

penn state-behrend EDA

2025-07-02

```
library("readr")
library("dplyr")
library("ggplot2")
library("readr")
library("stringr")
library("glue")
```

```
g <- params$category
singular_game <- readr::read_csv(glue("Desktop/SURA project code/extended_cmu_data/extended_cmu_data_",
```

```
## New names:
## Rows: 21 Columns: 22
## -- Column specification
## ----- Delimiter: ","
## (1): LINEUP (NAMES) dbl (20): ...1, NUMBER OF GUARDS, OPPONENT POSSESSIONS, CMU POSSESSIONS, OPPONENT
## CMU PTS, SCORE ... time (1): LINEUP MINUTES
## i Use `spec()` to retrieve the full column specification for this data. i Specify the column types o
## `show_col_types = FALSE` to quiet this message.
## * `` -> `...1`
```

```
# if negatives in any columns (specifically had problem in possession column)
for (colName in colnames(singular_game)){
  singular_game[[colName]][singular_game[[colName]] < 0] <- 0
}
```

```
singular_game$`LINEUP MINUTES` <- sapply(singular_game$`LINEUP MINUTES`, function(t){
  parts <- as.integer(strsplit(as.character(t),":")[[1]])
  parts[1]*60 + parts[2]
})
```

```
singular_game <- singular_game %>% rename(`LINEUP SECONDS` = `LINEUP MINUTES`) %>% mutate(LINEUP_SORTED =
  if (is.na(1)) return(NA)
  paste(sort(strsplit(1, ", ")[1]), collapse = " ")
}))
```

```
game <- singular_game %>% group_by(`LINEUP_SORTED`) %>% summarise(
  `NUMBER OF GUARDS` = mean(`NUMBER OF GUARDS`),
  `OPPONENT POSSESSIONS` = sum(`OPPONENT POSSESSIONS`, na.rm = TRUE),
  `CMU POSSESSIONS` = sum(`CMU POSSESSIONS`, na.rm = TRUE),
  `LINEUP SECONDS` = sum(`LINEUP SECONDS`, na.rm = TRUE),
  `OPPONENT PTS` = sum(`OPPONENT PTS`, na.rm = TRUE),
  `CMU PTS` = sum(`CMU PTS`, na.rm = TRUE),
  `CMU 3PA` = sum(`CMU 3PA`, na.rm = TRUE),
  `CMU FGA` = sum(`CMU FGA`, na.rm = TRUE),
  `CMU FTA` = sum(`CMU FTA`, na.rm = TRUE),
  `CMU REBOUNDS` = sum(`CMU REBOUNDS`, na.rm = TRUE),
  `TOTAL REBOUNDS` = sum(`TOTAL REBOUNDS`, na.rm = TRUE),
```

```

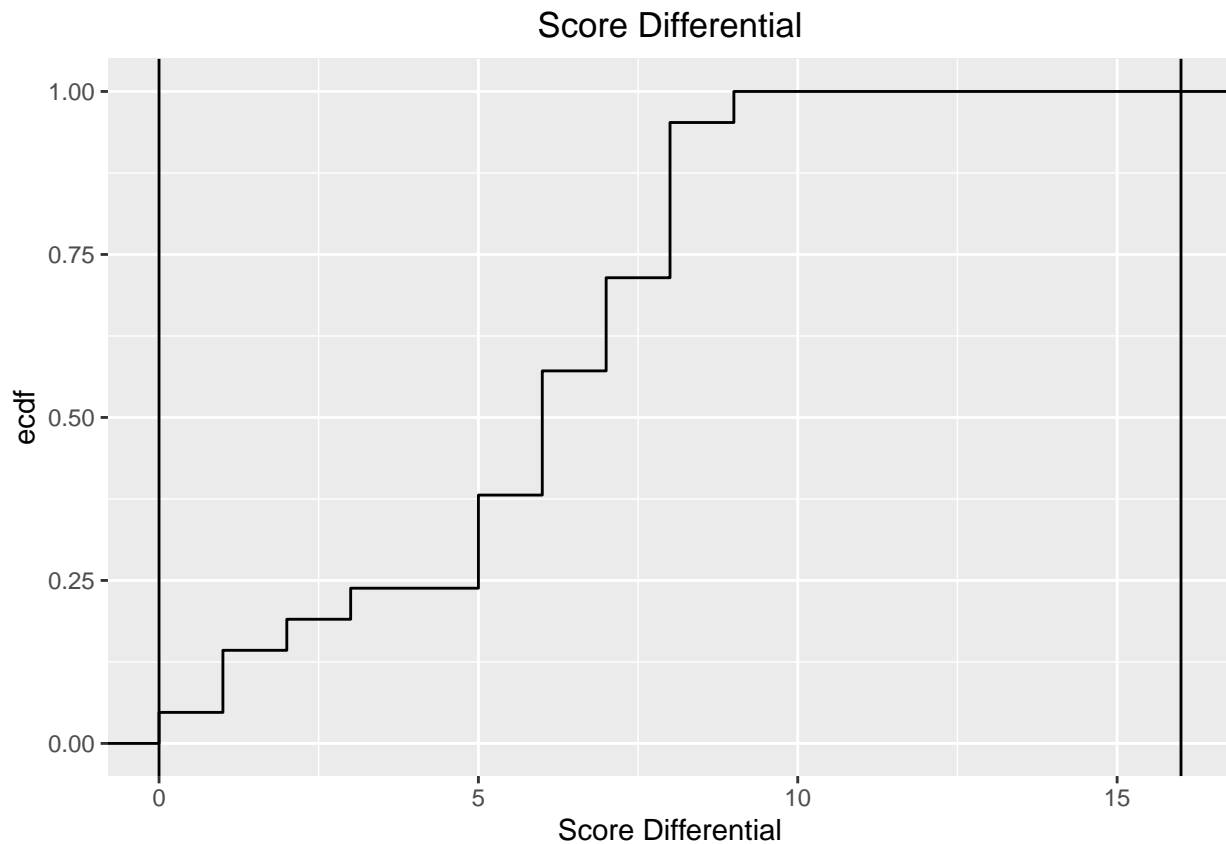
`SCORE DIFFERENTIAL WHEN ENTER` = paste(`SCORE DIFFERENTIAL WHEN ENTER`, collapse = ", "),
`QUARTER` = paste(`QUARTER`, collapse = ", ")
) %>%mutate(`PACE` = 40 * ((`CMU POSSESSIONS` + `OPPONENT POSSESSIONS`) / (2 * `LINEUP SECONDS`/60)),
`OFFENSIVE RATING` = 100 * (`CMU PTS` / `CMU POSSESSIONS`),
`DEFENSIVE RATING` = 100 * (`OPPONENT PTS` / `OPPONENT POSSESSIONS`),
`NET RATING` = `OFFENSIVE RATING` - `DEFENSIVE RATING`,
`3PA/FGA` = `CMU 3PA` / `CMU FGA`,
`TRUE SHOOTING %` = 100 * (`CMU PTS` / (2 * (`CMU FGA` + (0.44* `CMU FTA`)))),
`TRB%` = 100 * (`CMU REBOUNDS` / `TOTAL REBOUNDS`)

