



TECNOLÓGICO NACIONAL DE MEXICO  
INSTITUTO TECNOLÓGICO DE TIJUANA

SUBDIRECCIÓN ACADÉMICA  
DEPARTAMENTO DE INGENIERÍA EN SISTEMAS  
COMPUTACIONALES

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**MATERIA:**

Minería de datos.

**UNIDAD 1**

Practica 4.

**DOCENTE:**

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## Free Throws

**You have been supplied data for two additional in-game statics:**

- Free Throws
- Free Throws Attempt

You need to create three plots that portray the following insights:

- Free Throws Attempts per game
- Accuracy of Free Throws
- Player playing style (2 vs 3 points preference) excluding Free Throws

## Each Free Throw is worth 1 Point

- The data has been supplied in the form of vectors. You will have to create the matrices before you proceed with the analysis.

## #Seasons

Seasons<-

```
c("2005","2006","2007","2008","2009","2010","2011","2012","2013","2014")
```

## #Players

```
Players<-c("KobeBryant","JoeJohnson","LeBronJames","CarmeloAnthony","DwightHoward","ChrisBosh","ChrisPaul","KevinDurant","DerrickRose","DwayneWade")
```

## Free Throws

```
KobeBryant_FT <- c(696,667,623,483,439,483,381,525,18,196)
```

```
JoeJohnson_FT <- c(261,235,316,299,220,195,158,132,159,141)
```

```
LeBronJames_FT <- c(601,489,549,594,593,503,387,403,439,375)
```

```
CarmeloAnthony_FT <- c(573,459,464,371,508,507,295,425,459,189)
```

```
DwightHoward_FT <- c(356,390,529,504,483,546,281,355,349,143)
```

```
ChrisBosh_FT <- c(474,463,472,504,470,384,229,241,223,179)
```

```
ChrisPaul_FT <- c(394,292,332,455,161,337,260,286,295,289)
```

```
KevinDurant_FT <- c(209,209,391,452,756,594,431,679,703,146)
```

```
DerrickRose_FT <- c(146,146,146,197,259,476,194,0,27,152)
```

```
DwayneWade_FT <- c(629,432,354,590,534,494,235,308,189,284)
```

## **#Matrix**

```
FreeThrows <- rbind(KobeBryant_FT, JoeJohnson_FT, LeBronJames_FT,  
CarmeloAnthony_FT, DwightHoward_FT, ChrisBosh_FT, ChrisPaul_FT,  
KevinDurant_FT,  
DerrickRose_FT, DwayneWade_FT)  
rm(KobeBryant_FT, JoeJohnson_FT, LeBronJames_FT, CarmeloAnthony_FT,  
DwightHoward_FT, ChrisBosh_FT, ChrisPaul_FT, KevinDurant_FT,  
DerrickRose_FT,  
DwayneWade_FT)  
colnames(FreeThrows) <- Seasons  
rownames(FreeThrows) <- Players  
FreeThrows
```

## **#Free Throw Attempts**

```
KobeBryant_FTA <- c(819,768,742,564,541,583,451,626,21,241)  
JoeJohnson_FTA <- c(330,314,379,362,269,243,186,161,195,176)  
LeBronJames_FTA <- c(814,701,771,762,773,663,502,535,585,528)  
CarmeloAnthony_FTA <- c(709,568,590,468,612,605,367,512,541,237)  
DwightHoward_FTA <- c(598,666,897,849,816,916,572,721,638,271)  
ChrisBosh_FTA <- c(581,590,559,617,590,471,279,302,272,232)  
ChrisPaul_FTA <- c(465,357,390,524,190,384,302,323,345,321)  
KevinDurant_FTA <- c(256,256,448,524,840,675,501,750,805,171)  
DerrickRose_FTA <- c(205,205,205,250,338,555,239,0,32,187)  
DwayneWade_FTA <- c(803,535,467,771,702,652,297,425,258,370)
```

