

## Home Court Advantage in 2021: Does it exist?

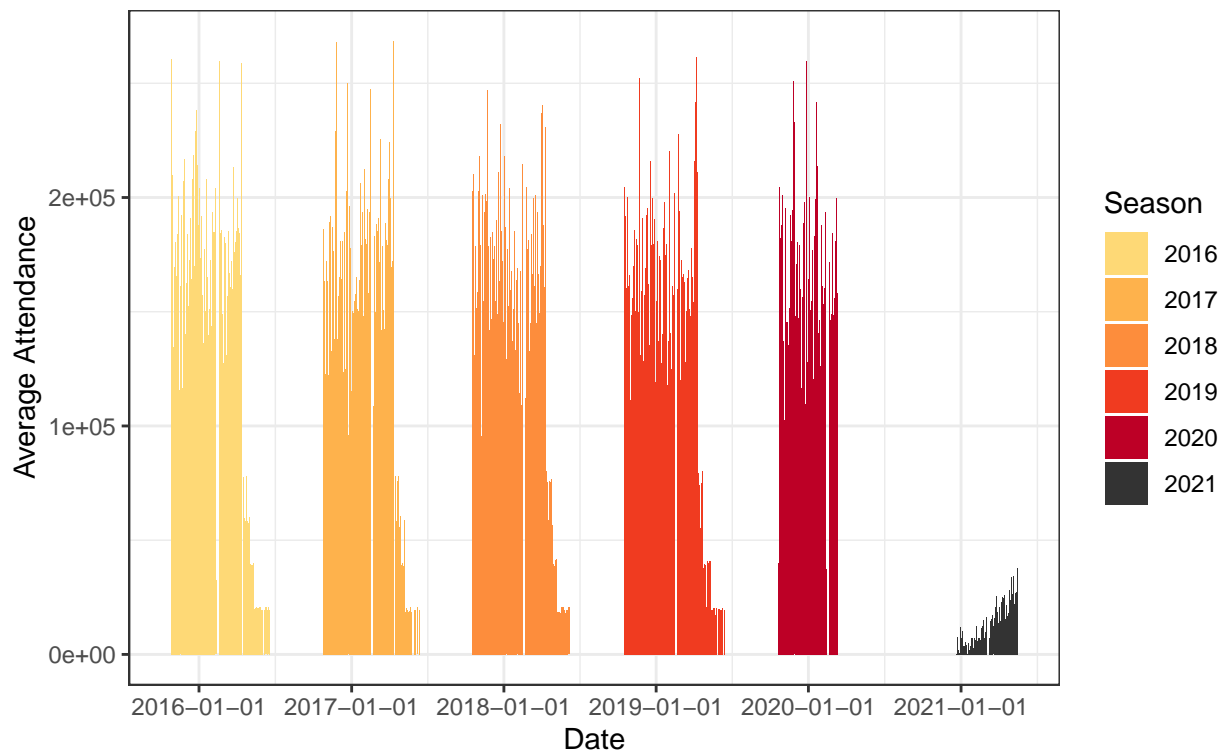
```
df = read.csv('inArenaResults.csv')[,-1] %>% as_tibble()
df = df[-which(is.na(df$AwayPts)),]
df = df[-which(df$Away=="Playoffs"),]

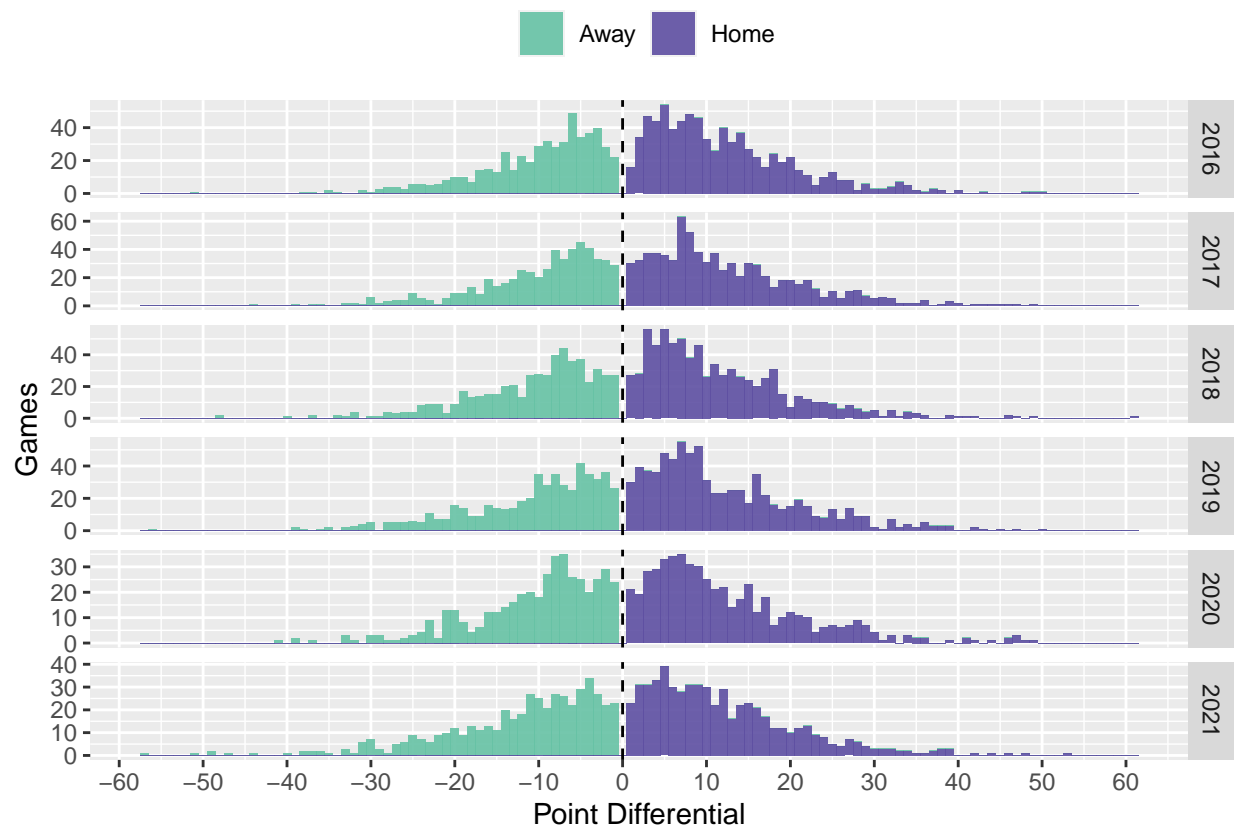
df = separate(data = df, col = Date, into = c("DayofWeek", "Month", "Day", "Year"), sep = " ")
df$Day = gsub(",", "", df$Day)
df$Month = ifelse(df$Month == "Jan", 1, ifelse(df$Month == "Feb", 2, ifelse(df$Month == "Mar", 3, ifelse(df$Month == "Apr", 4, ifelse(df$Month == "May", 5, ifelse(df$Month == "Jun", 6, ifelse(df$Month == "Jul", 7, ifelse(df$Month == "Aug", 