```

```

# see where to score differential cut off time -> SHOULD DO THIS AFTER OR BEFORE CUT SCRAP MINUTES?
ggplot(singular_game, aes(x = `SCORE DIFFERENTIAL WHEN ENTER`)) + stat_ecdf() + geom_vline(xintercept =

```



```

quantile(singular_game$`SCORE DIFFERENTIAL WHEN ENTER`, probs=c(0.1,0.9))

```

```

## 10% 90%
##    1    8

```

```

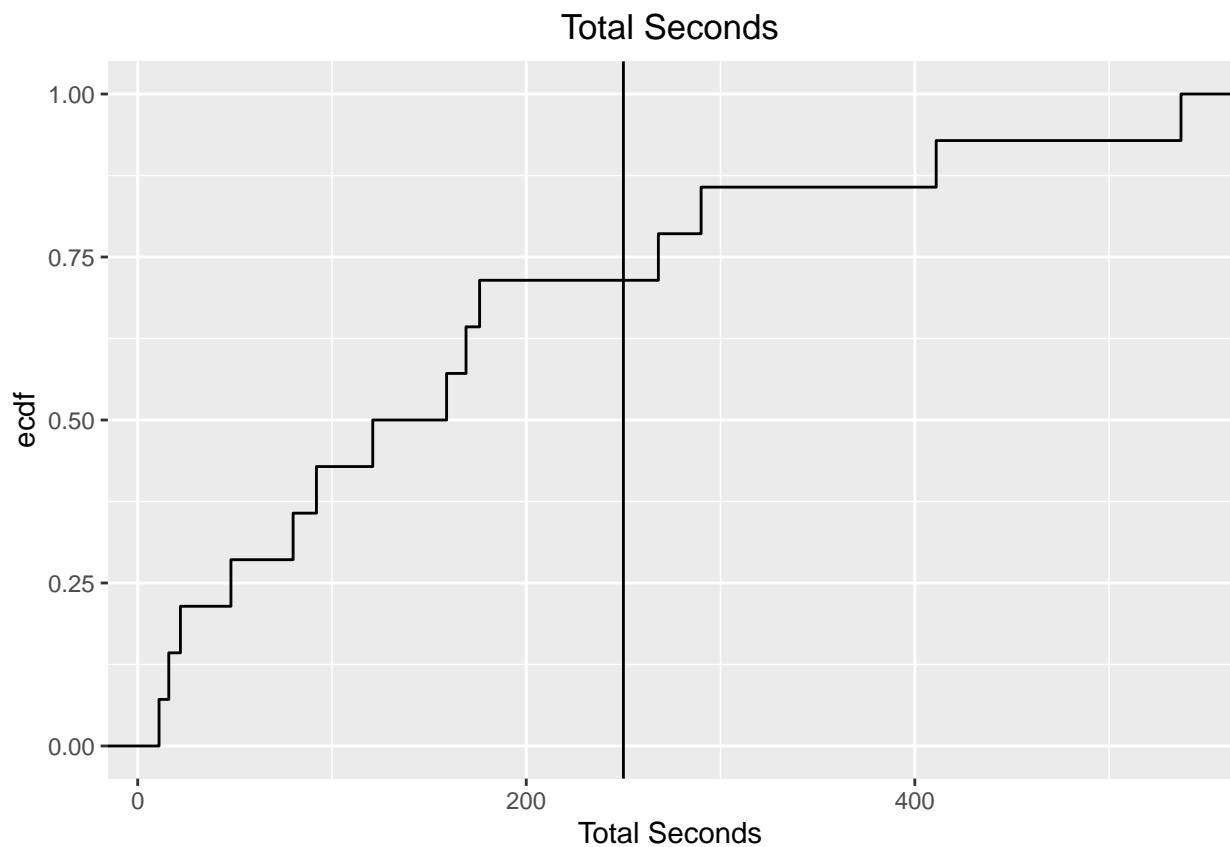
#game <- subset(game, !((`SCORE DIFFERENTIAL WHEN ENTER` <= 0 | `SCORE DIFFERENTIAL WHEN ENTER` >= 16))

