Ringer peak age by position

Derek Corcoran

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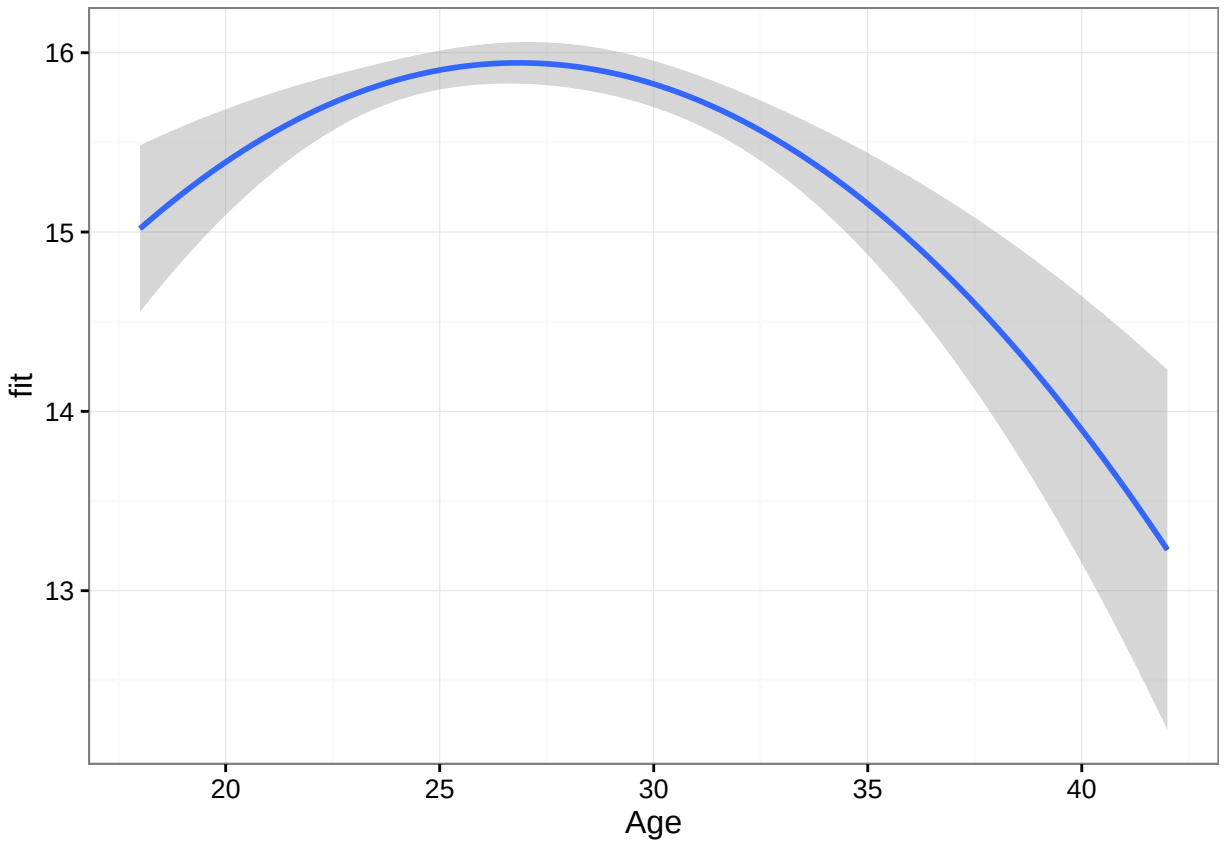
You can also embed plots, for example:

