summarise(shots = sum(Shot\_Result))

## # A tibble: 1 x 1  
## shots  
## <dbl>  
## 1 281

cl\_4 %>%  
 filter(!Player %in% stars) %>%  
 summarize(n())

## # A tibble: 1 x 1  
## `n()`  
## <int>  
## 1 703

cl\_5 %>%  
 filter(!Player %in% stars) %>%  
 summarise(shots = sum(Shot\_Result))

## # A tibble: 1 x 1  
## shots  
## <dbl>  
## 1 327

cl\_5 %>%  
 filter(!Player %in% stars) %>%  
 summarize(n())

## # A tibble: 1 x 1  
## `n()`  
## <int>  
## 1 852

Results for bums below were used to manually insert into the Excel Doc “Clutch Complete” as a standard to compare the career percentages of the stars in that data set.

30: 67/156 1: 107/237 2: 163/394 3: 232/538 4: 281/703 5: 327/852

# Load Clutch Complete - Career Output of All Potential Star’s Clutch Qualifying Shots

Clutch\_Complete is a data set of a compilation of all supposed star players one would think is “clutch”. It was compiled from NBA Advanced Stats and includes some 13 or so of the most likely “clutch” shooters today (and some from a while back like Kobe, Dirk, and Duncan, etc.). Again, this data includes each player’s entire career output of clutch qualifying shots. The only exception is the pooled “Bums” entries which are only from the past 6 years of playoffs. These “bums” include anyone not a part of the 34 names in “stars” derived above. So not only is it not the superstars, but not the mid-level stars either. Just “bums” so to speak. I felt the past 6 years gives a good sample size while not going too far back to be potentially outdated.

FYI: Notice Clutch\_Complete turns into player\_list below:

library(readxl)

## Warning: package 'readxl' was built under R version 3.4.2

library(directlabels)

## Warning: package 'directlabels' was built under R version 3.4.4

Clutch\_Complete <- read\_excel("Clutch Complete.xlsx")  
  
player\_list <- Clutch\_Complete %>%  
 select(Player, Min, FGM,FGA) %>%  
 filter(!is.na(FGA)) %>%  
 group\_by(Player, Min) %>%  
 summarize(tot\_made = sum(FGM), tot\_att = sum(FGA)) %>%  
 mutate(Percentage = round(tot\_made/tot\_att,2)) %>%  
 arrange(desc(Percentage))  
  
#initial graph hiding the identity of the bums  
ggplot(player\_list[player\_list$Player %in% stars\_current | player\_list$Player == "Bums",], aes(Min, Percentage, color = Player))+  
 scale\_x\_continuous(limits = c(-.4,5), breaks = c(0,.5,1,2,3,4,5))+  
 scale\_y\_continuous(breaks = c(.1,.2,.3,.4,.5,.6,.7,.8,.9))+  
 geom\_smooth(method = "loess", size = 2) +  
 scale\_color\_manual(values = c("deeppink1","black", "red2", "gold2", "brown4", "purple4", "blue", "yellow4"))+  
 geom\_dl(aes(label = Player), method = list(dl.combine("first.points"), cex = 0.8))+  
 theme\_classic()+  
 theme(legend.position="none")+  
 ggtitle("FG% When Tied or Team Down 3 or Less in Playoffs \n Across Time Remaining")+  
 ylab("Shooting Percentage")+  
 xlab("Minutes Left in Game")+  
 theme(plot.title = element\_text(hjust = 0.5))