```

```

# see where to cut time -> SHOULD DO THIS AFTER OR BEFORE CUT SCRAP MINUTES?
ggplot(game, aes(x = `LINEUP SECONDS`)) + stat_ecdf() + geom_vline(xintercept = 250) + labs(title = "To

```



```
quantile(game$`LINEUP SECONDS`,probs=c(0.9))
```

```
## 90%
## 374.7
```

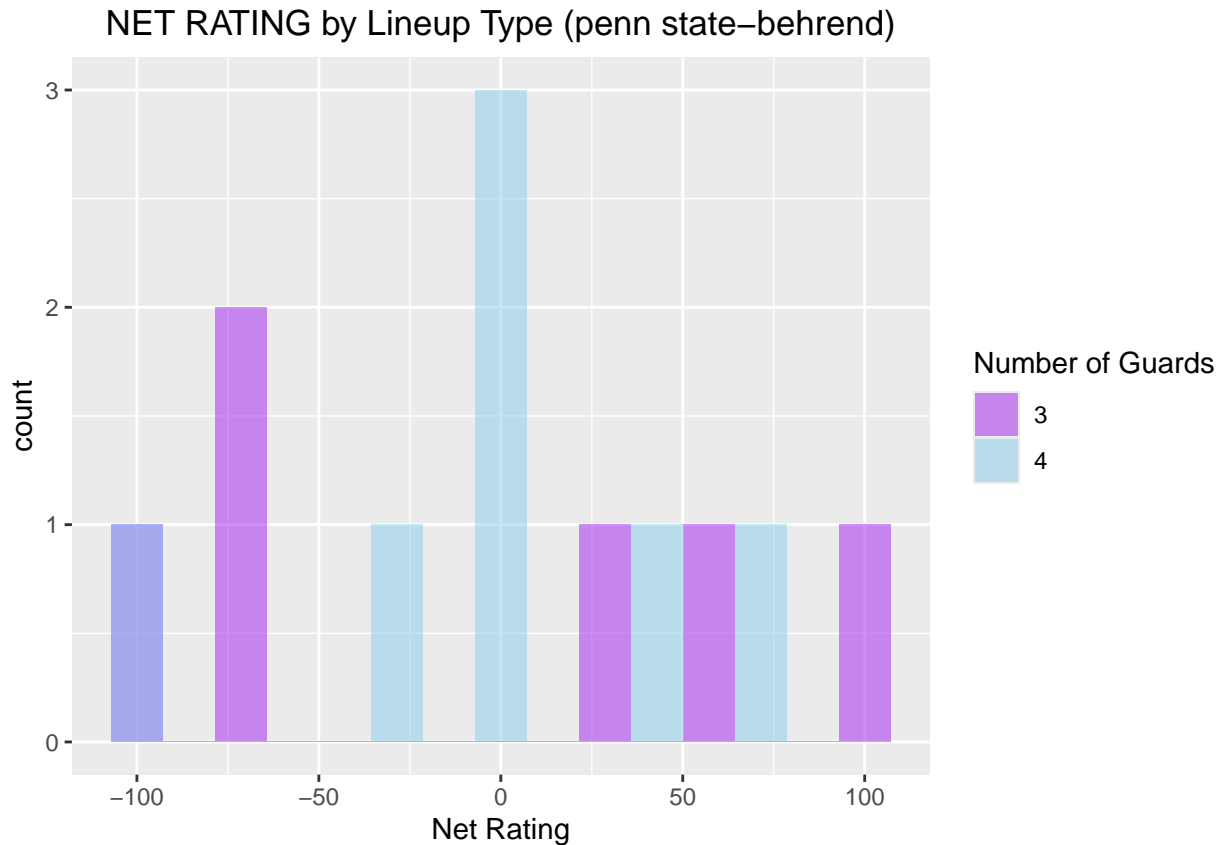
```
#game <- subset(game, `LINEUP SECONDS` >= 250)
```

```
#pdf(file = glue("Desktop/SURA project code/sing_game_EDA/{g}_plot.pdf"), width = 6, height = 5)
```

```
t_f <- c("3", "4")
```

```
ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `NET RATING`, fill = factor(`
```

```
## Warning: Removed 1 row containing non-finite outside the scale range (`stat_bin()`).
```



