Game Economics: Analisis de Fortnite

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Game Economics models are seeking to understand how players behave. There is a huge amount of data relating to how the different millions of players in the world play.

In this first analysis (very primary by the way) I have taken some of the variables that make up the Fortnite game base of a player X. Based on that analysis we will try to understand how it behaves, for that specific case. There are behavioral variables of the person, such as performance variables in the game.

I will only make a small descriptive analysis with a certain weight of inference in it.

```
## tibble [87 x 16] (S3: tbl_df/tbl/data.frame)
##  $ Date                : POSIXct[1:87], format: "2018-04-10" "2018-04-10" ...
##  $ Time of Day         : POSIXct[1:87], format: "1899-12-31 18:00:00" "1899-12-31 18:00:00" ...
##  $ Placed              : num [1:87] 27 45 38 30 16 30 20 29 21 24 ...
##  $ Mental State        : chr [1:87] "sober" "sober" "high" "high" ...
##  $ Eliminations        : num [1:87] 2 1 3 1 3 0 3 2 4 1 ...
##  $ Assists             : num [1:87] 0 2 0 3 1 1 3 2 0 2 ...
##  $ Revives             : num [1:87] 0 0 0 0 1 0 0 0 1 0 ...
##  $ Accuracy            : num [1:87] 0.23 0.3 0.3 0.18 0.58 0.1 0.25 0.25 0.39 0.35 ...
##  $ Hits                : num [1:87] 14 19 32 19 42 3 41 17 50 30 ...
##  $ Head Shots          : num [1:87] 2 1 1 1 18 1 6 4 14 1 ...
##  $ Distance Traveled   : num [1:87] 271 397 608 714 1140 ...
##  $ Materials Gathered  : num [1:87] 20 123 71 244 584 ...
##  $ Materials Used      : num [1:87] 20 30 60 10 150 60 150 50 20 70 ...
##  $ Damage Taken        : num [1:87] 272 247 176 238 365 146 175 219 196 150 ...
##  $ Damage to Players   : num [1:87] 331 444 322 330 668 117 634 412 989 422 ...
##  $ Damage to Structures: num [1:87] 621 998 1109 4726 2070 ...
```