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

## Warning in sqrt(sum.squares/one.delta): NaNs produced

## Warning in stats::qt(level/2 + 0.5, pred$df): NaNs produced

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

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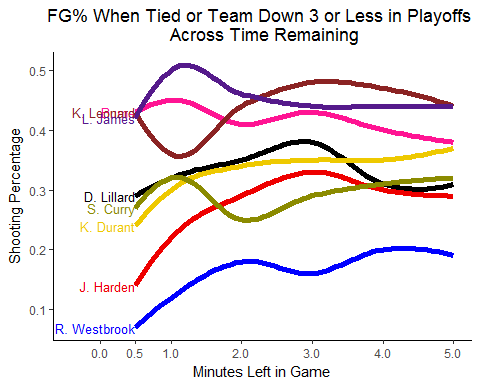
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#Reveal the almighty bums  
g <- ggplot(player\_list[player\_list$Player %in% stars\_current | player\_list$Player == "Bums",], aes(Min, Percentage, color = Player))+  
 scale\_x\_continuous(limits = c(-.40,5), breaks = c(0,.5,1,2,3,4,5))+  
 scale\_y\_continuous(breaks = c(.1,.2,.3,.4,.5,.6,.7,.8,.9))+  
 geom\_smooth(method = "loess", size = 2) +  
 scale\_color\_manual(values = c("deeppink2","black", "red2", "gold2", "firebrick4", "purple4", "blue", "yellow4"))+  
 theme\_classic()+  
 theme(legend.position="none")+  
 ggtitle("FG% When Tied or Team Down 3 or Less in Playoffs \n Across Time Remaining")+  
 ylab("Shooting Percentage")+  
 xlab("Minutes Left in Game")+  
 theme(plot.title = element\_text(hjust = 0.5))  
  
direct.label(g, "first.qp")

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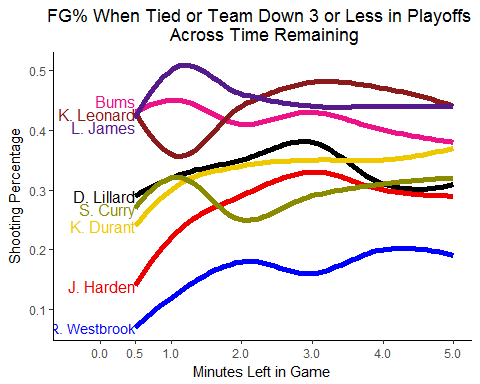
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p <- ggplot(player\_list[!player\_list$Player %in% stars\_current,], aes(Min, Percentage, color = Player))+  
 geom\_smooth(method = "loess")+  
 scale\_x\_continuous(limits = c(0,5), breaks = c(0,.5,1,2,3,4,5))+  
 scale\_y\_continuous(breaks = c(.1,.2,.3,.4,.5,.6,.7,.8,.9))+  
 geom\_smooth(method = "loess", size = 2) +  
 scale\_color\_manual(values = c("deeppink1","blue", "red2", "black", "purple4", "gray", "gray3"))+  
 theme\_classic()+  
 theme(legend.position="none")+  
 ggtitle("FG% When Tied or Team Down 3 or Less in Playoffs \n Across Time Remaining")+  
 ylab("Shooting Percentage")+  
 xlab("Minutes Left in Game")+  
 theme(plot.title = element\_text(hjust = 0.5))  
  
direct.label(p, "first.qp")

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## Warning in sqrt(sum.squares/one.delta): NaNs produced

## Warning in stats::qt(level/2 + 0.5, pred$df): NaNs produced

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

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## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

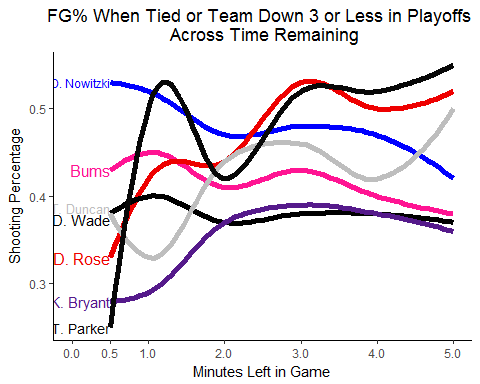
## Warning in sqrt(sum.squares/one.delta): NaNs produced

## Warning in stats::qt(level/2 + 0.5, pred$df): NaNs produced

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

## Warning in sqrt(sum.squares/one.delta): NaNs produced

## Warning in stats::qt(level/2 + 0.5, pred$df): NaNs produced



# Star Low Sample size Issue

Table Showing Low Sample Size For Individual Stars vs. Many of Bums

player\_list %>%  
 filter(Min == .5) %>%  
 group\_by(Player) %>%  
 summarize(total = sum(tot\_att))%>%  
 arrange(desc(total))

## # A tibble: 14 x 2  
## Player total  
## <chr> <dbl>  
## 1 Bums 156  
## 2 K. Bryant 32  
## 3 L. James 31  
## 4 K. Durant 21  
## 5 D. Nowitzki 19  
## 6 T. Duncan 16  
## 7 R. Westbrook 15  
## 8 S. Curry 15  
## 9 D. Lillard 14  
## 10 J. Harden 14  
## 11 D. Wade 13  
## 12 D. Rose 9  
## 13 K. Leonard 7  
## 14 T. Parker 4