8, ifelse(df$Month == "Sep", 9, ifelse(df$Month == "Oct", 10, ifelse(df$Month == "Nov", 11, ifelse(df$Month == "Dec", 12))))))))))
df = df %>% select(-DayofWeek)
df$Month = ifelse(as.numeric(df$Month) < 10, paste0("0", df$Month), df$Month)
df$Day = ifelse(as.numeric(df$Day) < 10, paste0("0", df$Day), df$Day)
df$Date = as.Date(paste0(df$Year, "-", df$Month, "-", df$Day))
df = df %>% select(-Month, -Day, -Year)
df$Attend = as.numeric(gsub(",", "", df$Attend))
df = df %>% drop_na()

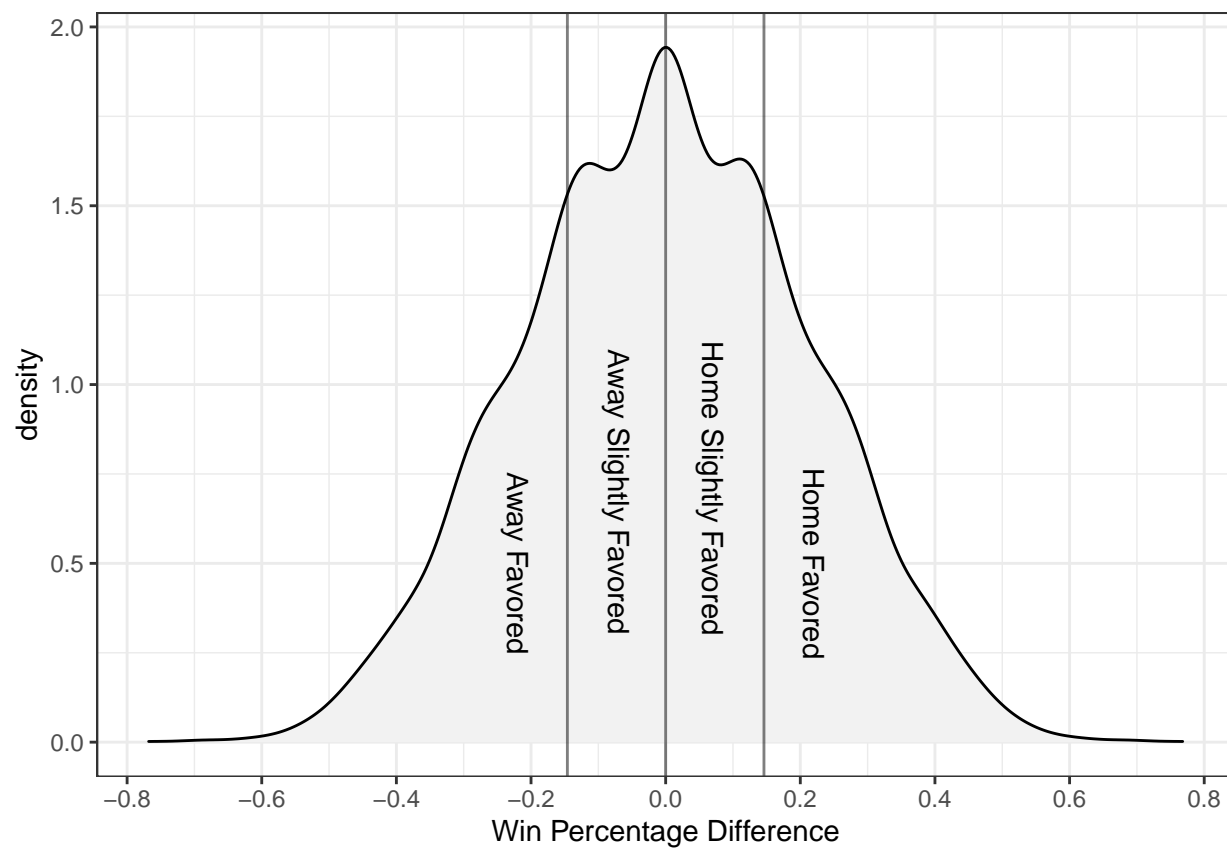
df %>% group_by(Date) %>% summarize(.groups = "drop", mean_attend = mean(Attend), season = as.factor(season))
```

