Synchrony in Psychotherapy, example with F1044 patient data

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Lists

Functions list

MeanMomentumByTime

Function that takes raw motion history data and make mean on a given interval. Intervals don't overlap, so the frequency of the data change (from 25 frames by seconde to 25 frames/interval by second).

Arguments:

- subject : Subject studied (patient, mother, father or therapist)
- indexOfvideos : List of videos studied (element eg 3 or list eg 1:3 or c(1,2,4))
- interval : number of frames in the studied interval
- data : data frame where there is data

```
MeanMomentumByTime <- function(subject, indexOfvideos=1:NumberOfvideos, interval, data){
  x <- c()
  for (file in indexlist[indexOfvideos]){
        dataVector <- data[which(data$file==file), subject]
        ## with ceiling : superior limit of the round
        IntervalNumbersVideo <- ceiling(length(dataVector)/interval)
        for (i in 1:IntervalNumbersVideo){
                borneinf<- 1+(i-1)*interval
                bornesup <-i*interval
                dataVectorInterval <- dataVector[borneinf:bornesup]
                mean <- mean(dataVectorInterval, na.rm=TRUE)
                x <- c(x, mean)
        }
  }
  return (x)
}
```

Slidinginterval

Function that takes raw motion history data and make mean on a given interval. The interval overlap, so the frequency of the data don't change. It stays at 25 frames/s.

Arguments:

- subject : subject studied (patient, mother, father or therapist)
- indexOfvideos : list of videos studied (element eg. 3 or list eg 1:3 or c(1,2,4))
- interval : number of frames in the studied interval
- data : data frame where there is data

```
SlidingInterval <- function(subject, indexOfvideos=1:NumberOfvideos, interval, data){
  x <- c()
  for (file in indexlist[indexOfvideos]){
      dataVector <- data[which(data$file==file), subject]
      NBofAnalysedframes <- length(dataVector)-interval+1
          for (i in 1:NBofAnalysedframes){
              borneinf<- (i)
              bornesup <-(interval-1+i)
              dataVectorInterval <- dataVector[borneinf:bornesup]
              mean <- mean(dataVectorInterval, na.rm=TRUE)
              x <- c(x, mean)
          }
  }
  return (x)
}
```

File lists

```
indexlist <- c("F1044C.VOB","F1044D1.VOB","F1044D2.VOB","F1044E.VOB","F1044F.VOB",
               "F1044G.VOB","F1044H.VOB","F1044I.VOB","F1044L.VOB","F1044M1.VOB",
               "F1044M2.VOB","F1044N.VOB", "F1044O.VOB", "F1044P.VOB", "F1044Q.VOB",
               "F1044R1.VOB","F1044R2.VOB")

labelvideolist<- c("C","D1","D2","E","F", "G","H","I","L","M1", "M2","N", "O", "P", "Q",
                   "R1","R2")

NumberOfvideos <- length(indexlist)

colOrderList <- c("blue","red", "green","orange")
```

Participants list

```
## [1] "father"    "mother"    "patient"   "therapist"
```

Presentation of the data

The timeMin is corresponding to a frame rate 25/sec.

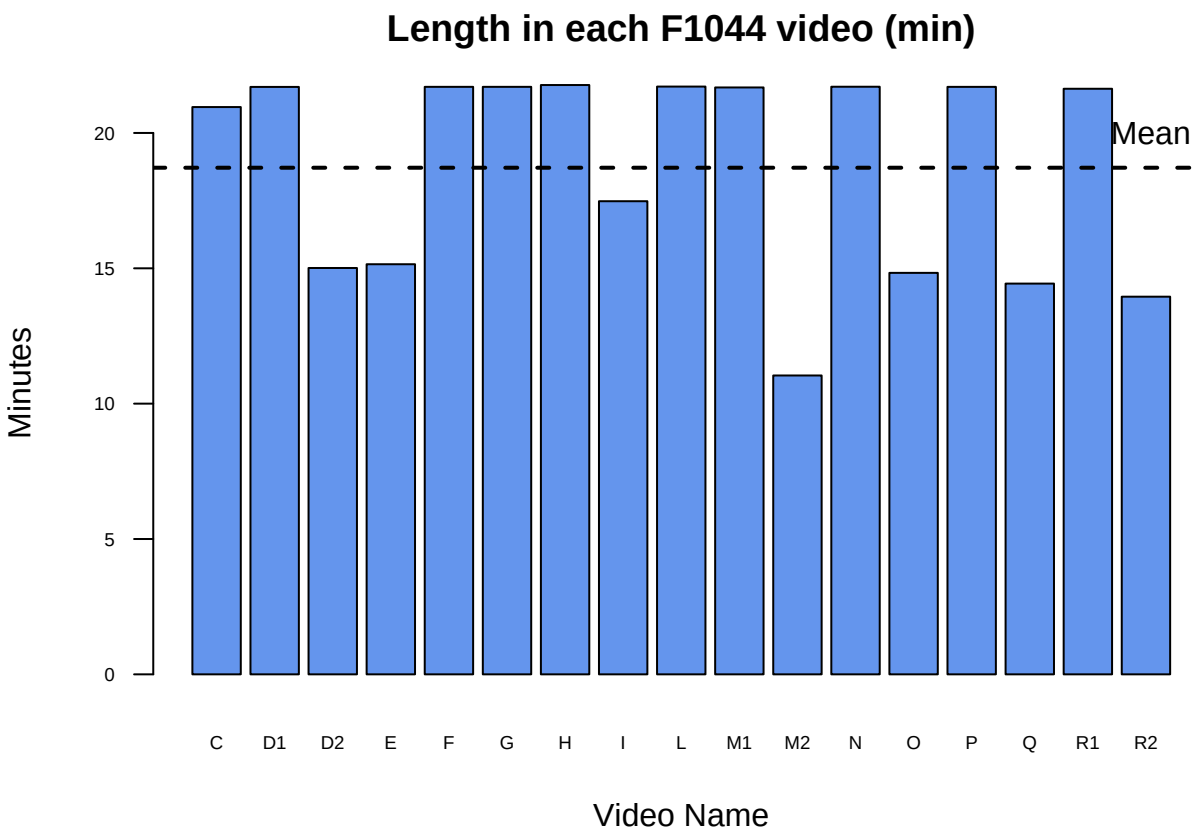
```
str(data)
```

```
## 'data.frame':    477258 obs. of  7 variables:
##  $ frame    : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ father   : num  0.01996 0.00915 0.01355 0.01787 0.01758 ...
##  $ mother   : num  1.82e-05 1.82e-05 3.64e-05 1.82e-05 9.09e-05 ...
##  $ patient  : num  NA NA NA NA NA NA NA NA NA NA ...
##  $ therapist: num  0.00162 0.00506 0.00349 0.00223 0.00249 ...
##  $ file     : Factor w/ 17 levels "F1044C.VOB","F1044D1.VOB",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ timeMin  : num  0.000667 0.001333 0.002 0.002667 0.003333 ...
```

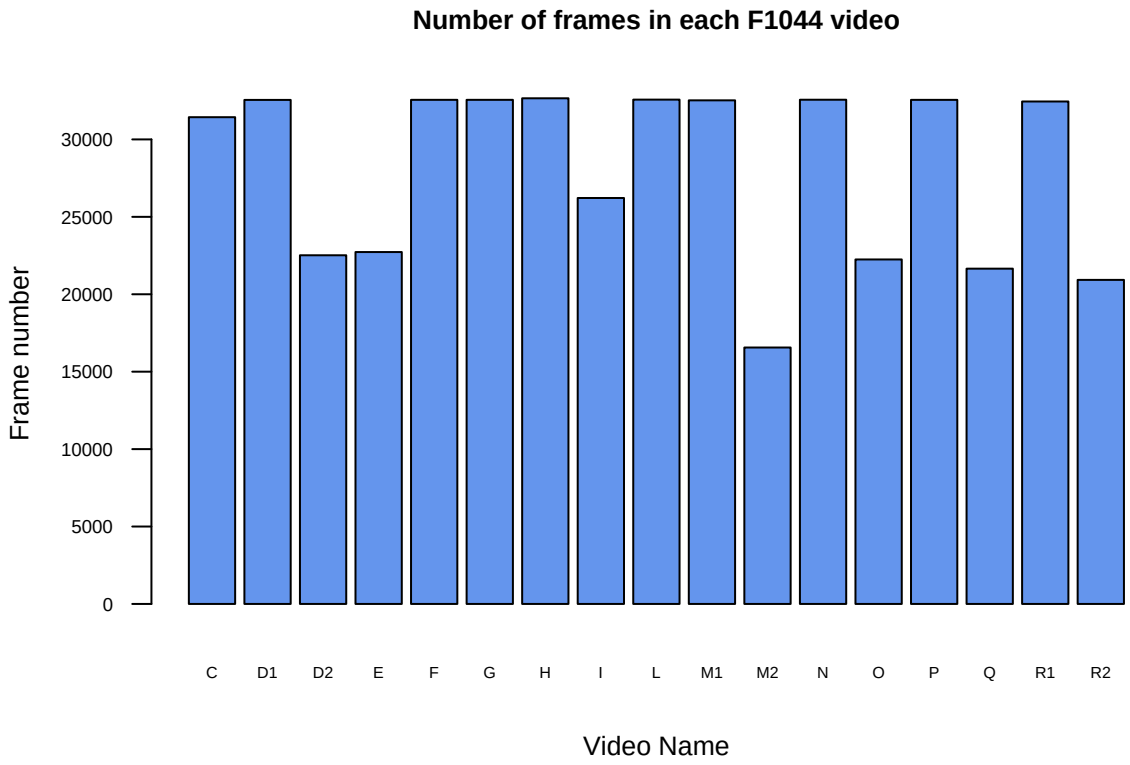
```
summary(data)
```

```
##      frame           father           mother         patient
##  Min.   :    1   Min.   :0.00     Min.   :0.00    Min.   :0.00
##  1st Qu.: 7019   1st Qu.:0.00     1st Qu.:0.00    1st Qu.:0.00
##  Median :14038   Median :0.00     Median :0.00    Median :0.00
##  Mean   :14576   Mean   :0.00     Mean   :0.00    Mean   :0.01
##  3rd Qu.:21364   3rd Qu.:0.00     3rd Qu.:0.00    3rd Qu.:0.01
##  Max.   :32656   Max.   :0.19     Max.   :0.49    Max.   :0.54
##                  NA's   :265686   NA's   :91545   NA's   :189317
##    therapist             file           timeMin
##  Min.   :0.0     F1044H.VOB: 32656   Min.   : 0.000667
##  1st Qu.:0.0     F1044L.VOB: 32570   1st Qu.: 4.679333
##  Median :0.0     F1044N.VOB: 32562   Median : 9.358333
##  Mean   :0.0     F1044G.VOB: 32556   Mean   : 9.717052
##  3rd Qu.:0.0     F1044F.VOB: 32555   3rd Qu.:14.242667
##  Max.   :0.8     F1044P.VOB: 32554   Max.   :21.770667
##  NA's   :77972   (Other)   :281805
```

