Looking at PTZ and bout length as a high active state, I have a dataframe with subjects, bout lengths and timeframes:

```
> head(AllPTZ)
  Subject BoutLength TimeFactor
       1          1          1
       1          1          1
       1          3          1
       1          1          1
       1          1          1
       1          2          1
```

I am sending you this dataframe, saved a table and R code, so you can check things for yourself as well and here is what I have checked:

1. I extracted max per each of 144 subjects(example for first few, run the code if you want to see all):

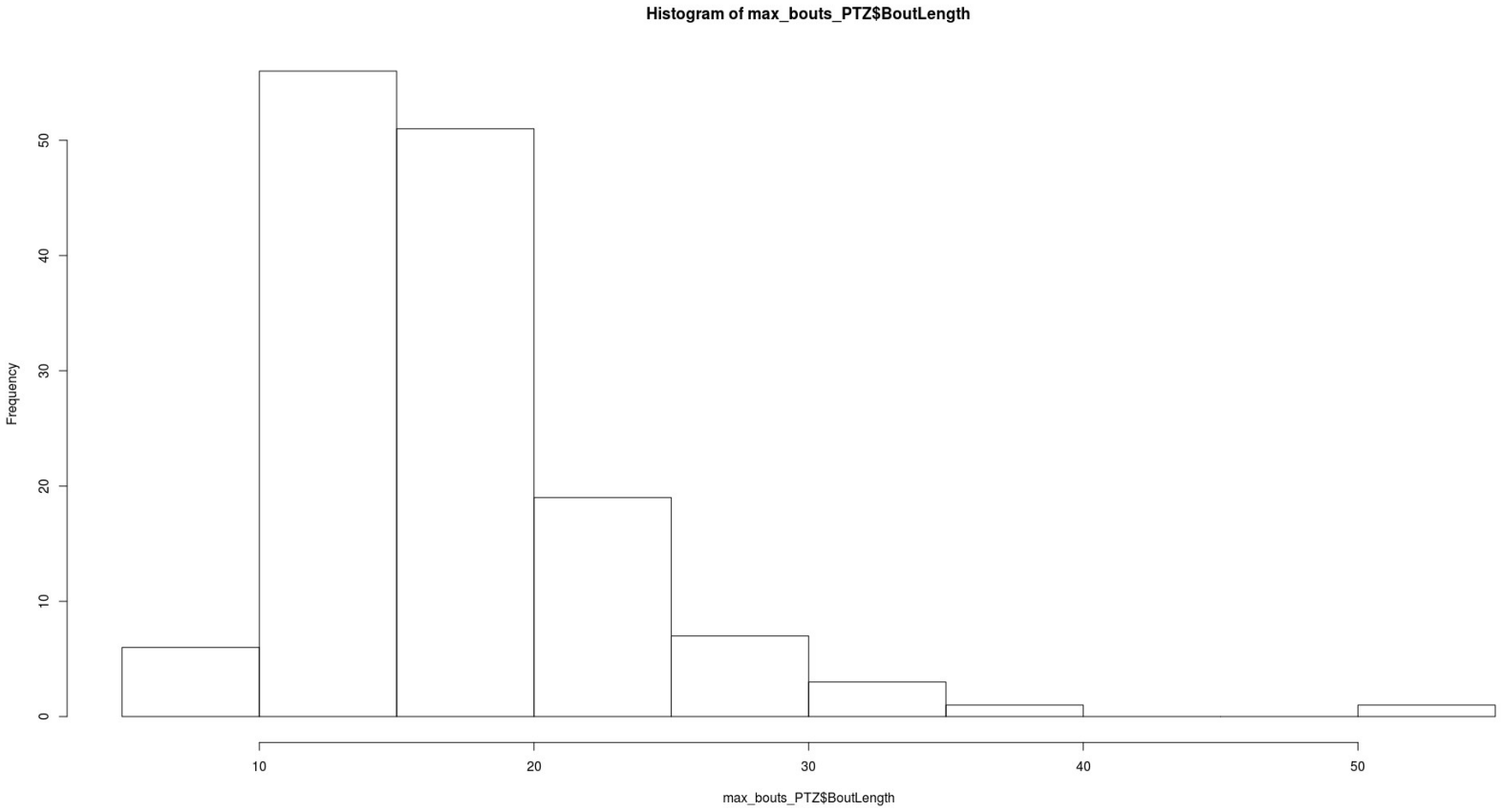
```
> max_bouts_PTZ<-merge(aggregate(BoutLength ~ Subject, data = AllPTZ, FUN = max), AllPTZ)

> max_bouts_PTZ<-max_bouts_PTZ[order(max_bouts_PTZ[,1]),]

> max_bouts_PTZ<-max_bouts_PTZ[!duplicated(max_bouts_PTZ[,1]),]

> head(max_bouts_PTZ)
    Subject BoutLength TimeFactor
        1          13         11
        2          16         12
        3          15          5
        4          13          6
        5          12          3
        6          17          2
```

out of this I checked the min, max, mean and sd of the max values:

```
> min(max_bouts_PTZ$BoutLength)
[1] 8
> max(max_bouts_PTZ$BoutLength)
[1] 53
> mean(max_bouts_PTZ$BoutLength)
[1] 17.21528
> sd(max_bouts_PTZ$BoutLength)
[1] 6.177065
```

So the minimum is 8, which is quite low, but sorting the maximum bout lengths and looking at the occurrences, the majority is from 10 to 20 long :

```
> hist(max_bouts_PTZ$BoutLength)$counts
 [1]  6 56 51 19  7  3  1  0  0  1
> hist(max_bouts_PTZ$BoutLength)$breaks
 [1]  5 10 15 20 25 30 35 40 45 50 55
```