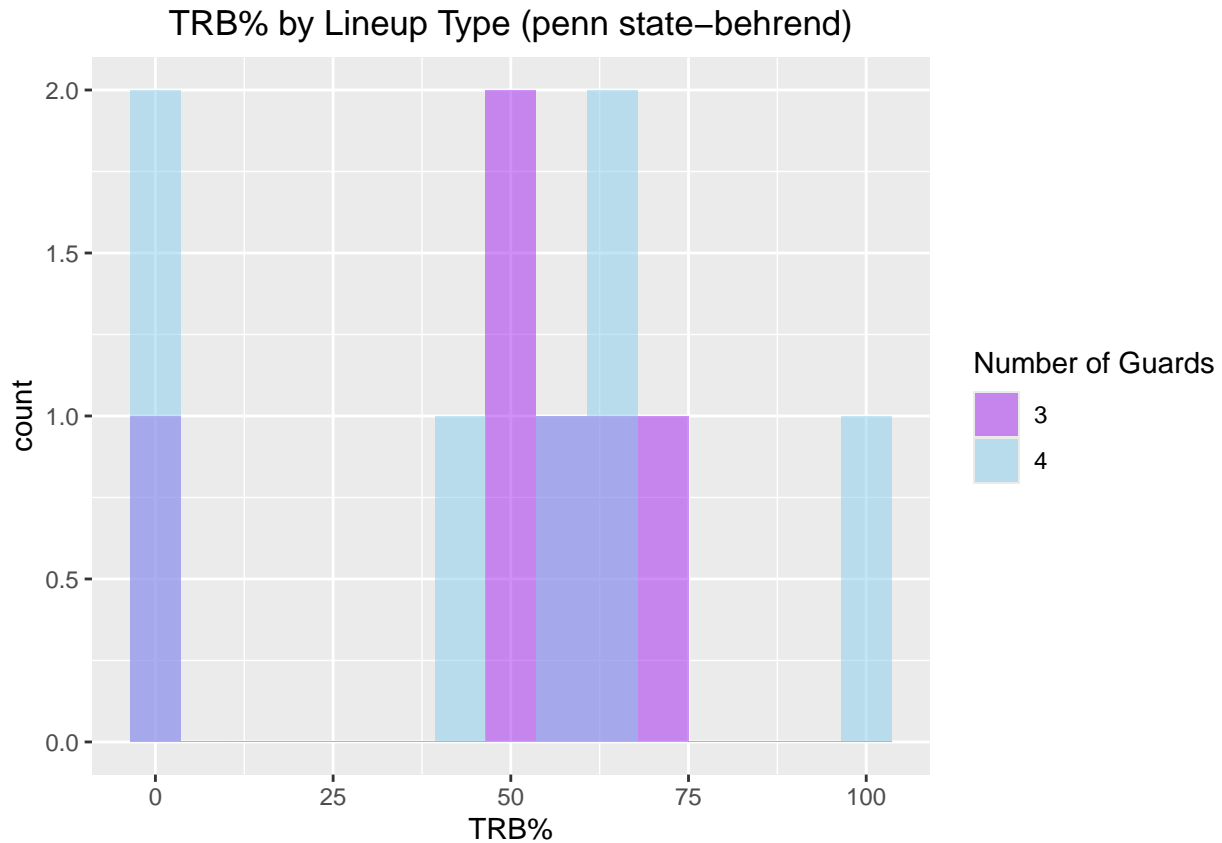
```
tapply(game$`NET RATING`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS` %in% t_f],
  FUN = function(x) {
    ## $`3`
    ##      Min.   1st Qu.   Median     Mean  3rd Qu.     Max.      NA's
    ## -100.000  -73.810  -16.471   -8.189   53.431   100.000         1
    ##
    ## $`4`
    ##      Min.   1st Qu.   Median     Mean  3rd Qu.     Max.
    ## -100.000  -18.215    0.000   -1.123   26.786    75.000
  },
  exact = TRUE)

wilcox.test(`NET RATING` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), exact = TRUE)

##
## Wilcoxon rank sum test with continuity correction
##
## data:  NET RATING by NUMBER OF GUARDS
## W = 20.5, p-value = 1
## alternative hypothesis: true location shift is not equal to 0

ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `TRB%`, fill = factor(`NUMBER OF GUARDS`)))

## Warning: Removed 1 row containing non-finite outside the scale range (`stat_bin()`).
```



```
tapply(game$`TRB%`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS` %in% t_f], FUN = function(x) {
  summary(x)
})
```

```
## $`3`
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.     NA's
##      0.00  50.00   52.78   48.94  63.89   71.43         1
##
```