### Average Attendance Per Day

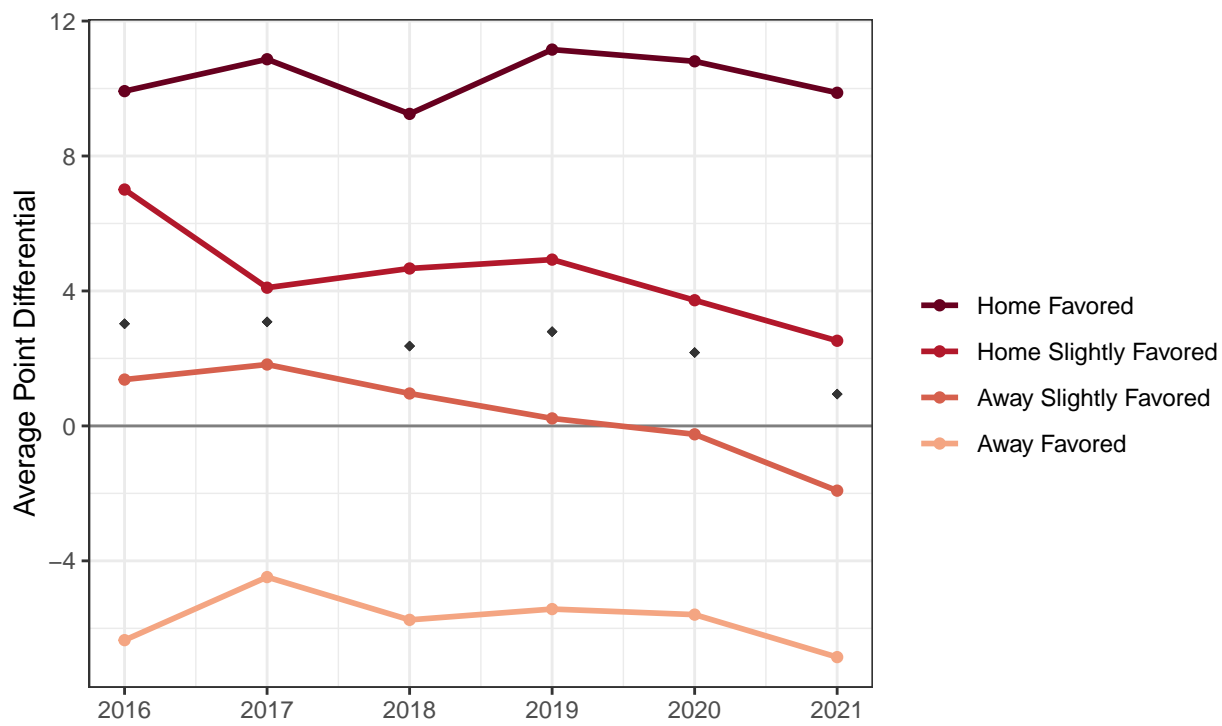
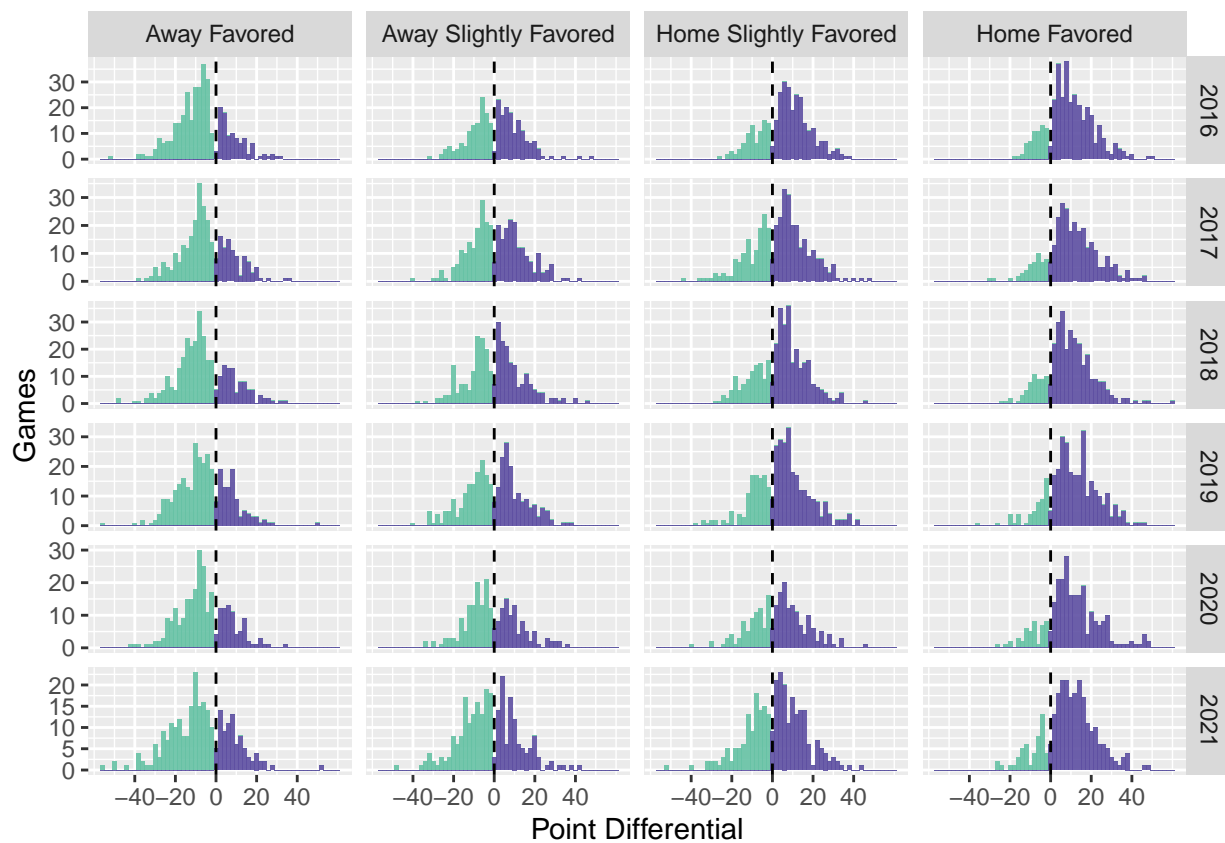
2015–16 to 2020–21