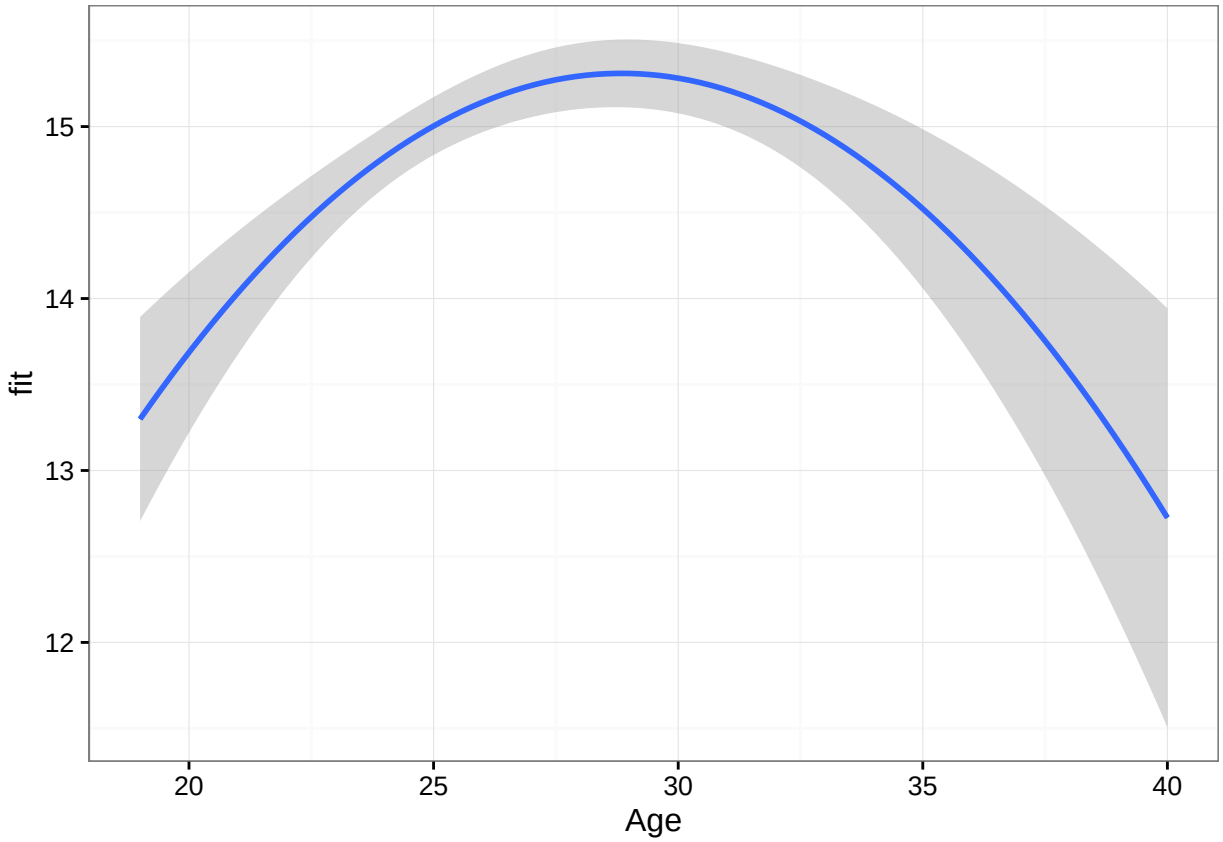
```
## 'data.frame':    7577 obs. of  30 variables:
##  $ Rk    : Factor w/ 7286 levels "1","10","100",..: 1 13 24 35 46 57 68 79 90 2 ...
##  $ Player: Factor w/ 1485 levels "Aaron Brooks",..: 80 89 11 3 21 58 60 93 4 57 ...
##  $ Season: Factor w/ 38 levels "2015-16","Season",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Age   : num  25 22 30 27 27 30 26 34 25 22 ...
##  $ Tm    : Factor w/ 42 levels "ATL","BOS","BRK",..: 26 21 20 19 13 27 12 15 25 27 ...
##  $ Lg    : Factor w/ 2 levels "Lg","NBA": 2 2 2 2 2 2 2 2 2 2 ...
##  $ G     : Factor w/ 49 levels "58","59","60",..: 2 22 13 2 3 16 21 6 24 20 ...
##  $ GS    : Factor w/ 86 levels "0","1","11","12",..: 15 53 32 8 28 48 14 32 55 3 ...
##  $ MP    : num  876 2014 2371 861 800 ...
##  $ PER   : num  14.7 15.5 10.9 13.8 21.3 22.4 12.4 12.9 12.7 12.9 ...
##  $ 3PAr  : Factor w/ 660 levels ".000",".001",..: 21 1 33 3 1 7 1 11 68 16 ...
##  $ FTr   : Factor w/ 693 levels ".082",".083",..: 58 73 14 23 65 47 23 51 30 46 ...
##  $ ORB%  : Factor w/ 179 levels "0.7","0.8","1.0",..: 58 17 9 63 15 62 10 55 45 31 ...
##  $ DRB%  : Factor w/ 293 levels "10.2","10.4",..: 21 25 5 51 55 44 29 17 32 34 ...
##  $ TRB%  : Factor w/ 217 levels "10.4","10.5",..: 8 15 54 26 36 21 16 1 7 5 ...
##  $ AST%  : Factor w/ 473 levels "10.0","10.1",..: 54 53 83 57 1 71 63 62 76 13 ...
##  $ STL%  : Factor w/ 50 levels "0.5","0.7","0.8",..: 11 5 1 6 22 4 3 25 10 19 ...
##  $ BLK%  : Factor w/ 100 levels "0.1","0.2","0.3",..: 21 29 3 30 40 25 20 10 18 18 ...
##  $ TOV%  : Factor w/ 244 levels "10.0","10.1",..: 1 32 68 28 54 63 35 21 25 37 ...
##  $ USG%  : Factor w/ 299 levels "10.6","11.0",..: 9 5 33 50 37 70 8 25 26 13 ...
##  $ ORtg  : Factor w/ 62 levels "100","101","102",..: 24 23 6 1 14 15 11 2 6 5 ...
##  $ DRtg  : Factor w/ 33 levels "100","101","102",..: 9 6 13 8 17 21 5 6 8 19 ...
##  $ OWS   : Factor w/ 173 levels "-0.1","0.1","-0.2",..: 20 36 20 4 16 39 18 8 19 9 ...
##  $ DWS   : Factor w/ 89 levels "0.0","0.3","0.4",..: 6 22 8 8 19 37 20 18 22 27 ...
##  $ WS    : Factor w/ 199 levels "-0.4","0.4","0.5",..: 22 50 24 7 28 8 30 21 33 28 ...
##  $ WS/48 : Factor w/ 328 levels "-.010",".012",..: 53 59 15 17 72 73 41 20 27 52 ...
##  $ OBPM  : Factor w/ 161 levels "0.0","-0.1","0.1",..: 5 15 11 49 17 13 36 28 7 33 ...
##  $ DBPM  : Factor w/ 114 levels "0.0","-0.1","0.1",..: 1 22 29 4 49 18 24 24 11 44 ...
##  $ BPM   : Factor w/ 188 levels "-0.1","-0.2",..: 3 34 36 57 59 29 10 1 3 29 ...
##  $ VORP  : Factor w/ 124 levels "0.0","0.1","-0.2",..: 10 27 3 9 23 28 12 16 22 21 ...
```

```
##        Rk                 Player         Season          Age       
##  Rk     : 292   Player       : 292   Season : 292   Min.   :18.00  
##  1      :   1   Tim Duncan   :  19   2015-16: 271   1st Qu.:24.00  
##  10     :   1   Kobe Bryant  :  18   2014-15: 267   Median :26.00  
##  100    :   1   Reggie Miller:  18   2013-14: 259   Mean   :26.87  
##  11     :   1   Karl Malone  :  18   2007-08: 216   3rd Qu.:29.00  
##  12     :   1   John Stockton:  18   1998-99: 207   Max.   :42.00  
##  (Other):7280   (Other)      :7194   (Other):6065   NA's   :292    
##        Tm         Lg              G              GS             MP       
##  TOT    : 497   Lg : 292   82     :1417   82     : 530   Min.   : 482  
##  Tm     : 292   NBA:7285   81     : 726   0      : 352   1st Qu.:1603  
##  UTA    : 280              80     : 674          : 329   Median :2111  
##  IND    : 273              79     : 510   GS     : 292   Mean   :2080  
```