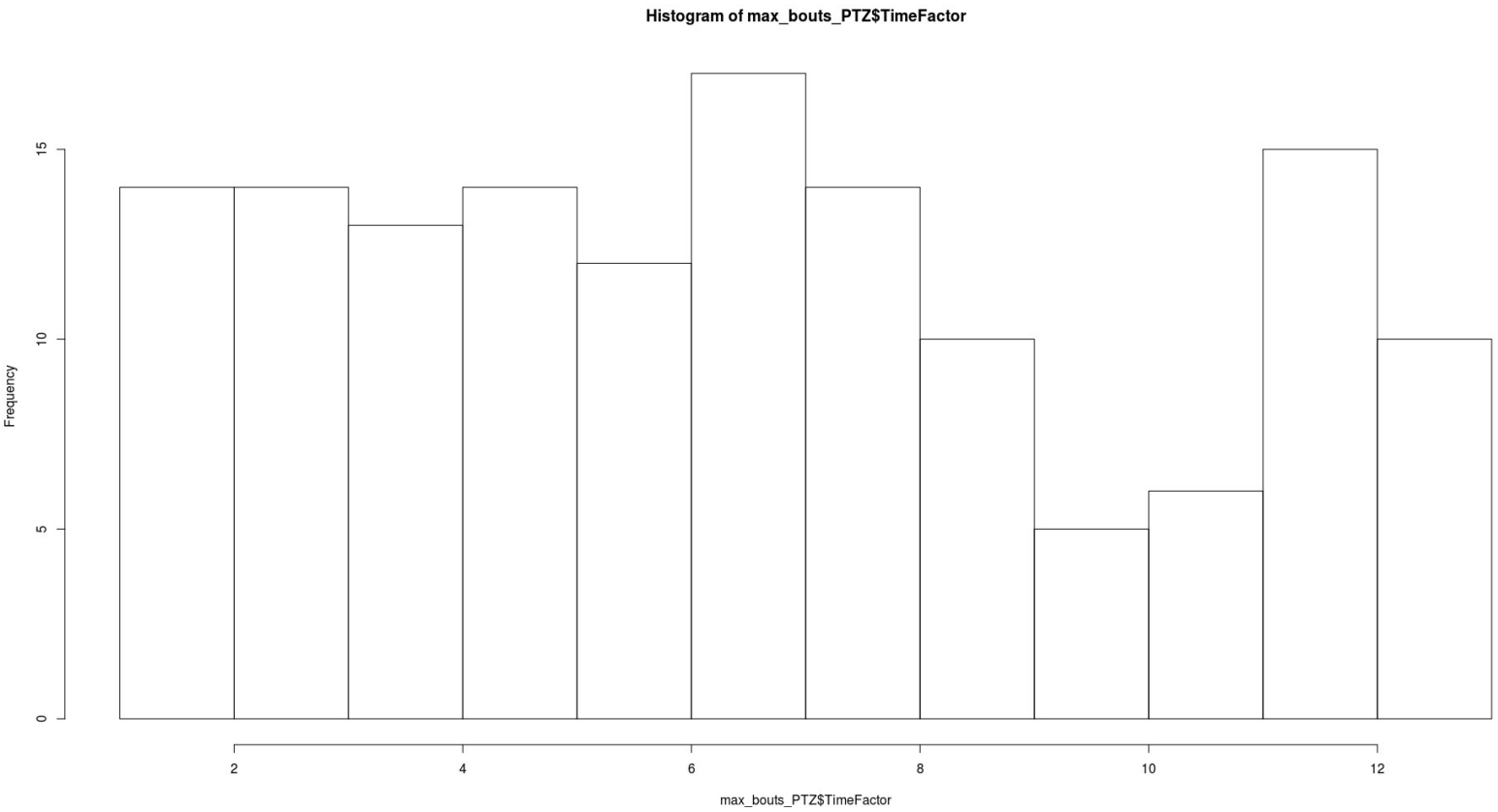


More precisely, the proportions of max bout lengths of all subjects, bigger then 10,15 and 20:

```
> length(max_bouts_PTZ$BoutLength[max_bouts_PTZ$BoutLength>10])/144
[1] 0.9583333
> length(max_bouts_PTZ$BoutLength[max_bouts_PTZ$BoutLength>15])/144
[1] 0.5694444
> length(max_bouts_PTZ$BoutLength[max_bouts_PTZ$BoutLength>20])/144
[1] 0.2152778
```

Looking at the occurrences regarding the time frame:

```
> hist(max_bouts_PTZ$TimeFactor)$counts
 [1] 16 15 13 11 11 18 14 12  6  5 13 10
> hist(max_bouts_PTZ$TimeFactor)$breaks
 [1]  1  2  3  4  5  6  7  8  9 10 11 12 13
```



Going a bit further and checking the first five max length bouts:

```
> max_5_bouts_PTZ<-aggregate(BoutLength ~ Subject, data = AllPTZ,
function(x){return(-sort(-x)[1:5])})
```

```
> head(max_5_bouts_PTZ)
```

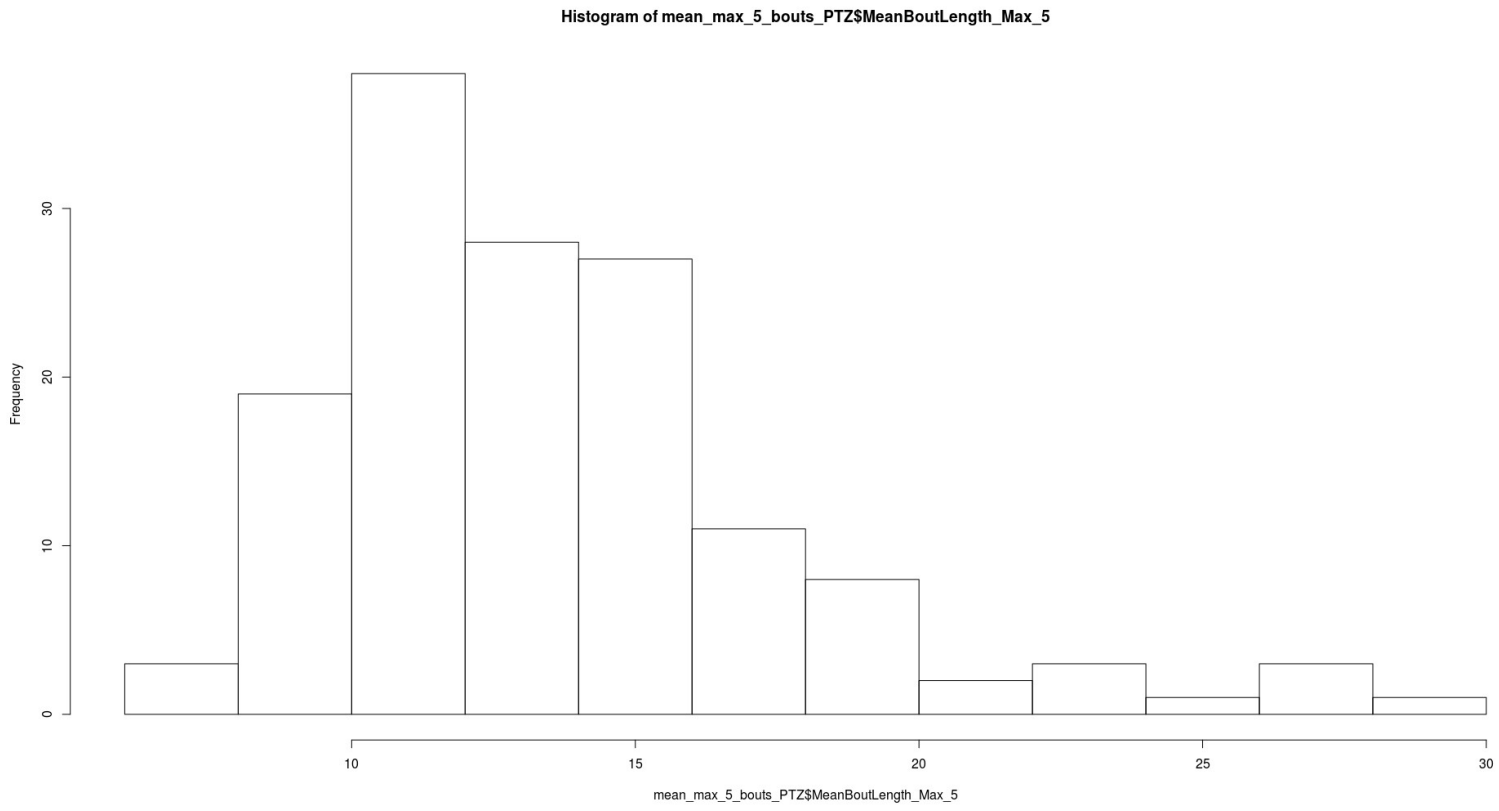
Subject	BoutLength.1	BoutLength.2	BoutLength.3	BoutLength.4	BoutLength.5
1	13	13	11	11	11
2	16	11	10	10	10
3	15	12	12	12	11
4	13	12	11	11	11
5	12	11	10	10	9
6	17	9	9	9	9

The mean of the first five max:

```
> mean_max_5_bouts_PTZ<-
as.data.frame(cbind(max_5_bouts_PTZ$Subject,apply(max_5_bouts_PTZ[,-
1],1,mean)))

> colnames(mean_max_5_bouts_PTZ)<-c("Subject","MeanBoutLength_Max_5")

> min(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5)
[1] 7.2
> max(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5)
[1] 28.2
> mean(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5)
[1] 13.77778
> sd(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5)
[1] 4.120025
```

And the distribution:

```
> hist(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5)$counts
 [1]  3 19 38 28 27 11  8  2  3  1  3  1
> hist(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5)$breaks
 [1]  6  8 10 12 14 16 18 20 22 24 26 28 30
```



Proportions of mean first five max bout lengths bigger than 10, 15, 20:

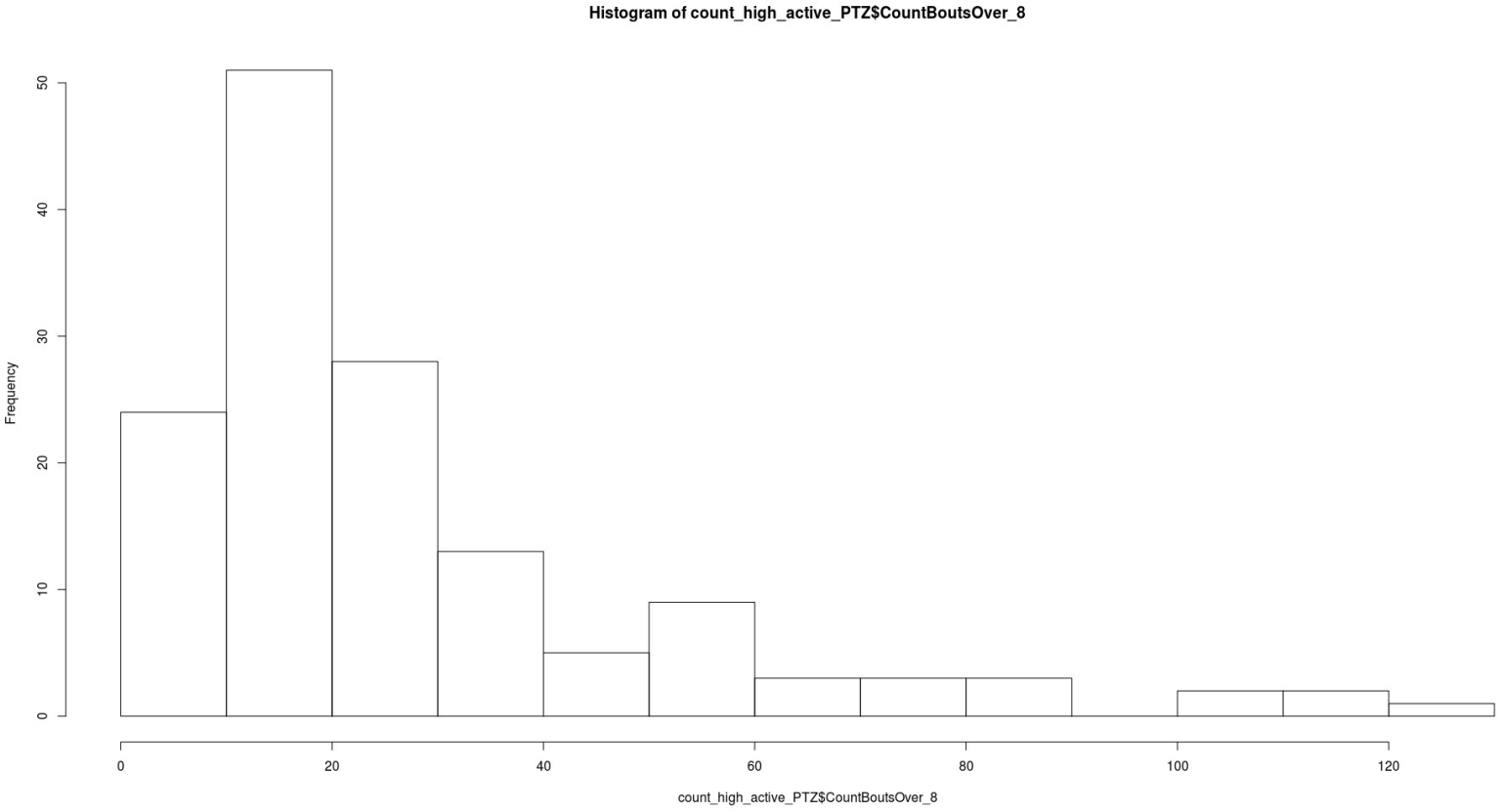
```
>length(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5[mean_max_5_bouts_PT
Z$MeanBoutLength_Max_5>10])/144
[1] 0.8472222
>length(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5[mean_max_5_bouts_PT
Z$MeanBoutLength_Max_5>15])/144
[1] 0.2708333
>length(mean_max_5_bouts_PTZ$MeanBoutLength_Max_5[mean_max_5_bouts_PT
Z$MeanBoutLength_Max_5>20])/144
[1] 0.06944444
```

Count the number of bouts equal or longer than the minimum maximum bout length of all subjects, which is 8.

```
> count_high_active_PTZ<-aggregate(BoutLength ~ Subject, data =
AllPTZ, function(x){return(length(x[x>=8]))})

> colnames(count_high_active_PTZ)<-c("Subject","CountBoutsOver_8")
>
> min(count_high_active_PTZ$CountBoutsOver_8)
[1] 1
>
> max(count_high_active_PTZ$CountBoutsOver_8)
[1] 127
>
> mean(count_high_active_PTZ$CountBoutsOver_8)
[1] 27.80556
>
> sd(count_high_active_PTZ$CountBoutsOver_8)
[1] 24.43495
```

And the distribution:

```
> hist(count_high_active_PTZ$CountBoutsOver_8)$counts
 [1] 24 51 28 13  5  9  3  3  3  0  2  2  1
>
> hist(count_high_active_PTZ$CountBoutsOver_8)$breaks
 [1]   0  10  20  30  40  50  60  70  80  90 100 110 120 130
```

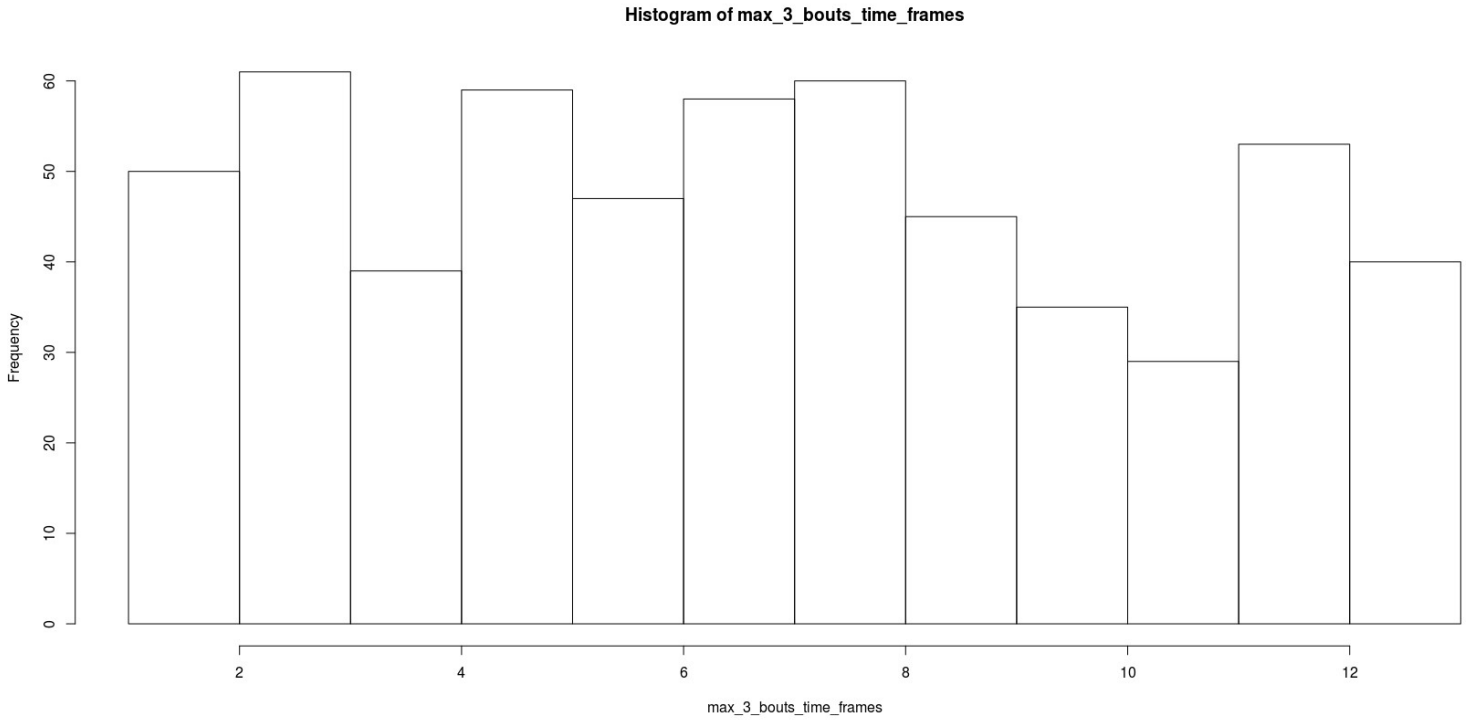


Proportions of these counts bigger than 5, 10, 20 (these counts=total number of bouts bigger than the minimum maximum bout length):

```
>length(count_high_active_PTZ$CountBoutsOver_8[count_high_active_PTZ$
CountBoutsOver_8>5])/144
[1] 0.9305556
>length(count_high_active_PTZ$CountBoutsOver_8[count_high_active_PTZ$
CountBoutsOver_8>10])/144
[1] 0.8333333
>length(count_high_active_PTZ$CountBoutsOver_8[count_high_active_PTZ$
CountBoutsOver_8>15])/144
[1] 0.625
```