## **Matrix**

```
FreeThrowsAttempts <- rbind(KobeBryant_FTA, JoeJohnson_FTA,  
LeBronJames_FTA,  
CarmeloAnthony_FTA, DwightHoward_FTA, ChrisBosh_FTA, ChrisPaul_FTA,  
KevinDurant_FTA, DerrickRose_FTA, DwayneWade_FTA)  
rm(KobeBryant_FTA, JoeJohnson_FTA, LeBronJames_FTA,  
CarmeloAnthony_FTA,
```

```
DwightHoward_FTA, ChrisBosh_FTA, ChrisPaul_FTA, KevinDurant_FTA,  
DerrickRose_FTA,
```

```
DwayneWade_FTA)
```

```
colnames(FreeThrowsAttempts) <- Seasons
```

```
rownames(FreeThrowsAttempts) <- Players
```

```
FreeThrowsAttempts
```

### **#Games**

```
KobeBryant_G <- c(80,77,82,82,73,82,58,78,6,35)
```

```
JoeJohnson_G <- c(82,57,82,79,76,72,60,72,79,80)
```

```
LeBronJames_G <- c(79,78,75,81,76,79,62,76,77,69)
```

```
CarmeloAnthony_G <- c(80,65,77,66,69,77,55,67,77,40)
```

```
DwightHoward_G <- c(82,82,82,79,82,78,54,76,71,41)
```

```
ChrisBosh_G <- c(70,69,67,77,70,77,57,74,79,44)
```

```
ChrisPaul_G <- c(78,64,80,78,45,80,60,70,62,82)
```

```
KevinDurant_G <- c(35,35,80,74,82,78,66,81,81,27)
```

```
DerrickRose_G <- c(40,40,40,81,78,81,39,0,10,51)
```

```
DwayneWade_G <- c(75,51,51,79,77,76,49,69,54,62)
```

### **#Matrix**

```
Games <- rbind(KobeBryant_G, JoeJohnson_G, LeBronJames_G,  
CarmeloAnthony_G,
```

```
DwightHoward_G, ChrisBosh_G, ChrisPaul_G, KevinDurant_G, DerrickRose_G,  
DwayneWade_G)
```

```
rm(KobeBryant_G, JoeJohnson_G, CarmeloAnthony_G, DwightHoward_G,  
ChrisBosh_G,
```

```
LeBronJames_G, ChrisPaul_G, DerrickRose_G, DwayneWade_G,  
KevinDurant_G)
```

```
colnames(Games) <- Seasons
```

```
rownames(Games) <- Players
```

### **#Field Goals**

```
KobeBryant_FG <- c(978,813,775,800,716,740,574,738,31,266)
```

```

JoeJohnson_FG <- c(632,536,647,620,635,514,423,445,462,446)
LeBronJames_FG <- c(875,772,794,789,768,758,621,765,767,624)
CarmeloAnthony_FG <- c(756,691,728,535,688,684,441,669,743,358)
DwightHoward_FG <- c(468,526,583,560,510,619,416,470,473,251)
ChrisBosh_FG <- c(549,543,507,615,600,524,393,485,492,343)
ChrisPaul_FG <- c(407,381,630,631,314,430,425,412,406,568)
KevinDurant_FG <- c(306,306,587,661,794,711,643,731,849,238)
DerrickRose_FG <- c(208,208,208,574,672,711,302,0,58,338)
DwayneWade_FG <- c(699,472,439,854,719,692,416,569,415,509)

```

### **#Matrix**

```

FieldGoals <- rbind(KobeBryant_FG, JoeJohnson_FG, LeBronJames_FG,
CarmeloAnthony_FG, DwightHoward_FG, ChrisBosh_FG, ChrisPaul_FG,
KevinDurant_FG,
DerrickRose_FG, DwayneWade_FG)
rm(KobeBryant_FG, JoeJohnson_FG, LeBronJames_FG, CarmeloAnthony_FG,
DwightHoward_FG, ChrisBosh_FG, ChrisPaul_FG, KevinDurant_FG,
DerrickRose_FG,
DwayneWade_FG)
colnames(FieldGoals) <- Seasons
rownames(FieldGoals) <- Players