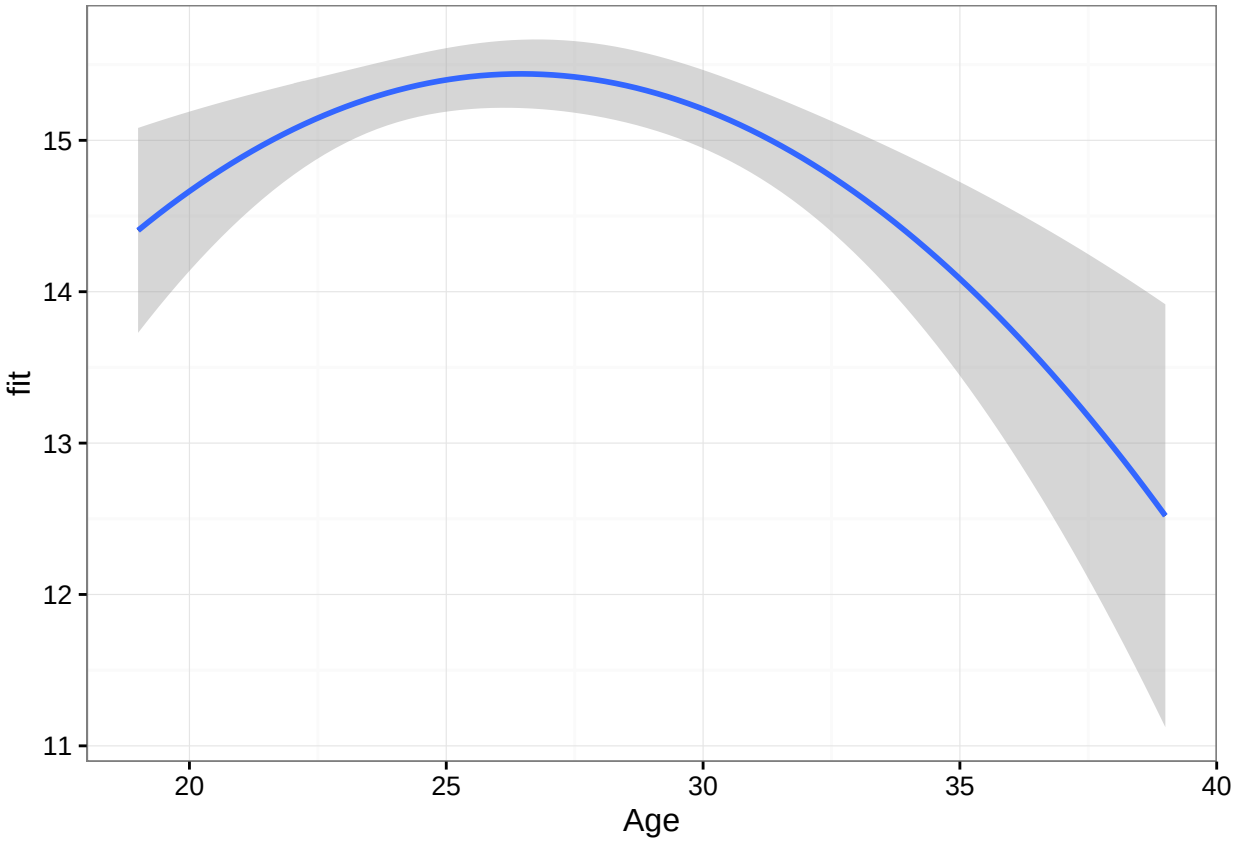
```
##  LAL    : 269              78     : 421   81     : 288   3rd Qu.:2572
##  SAS    : 268              77     : 373   80     : 260   Max.   :3533
##  (Other):5698              (Other):3456   (Other):5526   NA's   :292
##       PER              3PAr            FTr             ORB%
##  Min.   : 3.00   .000   : 523   FTr    : 292   ORB%   : 292
##  1st Qu.:12.50   3PAr   : 292   .339   :  34   1.8    : 117
##  Median :14.70   .002   : 269   .296   :  33   2.3    : 114
##  Mean   :15.11   .003   : 243   .252   :  32   1.7    : 113
##  3rd Qu.:17.20   .004   : 195   .273   :  32   1.9    : 113
##  Max.   :31.70   .005   : 189   .292   :  32   2.0    : 112
##  NA's   :292     (Other):5866   (Other):7122   (Other):6716
##       DRB%            TRB%            AST%            STL%
##  DRB%   : 292   TRB%   : 292   AST%   : 292   1.2    : 493
##  10.1   :  68   5.4    :  95   8.9    :  66   1.3    : 468
##  8.0    :  67   5.5    :  95   6.7    :  65   1.5    : 452
##  8.6    :  67   5.6    :  91   7.4    :  63   1.6    : 446
##  9.6    :  65   6.1    :  90   10.0   :  58   1.4    : 444
##  9.1    :  63   5.7    :  87   8.6    :  58   1.7    : 439
##  (Other):6955   (Other):6827   (Other):6975   (Other):4835
##       BLK%            TOV%            USG%            ORtg
##  0.3    : 472   TOV%   : 292   USG%   : 292   106    : 428
##  0.4    : 465   12.4   : 101   20.0   :  80   107    : 411
##  0.5    : 445   13.0   :  98   19.1   :  72   108    : 409
##  0.6    : 425   12.5   :  96   19.8   :  69   105    : 392
##  0.2    : 415   12.9   :  93   17.9   :  68   109    : 383
##  0.7    : 363   14.3   :  92   18.9   :  68   110    : 382
##  (Other):4992   (Other):6805   (Other):6928   (Other):5172
##       DRtg            OWS             DWS              WS
##  108    : 709   OWS    : 292   DWS    : 292   WS     : 292
##  106    : 677   1.0    : 172   1.3    : 287   2.2    : 121
##  107    : 674   1.3    : 162   1.4    : 275   1.7    : 120
##  109    : 631   1.2    : 161   1.2    : 272   4.0    : 118
##  105    : 600   1.1    : 160   1.7    : 268   3.7    : 116
##  104    : 556   1.6    : 153   1.6    : 265   2.1    : 115
##  (Other):3730   (Other):6477   (Other):5918   (Other):6695
##      WS/48           OBPM            DBPM            BPM
##  WS/48  : 292   OBPM   : 292   DBPM   : 292   BPM    : 292
##  .091   :  85   -0.5   : 156   0.4    : 180   -0.5   : 129
##  .103   :  77   0.2    : 153   -0.7   : 179   -0.1   : 128
##  .098   :  76   0.0    : 150   -0.9   : 176   -0.4   : 127
##  .093   :  73   0.3    : 141   -0.3   : 175   -0.3   : 124
##  .101   :  71   0.4    : 141   0.1    : 174   -0.2   : 120
##  (Other):6903   (Other):6544   (Other):6401   (Other):6657
##       VORP
##  VORP   : 292
##  0.2    : 260
##  0.1    : 241
##  0.4    : 228
##  0.8    : 221
##  0.5    : 213
##  (Other):6122
```