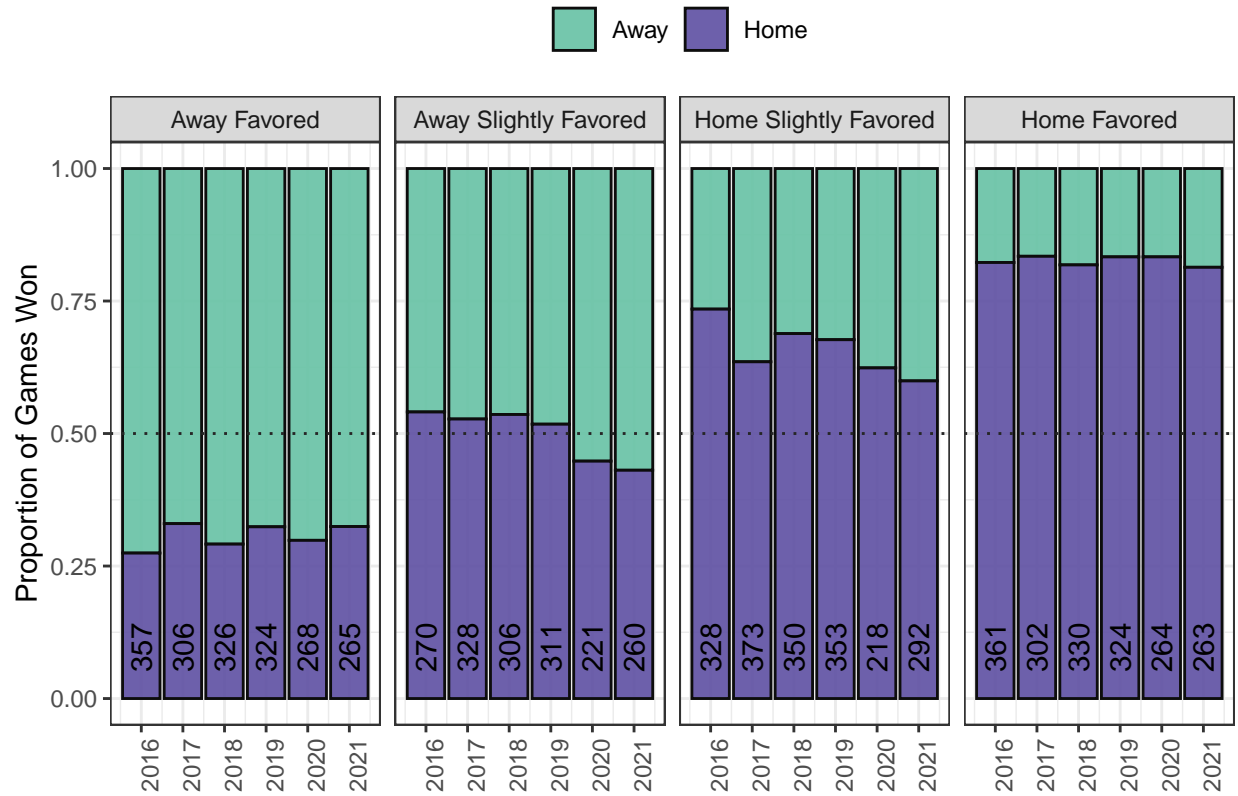






Var1	Freq
Away Favored	1846
Away Slightly Favored	1696
Home Slightly Favored	1914
Home Favored	1844





To test whether that difference in proportion of games won by home teams in 2016-2020 versus 2021 is significant, we can estimate the values using a confidence interval for the difference in proportions. We can estimate that same difference in each category at the 1% significance level to see in which categories home court advantage is being most heavily affected.

Matchup Type	LowerBound	Mean	UpperBound	Significant
Away Favored	-0.0565855	-0.0215555	0.0134745	
Away Slightly Favored	0.0470215	0.0866402	0.1262590	99% significant
Home Slightly Favored	0.0386143	0.0751609	0.1117075	99% significant
Home Favored	-0.0100423	0.0142688	0.0385798	

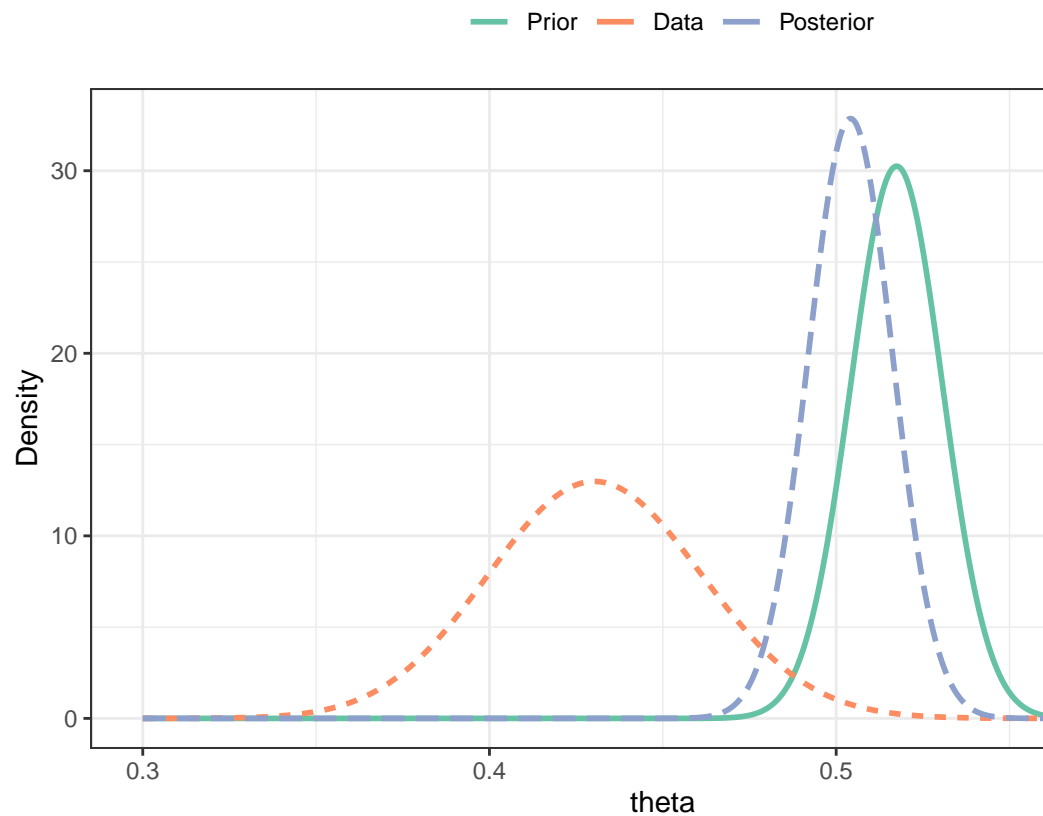
## Bayesian Analysis of True Proportion

```
away_slight = df %>% filter(WPDiffCat == "Away Slightly Favored") %>% mutate(sznGp = ifelse(season > 2000, "Away Slightly Favored", "Away Slightly Favored"))

bayes = data.frame(theta = seq(0.3, 0.6, .0001))
bayes = bayes %>% mutate(Prior = dbeta(x = theta, shape1 = as.numeric(away_slight[4,3]), shape2 = as.numeric(away_slight[3,3]))
bayes = bayes %>% mutate(Data = dbeta(x = theta, shape1 = as.numeric(away_slight[2,3]), shape2 = as.numeric(away_slight[1,3]))
bayes = bayes %>% mutate(Posterior = dbeta(x = theta, shape1 = as.numeric(away_slight[2,3]) + as.numeric(away_slight[4,3]), shape2 = as.numeric(away_slight[1,3]) + as.numeric(away_slight[3,3]))

bayes_plot = bayes %>% gather("Information", "Density", -theta)
bayes_plot$Information = factor(bayes_plot$Information, levels = c("Prior", "Data", "Posterior"))

bayes_plot %>% ggplot(aes(x = theta, y = Density, color = Information, linetype = Information)) + geom_line()
```