```

### **#Field Goal Attempts**

```

KobeBryant_FGA <- c(2173,1757,1690,1712,1569,1639,1336,1595,73,713)
JoeJohnson_FGA <- c(1395,1139,1497,1420,1386,1161,931,1052,1018,1025)
LeBronJames_FGA <- c(1823,1621,1642,1613,1528,1485,1169,1354,1353,1279)
CarmeloAnthony_FGA <-
c(1572,1453,1481,1207,1502,1503,1025,1489,1643,806)
DwightHoward_FGA <- c(881,873,974,979,834,1044,726,813,800,423)
ChrisBosh_FGA <- c(1087,1094,1027,1263,1158,1056,807,907,953,745)
ChrisPaul_FGA <- c(947,871,1291,1255,637,928,890,856,870,1170)

```

```
KevinDurant_FGA <- c(647,647,1366,1390,1668,1538,1297,1433,1688,467)
```

```
DerrickRose_FGA <- c(436,436,436,1208,1373,1597,695,0,164,835)
```

```
DwayneWade_FGA <- c(1413,962,937,1739,1511,1384,837,1093,761,1084)
```

### **#Matrix**

```
FieldGoalAttempts <- rbind(KobeBryant_FGA, JoeJohnson_FGA,  
LeBronJames_FGA,
```

```
CarmeloAnthony_FGA, DwightHoward_FGA, ChrisBosh_FGA, ChrisPaul_FGA,  
KevinDurant_FGA, DerrickRose_FGA, DwayneWade_FGA)
```

```
rm(KobeBryant_FGA, JoeJohnson_FGA, LeBronJames_FGA,  
CarmeloAnthony_FGA,
```

```
DwightHoward_FGA, ChrisBosh_FGA, ChrisPaul_FGA, KevinDurant_FGA,  
DerrickRose_FGA, DwayneWade_FGA)
```

```
colnames(FieldGoalAttempts) <- Seasons
```

```
rownames(FieldGoalAttempts) <- Players
```

### **#Points**

```
KobeBryant_PTS <- c(2832,2430,2323,2201,1970,2078,1616,2133,83,782)
```

```
JoeJohnson_PTS <- c(1653,1426,1779,1688,1619,1312,1129,1170,1245,1154)
```

```
LeBronJames_PTS <- c(2478,2132,2250,2304,2258,2111,1683,2036,2089,1743)
```

```
CarmeloAnthony_PTS <- c(2122,1881,1978,1504,1943,1970,1245,1920,2112,966)
```

```
DwightHoward_PTS <- c(1292,1443,1695,1624,1503,1784,1113,1296,1297,646)
```

```
ChrisBosh_PTS <- c(1572,1561,1496,1746,1678,1438,1025,1232,1281,928)
```

```
ChrisPaul_PTS <- c(1258,1104,1684,1781,841,1268,1189,1186,1185,1564)
```

```
KevinDurant_PTS <- c(903,903,1624,1871,2472,2161,1850,2280,2593,686)
```

```
DerrickRose_PTS <- c(597,597,597,1361,1619,2026,852,0,159,904)
```

```
DwayneWade_PTS <- c(2040,1397,1254,2386,2045,1941,1082,1463,1028,1331)
```

### **#Matrix**

```
Points <- rbind(KobeBryant_PTS, JoeJohnson_PTS, LeBronJames_PTS,  
CarmeloAnthony_PTS, DwightHoward_PTS, ChrisBosh_PTS, ChrisPaul_PTS,  
KevinDurant_PTS, DerrickRose_PTS, DwayneWade_PTS)
```

```
rm(KobeBryant_PTS, JoeJohnson_PTS, LeBronJames_PTS,
CarmeloAnthony_PTS,
```

```
DwightHoward_PTS, ChrisBosh_PTS, ChrisPaul_PTS, KevinDurant_PTS,
DerrickRose_PTS, DwayneWade_PTS)
```

```
colnames(Points) <- Seasons
```

```
rownames(Points) <- Players
```

## #Re-create the plotting function

```
myplot <- function(z, who=1:10) {
```

```
  matplot(t(z[who,,drop=F]), type="b", pch=15:18, col=c(1:4,6), main="Basketball
  Players
```

```
  Analysis")
```