16
15
14
13
fit
20
25
30
35
40
Age

Guards



Frowards



Centers

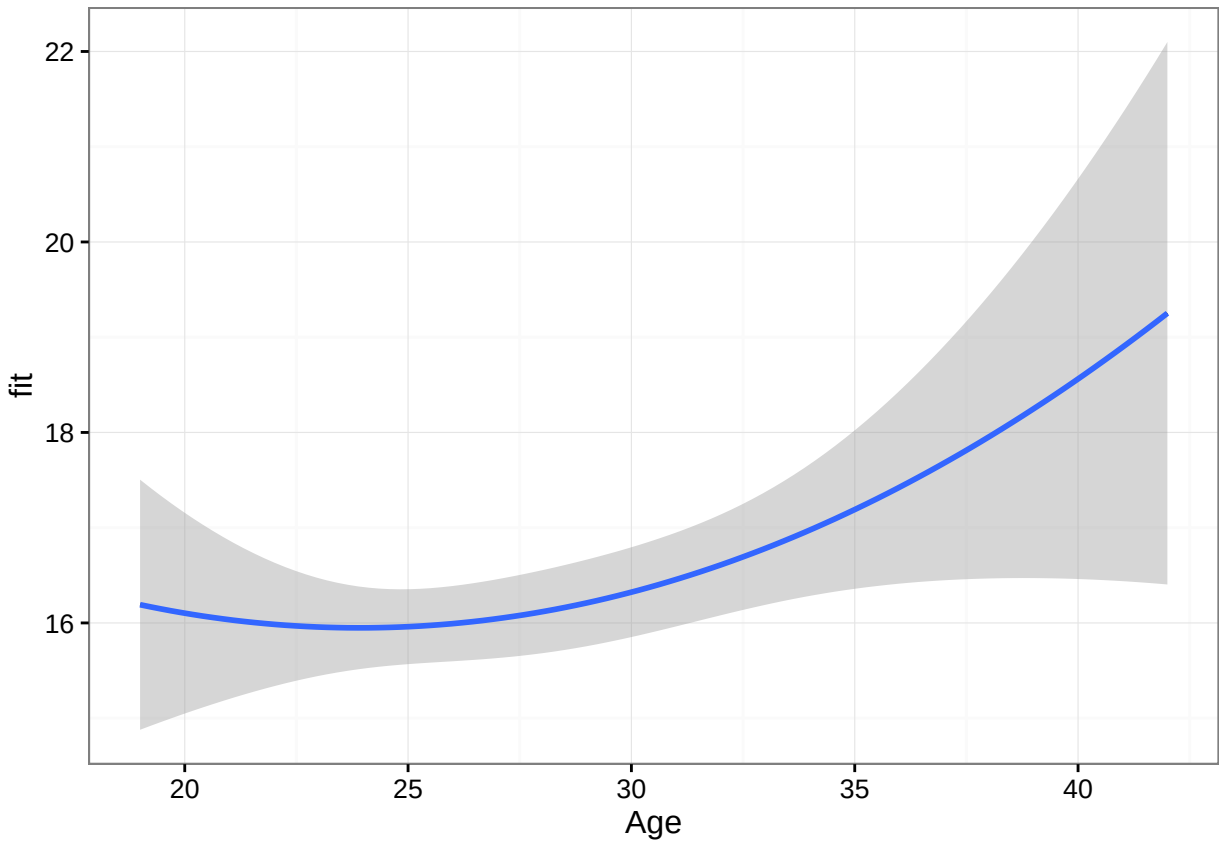
```
## 'data.frame':    758 obs. of  31 variables:
##  $ Rk      : Factor w/ 730 levels "1","10","100",..: 1 13 24 35 46 57 68 79 90 2 ...
##  $ Player  : Factor w/ 162 levels "Alexis Ajinca",..: 43 1 10 35 6 4 9 45 12 15 ...
##  $ Season  : Factor w/ 38 levels "2011-12","2012-13",..: 5 5 5 5 5 5 5 5 5 5 ...
##  $ Age     : num  22 27 27 29 29 31 21 33 26 26 ...
##  $ Tm      : Factor w/ 41 levels "BRK","CHI","CLE",..: 19 17 10 17 6 7 8 22 20 15 ...
##  $ Lg      : Factor w/ 2 levels "Lg","NBA": 2 2 2 2 2 2 2 2 2 2 ...
##  $ G       : Factor w/ 36 levels "58","59","60",..: 22 2 3 10 23 12 19 8 1 24 ...
##  $ GS      : Factor w/ 84 levels "0","1","10","13",..: 51 8 29 36 2 38 18 34 12 20 ...
##  $ MP      : num  2014 861 800 1178 1233 ...
##  $ PER     : num  15.5 13.8 21.3 11 17.8 15.9 18.3 14.7 17 17.1 ...
##  $ 3PAr    : Factor w/ 69 levels ".000",".001",..: 1 4 1 1 6 5 4 4 1 18 ...
##  $ FTr     : Factor w/ 413 levels ".106",".118",..: 67 10 50 84 66 7 79 80 65 64 ...
##  $ ORB%    : Factor w/ 117 levels "10.1","10.2",..: 19 59 15 7 15 60 32 12 4 53 ...
##  $ DRB%    : Factor w/ 173 levels "12.8","12.9",..: 9 52 58 64 36 53 38 61 50 33 ...
##  $ TRB%    : Factor w/ 130 levels "10.4","11.1",..: 16 34 49 48 31 40 42 46 37 21 ...
##  $ AST%    : Factor w/ 173 levels "1.0","10.0","10.1",..: 36 49 2 28 54 11 44 50 26 3 ...
##  $ STL%    : Factor w/ 30 levels "0.3","0.4","0.5",..: 8 9 22 7 7 9 18 9 14 19 ...
##  $ BLK%    : Factor w/ 92 levels "0.9","1.0","1.1",..: 19 20 45 5 18 42 37 8 39 21 ...
##  $ TOV%    : Factor w/ 167 levels "10.0","10.1",..: 26 23 56 57 17 60 6 54 20 45 ...
##  $ USG%    : Factor w/ 212 levels "10.6","10.7",..: 9 53 42 3 43 3 30 10 24 33 ...
```

```
##  $ ORtg    : Factor w/ 55 levels "100","101","102",..: 23 1 14 7 15 20 15 15 18 14 ...
##  $ DRtg    : Factor w/ 26 levels "100","101","102",..: 6 8 14 9 5 19 5 8 3 7 ...
##  $ OWS     : Factor w/ 114 levels "0.0","0.1","-0.2",..: 36 4 19 10 25 26 25 23 17 32 ...
##  $ DWS     : Factor w/ 72 levels "0.6","0.7","0.9",..: 17 3 14 4 11 22 14 10 5 19 ...
##  $ WS      : Factor w/ 145 levels "0.1","0.8","1.0",..: 49 3 26 14 31 39 33 28 19 44 ...
##  $ WS/48   : Factor w/ 221 levels ".006",".031",..: 47 6 68 11 48 57 42 24 51 35 ...
##  $ OBPM    : Factor w/ 107 levels "0.0","-0.1","0.1",..: 14 45 17 44 21 10 20 29 36 1 ...
##  $ DBPM    : Factor w/ 87 levels "0.0","-0.1","-0.2",..: 18 3 51 3 15 48 22 18 18 31 ...
##  $ BPM     : Factor w/ 136 levels "-0.2","0.2","-0.3",..: 29 48 50 45 1 49 8 7 18 31 ...
##  $ VORP    : Factor w/ 88 levels "0.0","-0.1","0.1",..: 27 9 21 13 12 29 16 12 3 30 ...
##  $ Position: chr  "Center" "Center" "Center" "Center" ...
```

```
##        Rk                  Player        Season         Age
##  Rk     : 29   Player         : 29   2014-15: 30   Min.   :19.00
##  1      :  1   Robert Parish  : 17   Season : 29   1st Qu.:24.00
##  10     :  1   Hakeem Olajuwon: 14   2015-16: 28   Median :27.00
##  100    :  1   Dikembe Mutombo: 13   2004-05: 27   Mean   :27.06
##  11     :  1   Vlade Divac    : 13   2001-02: 25   3rd Qu.:30.00
##  12     :  1   Bill Laimbeer  : 13   2006-07: 24   Max.   :42.00
##  (Other):724   (Other)        :659   (Other):595   NA's   :29
##        Tm        Lg             G             GS             MP
##  TOT    : 43   Lg : 29   82     :136   82     : 58   Min.   : 482
##  CHI    : 37   NBA:729   81     : 82   81     : 37   1st Qu.:1417
##  LAL    : 37             80     : 70   80     : 34   Median :1965
##  IND    : 31             79     : 50   78     : 29   Mean   :1934
##  BOS    : 31             78     : 42   GS     : 29   3rd Qu.:2418
##  LAC    : 29             74     : 38   0      : 27   Max.   :3277
##  (Other):550             (Other):340   (Other):544   NA's   :29
##       PER             3PAr           FTr            ORB%           DRB%
##  Min.   : 3.00   .000   :232   FTr    : 29   ORB%   : 29   DRB%   : 29
##  1st Qu.:12.30   .002   : 76   .287   :  5   9.5    : 19   17.7   : 13
##  Median :15.00   .003   : 69   .309   :  5   9.1    : 16   21.2   : 12
##  Mean   :15.41   .001   : 49   .345   :  5   9.7    : 16   21.5   : 12
##  3rd Qu.:17.70   .005   : 46   .363   :  5   10.4   : 15   18.3   : 12
##  Max.   :30.70   .004   : 43   .364   :  5   11.5   : 15   20.5   : 11
##  NA's   :29      (Other):243   (Other):704   (Other):648   (Other):669
##       TRB%           AST%           STL%           BLK%           TOV%
##  TRB%   : 29   AST%   : 29   0.8    : 80   BLK%   : 29   TOV%   : 29
##  15.8   : 17   7.4    : 16   0.9    : 72   2.3    : 24   15.4   : 14
##  12.8   : 15   6.4    : 15   1.1    : 72   1.8    : 18   16.9   : 13
##  14.4   : 15   4.6    : 13   1.0    : 67   2.6    : 17   12.5   : 13
##  12.5   : 12   4.2    : 12   1.2    : 67   3.4    : 17   12.9   : 12
##  12.9   : 12   6.6    : 12   0.7    : 60   1.6    : 16   13.3   : 12
##  (Other):658   (Other):661   (Other):340   (Other):637   (Other):665
##       USG%           ORtg           DRtg           OWS            DWS
##  USG%   : 29   106    : 42   103    : 73   OWS    : 29   1.9    : 35
##  16.7   : 12   113    : 40   104    : 68   1.2    : 22   2.2    : 33
##  20.0   : 11   108    : 39   105    : 60   2.6    : 22   DWS    : 29
##  14.8   : 10   109    : 36   106    : 60   1.3    : 21   2.5    : 26
##  19.1   : 10   111    : 36   102    : 57   0.0    : 19   2.3    : 24
##  13.6   :  9   105    : 35   107    : 55   2.3    : 19   1.6    : 23
##  (Other):677   (Other):530   (Other):385   (Other):626   (Other):588
##        WS           WS/48          OBPM           DBPM           BPM
##  WS     : 29   WS/48  : 29   OBPM   : 29   DBPM   : 29   BPM    : 29
```

```
##  3.0    : 17   .107   : 11   -1.2   : 21   1.7    : 24   1.4    : 18
##  2.9    : 16   .147   : 11   -2.1   : 21   0.4    : 22   -0.6   : 17
##  4.0    : 16   .089   : 10   -0.9   : 18   1.4    : 22   -1.2   : 17
##  4.1    : 15   .072   :  9   -1.5   : 18   0.5    : 20   0.4    : 16
##  1.7    : 14   .111   :  9   -3.1   : 18   0.8    : 20   -3.3   : 15
##  (Other):651   (Other):679   (Other):633   (Other):621   (Other):646
##       VORP       Position
##  0.2    : 32   Length:758
##  VORP   : 29   Class :character
##  0.3    : 27   Mode  :character
##  1.2    : 27
##  0.1    : 26
##  0.5    : 25
##  (Other):592
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: PER ~ Age + I(Age^2) + (1 | Player)
##    Data: big_dataCenters
##
## REML criterion at convergence: 3520.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.3285 -0.5903 -0.0130  0.6191  2.6191
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  Player   (Intercept) 15.913   3.989
##  Residual              3.988   1.997
## Number of obs: 729, groups:  Player, 161
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept) -18.42447    3.25687  -5.657
## Age           2.49249    0.23084  10.798
## I(Age^2)     -0.04633    0.00406 -11.410
##
## Correlation of Fixed Effects:
##          (Intr) Age
## Age      -0.990
## I(Age^2)  0.973 -0.994
```