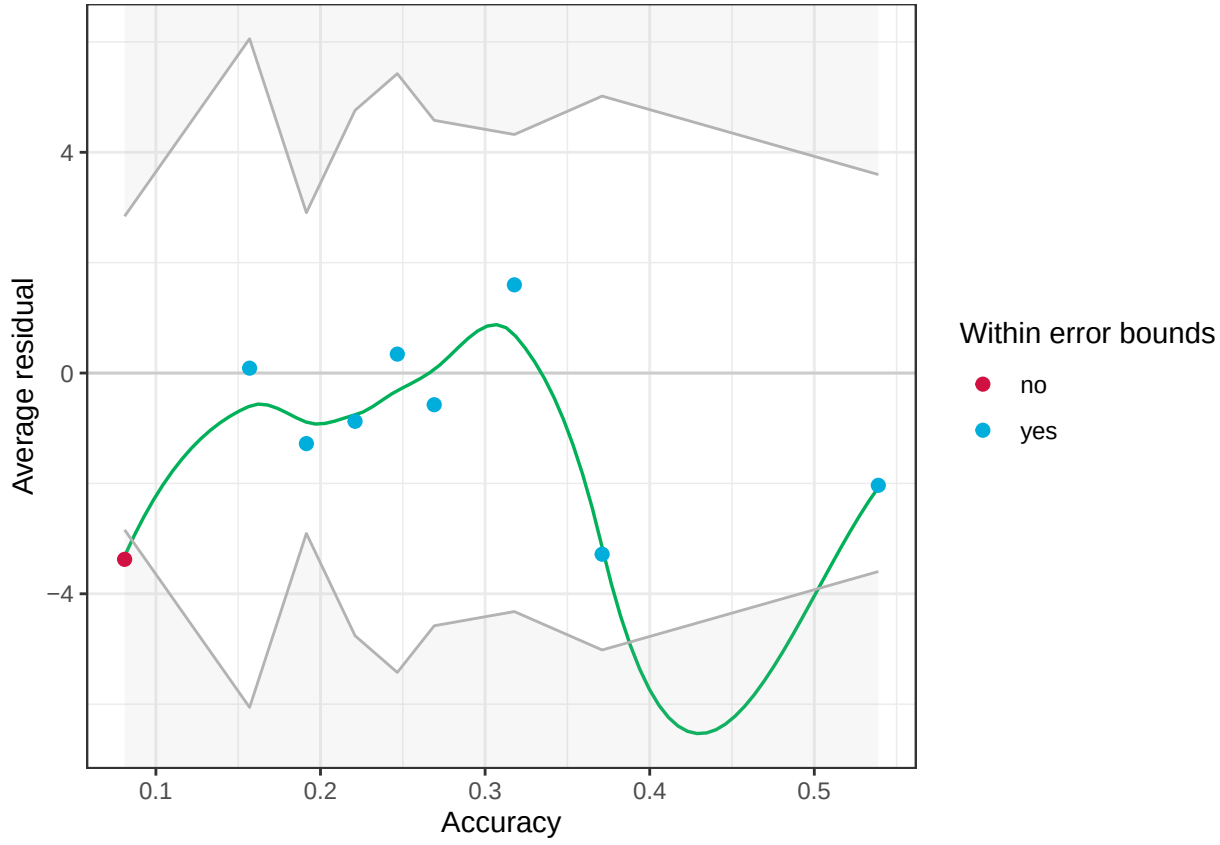
Below we show at a descriptive level, which would be of all the variables that are available in the base, the ones that best fit to explain the model to have a **Good Performance** in the game. As we can see, the weights of the variables are positive and negative, but the fit of the model measured by R2, as well as by the Accuracy of the model, has some weaknesses in the *fit* of the residual values.

```
##
## Call:
## lm(formula = Placed ~ Date + Revives + Accuracy + `Head Shots` +
##     `Distance Traveled`, data = df1)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -11.216  -5.010  -1.109   3.885  33.174
##
## Coefficients:
```

```
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)           2.020e+04  7.158e+03   2.822  0.00600 **
## Date                 -1.324e-05  4.698e-06  -2.818  0.00607 **
## Revives              -2.999e+00  1.142e+00  -2.627  0.01029 *
## Accuracy              1.362e+01  6.491e+00   2.099  0.03897 *
## `Head Shots`         -4.512e-01  1.482e-01  -3.045  0.00314 **
## `Distance Traveled` -7.861e-03  7.810e-04 -10.065 6.32e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## s: 7.493 on 81 degrees of freedom
## Multiple R-squared: 0.694,
## Adjusted R-squared: 0.6751
## F-statistic: 36.74 on 5 and 81 DF,  p-value: < 2.2e-16

## # Accuracy of Model Predictions
##
## Accuracy: 82.91%
##       SE: 9.04%-points
##   Method: Correlation between observed and predicted

## Warning: About 89% of the residuals are inside the error bounds (~95% or higher would be good).
```




```
##
##  studentized Breusch-Pagan test
```

```
##
## data:  modelPlace
## BP = 7.0602, df = 5, p-value = 0.2162
```