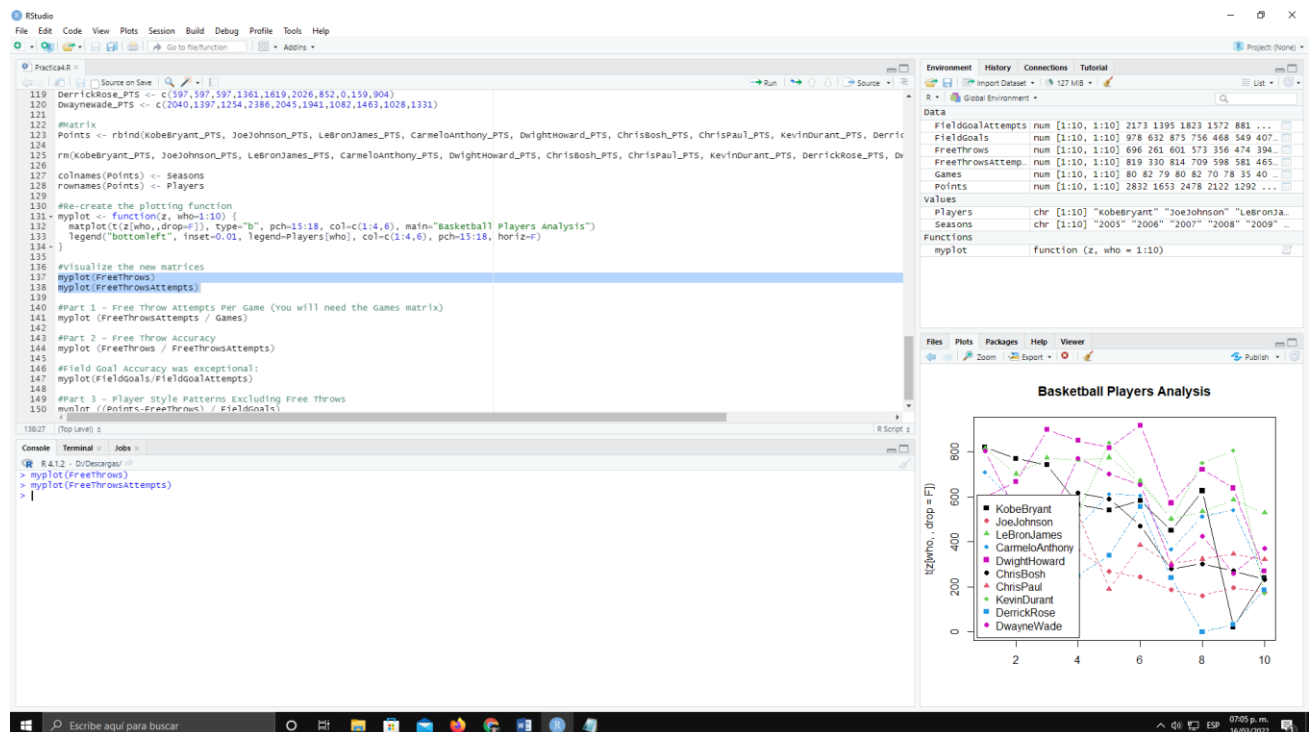
```
  legend("bottomleft", inset=0.01, legend=Players[who], col=c(1:4,6), pch=15:18,
  horiz=F)
```

```
}
```