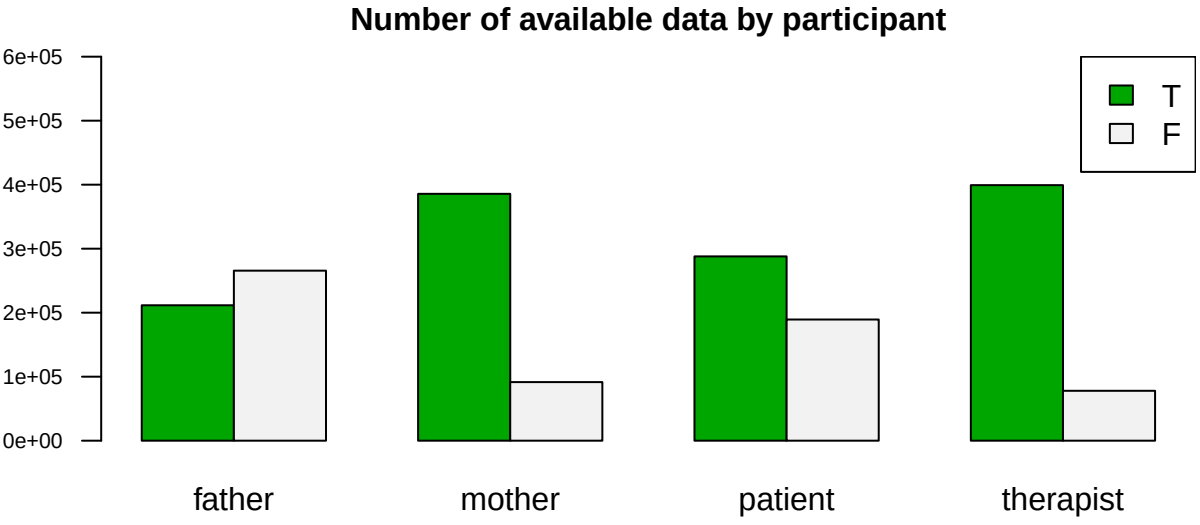
Length of the videos in minutes



Length of the videos in number of frames



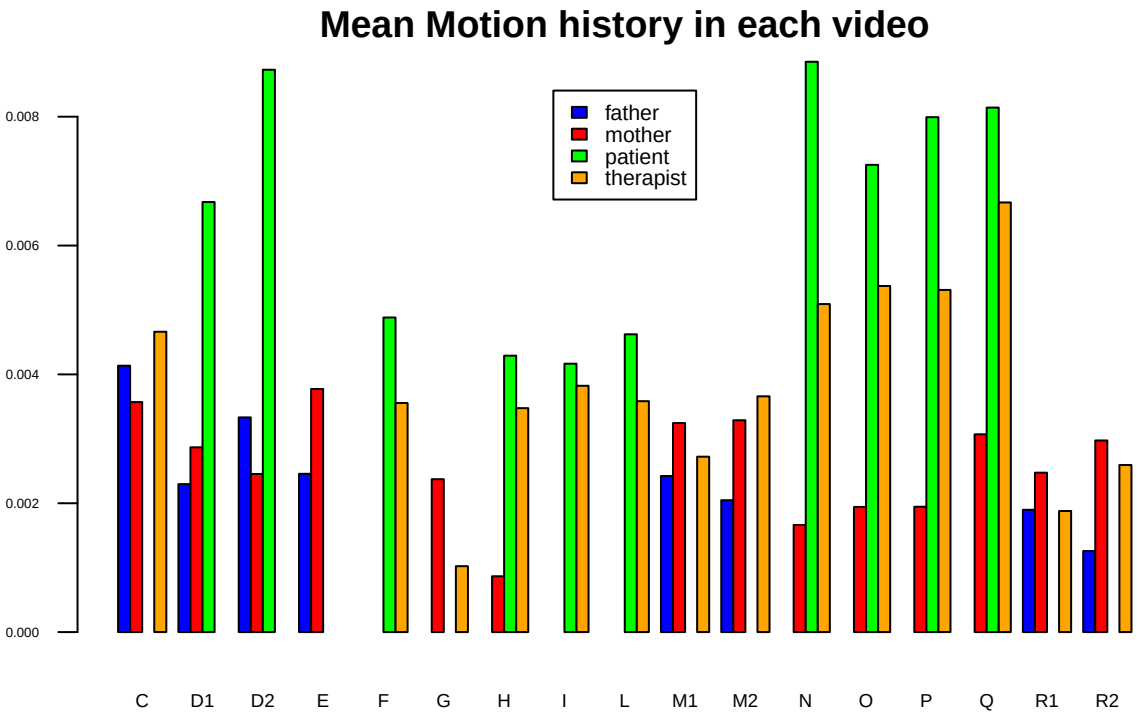
Number of Available (True) and Not Available (False) data for each participant



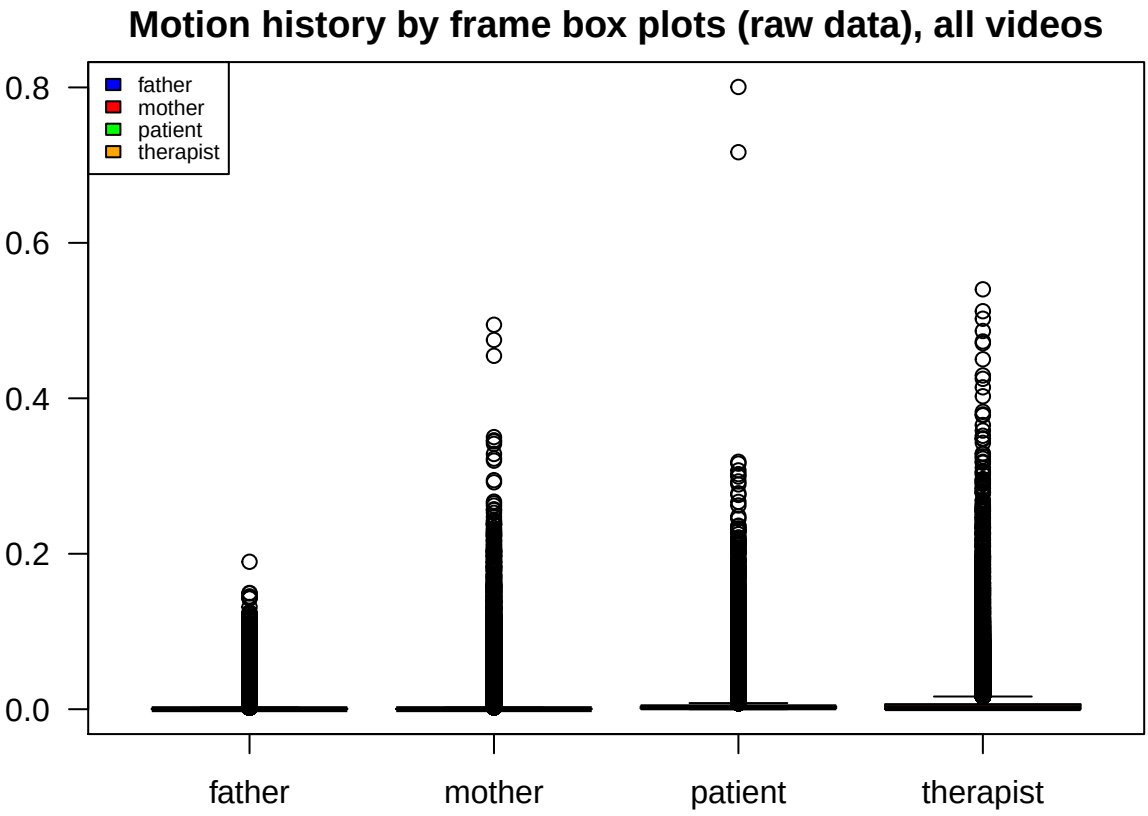
Mother and therapist are the more often present participants.