Create a pooled star group so comparison with bums is possible:

player\_list$Type <- if\_else(player\_list$Player %in% stars,"Stars", "Bums")  
  
player\_list %>%  
 filter(Min == .5) %>%  
 group\_by(Type) %>%  
 mutate(Percent = sum(tot\_made) / sum(tot\_att)) %>%  
 summarise(Avr = mean(Percent))

## # A tibble: 2 x 2  
## Type Avr  
## <chr> <dbl>  
## 1 Bums 0.4294872  
## 2 Stars 0.3142857

#USE IN ARTICLE  
  
bum\_star\_graph <- player\_list %>%  
 filter(Player != "Stars") %>%  
 group\_by(Type, Min) %>%  
 summarize(tot\_made = sum(tot\_made), tot\_att = sum(tot\_att)) %>%  
 mutate(Percentage = round(tot\_made/tot\_att,2)) %>%  
 arrange(desc(Percentage))  
  
ggplot(bum\_star\_graph, aes(Min, Percentage, color = Type))+  
 geom\_smooth(se = FALSE, size = 2)+  
 scale\_y\_continuous(limits = c(0,1), breaks = c(.1,.2,.3,.4,.5,.6,.7,.8,.9))+  
 scale\_x\_continuous(breaks = c(.5,1,2,3,4,5))+  
 scale\_color\_manual(values = c("deeppink2","springgreen4"))+  
 theme\_classic()+  
 ggtitle("Pooled 'Closers' vs. Pooled Bums FG% \n Playoffs When Tied or Down 3 or Less \n Across Time Remaining")+  
 ylab("Shooting Percentage")+  
 xlab("Minutes Left in Game")+  
 theme(plot.title = element\_text(hjust = 0.5))

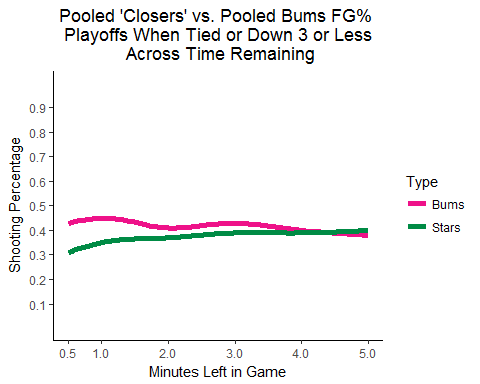
## `geom\_smooth()` using method = 'loess'

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

## Warning in sqrt(sum.squares/one.delta): NaNs produced

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

## Warning in sqrt(sum.squares/one.delta): NaNs produced



Same things as above only this time let’s only focus on the BEST closers, leaving out the mid-level stars:

super\_stars <- c("S. Curry", "L. James", "K. Durant","K. Leonard", "D. Nowitzki","T. Duncan", "K. Bryant")  
  
bum\_star\_graph <- player\_list %>%  
 filter(Player != "super\_stars") %>%  
 group\_by(Type, Min) %>%  
 summarize(tot\_made = sum(tot\_made), tot\_att = sum(tot\_att)) %>%  
 mutate(Percentage = round(tot\_made/tot\_att,2)) %>%  
 arrange(desc(Percentage))  
  
ggplot(bum\_star\_graph, aes(Min, Percentage, color = Type))+  
 geom\_smooth(se = FALSE, size = 2)+  
 scale\_y\_continuous(limits = c(0,1), breaks = c(.1,.2,.3,.4,.5,.6,.7,.8,.9))+  
 scale\_x\_continuous(breaks = c(.5,1,2,3,4,5))+  
 scale\_color\_manual(values = c("deeppink2","springgreen4"))+  
 theme\_classic()+  
 ggtitle("Super 'Closers' vs. Pooled Bums FG% \n Playoffs When Tied or Down 3 or Less \n Across Time Remaining")+  
 ylab("Shooting Percentage")+  
 xlab("Minutes Left in Game")+  
 theme(plot.title = element\_text(hjust = 0.5))