## #Visualize the new matrices

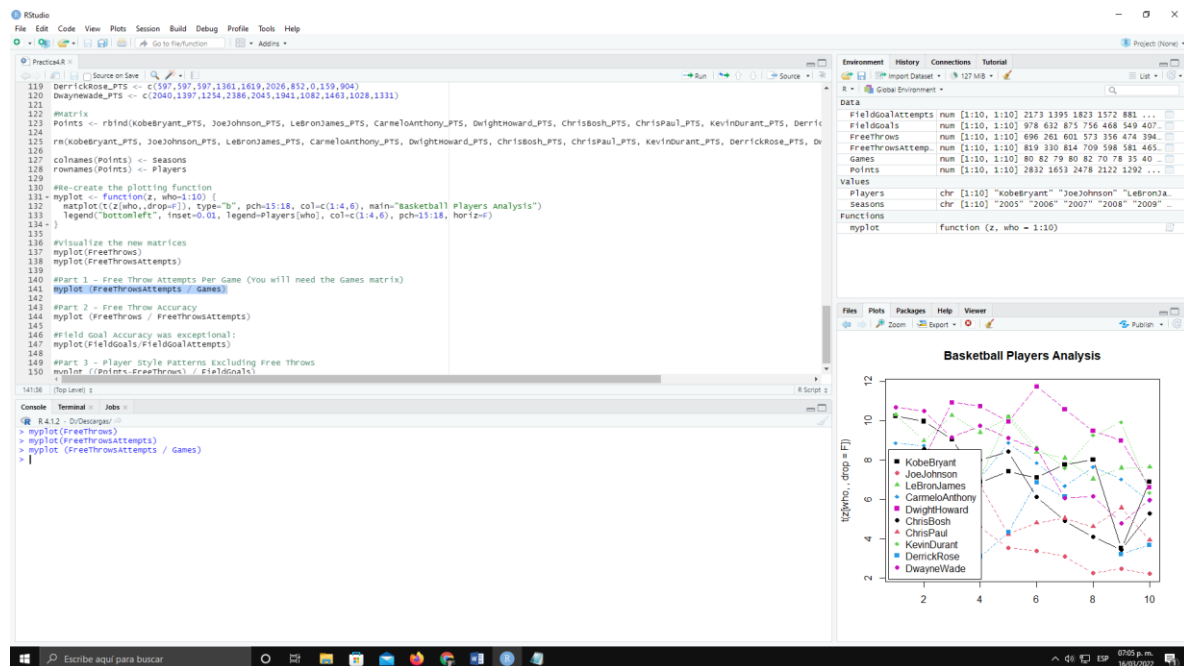
```
myplot(FreeThrows)
```

```
myplot(FreeThrowsAttempts)
```



## #Part 1 - Free Throw Attempts Per Game (You will need the Games matrix)

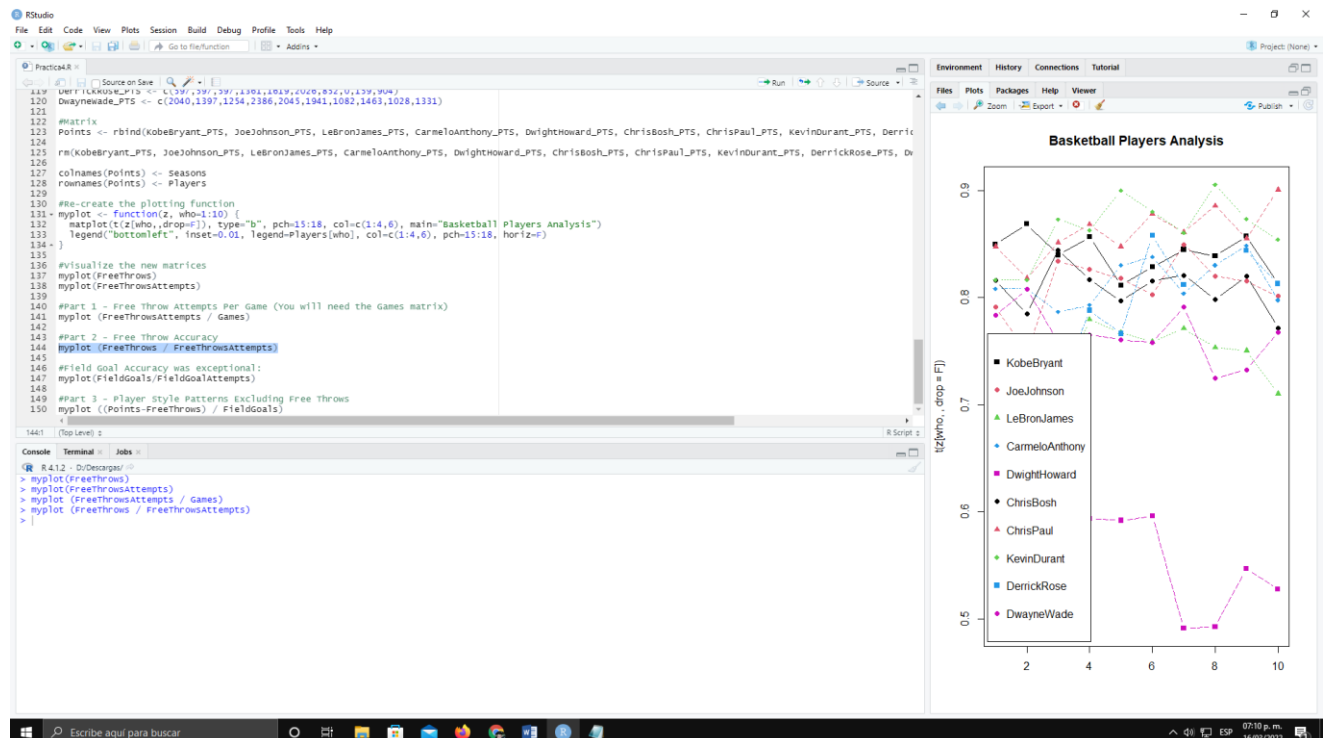
myplot (FreeThrowsAttempts / Games)



