Spatial

Derek Corcoran

September 1, 2016

2015

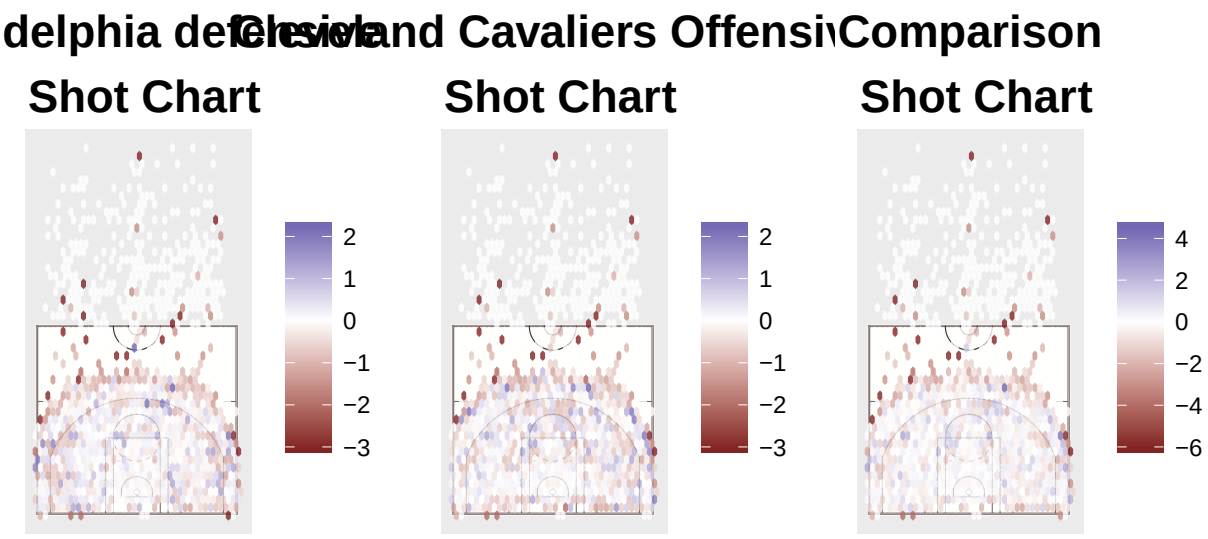
2016

2014

```
ShotComparison <- function(OffTeam, DefTown, SeasondataOff, SeasonDataDef, nbins = 40) {
  #Filter the offensive data of the Offensive Team
  Off <- filter(SeasondataOff, TEAM_NAME == OffTeam)
  #Filter the Deffensive data of the Defensive team
  deff <- SeasonDataDef[names(SeasonDataDef) == DefTown][[1]]
  #Get the maximum and minumum values for x and y
  xbnds <- range(c(SeasondataOff$LOC_X, deff$LOC_X))
  ybnds <- range(c(SeasondataOff$LOC_Y, deff$LOC_Y))
  #Make hexbin dataframes out of the teams
  makeHexData <- function(df) {
    h <- hexbin(df$LOC_X, df$LOC_Y, nbins, xbnds = xbnds, ybnds = ybnds, IDs = TRUE)
    data.frame(hcell2xy(h),
               PPS = tapply(as.numeric(as.character(df$SHOT_MADE_FLAG))*ifelse(tolower(df$SHOT_TYPE) ==
               ST = tapply(df$SHOT_MADE_FLAG, h@cID, FUN = function(z) length(z)),
               cid = h@cell)
  }
  ##Total NBA data
  Totalhex <- makeHexData(SeasondataOff)
  ##Defensive team data
  Defhex <- makeHexData(deff)
  ##Offensive team data
  Offhex <- makeHexData(Off)
  #Merge offensive and deffensive data with total data by Cell id
  DeffbyCell <- merge(Totalhex, Defhex, by = "cid", all = T)
  OffByCell <- merge(Totalhex, Offhex, by = "cid", all = T)
  ##  when calculating the difference empty cells should count as 0
  DeffbyCell$PPS.x[is.na(DeffbyCell$PPS.x)] <- 0
  DeffbyCell$PPS.y[is.na(DeffbyCell$PPS.y)] <- 0
  DeffbyCell$ST.y[is.na(DeffbyCell$ST.y)] <- 0

  OffByCell$PPS.x[is.na(OffByCell$PPS.x)] <- 0
  OffByCell$PPS.y[is.na(OffByCell$PPS.y)] <- 0
  OffByCell$ST.y[is.na(OffByCell$ST.y)] <- 0
  #  make a "difference" data.frame
  DiffDeff <- data.frame(x = ifelse(is.na(DeffbyCell$x.x), DeffbyCell$x.y, DeffbyCell$x.x),
                         y = ifelse(is.na(DeffbyCell$y.x), DeffbyCell$y.y, DeffbyCell$y.x),
                         PPS= DeffbyCell$PPS.y - DeffbyCell$PPS.x,
```

```
                      cid= DeffbyCell$cid,
                      ST = DeffbyCell$ST.y)

DiffOff <- data.frame(x = ifelse(is.na(OffByCell$x.x), OffByCell$x.y, OffByCell$x.x),