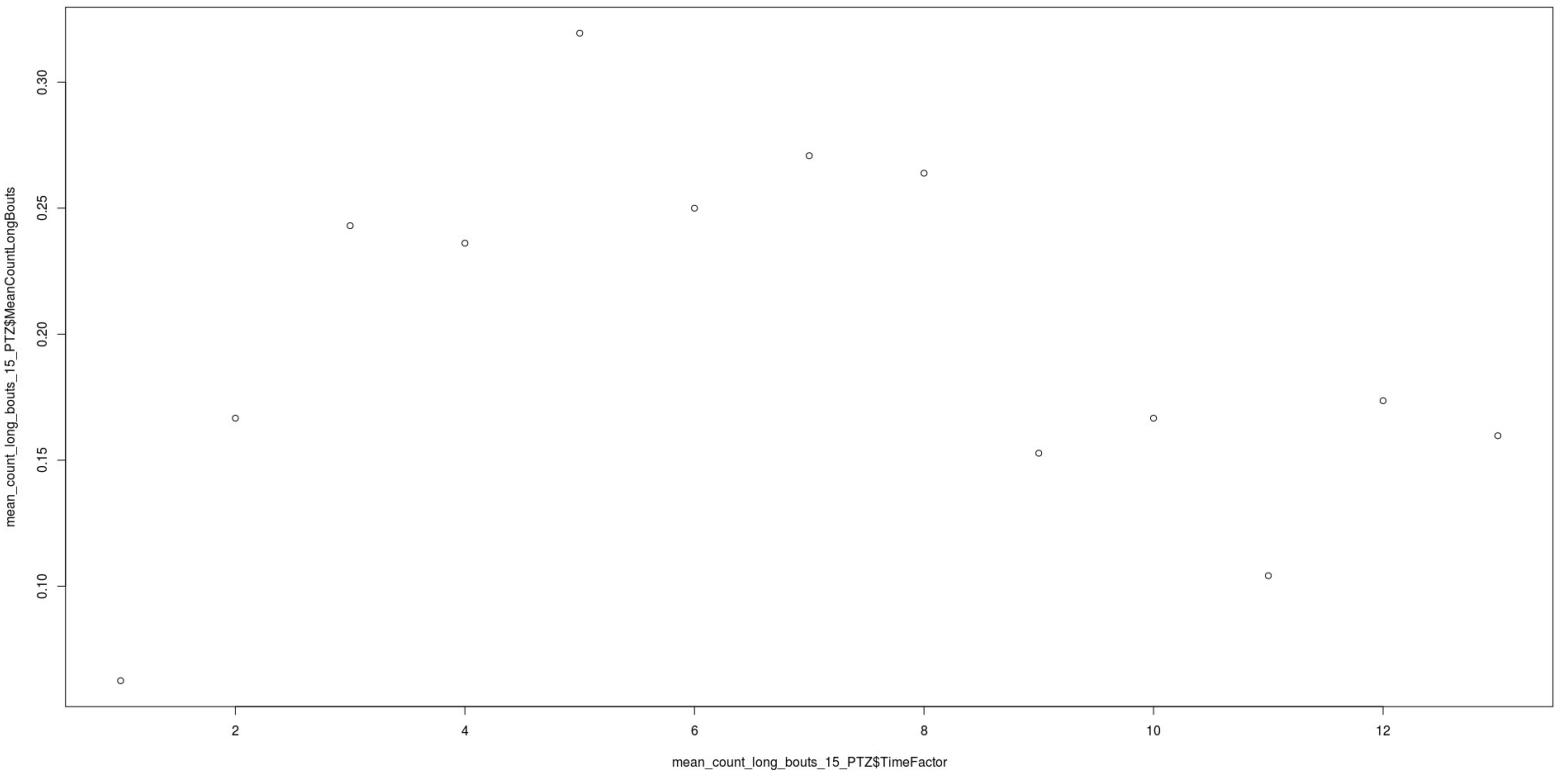
It might help to see the distribution of the first 3 max length bouts, so you know when to look, although it seems almost uniform:

```
> max_3_bouts_time_frames<- max_bouts_PTZ$TimeFactor

> get_time_frames<-merge(aggregate(BoutLength ~ Subject, data =
AllPTZ, function(x){return(-sort(-x)[2])}),AllPTZ)
> get_time_frames<-get_time_frames[order(get_time_frames[,1]),]
> get_time_frames<-get_time_frames[!
duplicated(get_time_frames[,1]),3]

> max_3_bouts_time_frames<-c(max_5_bouts_time_frames,get_time_frames)

> get_time_frames<-merge(aggregate(BoutLength ~ Subject, data =
AllPTZ, function(x){return(-sort(-x)[3])}),AllPTZ)
> get_time_frames<-get_time_frames[order(get_time_frames[,1]),]
> get_time_frames<-get_time_frames[!
duplicated(get_time_frames[,1]),3]

> max_3_bouts_time_frames<-c(max_5_bouts_time_frames,get_time_frames)

> hist(max_3_bouts_time_frames)$counts
 [1] 50 61 39 59 47 58 60 45 35 29 53 40

> hist(max_3_bouts_time_frames)$breaks
 [1]  1  2  3  4  5  6  7  8  9 10 11 12 13
```

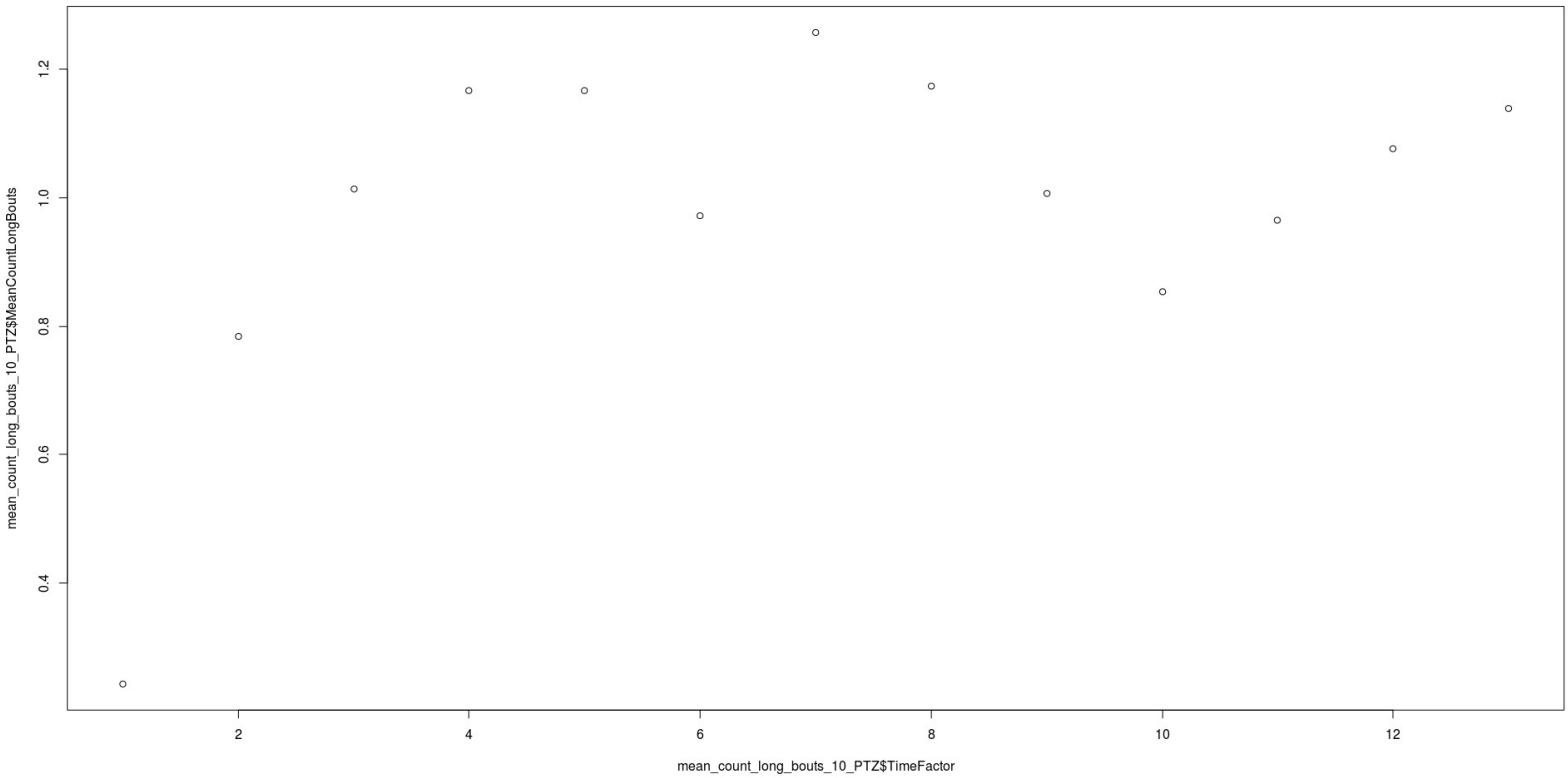


Mean number of bouts longer than 4, 6, 8, 10, 15 per time frame, over all subjects. Note that they can not be exactly seen as mean per subject as the mean is over all counts pooled together, not per subject summed.