Here

```
big_dataNBA <- rbind.data.frame(big_dataGuards, big_dataFrowards, big_dataCenters)
big_dataNBA$Position <- as.factor(big_dataNBA$Position)
str(big_dataNBA)
```

```
## 'data.frame':    5054 obs. of  31 variables:
##  $ Rk      : Factor w/ 2365 levels "1","10","100",..: 1 13 24 35 46 57 68 79 90 2 ...
##  $ Player  : Factor w/ 1034 levels "Aaron Brooks",..: 4 23 57 46 95 68 86 20 6 1 ...
##  $ Season  : Factor w/ 38 levels "2014-15","2015-16",..: 2 2 2 2 2 2 2 2 2 2 ...
##  $ Age     : num  30 28 33 31 25 27 35 19 25 31 ...
##  $ Tm      : Factor w/ 42 levels "ATL","BOS","BRK",..: 19 29 10 7 8 11 9 23 2 4 ...
##  $ Lg      : Factor w/ 2 levels "Lg","NBA": 2 2 2 2 2 2 2 2 2 2 ...
##  $ G       : Factor w/ 47 levels "58","59","61",..: 13 4 10 16 24 13 1 18 18 11 ...
##  $ GS      : Factor w/ 86 levels "0","1","10","12",..: 29 1 1 8 2 32 11 26 37 1 ...
##  $ MP      : Factor w/ 2003 levels "1001","1079",..: 66 6 2 30 64 43 95 50 73 3 ...
##  $ PER     : num  10.9 13.9 11.7 15.4 16 13 9.8 11.9 13.2 11.8 ...
##  $ 3PAr    : Factor w/ 628 levels ".032",".037",..: 33 74 32 47 41 79 86 42 57 56 ...
##  $ FTr     : Factor w/ 659 levels ".054",".056",..: 20 74 22 12 59 16 3 65 10 13 ...
##  $ ORB%    : Factor w/ 173 levels "0.5","0.8","1.0",..: 4 2 23 10 20 28 3 7 13 13 ...
##  $ DRB%    : Factor w/ 283 levels "10.0","10.1",..: 9 50 53 52 37 64 61 53 44 46 ...
##  $ TRB%    : Factor w/ 214 levels "11.2","12.4",..: 23 7 20 12 1 30 11 10 8 10 ...
##  $ AST%    : Factor w/ 467 levels "10.0","10.6",..: 87 44 2 59 14 24 56 22 86 47 ...
##  $ STL%    : Factor w/ 47 levels "0.5","0.8","1.0",..: 1 9 13 2 8 16 5 3 15 7 ...
```

```
##  $ BLK%    : Factor w/ 98 levels "0.1","0.2","0.3",..: 3 3 7 1 13 11 4 8 6 7 ...
##  $ TOV%    : Factor w/ 232 levels "10.1","10.2",..: 55 39 12 17 8 15 47 23 57 24 ...
##  $ USG%    : Factor w/ 270 levels "11.0","12.6",..: 26 27 28 57 54 11 7 54 39 53 ...
##  $ ORtg    : Factor w/ 62 levels "100","101","102",..: 6 14 7 7 6 15 2 3 6 26 ...
##  $ DRtg    : Factor w/ 30 levels "102","103","104",..: 11 10 5 10 7 9 7 11 5 8 ...
##  $ OWS     : Factor w/ 158 levels "0.0","-0.2","0.2",..: 24 26 11 27 30 36 4 17 26 3 ...
##  $ DWS     : Factor w/ 84 levels "0.3","0.4","0.5",..: 7 4 10 5 17 11 6 5 25 5 ...
##  $ WS      : Factor w/ 186 levels "0.0","0.3","0.4",..: 28 27 23 29 38 39 9 20 42 8 ...
##  $ WS/48   : Factor w/ 311 levels ".001",".009",..: 19 55 45 38 42 52 17 13 44 12 ...
##  $ OBPM    : Factor w/ 151 levels "-0.1","-0.2",..: 10 19 22 30 5 27 32 10 9 8 ...
##  $ DBPM    : Factor w/ 109 levels "0.0","-0.1","0.1",..: 29 39 15 40 7 6 29 35 6 40 ...
##  $ BPM     : Factor w/ 171 levels "-0.1","0.1","0.2",..: 38 28 34 20 1 19 50 45 3 48 ...
##  $ VORP    : Factor w/ 115 levels "0.0","-0.1","0.1",..: 4 3 1 7 21 27 8 12 25 8 ...
##  $ Position: Factor w/ 3 levels "Center","Froward",..: 3 3 3 3 3 3 3 3 3 3 ...
```

```
LMENULL <- lmer(PER ~ Age + I(Age^2) + (1|Player), data = big_dataNBA, REML=FALSE)
LME1 <- lmer(PER ~ Age + I(Age^2) + Position + Age*Position + (1|Player), data = big_dataNBA, REML=FALSE
LME2 <- lmer(PER ~ Age + I(Age^2) + Position + Age*Position + (1+ Age|Player), data = big_dataNBA, REML=

GLME2 <- glmer(PER ~ Age + I(Age^2) + Position + Age*Position + (1+ Age|Player), data = big_dataNBA, REM

summary(LME1)
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: PER ~ Age + I(Age^2) + Position + Age * Position + (1 | Player)
##    Data: big_dataNBA
##
##      AIC      BIC   logLik deviance df.resid
##  22929.9  22988.3 -11455.9  22911.9     4850
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.7427 -0.5685 -0.0002  0.5826  3.9564
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  Player   (Intercept) 9.522    3.086
##  Residual             4.063    2.016
## Number of obs: 4859, groups:  Player, 1033
##
## Fixed effects:
##                       Estimate Std. Error t value
## (Intercept)         -20.671562   1.620573 -12.756
## Age                   2.654113   0.108143  24.543
## I(Age^2)             -0.049091   0.001861 -26.383
## PositionFroward       2.363360   0.857788   2.755
## PositionGuard        -1.641061   0.825414  -1.988
## Age:PositionFroward  -0.106942   0.030686  -3.485
## Age:PositionGuard     0.037293   0.029369   1.270
##
## Correlation of Fixed Effects:
##             (Intr) Age    I(A^2) PstnFr PstnGr Ag:PsF
## Age         -0.968
## I(Age^2)     0.895 -0.971
```

```
## PositnFrwrd -0.465  0.283 -0.098
## PositionGrd -0.433  0.239 -0.046  0.746
## Ag:PstnFrwr  0.444 -0.302  0.105 -0.931 -0.692
## Age:PstnGrd  0.410 -0.257  0.050 -0.695 -0.931  0.742
```

```
summary(LME2)
```