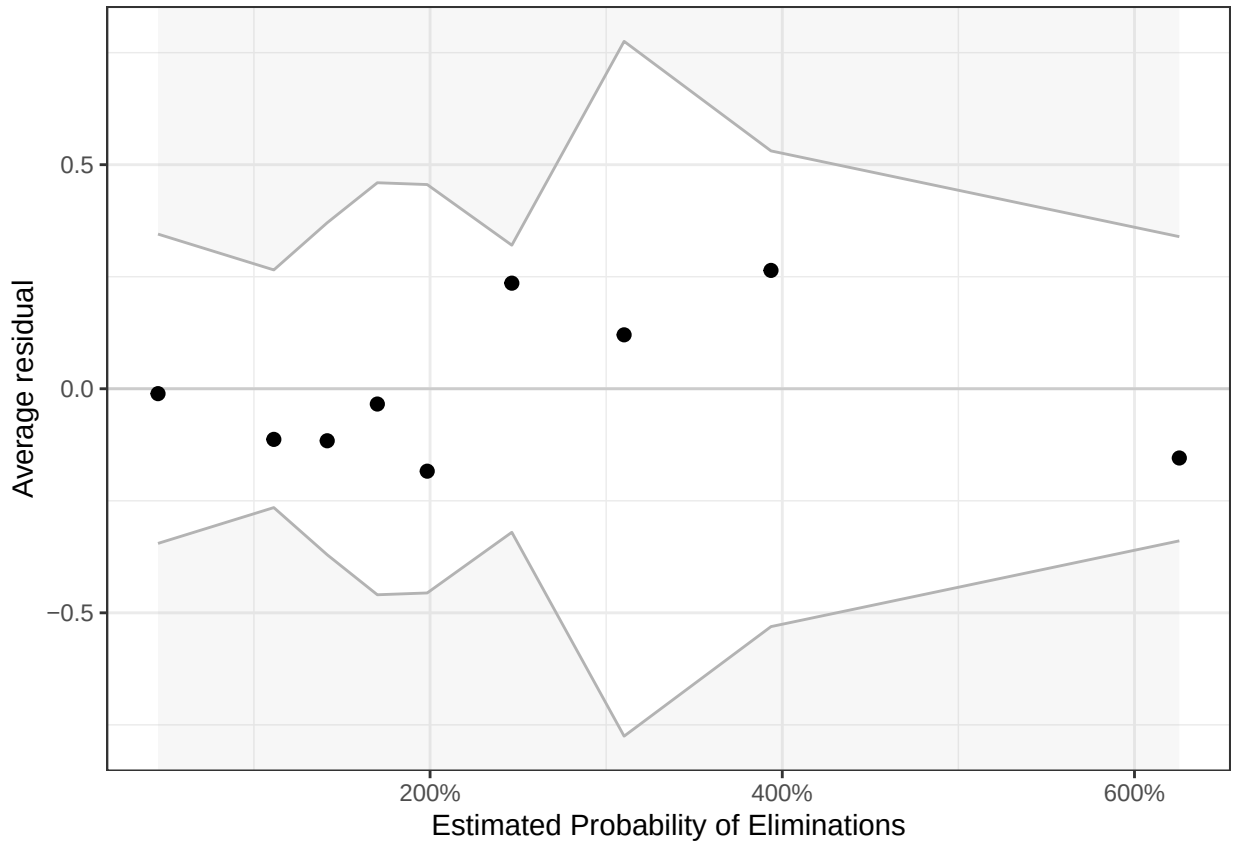
```
##
##  Shapiro-Wilk normality test
##
## data:  modelPlace$residuals
## W = 0.89166, p-value = 2.452e-06
```

In the case of the **Elimination** model, the model also has a good descriptive performance, and why not inferential, since the values of R2 and Accurancy behave quite well.

```
##
## Call:
## lm(formula = Eliminations ~ Date + `Time of Day` + `Mental State` +
##     Assists + Hits + `Head Shots` + `Materials Used` + `Damage to Players` +
##     Placed, data = df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.24921 -0.43578  0.00541  0.43787  2.63679
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)         -5.121e+04  1.375e+04  -3.725 0.000370 ***
## Date                -8.734e-07  5.123e-07  -1.705 0.092236 .
## `Time of Day`       -2.378e-05  6.324e-06  -3.761 0.000328 ***
## `Mental State`       1.830e-01  8.607e-02   2.126 0.036747 *
## Assists             -2.329e-01  6.096e-02  -3.820 0.000269 ***
## Hits                 2.051e-02  6.406e-03   3.201 0.001991 **
## `Head Shots`        -8.246e-02  1.924e-02  -4.285 5.23e-05 ***
## `Materials Used`     1.653e-03  4.624e-04   3.576 0.000607 ***
## `Damage to Players`  3.581e-03  4.661e-04   7.683 4.13e-11 ***
## Placed              -2.103e-02  8.649e-03  -2.431 0.017366 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## s: 0.717 on 77 degrees of freedom
## Multiple R-squared: 0.8705,
## Adjusted R-squared: 0.8554
## F-statistic: 57.53 on 9 and 77 DF,  p-value: < 2.2e-16
```

```
## # Accuracy of Model Predictions
##
## Accuracy: 92.20%
##       SE: 2.12%-points
##   Method: Correlation between observed and predicted
```

```
## Ok: About 100% of the residuals are inside the error bounds.
```