                      y = ifelse(is.na(OffByCell$y.x), OffByCell$y.y, OffByCell$y.x),
                      PPS= OffByCell$PPS.y - OffByCell$PPS.x,
                      ST = OffByCell$ST.x,
                      cid = OffByCell$cid,
                      ST = OffByCell$ST.y)
#make team comparisons
Comparison <- merge(DiffOff, DiffDeff, by = "cid", all = T)
Comparison <- Comparison[,-c(6:7)]
Comparison$Diff <- c(Comparison$PPS.x + Comparison$PPS.y)


PPSAA <- weighted.mean((Comparison$PPS.x + Comparison$PPS.y), Comparison$ST.x)

OFF <- ggplot(DiffOff)  +
  annotation_custom(court, -250, 250, -52, 418) +
  geom_hex(aes(x = x, y = y, fill = PPS),
           stat = "identity", alpha = 0.8) +
  guides(alpha = FALSE, size = FALSE) +
  coord_fixed()  +theme(line = element_blank(),
                        axis.title.x = element_blank(),
                        axis.title.y = element_blank(),
                        axis.text.x = element_blank(),
                        axis.text.y = element_blank(),
                        legend.title = element_blank(),
                        plot.title = element_text(size = 17, lineheight = 1.2, face = "bold")) + ggti
DEF <- ggplot(DiffDeff)  +
  annotation_custom(court, -250, 250, -52, 418) +
  geom_hex(aes(x = x, y = y, fill = PPS),
           stat = "identity", alpha = 0.8) +
  guides(alpha = FALSE, size = FALSE) +

  coord_fixed()  +theme(line = element_blank(),
                        axis.title.x = element_blank(),
                        axis.title.y = element_blank(),
                        axis.text.x = element_blank(),
                        axis.text.y = element_blank(),
                        legend.title = element_blank(),
                        plot.title = element_text(size = 17, lineheight = 1.2, face = "bold")) + ggti

COMP <- ggplot(Comparison)  +
  annotation_custom(court, -250, 250, -52, 418) +
  geom_hex(aes(x = x.x, y = y.x, fill = Diff),
           stat = "identity", alpha = 0.8) +
  guides(alpha = FALSE, size = FALSE) +

  coord_fixed()  +theme(line = element_blank(),
                        axis.title.x = element_blank(),
                        axis.title.y = element_blank(),
                        axis.text.x = element_blank(),
```