Global Motion history

Mean Motion history by video by participant



Motion history box plots by frame (raw data), all videos



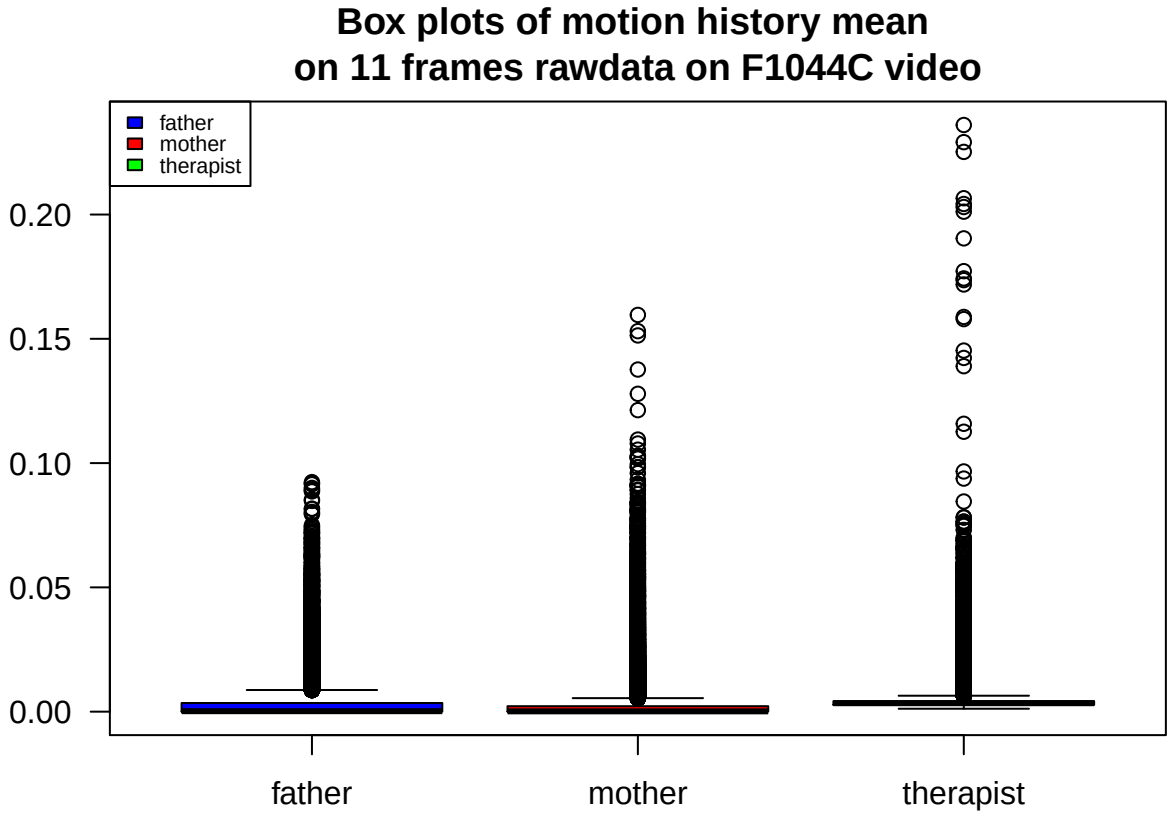
Raw data and mean of Motion History on sliding and non overlapping intervals on F1044C video

F1044C video

It is the first video of F10044C. The father, mother and therapist are present. The patient is absent.

Raw data

```
rawdatafather <- data[which(data$file=="F1044C.VOB"),]$father
rawdataMother <- data[which(data$file=="F1044C.VOB"),]$mother
rawdataTherapist <- data[which(data$file=="F1044C.VOB"),]$therapist

par(mar=c(3,3,3,2))
boxplot(rawdatafather, rawdataMother, rawdataTherapist,
        col=colOrderList[c(1,2,4)],
        names=ParticipantsList[c(1,2,4)],
        main= "Box plots of motion history mean
on 11 frames rawdata on F1044C video", las=1)
par(mar=c(1,0.5,0.5,1))
legend("topleft", ParticipantsList[c(1,2,4)], fill=colOrderList, cex=0.7)
```




```
summary(rawdatafather)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.     NA's
## 0.000000 0.000000 0.000196 0.004135 0.003488 0.092340       10
```

```
summary(rawdataMother)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.     NA's
## 0.000000 0.000036 0.000127 0.003570 0.002200 0.159600       10
```

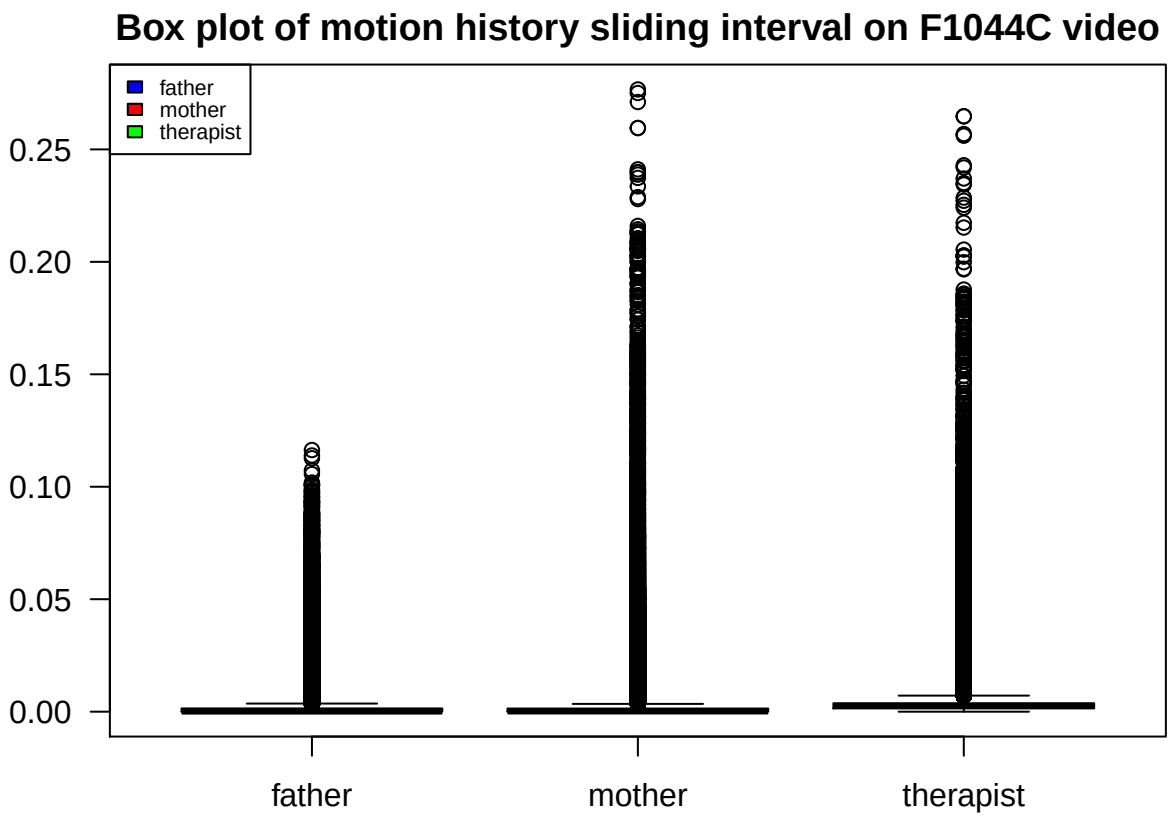
```
summary(rawdataTherapist)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.     NA's
## 0.001179 0.002750 0.003405 0.004662 0.004234 0.236000       10
```

Sliding interval

```
## Reminder:
#SlidingInterval <- function(subject, indexOfvideos=1:NumberOfvideos, interval, data) with :
# subject : subject studied (patient, mother, father or therapist)
# indexOfvideos : list of videos studied (element eg. 3 or list eg 1:3 or c(1,2,4))
# interval : number of frames in the studied interval
# data : data frame where there is data
```

```
slidedfather <- SlidingInterval("father", 1:NumberOfvideos , 11, data)
slidedmother <- SlidingInterval("mother", 1:NumberOfvideos , 11, data)
slidedtherapist <- SlidingInterval("therapist", 1:NumberOfvideos , 11, data)
slidedpatient <- SlidingInterval("patient", 1:NumberOfvideos , 11, data)

par(mar=c(3,3,2,2))
boxplot(slidedfather, slidedmother, slidedtherapist,
        col=colOrderList[c(1,2,4)],
        names=ParticipantsList[c(1,2,4)],
        main= "Box plot of motion history sliding interval on F1044C video", las=1)
par(mar=c(1,0.5,0.5,1))
legend("topleft", ParticipantsList[c(1,2,4)], fill=colOrderList, cex=0.7)
```




```
summary(slidedfather)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.00    0.00    0.00    0.00    0.00    0.12  265516
```

```
summary(slidedmother)
```

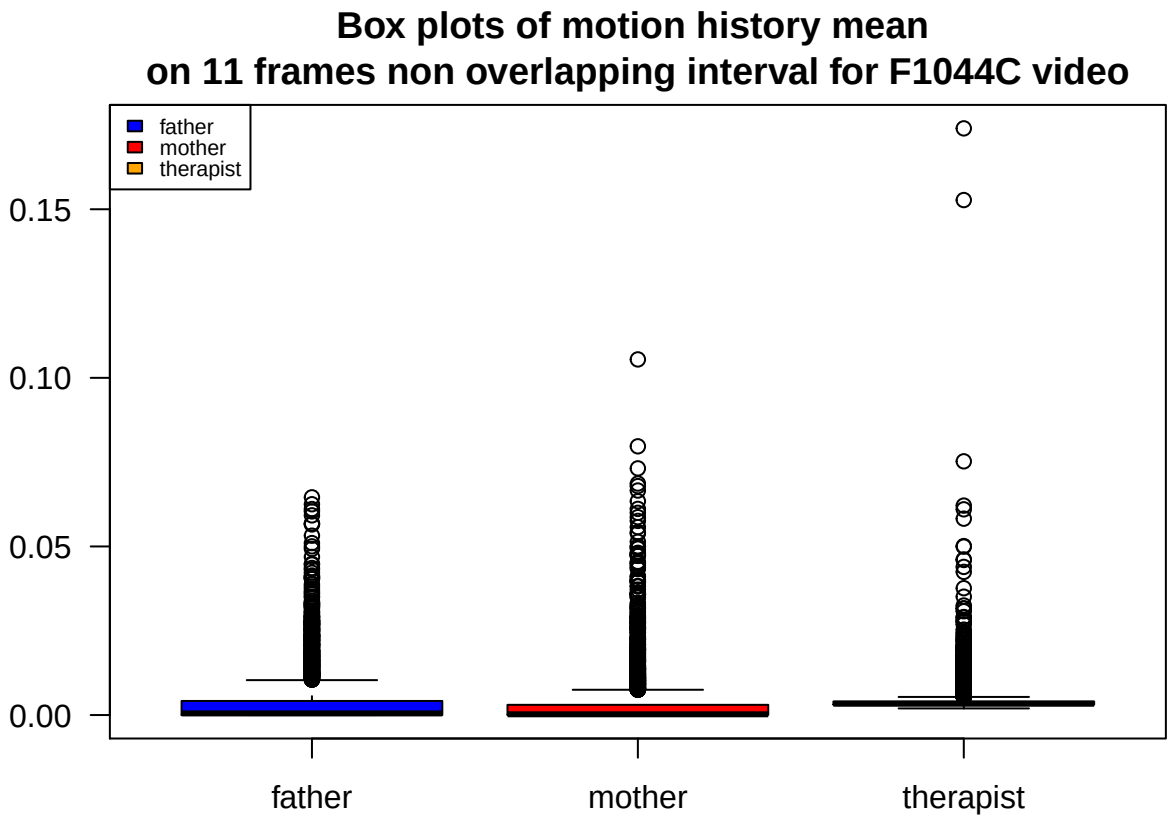
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.00    0.00    0.00    0.00    0.00    0.28   91375
```