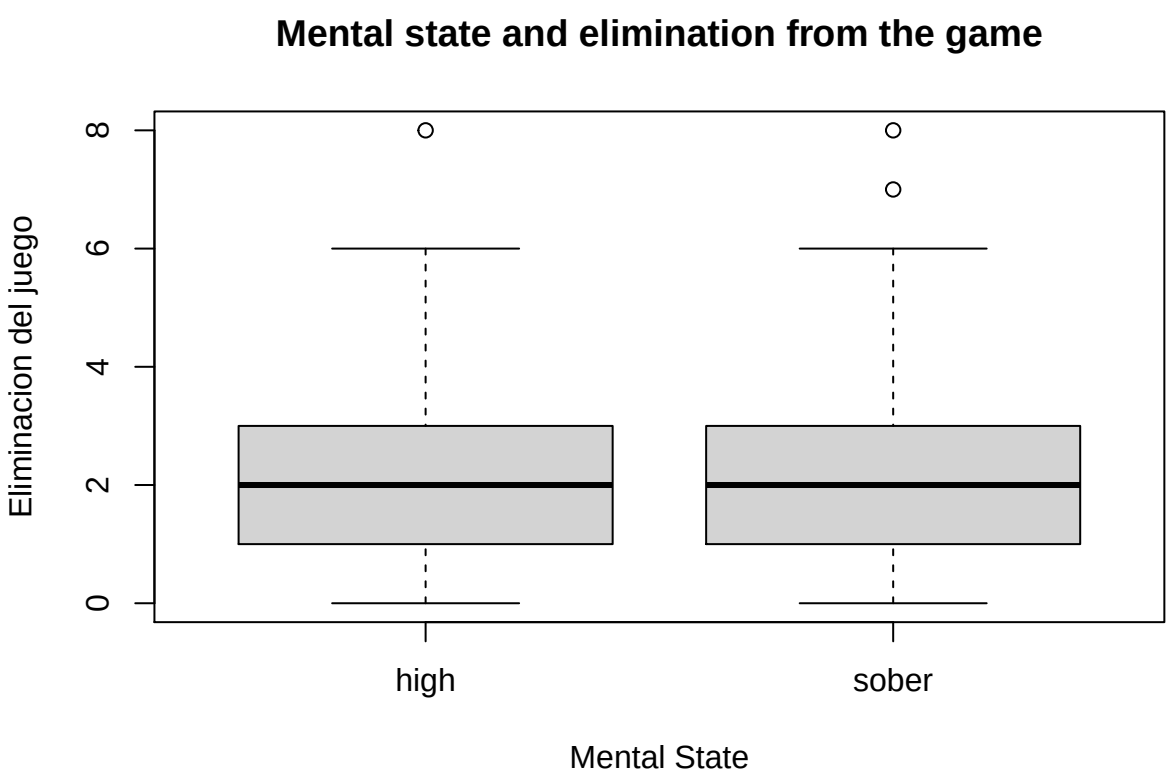


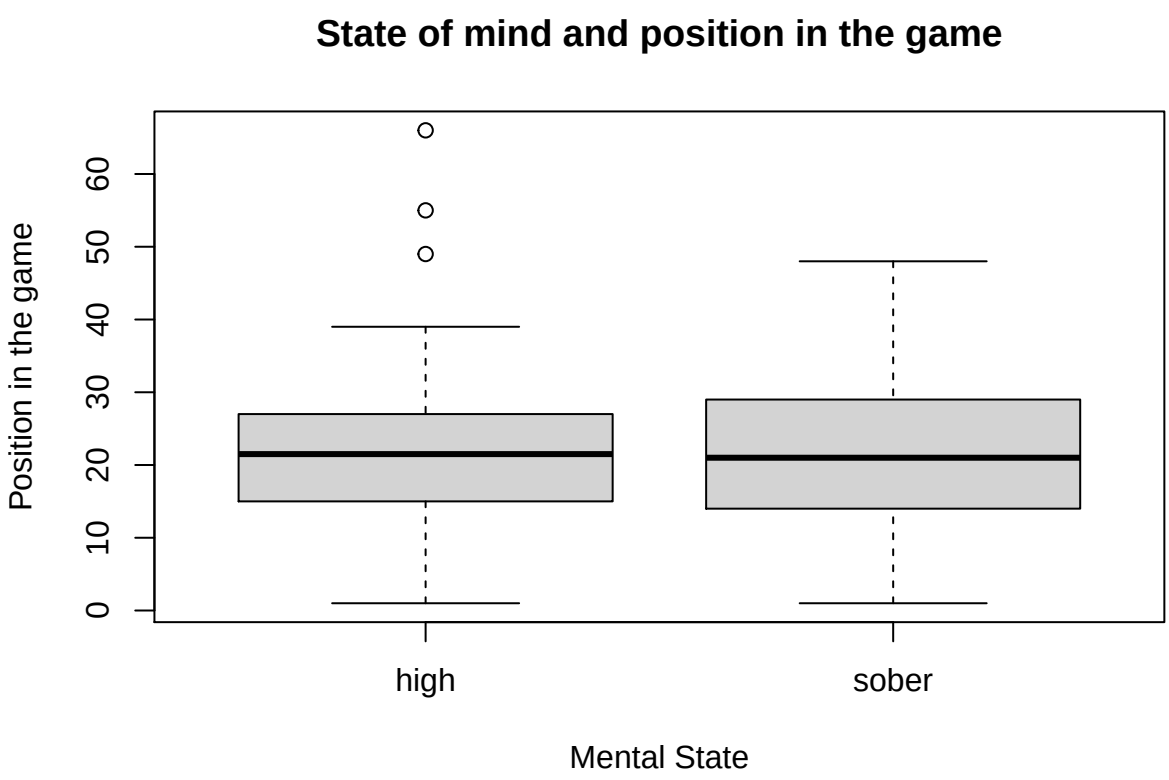

```
##
##  studentized Breusch-Pagan test
##
## data:  modelEli
## BP = 8.1855, df = 9, p-value = 0.5156
```