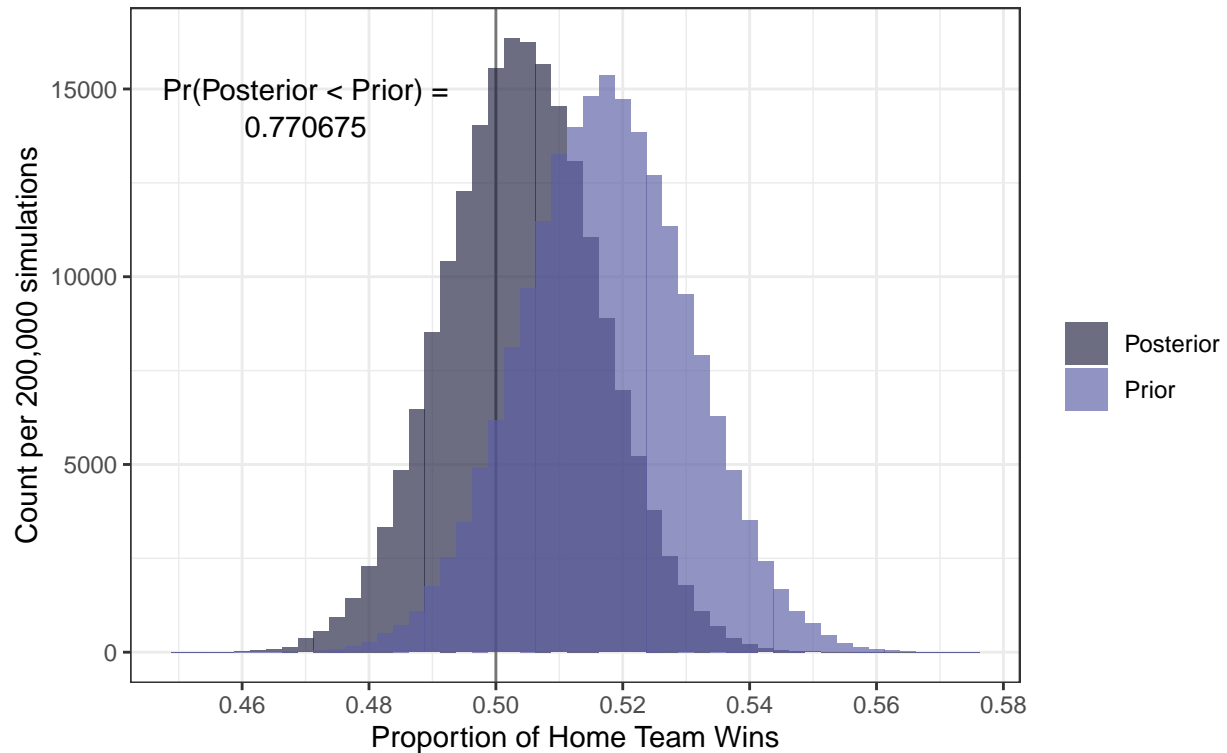


Away Team Slightly Favored

```
sim = data.frame(pri_draw = rbeta(n = 2e5, shape1 = as.numeric(away_slight[4,3]),
                                shape2 = as.numeric(away_slight[3,3])),
                 pos_draw = rbeta(n = 2e5, shape1 = as.numeric(away_slight[2,3]) + as.numeric(away_slight[4,3]),
                                shape2 = as.numeric(away_slight[1,3]) + as.numeric(away_slight[3,3])))
sim_gather = sim %>% gather("Draw", "Value") %>% mutate(Draw = ifelse(Draw == "pri_draw", "Prior", "Posterior"))
sim_gather %>% ggplot(aes(x = Value, fill = Draw)) + geom_vline(xintercept = .5, alpha = I(1/2)) + geom_bar()
```

## Away Team Slightly Favored

Difference between prior simulations (2016–2020) and posterior simulations (2021)