```
summary(slidedtherapist)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.00    0.00    0.00    0.00    0.00    0.26   77805
```

Non overlapping interval

```
fatherEleven<- MeanMomentumByTime("father", indexOfvideos=1, interval=11, data)

motherEleven <- MeanMomentumByTime("mother", indexOfvideos=1, interval=11, data)

therapistEleven <- MeanMomentumByTime("therapist", indexOfvideos=1, interval=11, data)

par(mar=c(3,3,3,2))
boxplot(fatherEleven, motherEleven, therapistEleven,
        col=colOrderList[c(1,2,4)],
        names=ParticipantsList[c(1,2,4)],
        main= "Box plots of motion history mean
on 11 frames non overlapping interval for F1044C video", las=1)
par(mar=c(1,0.5,0.5,1))
legend("topleft", ParticipantsList[c(1,2,4)], fill=colOrderList[c(1,2,4)], cex=0.7)
```




```
summary(fatherEleven)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.      NA's
## 0.0000000 0.0000056 0.0004807 0.0041380 0.0041740 0.0645600         1
```

```
summary(motherEleven)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.      NA's
## 0.0000033 0.0000430 0.0002248 0.0035770 0.0030270 0.1055000         1
```

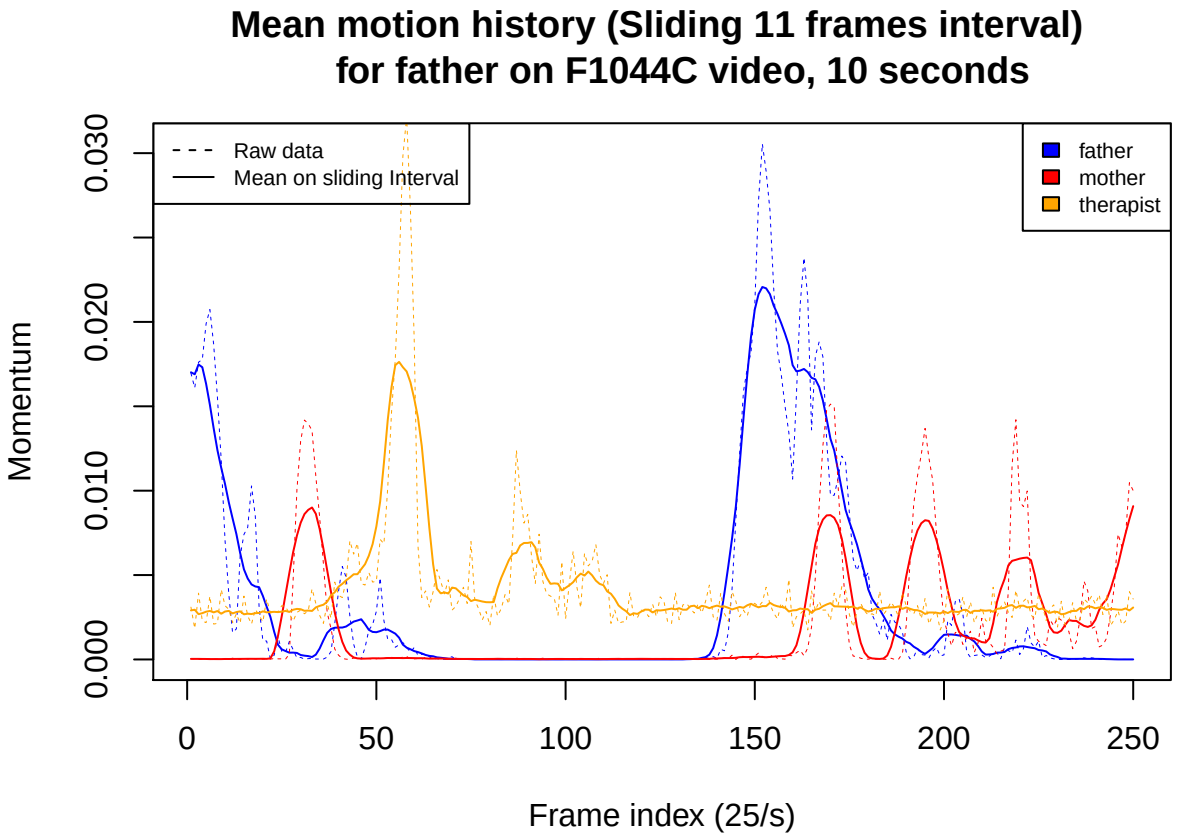
```
summary(therapistEleven)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.     NA's
## 0.001964 0.003099 0.003349 0.004673 0.004016 0.174000        1
```

Focus on the motion history of the first 20 seconds of the first video(C)

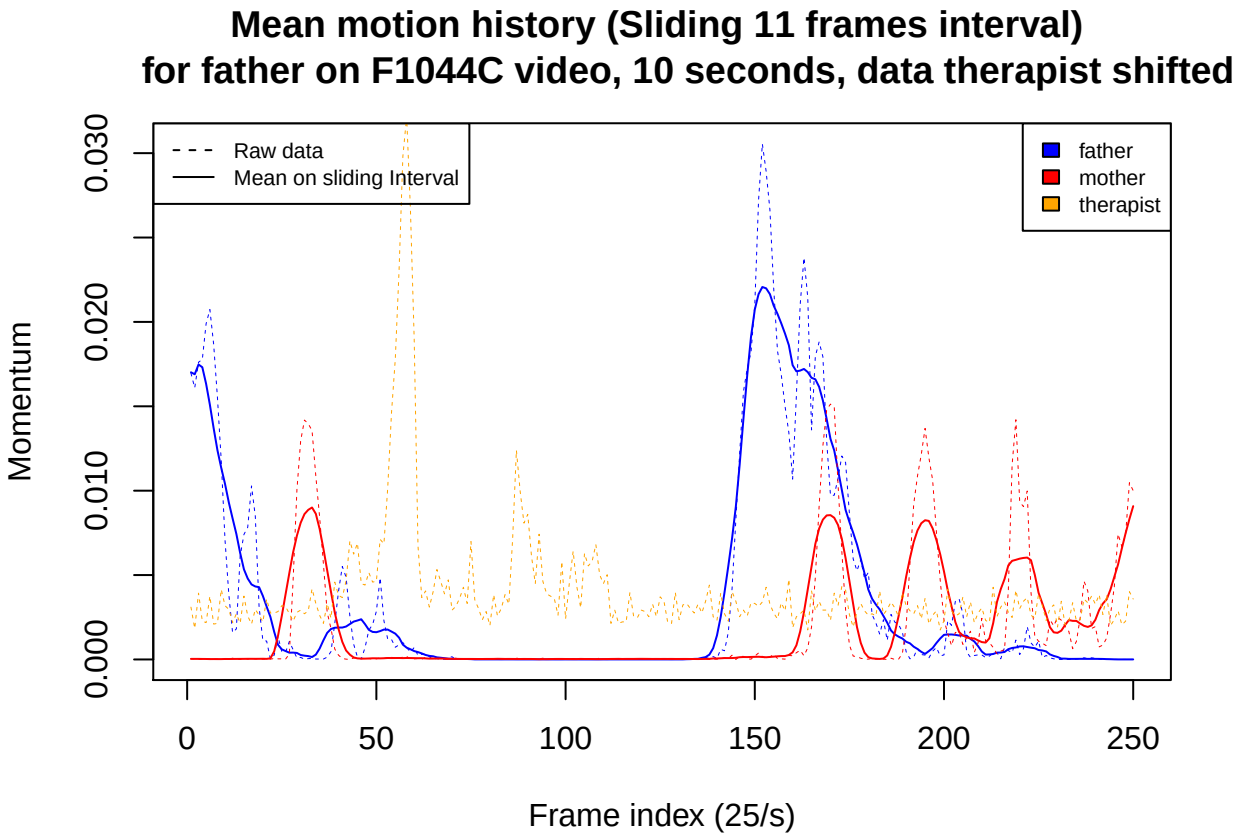
Sliding interval function on a 11 frames interval