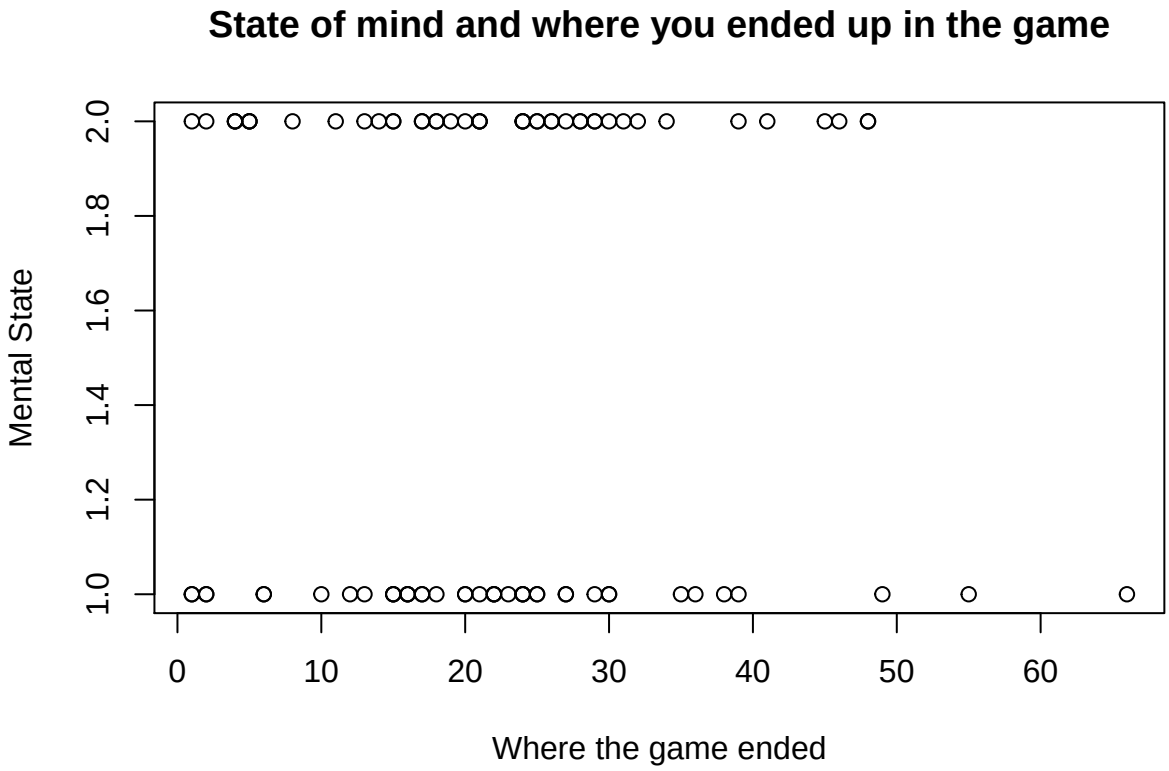
```
##
##  Shapiro-Wilk normality test
##
## data:  modelEli$residuals
## W = 0.958, p-value = 0.006513
```