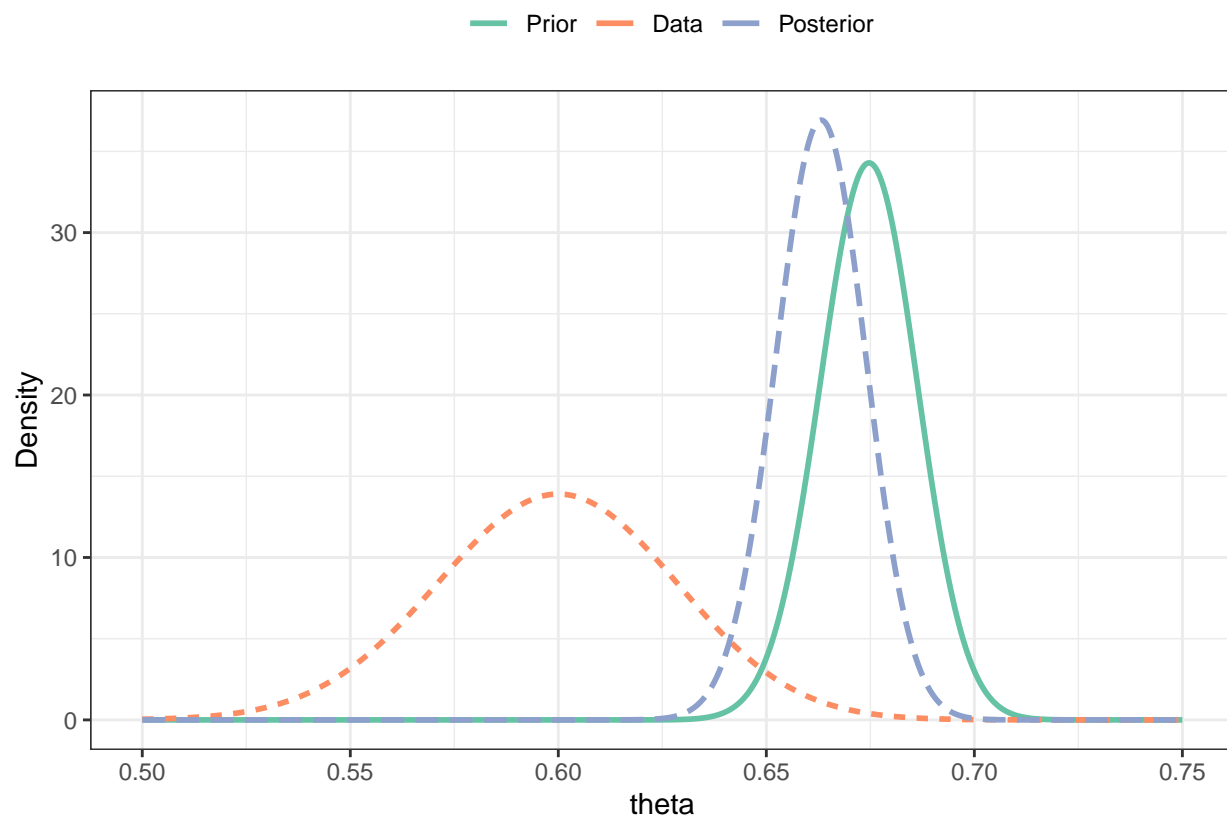


#### Home Team Slightly Favored

```
home_slight = df %>% filter(WPDiffCat == "Home Slightly Favored") %>% mutate(sznGp = ifelse(season > 20,
bayes = data.frame(theta = seq(0.5,.75,.0001))
bayes = bayes %>% mutate(Prior = dbeta(x = theta, shape1 = as.numeric(home_slight[4,3]), shape2 = as.nu
bayes = bayes %>% mutate(Data = dbeta(x = theta, shape1 = as.numeric(home_slight[2,3]), shape2 = as.nu
bayes = bayes %>% mutate(Posterior = dbeta(x = theta, shape1 = as.numeric(home_slight[2,3]) + as.numeri

bayes_plot = bayes %>% gather("Information", "Density", -theta)
bayes_plot$Information = factor(bayes_plot$Information, levels = c("Prior", "Data", "Posterior"))

bayes_plot %>% ggplot(aes(x = theta, y = Density, color = Information, linetype = Information)) + geom_
```

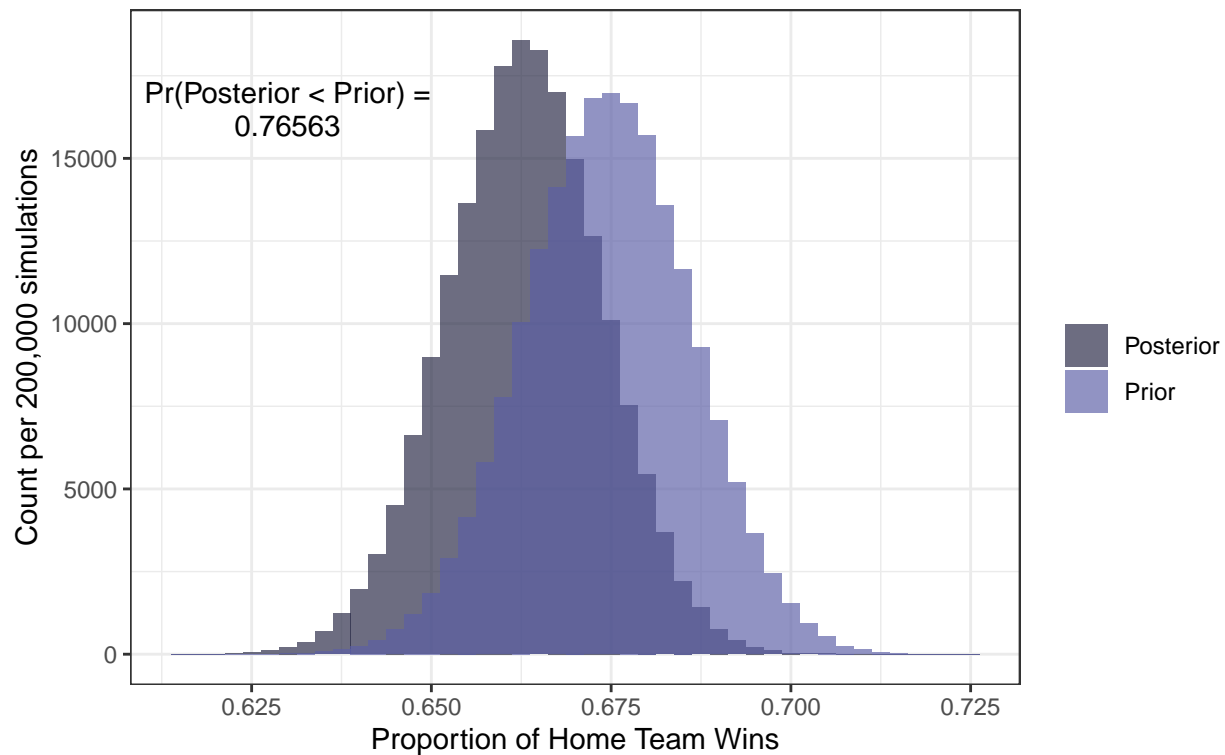


```
sim = data.frame(pri_draw = rbeta(n = 2e5, shape1 = as.numeric(home_slight[4,3]),
                                shape2 = as.numeric(home_slight[3,3])),
                pos_draw = rbeta(n = 2e5, shape1 = as.numeric(home_slight[2,3]) + as.numeric(home_slight[4,3]),
                                shape2 = as.numeric(home_slight[1,3]) + as.numeric(home_slight[3,3])))
sim_gather = sim %>% gather("Draw", "Value") %>% mutate(Draw = ifelse(Draw == "pri_draw", "Prior", "Posterior"))
sim_gather %>% ggplot(aes(x = Value, fill = Draw)) + geom_histogram(alpha = I(2/3), position = "identity")
```



## Home Team Slightly Favored

Difference between prior simulations (2016–2020) and posterior simulations (2021)