Notice how Chris Paul gets few attempts per game

## #Part 2 - Free Throw Accuracy

myplot (FreeThrows / FreeThrowsAttempts)

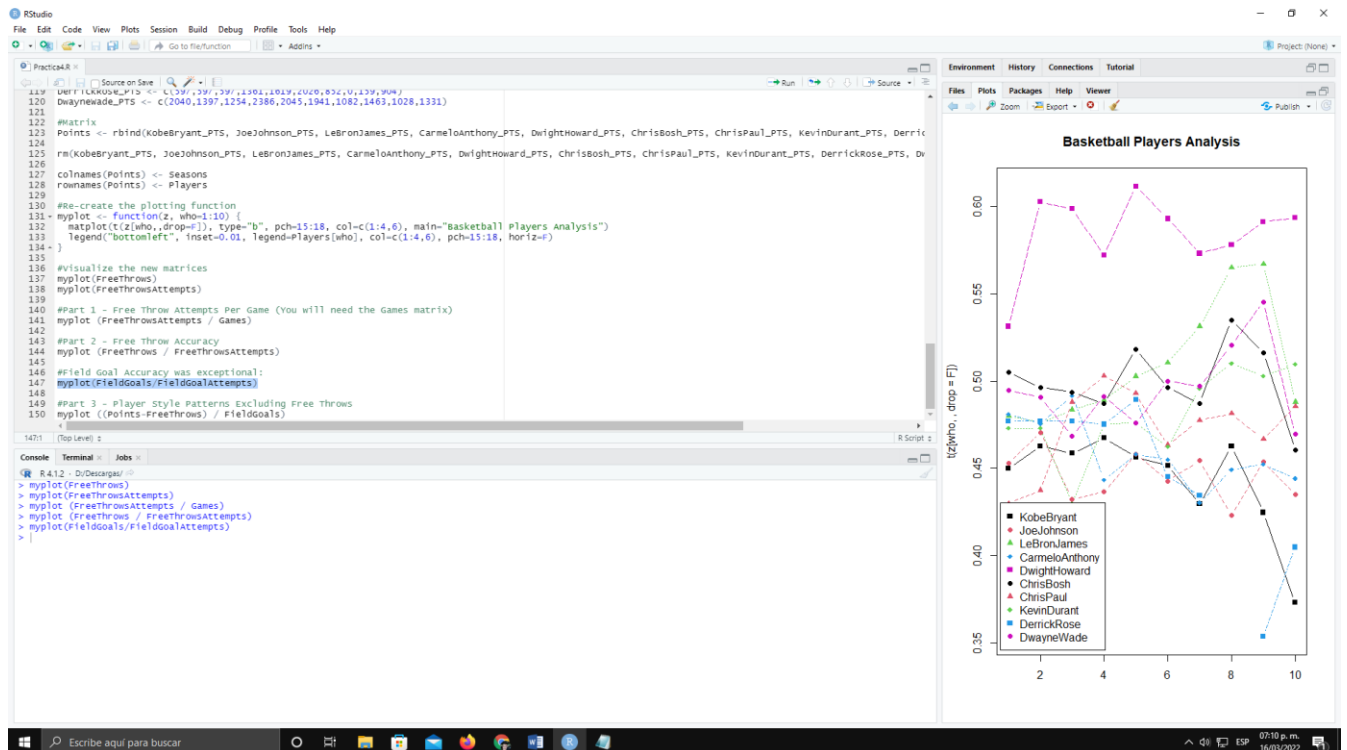




- And yet Chris Paul's accuracy is one of the highest
- Chances are his team would get more points if he had more FTA's
- Also notice that Dwight Howard's FT Accuracy is extremely poor
- compared to other players. If you recall, Dwight Howard's