```
par(mar=c(4,4,4,2))
plot(1:250, data$father[6:255], main="Mean motion history (Sliding 11 frames interval)
     for father on F1044C video, 10 seconds ", xlab="Frame index (25/s)",
     ylab="Momentum",
     col="blue", type="l", lty=2, lwd=0.5)
lines(slidedfather[1:250],  col="blue", lty=1)
lines(data$mother[6:255],  col="red", lty=2, lwd=0.5)
lines(slidedmother[1:250],  col="red", lty=1)
lines(data$therapist[6:255],  col="orange", lty=2, lwd=0.5)
lines(slidedtherapist[1:250],  col="orange", lty=1)
legend("topleft", c("Raw data", "Mean on sliding Interval") , lty=c(2, 1), cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList[c(1,2,4)], cex=0.7)
```



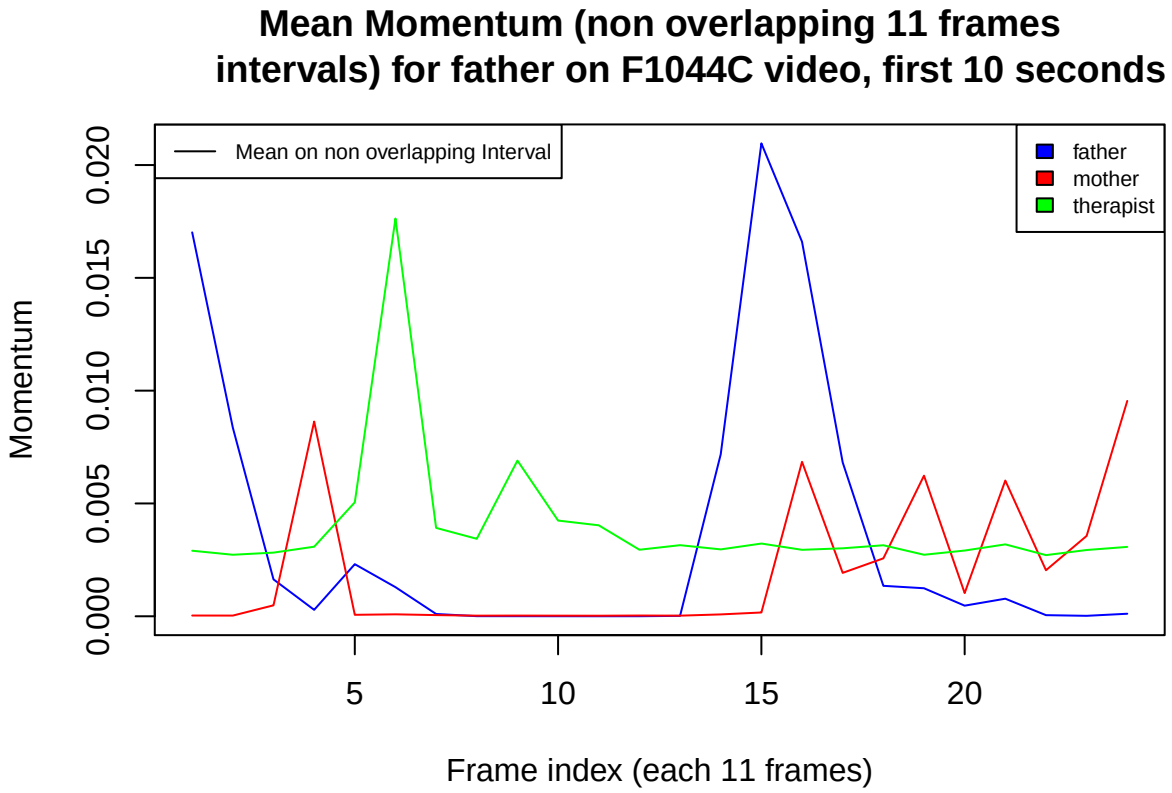
Sliding interval function on a 11 frames interval with shifting of therapist (substraction of min value of therapist)

```
par(mar=c(4,4,4,2))
plot(1:250, data$father[6:255], main="Mean motion history (Sliding 11 frames interval)
     for father on F1044C video, 10 seconds, data therapist shifted", xlab="Frame index (25/s)", ylab="
     col="blue", type="l", lty=2, lwd=0.5)
lines(slidedfather[1:250],  col="blue", lty=1)
lines(data$mother[6:255],  col="red", lty=2, lwd=0.5)
lines(slidedmother[1:250],  col="red", lty=1)
lines(data$therapist[6:255],  col="orange", lty=2, lwd=0.5)
lines(slidedtherapist[1:250]-min(slidedtherapist),  col="orange", lty=1)
legend("topleft", c("Raw data", "Mean on sliding Interval") , lty=c(2, 1), cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList[c(1,2,4)], cex=0.7)
```



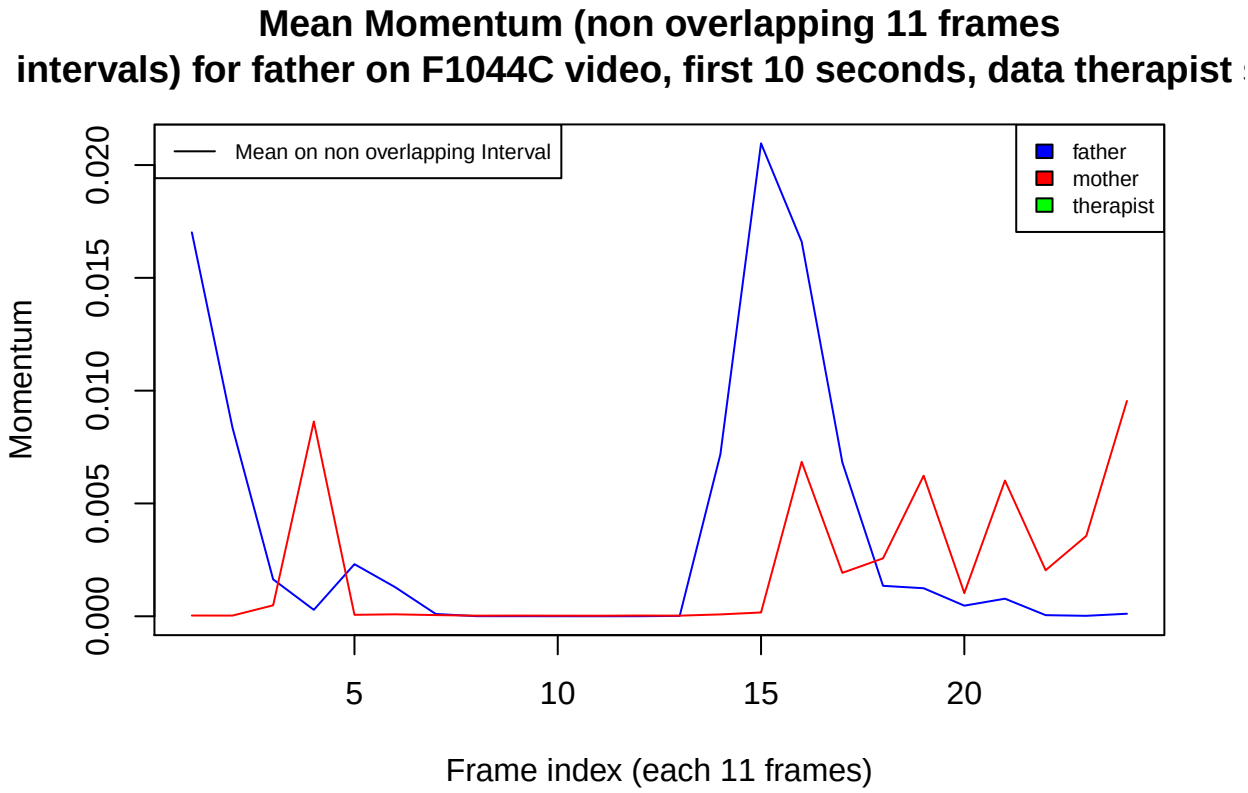
Non overlapping interval function on a 11 frames interval