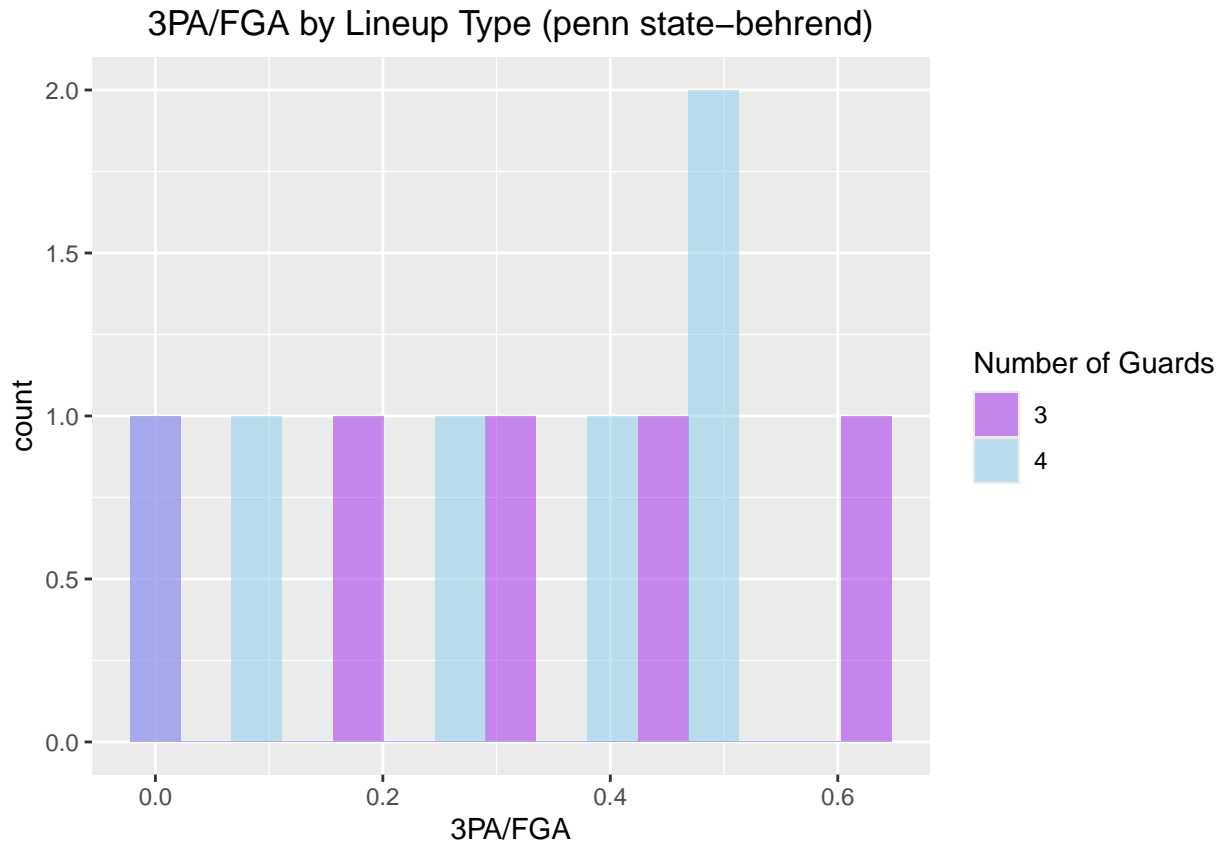
```
## $`4`
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      0.00  20.00   60.00   46.94  64.29  100.00
```

```
wilcox.test(`TRB%` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), exact = FALSE)
```

```
##
## Wilcoxon rank sum test with continuity correction
##
## data:  TRB% by NUMBER OF GUARDS
## W = 21.5, p-value = 1
## alternative hypothesis: true location shift is not equal to 0
```