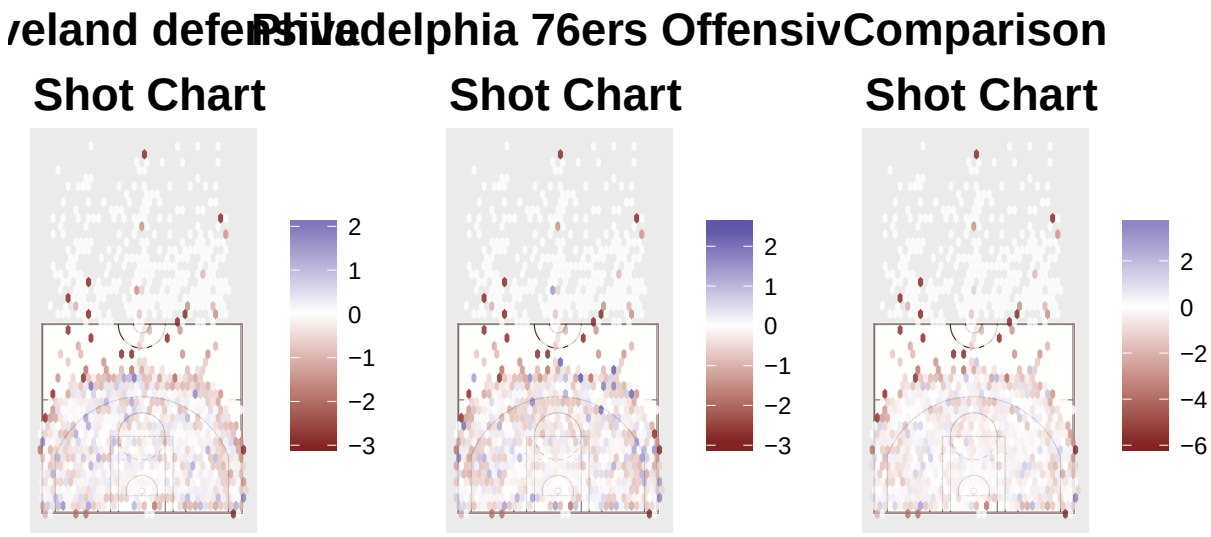
```
                          axis.text.y = element_blank(),
                          legend.title = element_blank(),
                          plot.title = element_text(size = 17, lineheight = 1.2, face = "bold")) + ggti

  grid.arrange(DEF, OFF, COMP, ncol=3)

  return(list(Off = DiffOff, deff = DiffDeff, Comparison = Comparison, Total = Totalhex, PPSAA = PPSAA))
}

Com1 <- ShotComparison(OffTeam = "Cleveland Cavaliers", DefTown = "Philadelphia", SeasondataOff = shotDa
```




```
Com1$PPSAA
```

```
## [1] 0.02043016
```

```
Com2 <- ShotComparison(OffTeam = "Philadelphia 76ers", DefTown = "Cleveland", SeasondataOff = shotDataT
```




```
Com2$PPSAA
```

```
## [1] -0.1028978
```

```
Offensive_teams <- as.character(unique(shotDataTotal2016$TEAM_NAME))

defenseve_names <- names(shotDatafDef2016)


for (i in 1:length(Offensive_teams)) {
  print(Offensive_teams[i])
}
```

```
## [1] "Detroit Pistons"
## [1] "Atlanta Hawks"
## [1] "Chicago Bulls"
## [1] "Cleveland Cavaliers"
## [1] "New Orleans Pelicans"
## [1] "Golden State Warriors"
## [1] "Orlando Magic"
## [1] "Washington Wizards"
## [1] "Philadelphia 76ers"
## [1] "Boston Celtics"
## [1] "Brooklyn Nets"
## [1] "Utah Jazz"
```

```
## [1] "Miami Heat"
## [1] "Charlotte Hornets"
## [1] "Toronto Raptors"
## [1] "Indiana Pacers"
## [1] "Houston Rockets"
## [1] "Denver Nuggets"
## [1] "Memphis Grizzlies"
## [1] "New York Knicks"
## [1] "Milwaukee Bucks"
## [1] "Oklahoma City Thunder"
## [1] "San Antonio Spurs"
## [1] "Dallas Mavericks"
## [1] "Phoenix Suns"
## [1] "Portland Trail Blazers"
## [1] "Los Angeles Clippers"
## [1] "Sacramento Kings"
## [1] "Los Angeles Lakers"
## [1] "Minnesota Timberwolves"
```