```
plot (1:24, fatherEleven[1:24], type="l", col="blue",
main="Mean Momentum (non overlapping 11 frames
      intervals) for father on F1044C video, first 10 seconds",
ylab="Momentum", xlab="Frame index (each 11 frames)" )
lines(motherEleven[1:24], col="red", lty=1)
lines(therapistEleven[1:24], col="green", lty=1)
legend("topleft", "Mean on non overlapping Interval" , lty=1, cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList, cex=0.7)
```



Non overlapping interval function on a 11 frames interval with shifting of therapist (substraction of min value of therapist)

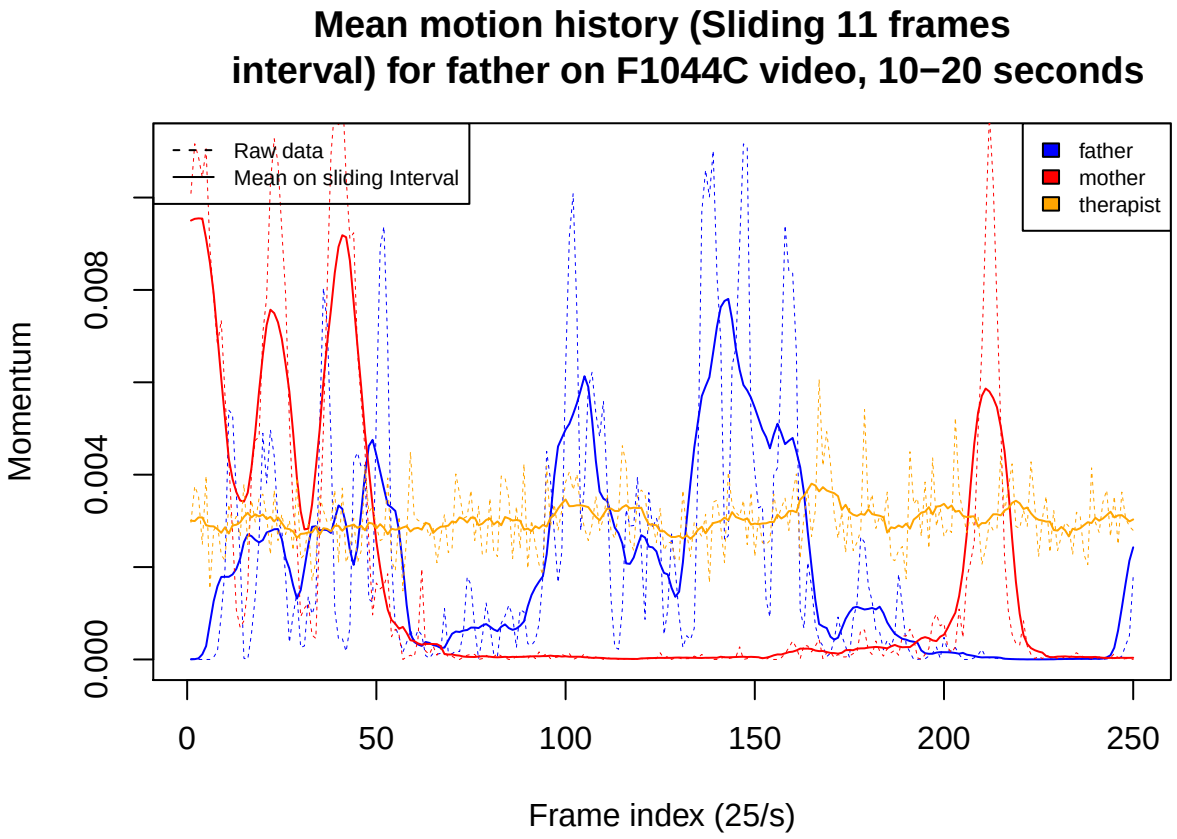
```
plot (1:24, fatherEleven[1:24], type="l", col="blue",
main="Mean Momentum (non overlapping 11 frames
      intervals) for father on F1044C video, first 10 seconds, data therapist shifted",
ylab="Momentum", xlab="Frame index (each 11 frames)" )
lines(motherEleven[1:24], col="red", lty=1)
lines(therapistEleven[1:24]-min(slidedtherapist), col="green", lty=1)
legend("topleft", "Mean on non overlapping Interval" , lty=1, cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList, cex=0.7)
```



Motion history of the father during 10-20 seconds of the first video(C)

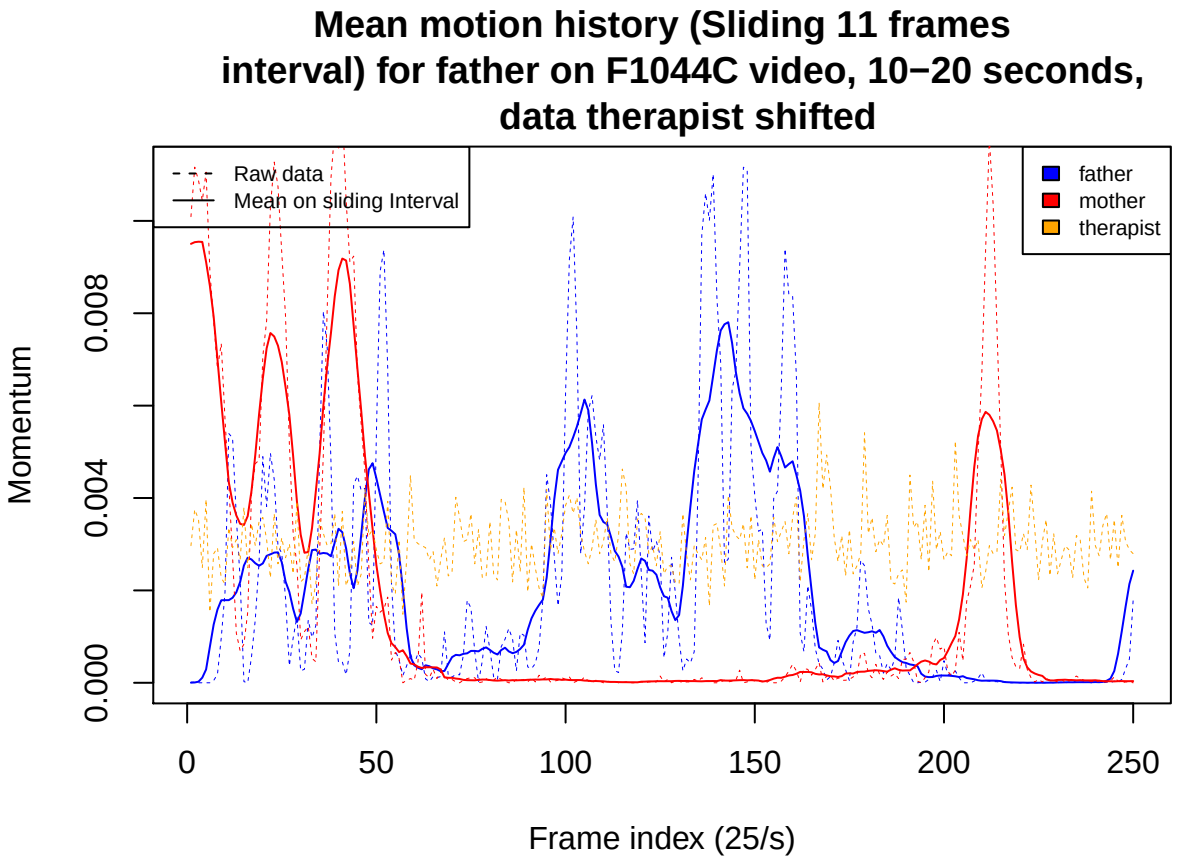
Non overlapping interval function on a 11 frames interval

```
par(mar=c(4,4,4,2))
plot(1:250, data$father[256:505], main="Mean motion history (Sliding 11 frames
     interval) for father on F1044C video, 10-20 seconds", xlab="Frame index (25/s)",
     ylab="Momentum", col="blue", type="l", lty=2, lwd=0.5)
lines(slidedfather[251:500],  col="blue", lty=1)
lines(data$mother[256:505],  col="red", lty=2, lwd=0.5)
lines(slidedmother[251:500],  col="red", lty=1)
lines(data$therapist[256:505],  col="orange", lty=2, lwd=0.5)
lines(slidedtherapist[251:500],  col="orange", lty=1)
legend("topleft", c("Raw data", "Mean on sliding Interval") , lty=c(2, 1), cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList[c(1,2,4)], cex=0.7)
```



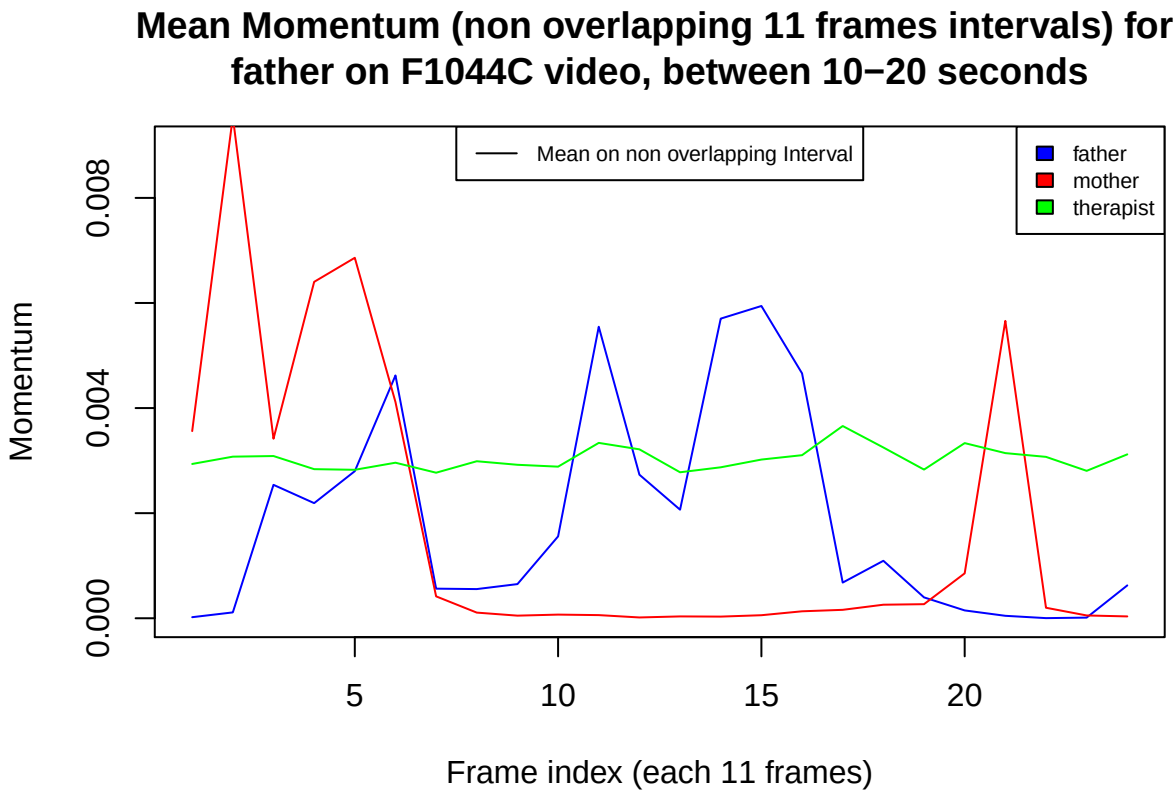
Non overlapping interval function on a 11 frames interval with shifting of therapist (substraction of min value of therapist)

```
par(mar=c(4,4,4,2))
plot(1:250, data$father[256:505], main="Mean motion history (Sliding 11 frames
     interval) for father on F1044C video, 10-20 seconds,
     data therapist shifted", xlab="Frame index (25/s)", ylab="Momentum", col="blue",
     type="l", lty=2, lwd=0.5)
lines(slidedfather[251:500],  col="blue", lty=1)
lines(data$mother[256:505],  col="red", lty=2, lwd=0.5)
lines(slidedmother[251:500],  col="red", lty=1)
lines(data$therapist[256:505],  col="orange", lty=2, lwd=0.5)
lines(slidedtherapist[251:500]-min(slidedtherapist),  col="orange", lty=1)
legend("topleft", c("Raw data", "Mean on sliding Interval") , lty=c(2, 1), cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList[c(1,2,4)], cex=0.7)
```



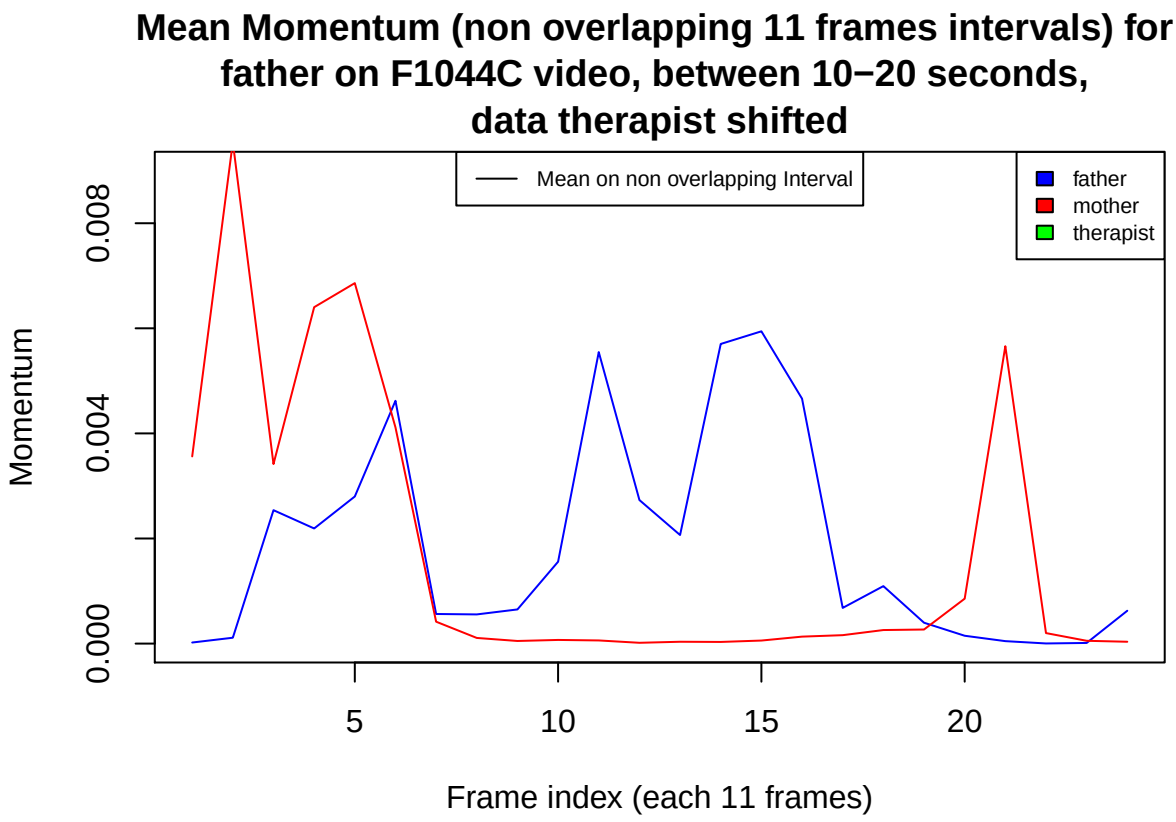
Non overlapping interval function on a 11 frames interval