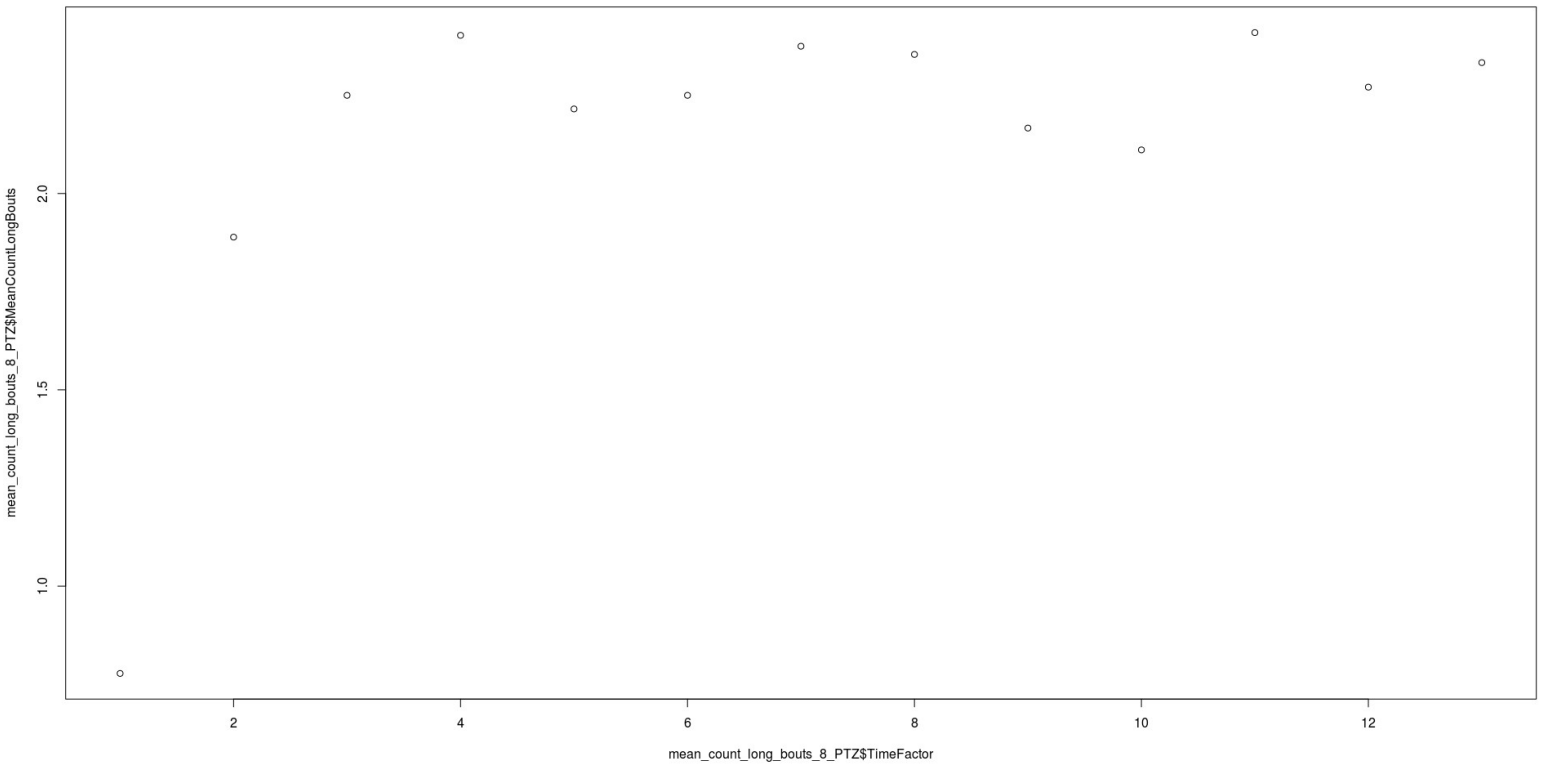
```
> mean_count_long_bouts_15_PTZ<-aggregate(BoutLength ~ TimeFactor, data = AllPTZ,
function(x){return(length(x[x>=15])/144)})
> colnames(mean_count_long_bouts_15_PTZ)<-c("TimeFactor","MeanCountLongBouts")
> mean_count_long_bouts_15_PTZ
   TimeFactor MeanCountLongBouts
1           1          0.0625000
2           2          0.1666667
3           3          0.2430556
4           4          0.2361111
5           5          0.3194444
6           6          0.2500000
7           7          0.2708333
8           8          0.2638889
9           9          0.1527778
10         10          0.1666667
11         11          0.1041667
12         12          0.1736111
13         13          0.1597222
>
plot(mean_count_long_bouts_15_PTZ$TimeFactor,mean_count_long_bouts_15_PTZ$MeanCount
LongBouts)
```



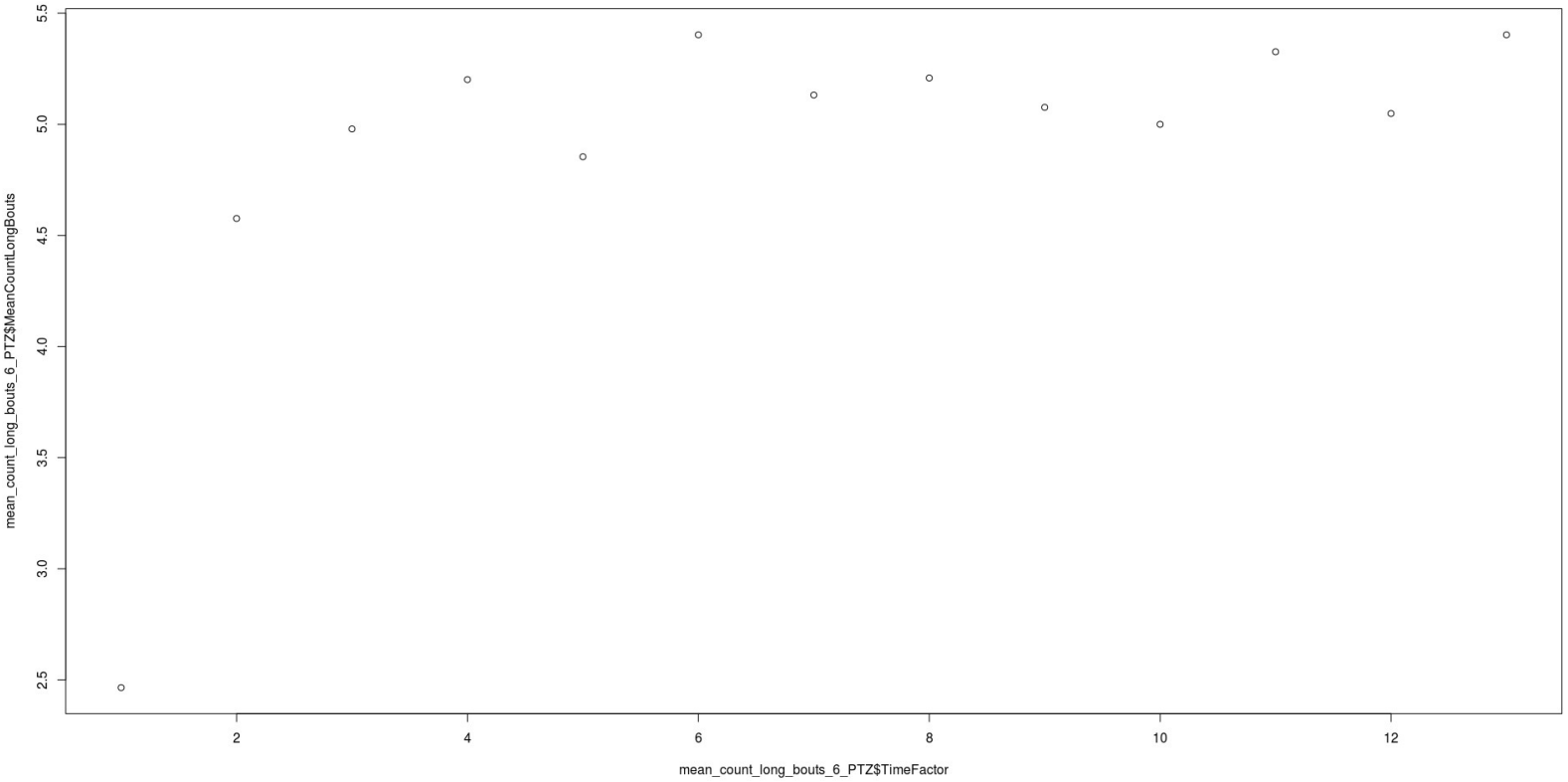
```
> mean_count_long_bouts_10_PTZ<-aggregate(BoutLength ~ TimeFactor, data = AllPTZ,
function(x){return(length(x[x>=10])/144)})
> colnames(mean_count_long_bouts_10_PTZ)<-c("TimeFactor","MeanCountLongBouts")
> mean_count_long_bouts_10_PTZ
   TimeFactor MeanCountLongBouts
1           1          0.2430556
2           2          0.7847222
3           3          1.0138889
4           4          1.1666667
5           5          1.1666667
6           6          0.9722222
7           7          1.2569444
8           8          1.1736111
9           9          1.0069444
10         10          0.8541667
11         11          0.9652778
12         12          1.0763889
13         13          1.1388889
>
plot(mean_count_long_bouts_10_PTZ$TimeFactor,mean_count_long_bouts_10_PTZ$MeanCount
LongBouts)
```