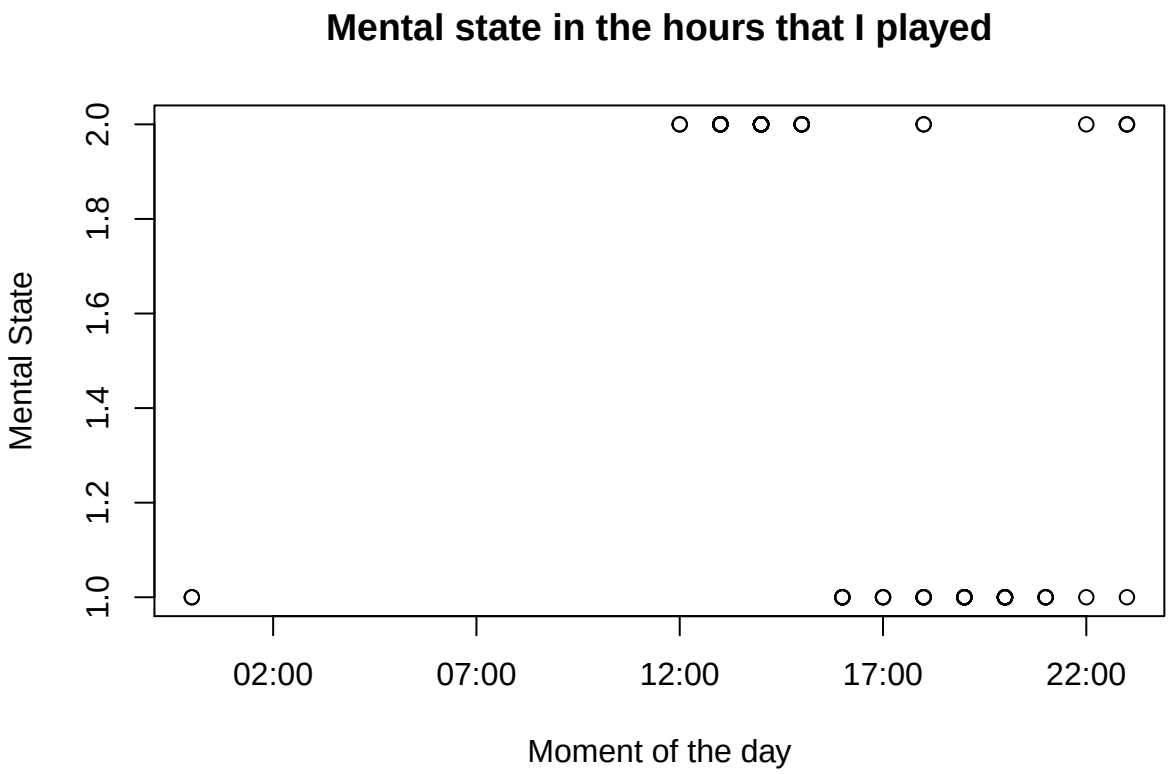
Next, we were struck by the fact that a variable appeared in the database that would explain or influence performance in the game. This variable is the Mental State.

It is evident that the Mental State and its performance do not have major impacts. In turn, the Mental State differed by the time of day.


Mental state and elimination from the game
Eliminacion del juego
0
2
4
6
8
high
sober
Mental State


State of mind and position in the game
Position in the game
0
10
20
30
40
50
60
high
sober
Mental State


State of mind and where you ended up in the game
Mental State
1.0
1.2
1.4
1.6
1.8
2.0
0
10
20
30
40
50
60
Where the game ended


Mental state in the hours that I played
Mental State
1.0
1.2
1.4
1.6
1.8
2.0
02:00
07:00
12:00
17:00
22:00
Moment of the day