```
plot (1:24, fatherEleven[23:46], type="l", col="blue",
main="Mean Momentum (non overlapping 11 frames intervals) for
father on F1044C video, between 10-20 seconds",
ylab="Momentum", xlab="Frame index (each 11 frames)", ylim=c(0, 0.009))
lines(motherEleven[23:46], col="red", lty=1)
lines(therapistEleven[23:46], col="green", lty=1)
legend("top", "Mean on non overlapping Interval" , lty=1, cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList, cex=0.7)
```



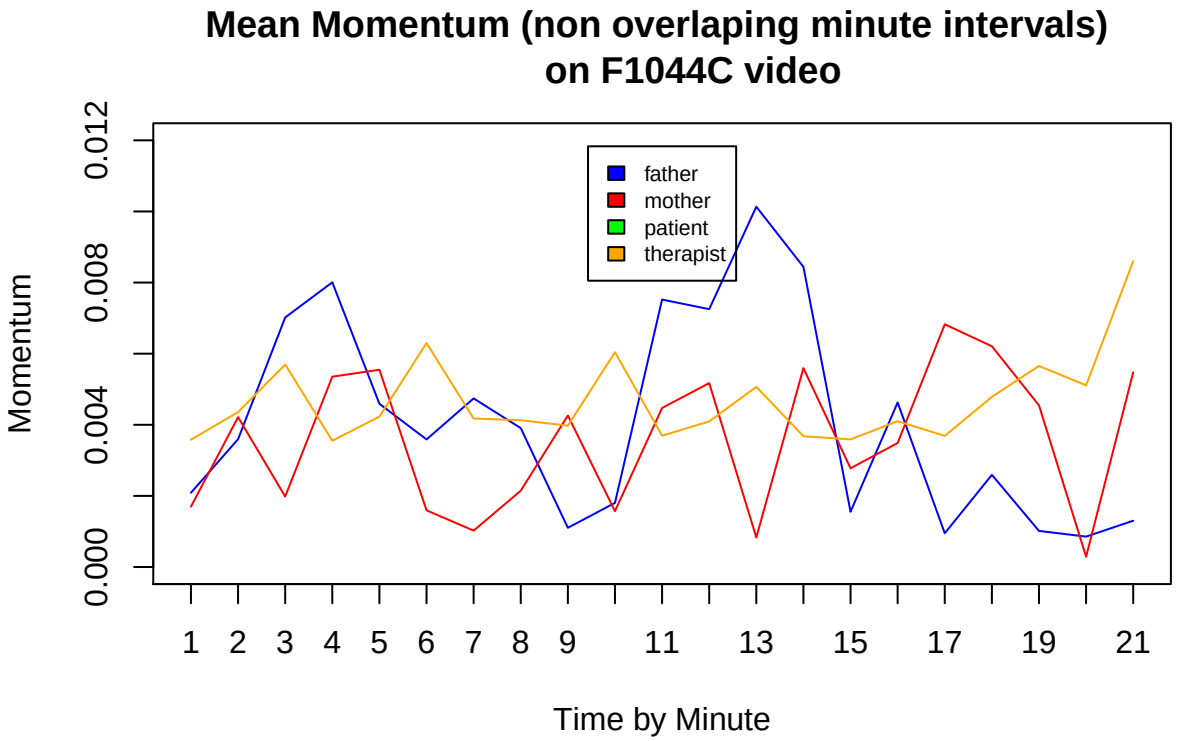
Non overlapping interval function on a 11 frames interval with shifting of therapist (substraction of min value of therapist)

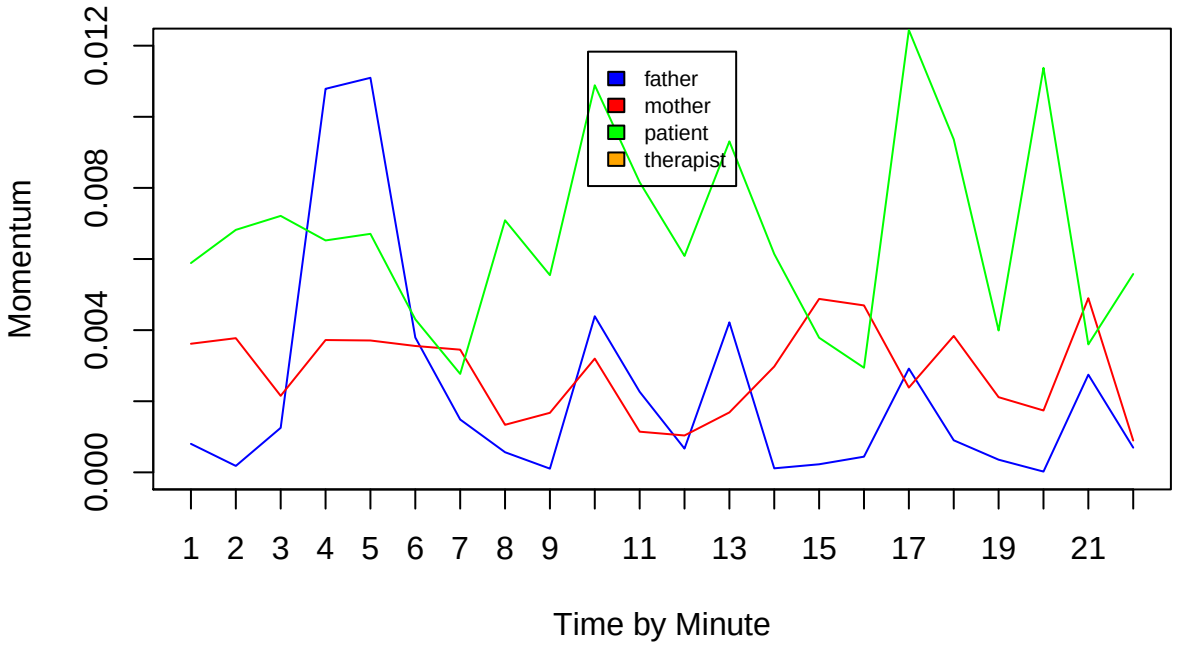
```
plot (1:24, fatherEleven[23:46], type="l", col="blue",
main="Mean Momentum (non overlapping 11 frames intervals) for
father on F1044C video, between 10-20 seconds,
data therapist shifted",
ylab="Momentum", xlab="Frame index (each 11 frames)", ylim=c(0, 0.009))
lines(motherEleven[23:46], col="red", lty=1)
lines(therapistEleven[23:46]-min(slidedtherapist), col="green", lty=1)
legend("top", "Mean on non overlapping Interval" , lty=1, cex=0.7)
legend("topright", ParticipantsList[c(1,2,4)], fill=colOrderList, cex=0.7)
```

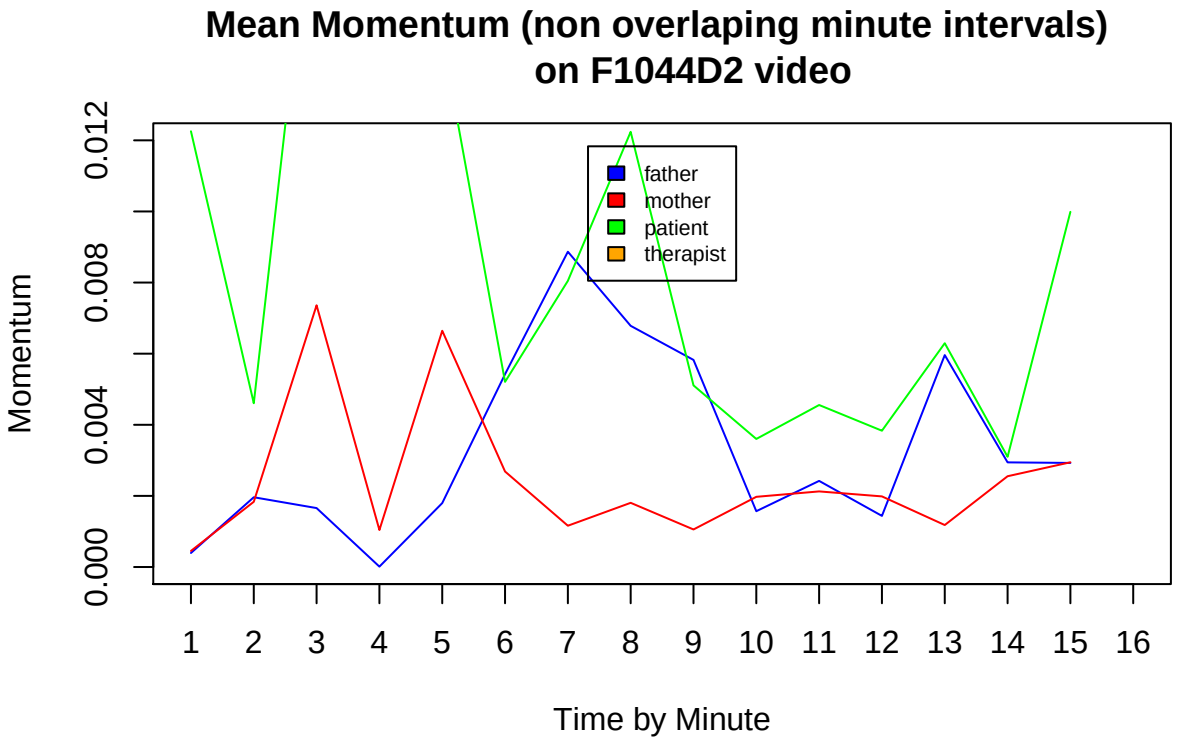


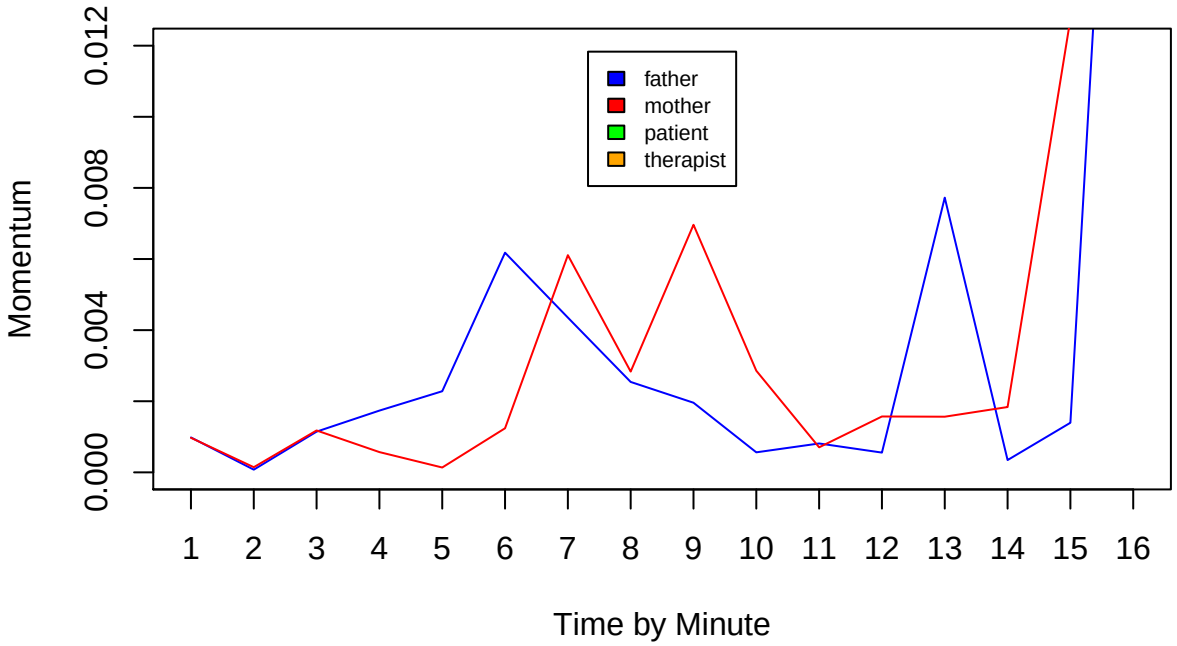
Mean Momentum by minute plots

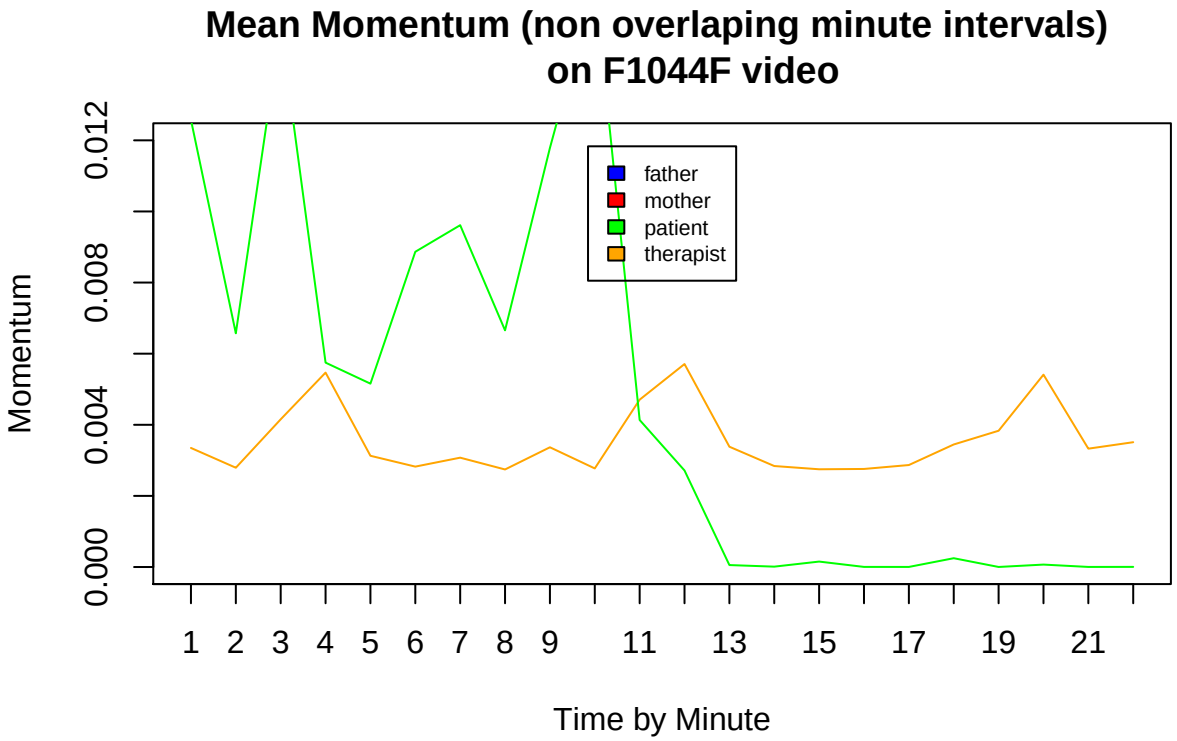
```
for (i in 1:NumberOfvideos){
  fatherMinute<- MeanMomentumByTime("father", indexOfvideos=i, interval=1500, data)