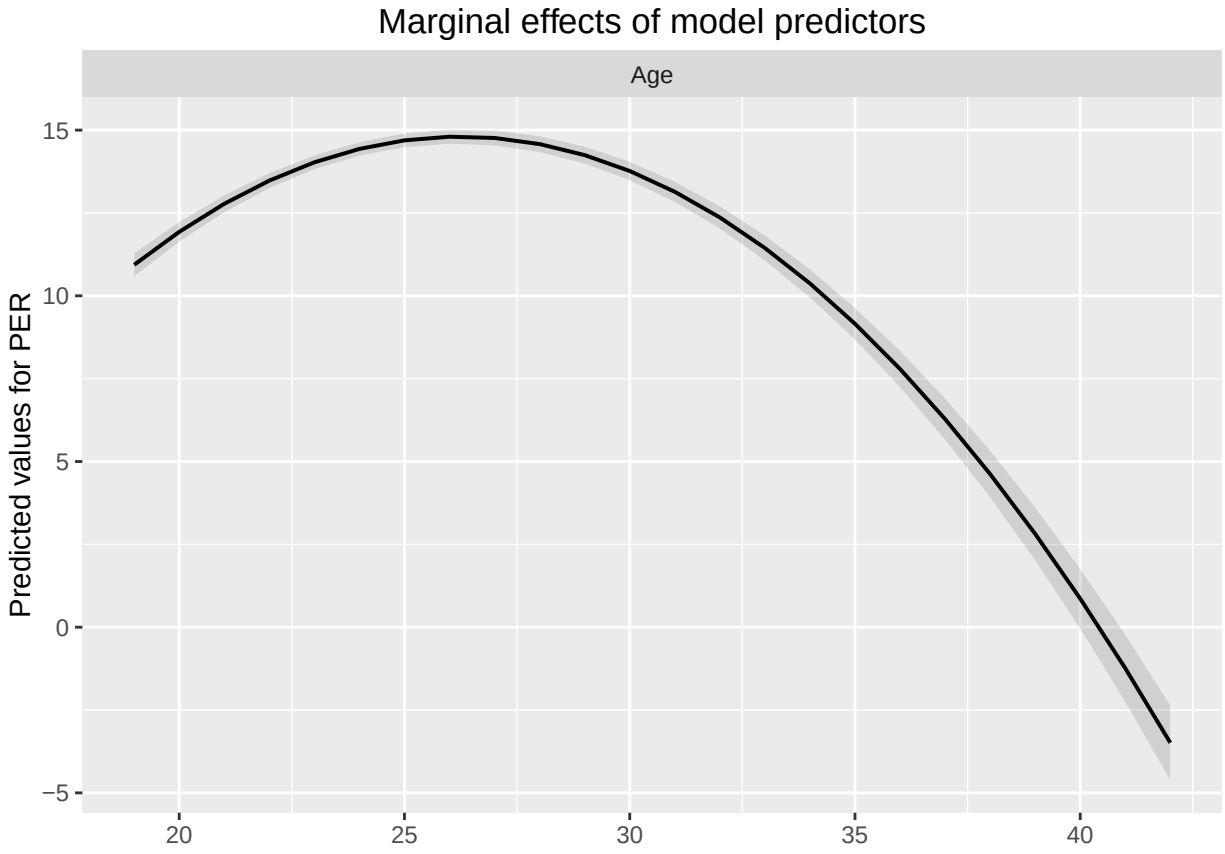
```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: PER ~ Age + I(Age^2) + Position + Age * Position + (1 + Age |
##     Player)
##    Data: big_dataNBA
##
##      AIC      BIC   logLik deviance df.resid
##  22425.4  22496.8 -11201.7  22403.4     4848
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.5325 -0.5652 -0.0106  0.5641  3.3699
##
## Random effects:
##  Groups   Name        Variance Std.Dev. Corr
##  Player   (Intercept) 67.510   8.2165
##           Age          0.110   0.3317   -0.93
##  Residual              3.054   1.7476
## Number of obs: 4859, groups:  Player, 1033
##
## Fixed effects:
##                       Estimate Std. Error t value
## (Intercept)         -35.779070   1.929417  -18.54
## Age                   3.879360   0.125599   30.89
## I(Age^2)             -0.073708   0.002167  -34.01
## PositionFroward       2.236507   1.321423    1.69
## PositionGuard        -2.059699   1.272040   -1.62
## Age:PositionFroward  -0.101784   0.052520   -1.94
## Age:PositionGuard     0.054919   0.050422    1.09
##
## Correlation of Fixed Effects:
##             (Intr) Age    I(A^2) PstnFr PstnGr Ag:PsF
## Age         -0.962
## I(Age^2)     0.817 -0.937
## PositnFrwrd -0.529  0.336 -0.053
## PositionGrd -0.519  0.315 -0.018  0.737
## Ag:PstnFrwr  0.510 -0.340  0.050 -0.972 -0.713
## Age:PstnGrd  0.502 -0.321  0.016 -0.715 -0.971  0.733
```

```
summary(GLME2)
```