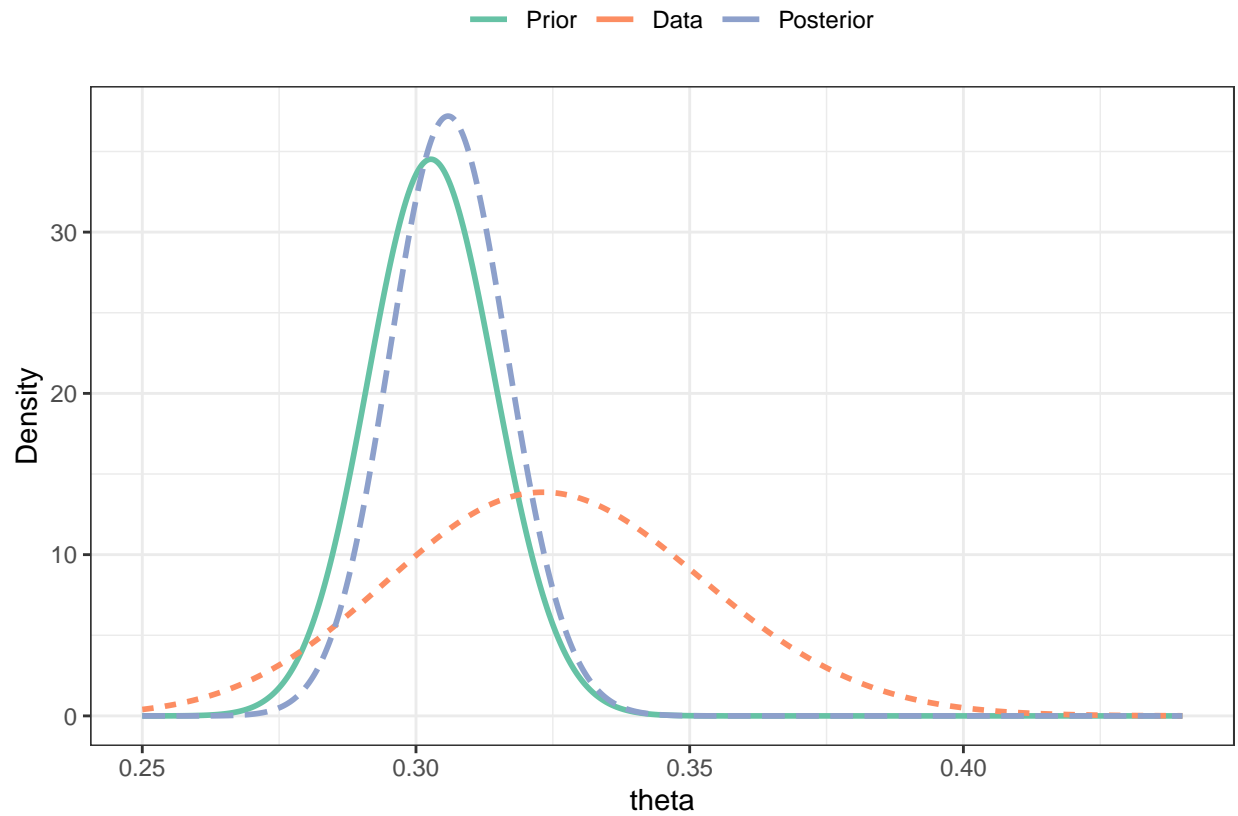
#### Away Team Heavily Favored

```
away_heavily = df %>% filter(WPDiffCat == "Away Favored") %>% mutate(sznGp = ifelse(season > 2020, "cur", "pre"))

bayes = data.frame(theta = seq(0.25, 0.44, .0001))
bayes = bayes %>% mutate(Prior = dbeta(x = theta, shape1 = as.numeric(away_heavily[4,3]), shape2 = as.numeric(away_heavily[5,3]))
bayes = bayes %>% mutate(Data = dbeta(x = theta, shape1 = as.numeric(away_heavily[2,3]), shape2 = as.numeric(away_heavily[3,3]))
bayes = bayes %>% mutate(Posterior = dbeta(x = theta, shape1 = as.numeric(away_heavily[2,3]) + as.numeric(away_heavily[3,3]), shape2 = as.numeric(away_heavily[4,3]) + as.numeric(away_heavily[5,3]))

bayes_plot = bayes %>% gather("Information", "Density", -theta)
bayes_plot$Information = factor(bayes_plot$Information, levels = c("Prior", "Data", "Posterior"))

bayes_plot %>% ggplot(aes(x = theta, y = Density, color = Information, linetype = Information)) + geom_line()
```



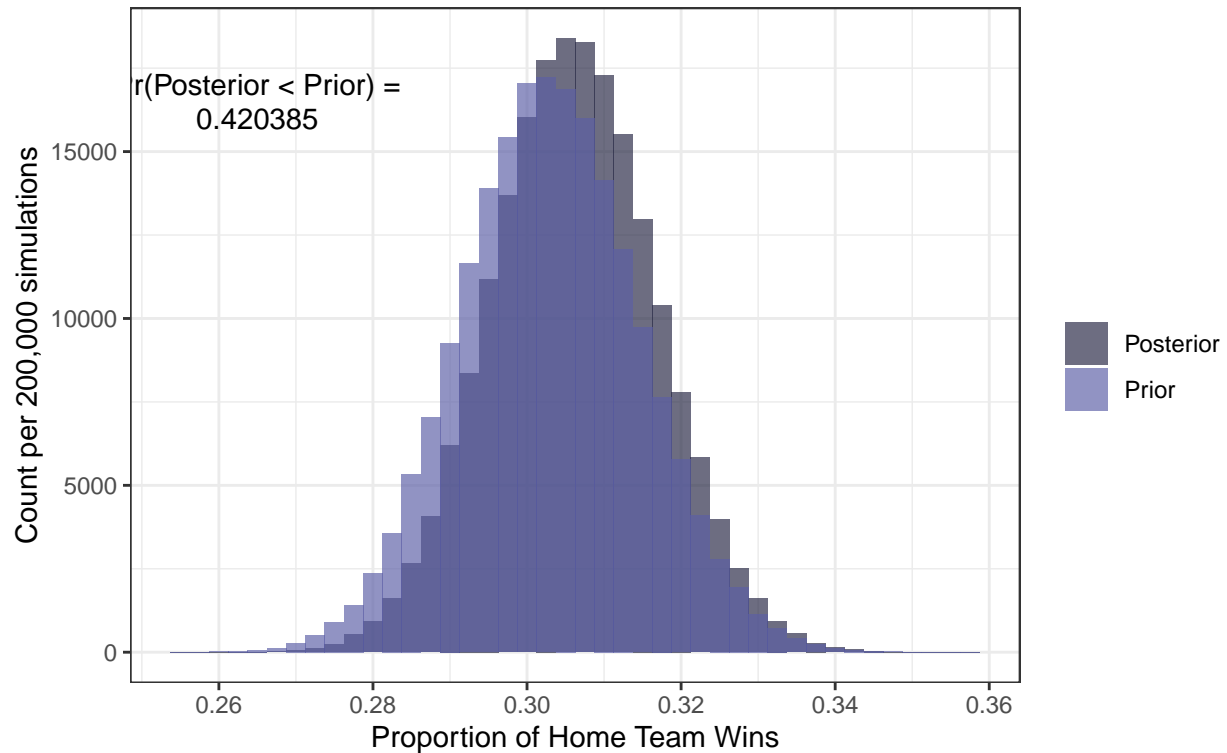
```

sim = data.frame(pri_draw = rbeta(n = 2e5, shape1 = as.numeric(away_heavily[4,3]),
                                shape2 = as.numeric(away_heavily[3,3])),
                pos_draw = rbeta(n = 2e5, shape1 = as.numeric(away_heavily[2,3]) + as.numeric(away_heavily[4,3]),
                                shape2 = as.numeric(away_heavily[1,3]) + as.numeric(away_heavily[3,3])))
sim_gather = sim %>% gather("Draw", "Value") %>% mutate(Draw = ifelse(Draw == "pri_draw", "Prior", "Posterior"))
sim_gather %>% ggplot(aes(x = Value, fill = Draw)) + geom_histogram(alpha = I(2/3), position = "identity")