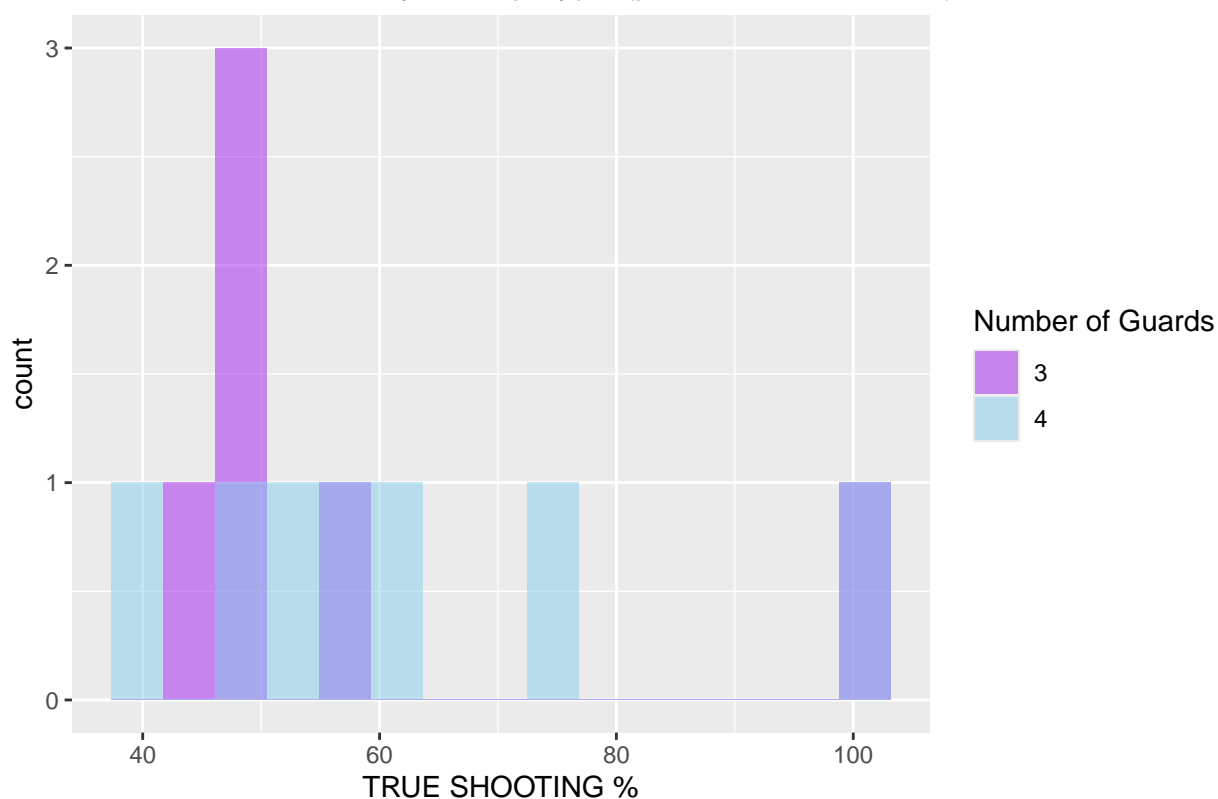
```
ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `3PA/FGA`, fill = factor(`NUMBER OF GUARDS`)))
```

```
## Warning: Removed 3 rows containing non-finite outside the scale range (`stat_bin()`).
```



```
tapply(game$`3PA/FGA`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS` %in% t_f], FUN = function(x) {
  ## $`3`
  ##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
  ## 0.0000 0.1667 0.3333 0.3159 0.4545 0.6250     2
  ##
  ## $`4`
  ##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
  ## 0.0000 0.1202 0.3250 0.2878 0.4750 0.5000     1
  wilcox.test(`3PA/FGA` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), exact = FALSE)
  ##
  ## Wilcoxon rank sum test with continuity correction
  ##
  ## data: 3PA/FGA by NUMBER OF GUARDS
  ## W = 15.5, p-value = 1
  ## alternative hypothesis: true location shift is not equal to 0
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `TRUE SHOOTING %`, fill = factor(`NUMBER OF GUARDS`)))
  ## Warning: Removed 1 row containing non-finite outside the scale range (`stat_bin()`).
```

TRUE SHOOTING % by Lineup Type (penn state-behrend)



```
tapply(game$TRUE SHOOTING % [game$NUMBER OF GUARDS %in% t_f], game$NUMBER OF GUARDS [game$NUMBER OF GUARDS %in% t_f], FUN = function(x) {
```

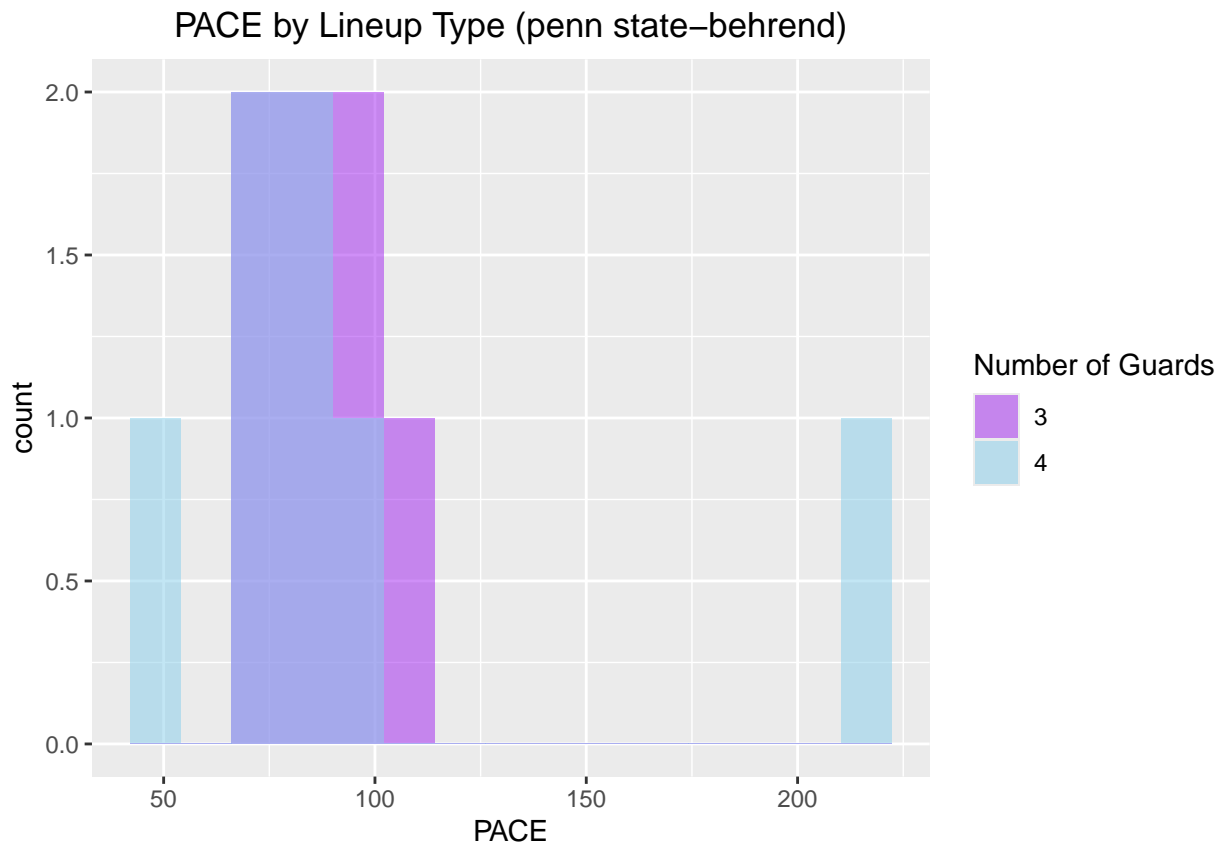
```
## $`3`
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##  44.77  47.08   50.00   58.10  55.11  100.93     1
##
```

```
## $`4`
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  39.47  50.51   56.82   61.97  68.24  100.00
```

```
wilcox.test(`TRUE SHOOTING %` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), exact = FALSE)
```

```
##
## Wilcoxon rank sum test with continuity correction
##
## data: TRUE SHOOTING % by NUMBER OF GUARDS
## W = 15.5, p-value = 0.472
## alternative hypothesis: true location shift is not equal to 0
```

```
ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `PACE`, fill = factor(`NUMBER OF GUARDS` %in% t_f)))
```



```
tapply(game$`PACE`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS` %in% t_f], FUN = function(x) {
  summary(x)
})
```

```
## $`3`
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  74.48   78.41   83.02   87.02   92.87  109.09
##
```