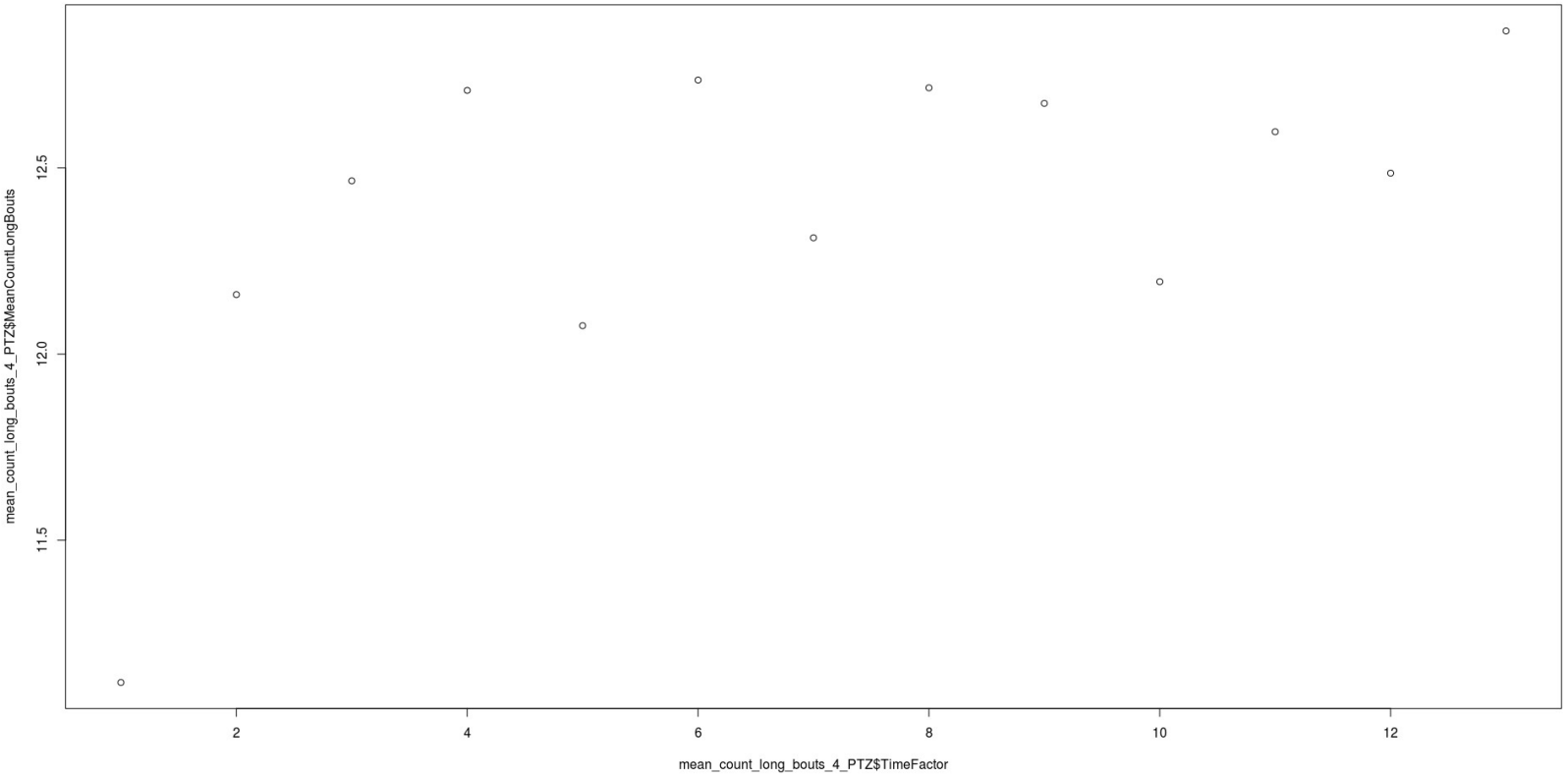
```
> mean_count_long_bouts_8_PTZ<-aggregate(BoutLength ~ TimeFactor, data = AllPTZ,
function(x){return(length(x[x>=8])/144)})
> colnames(mean_count_long_bouts_8_PTZ)<-c("TimeFactor","MeanCountLongBouts")
> mean_count_long_bouts_8_PTZ
   TimeFactor MeanCountLongBouts
1           1          0.7777778
2           2          1.8888889
3           3          2.2500000
4           4          2.4027778
5           5          2.2152778
6           6          2.2500000
7           7          2.3750000
8           8          2.3541667
9           9          2.1666667
10         10          2.1111111
11         11          2.4097222
12         12          2.2708333
13         13          2.3333333
>
plot(mean_count_long_bouts_8_PTZ$TimeFactor,mean_count_long_bouts_8_PTZ$MeanCountLo
ngBouts)
```



```
> mean_count_long_bouts_6_PTZ<-aggregate(BoutLength ~ TimeFactor, data = AllPTZ,
function(x){return(length(x[x>=6])/144)})
> colnames(mean_count_long_bouts_6_PTZ)<-c("TimeFactor","MeanCountLongBouts")
> mean_count_long_bouts_6_PTZ
   TimeFactor MeanCountLongBouts
1           1           2.465278
2           2           4.576389
3           3           4.979167
4           4           5.201389
5           5           4.854167
6           6           5.402778
7           7           5.131944
8           8           5.208333
9           9           5.076389
10         10           5.000000
11         11           5.326389
12         12           5.048611
13         13           5.402778
>
plot(mean_count_long_bouts_6_PTZ$TimeFactor,mean_count_long_bouts_6_PTZ$MeanCountLo
ngBouts)
```

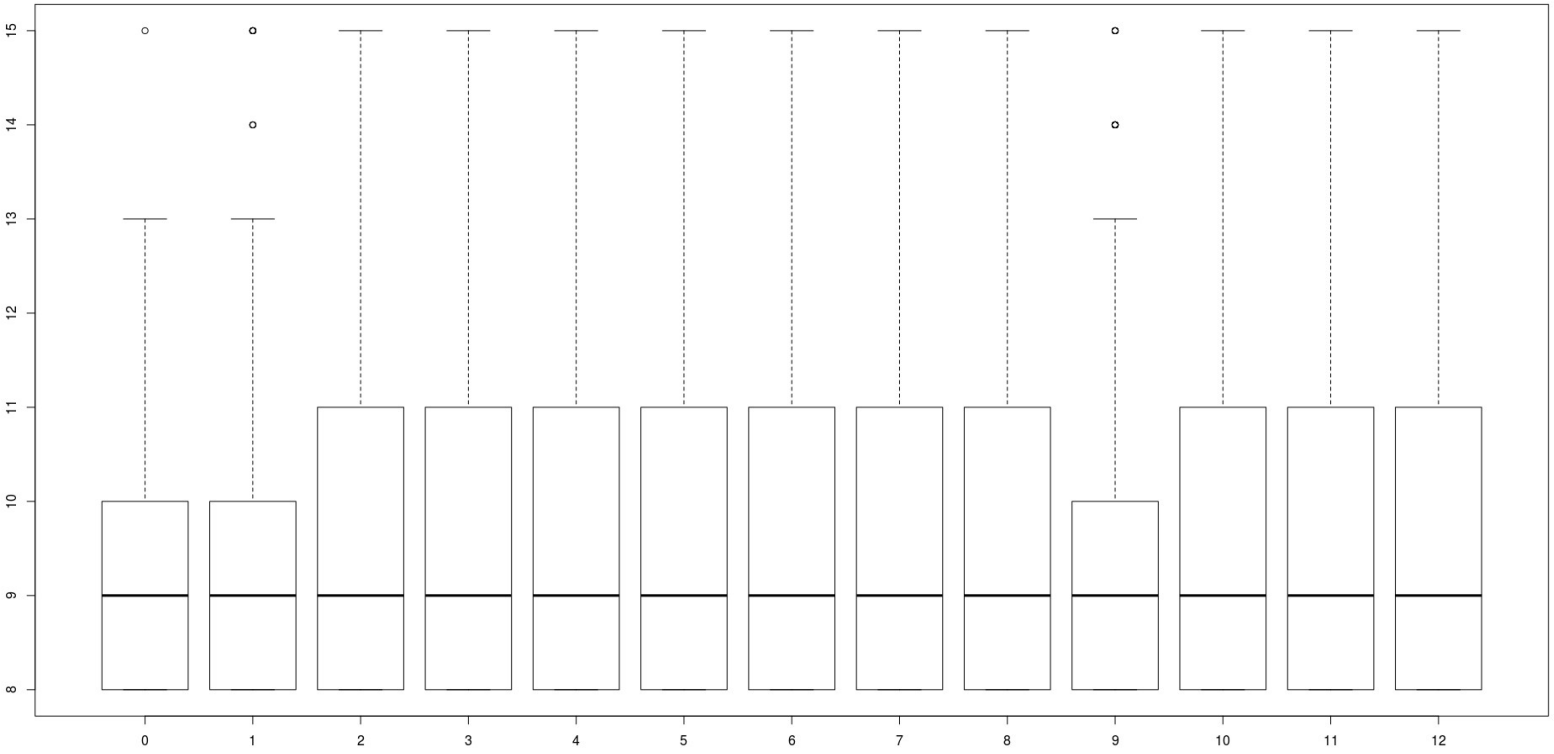


```
> mean_count_long_bouts_4_PTZ<-aggregate(BoutLength ~ TimeFactor, data = AllPTZ,
function(x){return(length(x[x>=4])/144)})
> colnames(mean_count_long_bouts_4_PTZ)<-c("TimeFactor","MeanCountLongBouts")
> mean_count_long_bouts_4_PTZ
   TimeFactor MeanCountLongBouts
1           1           11.11806
2           2           12.15972
3           3           12.46528
4           4           12.70833
5           5           12.07639
6           6           12.73611
7           7           12.31250
8           8           12.71528
9           9           12.67361
10         10           12.19444
11         11           12.59722
12         12           12.48611
13         13           12.86806
>
plot(mean_count_long_bouts_4_PTZ$TimeFactor,mean_count_long_bouts_4_PTZ$MeanCountLo
ngBouts)
```