```

## Away Team Heavily Favored

Difference between prior simulations (2016–2020) and posterior simulations (2021)

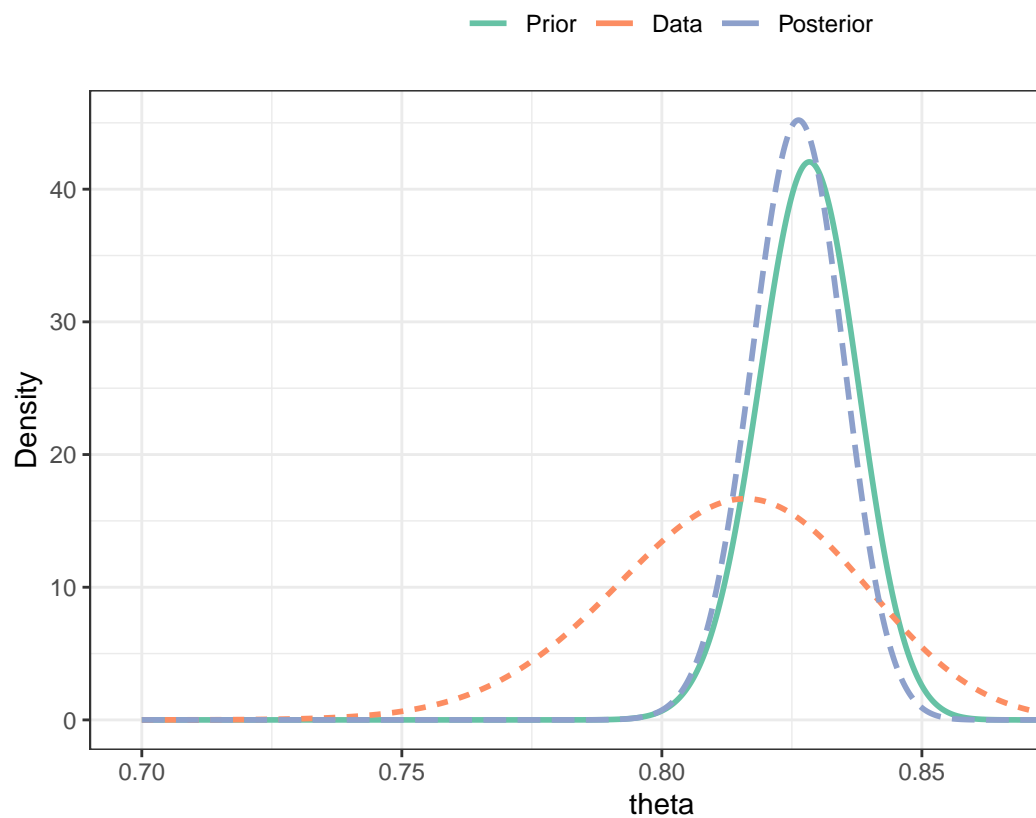


```
home_heavily = df %>% filter(WPDiffCat == "Home Favored") %>% mutate(sznGp = ifelse(season > 2020, "cur", "pre"))

bayes = data.frame(theta = seq(0.7, 0.90, .0001))
bayes = bayes %>% mutate(Prior = dbeta(x = theta, shape1 = as.numeric(home_heavily[4,3]), shape2 = as.numeric(home_heavily[5,3]))
bayes = bayes %>% mutate(Data = dbeta(x = theta, shape1 = as.numeric(home_heavily[2,3]), shape2 = as.numeric(home_heavily[3,3]))
bayes = bayes %>% mutate(Posterior = dbeta(x = theta, shape1 = as.numeric(home_heavily[2,3]) + as.numeric(home_heavily[3,3]), shape2 = as.numeric(home_heavily[4,3]) + as.numeric(home_heavily[5,3]))

bayes_plot = bayes %>% gather("Information", "Density", -theta)
bayes_plot$Information = factor(bayes_plot$Information, levels = c("Prior", "Data", "Posterior"))

bayes_plot %>% ggplot(aes(x = theta, y = Density, color = Information, linetype = Information)) + geom_line()
```



### Home Team Heavily Favored

```
sim = data.frame(pri_draw = rbeta(n = 2e5, shape1 = as.numeric(home_heavily[4,3]),
                                shape2 = as.numeric(home_heavily[3,3])),
                 pos_draw = rbeta(n = 2e5, shape1 = as.numeric(home_heavily[2,3]) + as.numeric(home_heavily[4,3]),
                                shape2 = as.numeric(home_heavily[1,3]) + as.numeric(home_heavily[3,3])))
sim_gather = sim %>% gather("Draw", "Value") %>% mutate(Draw = ifelse(Draw == "pri_draw", "Prior", "Posterior"))
sim_gather %>% ggplot(aes(x = Value, fill = Draw)) + geom_histogram(alpha = I(2/3), position = "identity")
```

## Home Team Heavily Favored

Difference between prior simulations (2016–2020) and posterior simulations (2021)