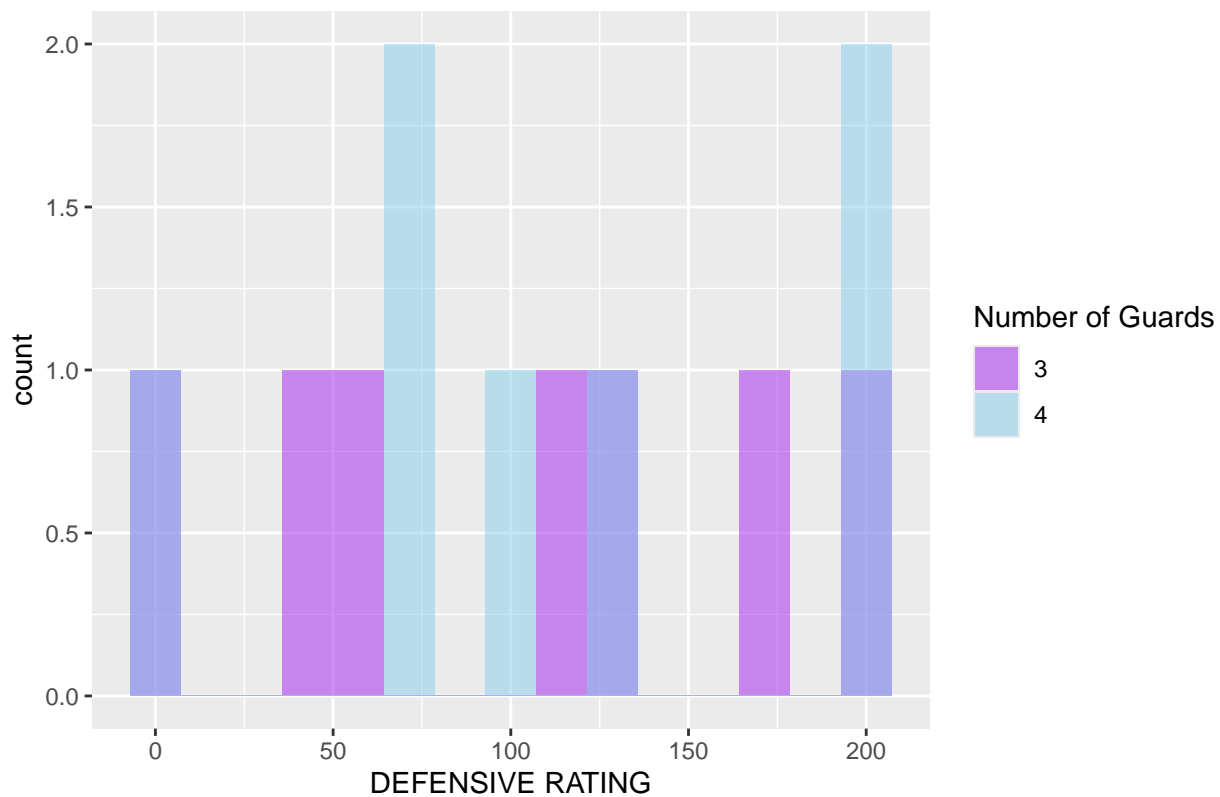
```
## $`4`
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  50.00   71.08   79.34   94.49   85.88  218.18
```

```
wilcox.test(`PACE` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), exact = FALSE)
```

```
##
## Wilcoxon rank sum test with continuity correction
##
## data: PACE by NUMBER OF GUARDS
## W = 32.5, p-value = 0.3374
## alternative hypothesis: true location shift is not equal to 0
```

```
ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `DEFENSIVE RATING`, fill = factor(`NUMBER OF GUARDS`)))
```