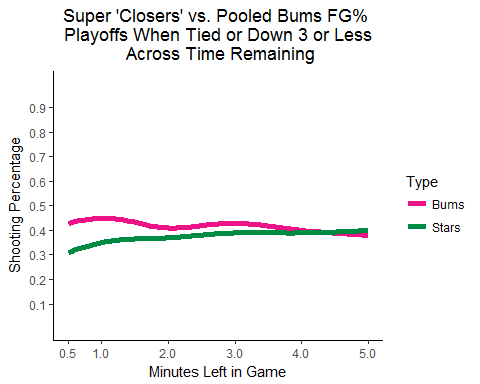
## `geom\_smooth()` using method = 'loess'

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

## Warning in sqrt(sum.squares/one.delta): NaNs produced

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6  
  
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =  
## parametric, : Chernobyl! trL>n 6

## Warning in sqrt(sum.squares/one.delta): NaNs produced

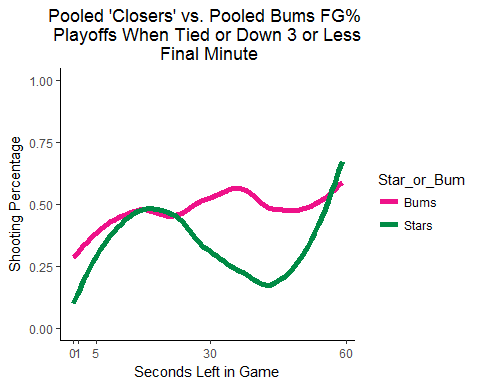


Great plot. clearly shows that as minutes wane, clutch shooters (ACROSS THEIR CAREER) choke more than bums (IN LAST 6 YEARS) but with 5 min stars are better as expected.

# Last Minutes Comparison (Stars vs. Bums)

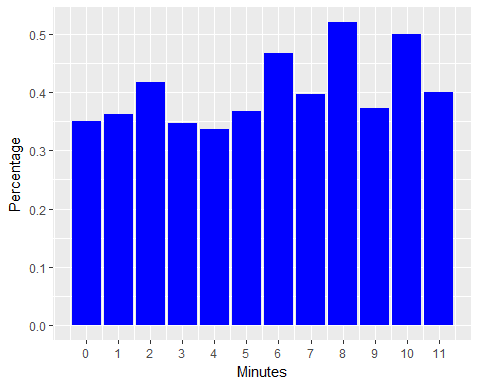
Now go into last minute - show each and every second.

clutch\_analysis$Star\_or\_Bum <- NA  
clutch\_analysis$Star\_or\_Bum <- if\_else(clutch\_analysis$Player %in% stars,"Stars", "Bums")  
  
  
last\_min <- clutch\_analysis %>%  
 filter(Minutes == 0) %>%  
 group\_by(Star\_or\_Bum, Seconds) %>%  
 summarize(tot\_made = sum(Shot\_Result), tot\_att = n()) %>%  
 mutate(Percentage = round(tot\_made/tot\_att,2))  
  
ggplot(last\_min, aes(Seconds, Percentage, fill = Star\_or\_Bum, color = Star\_or\_Bum))+  
 geom\_smooth(method = "loess", se = FALSE, size = 2)+  
 scale\_x\_continuous(breaks = c(0,1,5,30,60))+  
 scale\_y\_continuous(limits = c(0,1))+  
 scale\_color\_manual(values = c("deeppink2","springgreen4"))+  
 theme\_classic()+  
 ggtitle("Pooled 'Closers' vs. Pooled Bums FG% \n Playoffs When Tied or Down 3 or Less \n Final Minute")+  
 ylab("Shooting Percentage")+  
 xlab("Seconds Left in Game")+  
 theme(plot.title = element\_text(hjust = 0.5))