**#Field Goal Accuracy was exceptional:**

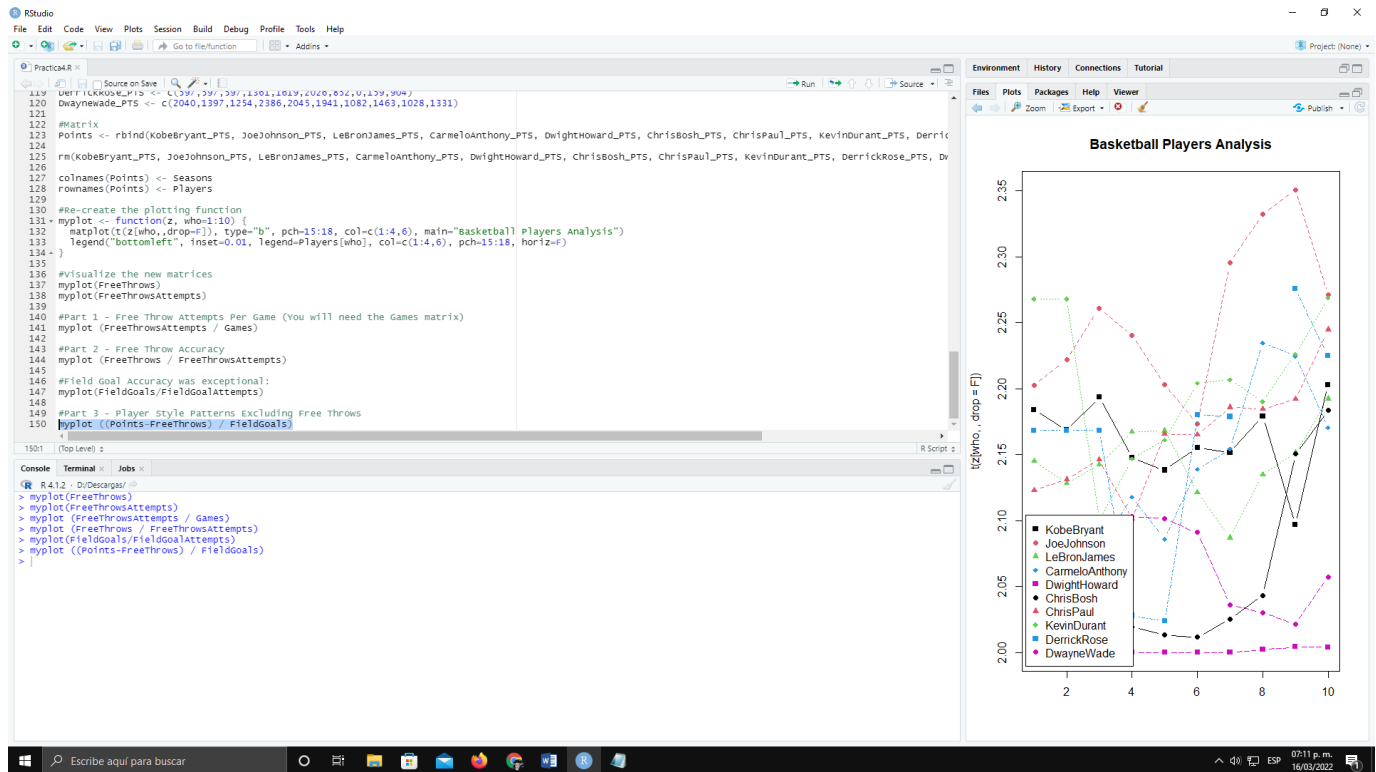
`myplot(FieldGoals/FieldGoalAttempts)`



How could this be? Why is there such a drastic difference? #We will see just now...

**#Part 3 - Player Style Patterns Excluding Free Throws**

`myplot ((Points-FreeThrows) / FieldGoals)`



Because we have excluded free throws, this plot now shows us the true representation of player style change. We can verify that this is the case because all the marks without exception on this plot are between 2 and 3. That is because Field Goals can only be for either 2 points or 3 points.