DEFENSIVE RATING by Lineup Type (penn state-behrend)



```
tapply(game$`DEFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS` %in% t_f],
```

```
## $`3`
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.00  46.47  116.67   101.37  150.00   200.00
##
```

```
## $`4`
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.00  72.56  100.00   111.21  166.67   200.00
```

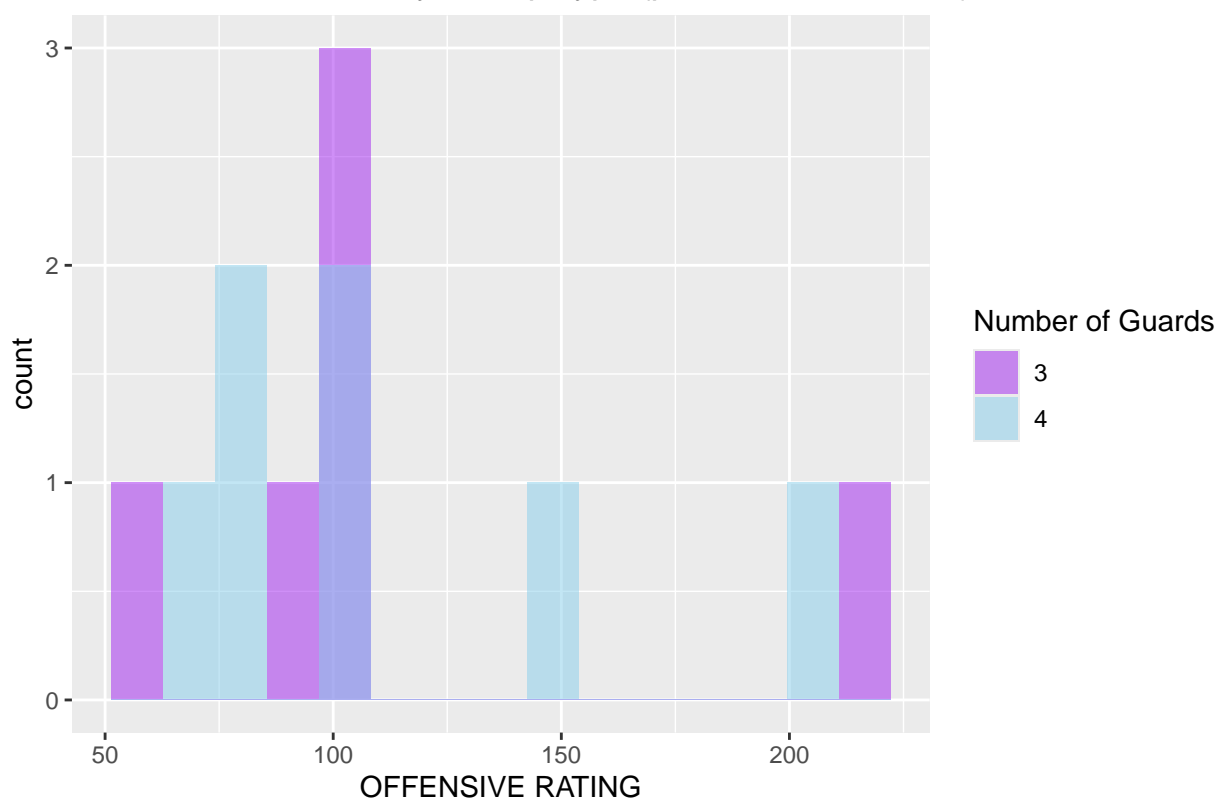
```
wilcox.test(`DEFENSIVE RATING` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f),
```

```
##
## Wilcoxon rank sum test with continuity correction
##
## data: DEFENSIVE RATING by NUMBER OF GUARDS
## W = 22, p-value = 0.797
## alternative hypothesis: true location shift is not equal to 0
```

```
ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `OFFENSIVE RATING`, fill = fa
```

```
## Warning: Removed 1 row containing non-finite outside the scale range (`stat_bin()`).
```

OFFENSIVE RATING by Lineup Type (penn state-behrend)



```

tapply(game$`OFFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS` %in% t_f], FUN = function(x) {

```

```

## $`3`
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##   57.14  90.00  100.00  110.08  100.00  216.67     1
##

```

```

## $`4`
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   70.59  75.00  100.00  110.08  125.00  200.00

```

```

wilcox.test(`OFFENSIVE RATING` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), c

```

```

##
## Wilcoxon rank sum test with continuity correction
##
## data:  OFFENSIVE RATING by NUMBER OF GUARDS
## W = 22, p-value = 0.9413
## alternative hypothesis: true location shift is not equal to 0

```

```

#dev.off()

```