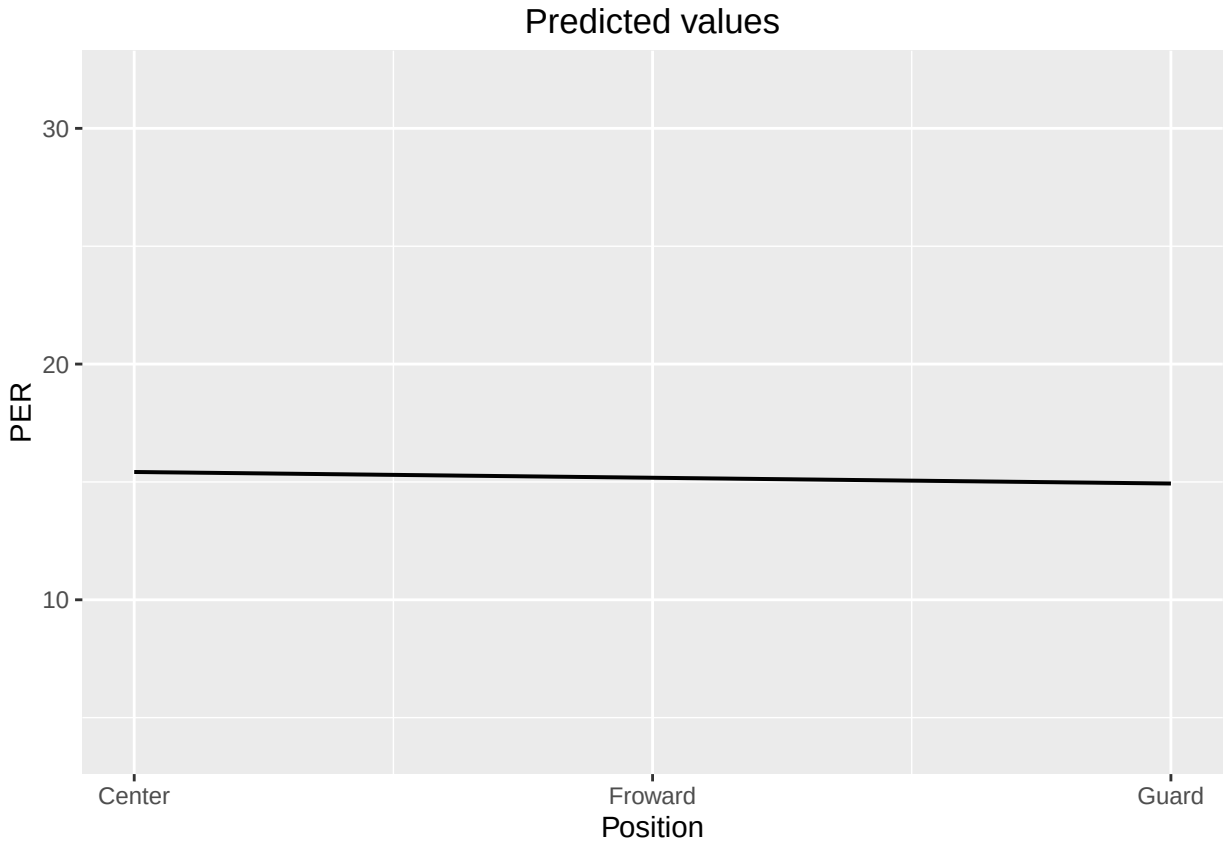
```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: PER ~ Age + I(Age^2) + Position + Age * Position + (1 + Age |
##     Player)
##    Data: big_dataNBA
##
##      AIC      BIC   logLik deviance df.resid
```

```
##  22425.4  22496.8 -11201.7  22403.4     4848
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.5325 -0.5652 -0.0106  0.5641  3.3699
##
## Random effects:
##  Groups   Name        Variance Std.Dev. Corr
##  Player   (Intercept) 67.510   8.2165
##           Age          0.110   0.3317   -0.93
##  Residual              3.054   1.7476
## Number of obs: 4859, groups:  Player, 1033
##
## Fixed effects:
##                       Estimate Std. Error t value
## (Intercept)         -35.779070   1.929417  -18.54
## Age                   3.879360   0.125599   30.89
## I(Age^2)             -0.073708   0.002167  -34.01
## PositionFroward       2.236507   1.321423    1.69
## PositionGuard        -2.059699   1.272040   -1.62
## Age:PositionFroward  -0.101784   0.052520   -1.94
## Age:PositionGuard     0.054919   0.050422    1.09
##
## Correlation of Fixed Effects:
##             (Intr) Age    I(A^2) PstnFr PstnGr Ag:PsF
## Age         -0.962
## I(Age^2)     0.817 -0.937
## PositnFrwrd -0.529  0.336 -0.053
## PositionGrd -0.519  0.315 -0.018  0.737
## Ag:PstnFrwr  0.510 -0.340  0.050 -0.972 -0.713
## Age:PstnGrd  0.502 -0.321  0.016 -0.715 -0.971  0.733
```

```
sjp.glmer(GLME2, type = "eff", show.ci = TRUE)
```