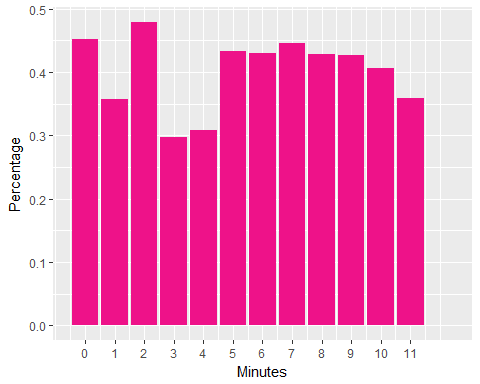


# Comparision of Final 12 Minutes by Each Individual Minute (Stars vs. Bums)

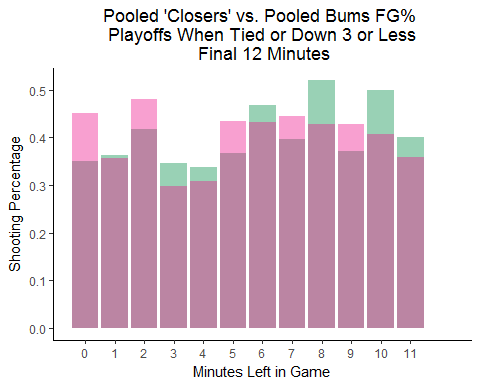
time\_perc\_stars <- clutch\_analysis %>%  
 filter(Shot\_Result == 0 | Shot\_Result == 1) %>%  
 filter(Lead < 1 & Lead > -4) %>%  
 filter(Quarter == "4" |   
 Quarter == "OT1" | Quarter == "OT2" |   
 Quarter == "OT3" | Quarter == "OT4") %>%  
 filter(Is\_FT == "No" & Player %in% stars) %>%  
 group\_by(Minutes) %>%  
 summarise(n = n(), Percentage = mean(Shot\_Result))  
  
time\_perc\_bums <- clutch\_analysis %>%  
 filter(Shot\_Result == 0 | Shot\_Result == 1) %>%  
 filter(Lead < 1 & Lead > -4) %>%  
 filter(Quarter == "4" |   
 Quarter == "OT1" | Quarter == "OT2" |   
 Quarter == "OT3" | Quarter == "OT4") %>%  
 filter(Is\_FT == "No" & !Player %in% stars) %>%  
 group\_by(Minutes) %>%  
 summarise(n = n(), Percentage = mean(Shot\_Result))  
  
ggplot(time\_perc\_stars, aes(Minutes, Percentage))+  
 geom\_bar(stat = "identity", fill = "blue")+  
 scale\_x\_continuous(breaks = c(0,1,2,3,4,5,6,7,8,9,10,11))



ggplot(time\_perc\_bums, aes(Minutes, Percentage))+  
 geom\_bar(stat = "identity", fill = "deeppink2")+  
 scale\_x\_continuous(breaks = c(0,1,2,3,4,5,6,7,8,9,10,11))



#BEATUFUL PLOT!!! JUST MESS WITH COLORS TO FIND BEST MATCH.   
ggplot(NULL, aes(Minutes, Percentage))+  
 geom\_bar(aes(fill = "Percentage"), stat = "identity", data = time\_perc\_stars, alpha = .4, fill = "springgreen4")+  
 geom\_bar(aes(fill = "Percentage"), stat = "identity", data = time\_perc\_bums, alpha = .4, fill = "deeppink2")+  
 scale\_x\_continuous(breaks = c(0,1,2,3,4,5,6,7,8,9,10,11))+  
 theme\_classic()+  
 ggtitle("Pooled 'Closers' vs. Pooled Bums FG% \n Playoffs When Tied or Down 3 or Less \n Final 12 Minutes")+  
 ylab("Shooting Percentage")+  
 xlab("Minutes Left in Game")+  
 theme(plot.title = element\_text(hjust = 0.5))



Despite a dip in the 7 minute and 9 minute range, stars out-shot bums until there were less than 3 minutes to go overall.

# Why Are Bums Better?

Since the crossover occurs under 3 minutes in %, use this as the parameter. All 34 stars used in this graph. You can see the disparity in 0-3 ft. shots in favor of the bums. Easier shots, better chance of making it. Not super difficult.

clutch\_analysis$Shot\_Length <- as.numeric(clutch\_analysis$Shot\_Length)  
  
  
clutch\_analysis %>%  
 filter(Minutes < 3) %>%  
 ggplot(aes(Shot\_Length, fill = factor(Star\_or\_Bum)))+  
 geom\_bar(position = "dodge", alpha = .7)+  
 scale\_fill\_manual("Stars Vs. Bums", values = c("Bums" = "deeppink2", "Stars" = "springgreen4"))+  
 theme\_classic()+  
 ggtitle("Amount of Shots Per Foot \n Pooled 'Closers' vs. Pooled Bums in Playoffs When Tied or Down 3 or Less \n Final 3 Minutes")+  
 scale\_x\_continuous(breaks = seq(0,62,2))+  
 ylab("Number of Shots")+  
 xlab("Length of Shots (in feet)")+  
 theme(plot.title = element\_text(hjust = 0.5))