Box plots of bouts of length from 8 to 16 and over 16 per time frame(characteristics of longer bouts per time, over all subjects=they are in the box)

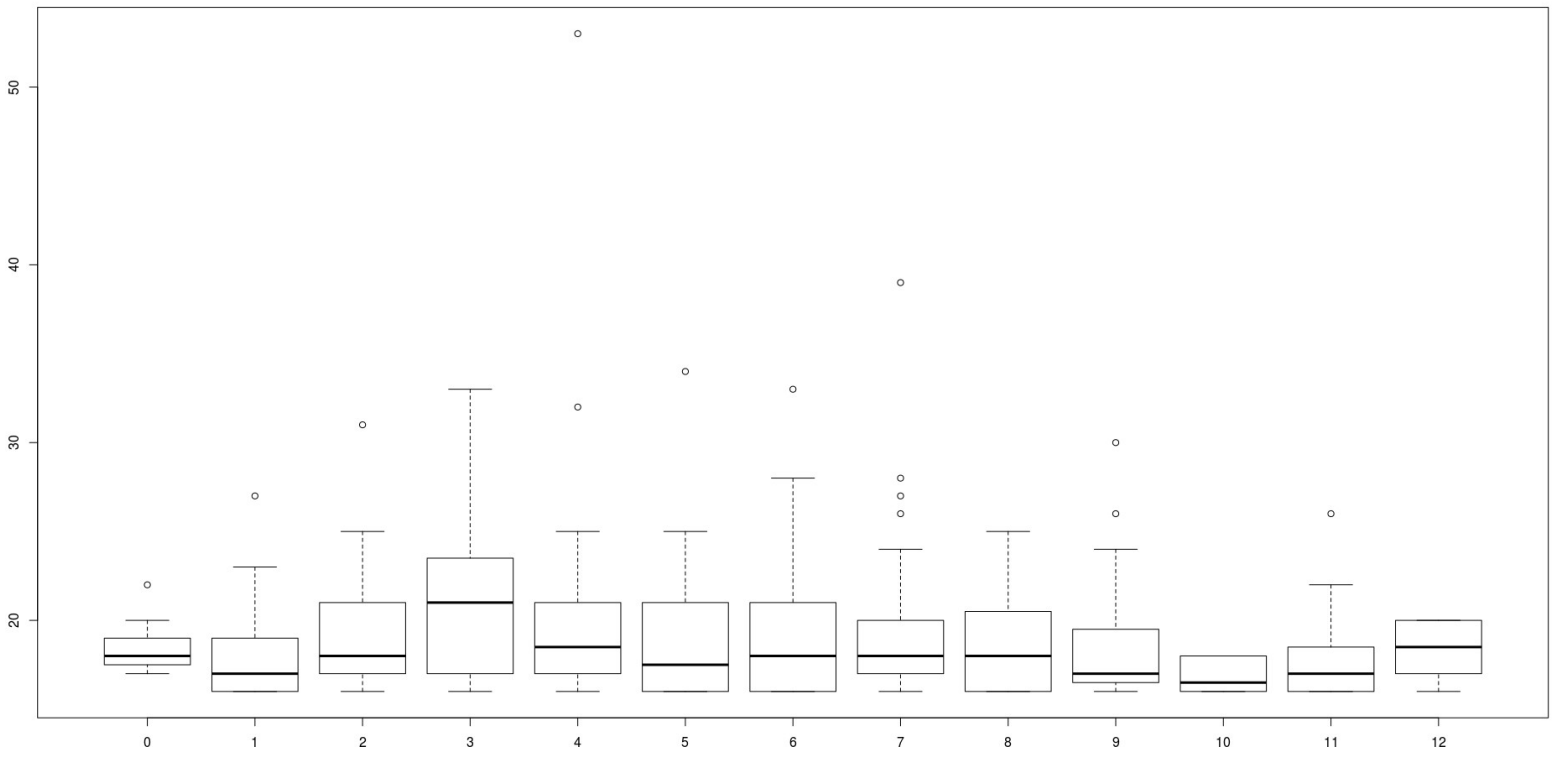
```
PTZ_long_bouts_8_16<-aggregate(BoutLength ~ TimeFactor, data = AllPTZ, function(x)
{return(x[x>=8 & x<16])})
boxplot(sapply(PTZ_long_bouts_8_16[,2], '[',
seq(max(sapply(PTZ_long_bouts_8_16[,2],length)))))
```



Sorry for the missing labels, x is time frame (0-12=1-13), y is bout length and as you can see from the ylim, they go from 8 up to but not including 16.

Same here except the bout length is from including 16 and over:

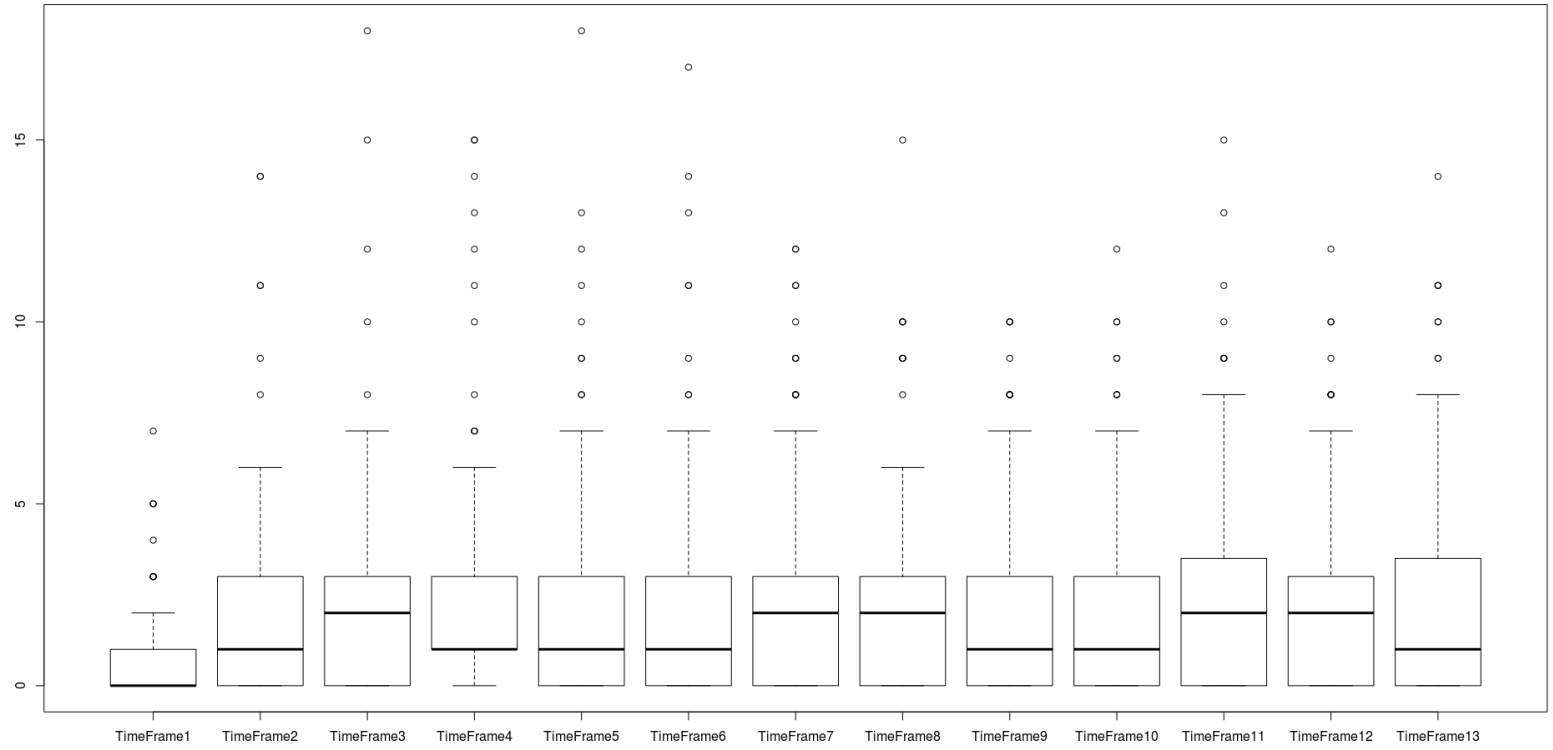
```
PTZ_long_bouts_16<-aggregate(BoutLength ~ TimeFactor, data = AllPTZ, function(x)
{return(x[x>=16])})
boxplot(sapply(PTZ_long_bouts_16[,2], '[',
seq(max(sapply(PTZ_long_bouts_16[,2],length)))))
```



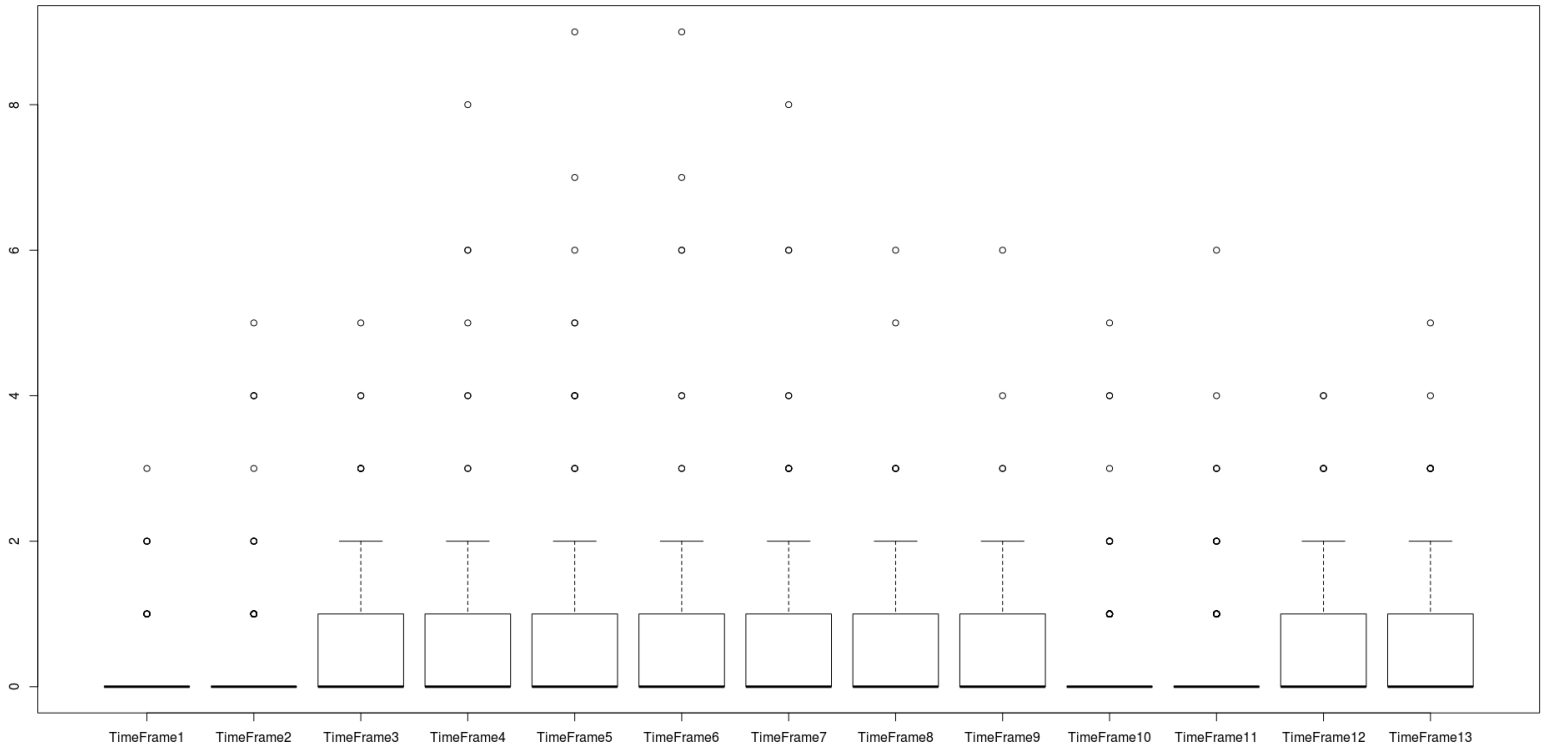
Last, the boxplots of counts of bouts longer then 8,12,6 per time frame over all subjects(subjects form the box)

```
count_longer_8_bouts_PTZ<-aggregate(BoutLength ~ Subject, data =
AllPTZ[AllPTZ$TimeFactor==1,], function(x){return(length(x[x>=8]))})

for(time_frame in 2:13){
      count_longer_8_bouts_PTZ<-cbind(count_longer_8_bouts_PTZ,
aggregate(BoutLength ~ Subject, data = AllPTZ[AllPTZ$TimeFactor==time_frame,],
function(x){return(length(x[x>=8]))})[,2])
}

colnames(count_longer_8_bouts_PTZ)<-
c("Subject","TimeFrame1","TimeFrame2","TimeFrame3","TimeFrame4","TimeFrame5","TimeF
rame6","TimeFrame7","TimeFrame8","TimeFrame9","TimeFrame10","TimeFrame11","TimeFram
e12","TimeFrame13")
```

```
boxplot(count_longer_8_bouts_PTZ[,-1])
```



```
count_longer_12_bouts_PTZ<-aggregate(BoutLength ~ Subject, data =
AllPTZ[AllPTZ$TimeFactor==1,], function(x){return(length(x[x>=12]))})

for(time_frame in 2:13){
      count_longer_12_bouts_PTZ<-cbind(count_longer_12_bouts_PTZ,
aggregate(BoutLength ~ Subject, data = AllPTZ[AllPTZ$TimeFactor==time_frame,],
function(x){return(length(x[x>=12]))})[,2])
}

colnames(count_longer_12_bouts_PTZ)<-
c("Subject","TimeFrame1","TimeFrame2","TimeFrame3","TimeFrame4","TimeFrame5","TimeF
rame6","TimeFrame7","TimeFrame8","TimeFrame9","TimeFrame10","TimeFrame11","TimeFram
e12","TimeFrame13")

boxplot(count_longer_12_bouts_PTZ[,-1])
```



```
count_longer_6_bouts_PTZ<-aggregate(BoutLength ~ Subject, data =
AllPTZ[AllPTZ$TimeFactor==1,], function(x){return(length(x[x>=6]))})

for(time_frame in 2:13){
      count_longer_6_bouts_PTZ<-cbind(count_longer_6_bouts_PTZ,
aggregate(BoutLength ~ Subject, data = AllPTZ[AllPTZ$TimeFactor==time_frame,],
function(x){return(length(x[x>=6]))})[,2])
}

colnames(count_longer_6_bouts_PTZ)<-
c("Subject","TimeFrame1","TimeFrame2","TimeFrame3","TimeFrame4","TimeFrame5","TimeF
rame6","TimeFrame7","TimeFrame8","TimeFrame9","TimeFrame10","TimeFrame11","TimeFram
e12","TimeFrame13")

boxplot(count_longer_6_bouts_PTZ[,-1])
```