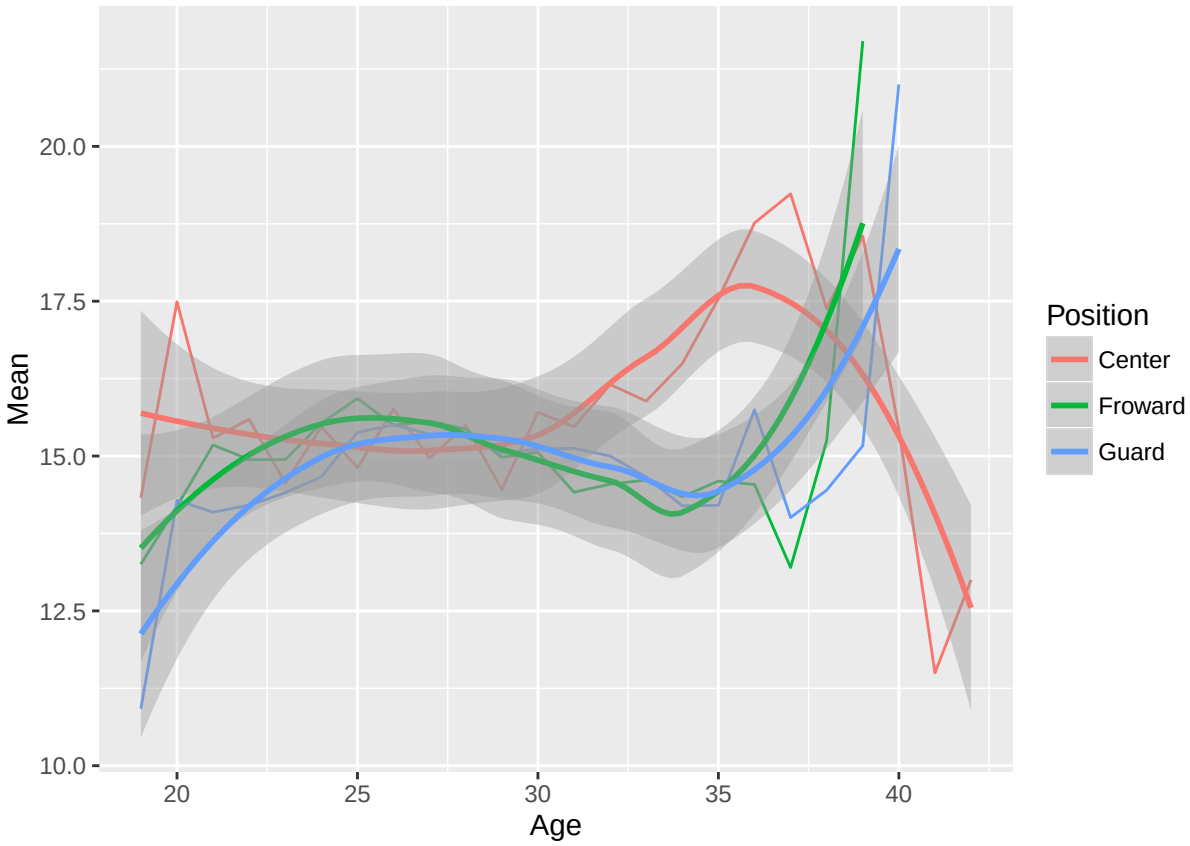



```
sjp.glmer(GLME2, type = "pred",
          vars = c("Position"),
          facet.grid = F)#anova(LME1, LME2)
```



Age	Position	Mean	SD	n
19	Center	14.32500	0.9912114	4
19	Froward	13.25385	3.7935505	13
19	Guard	10.92000	3.5436328	10
20	Center	17.49091	3.6401798	11
20	Froward	14.19250	3.1075910	40
20	Guard	14.28667	2.9338375	30
21	Center	15.29167	4.4324806	24
21	Froward	15.17857	3.3716161	70
21	Guard	14.09324	2.8278619	74
22	Center	15.59111	4.0260979	45
22	Froward	14.94161	3.5125540	137
22	Guard	14.20759	3.5103948	158
23	Center	14.56190	3.6493229	63
23	Froward	14.94253	3.4831264	174
23	Guard	14.40721	3.4496432	222
24	Center	15.47460	3.9118912	63
24	Froward	15.53057	3.3856234	193
24	Guard	14.66705	3.5780187	258
25	Center	14.80988	4.2280493	81
25	Froward	15.92890	3.4107180	173
25	Guard	15.38185	3.5900043	248
26	Center	15.75857	4.4377006	70
26	Froward	15.49529	3.7832914	191
26	Guard	15.50220	3.6329057	227
27	Center	14.96849	4.6553994	73
27	Froward	15.56164	3.8652754	159

Age	Position	Mean	SD	n
27	Guard	15.35446	3.6844064	213
28	Center	15.49273	5.4400386	55
28	Froward	15.43401	3.8846642	147
28	Guard	15.33838	3.2410974	198
29	Center	14.46111	5.1236933	54
29	Froward	14.97920	3.9745419	125
29	Guard	15.05000	3.5664296	182
30	Center	15.70714	4.9145078	42
30	Froward	15.06020	3.7843612	98
30	Guard	15.10993	3.6825852	151
31	Center	15.47250	4.2478947	40
31	Froward	14.41667	4.1647075	72
31	Guard	15.12542	3.3408425	118
32	Center	16.15455	5.1164618	33
32	Froward	14.54528	4.0954743	53
32	Guard	15.00111	3.6112027	90
33	Center	15.88750	5.2803419	24
33	Froward	14.61250	4.5778837	40
33	Guard	14.66094	3.5862886	64
34	Center	16.49231	5.3799724	13
34	Froward	14.34324	4.2049270	37
34	Guard	14.19600	3.8929533	50
35	Center	17.54000	4.7947193	10
35	Froward	14.59524	5.4894878	21
35	Guard	14.20333	3.1732159	30
36	Center	18.76250	4.1812293	8
36	Froward	14.54167	5.7014286	12
36	Guard	15.74667	3.6558889	15
37	Center	19.23333	4.5081408	3
37	Froward	13.20000	6.3567737	8
37	Guard	14.00714	3.7858978	14
38	Center	17.38000	5.5215034	5
38	Froward	15.25000	8.2731493	2
38	Guard	14.45000	4.0309517	8
39	Center	18.55000	0.9192388	2
39	Froward	21.70000	NA	1
39	Guard	15.16667	6.0739883	3
40	Center	15.43333	0.9073772	3
40	Guard	21.00000	NA	1
41	Center	11.50000	1.9798990	2
42	Center	13.00000	NA	1
NA	Center	NaN	NaN	29
NA	Froward	NaN	NaN	71
NA	Guard	NaN	NaN	95


20.0
17.5
15.0
12.5
10.0
Mean
20
25
30
35
40
Age
Position
Center
Froward
Guard