  MotherMinute<- MeanMomentumByTime("mother", indexOfvideos=i, interval=1500, data)

  TherapistMinute<- MeanMomentumByTime("therapist", indexOfvideos=i, interval=1500, data)

  PatientMinute<- MeanMomentumByTime("patient", indexOfvideos=i, interval=1500, data)

length(fatherMinute)

  par(mar=c(4,4,4,2))
      plot (1:length(fatherMinute), fatherMinute, type="l", col="blue",
      main=paste("Mean Momentum (non overlaping minute intervals)
      on F1044", labelvideolist[i], " video" , sep=""),
      ylab="Momentum", xlab="Time by Minute", ylim=c(0, 12E-03),
      xaxp=c(0, length(fatherMinute), length(fatherMinute)))
      lines(MotherMinute, col="red")
      lines(TherapistMinute, col="orange")
      lines(PatientMinute, col="green")
      legend("top", inset=.05, ParticipantsList,
             fill=colOrderList, cex=0.7)
}
```

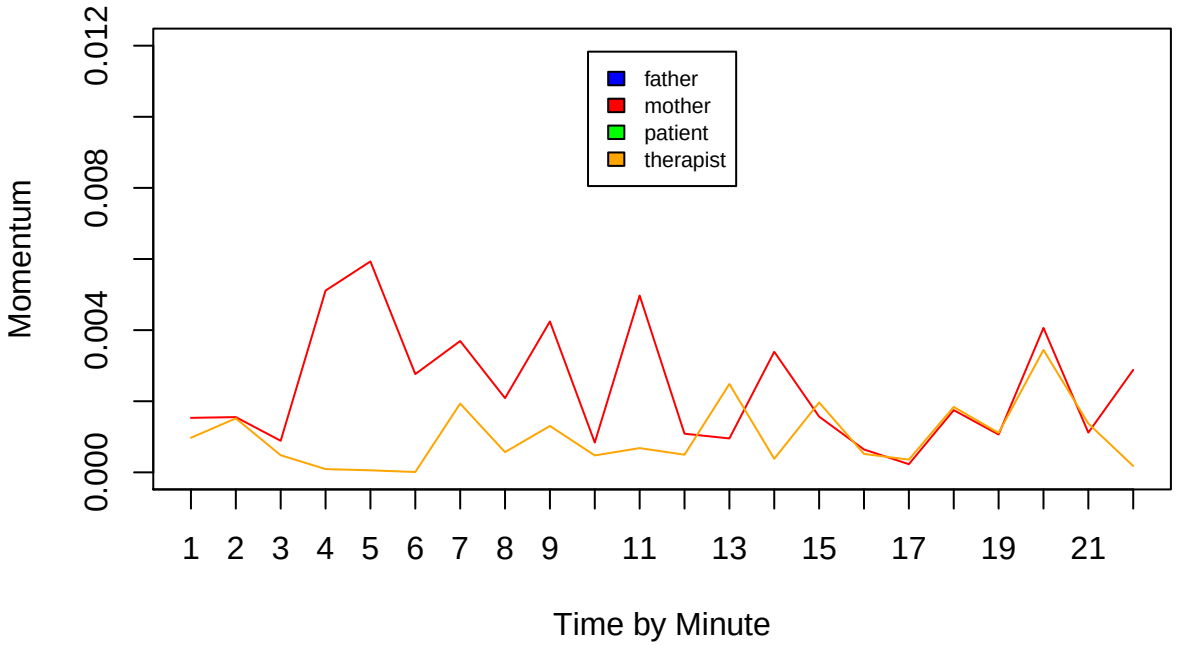

Mean Momentum (non overlaping minute intervals)
on F1044C video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute

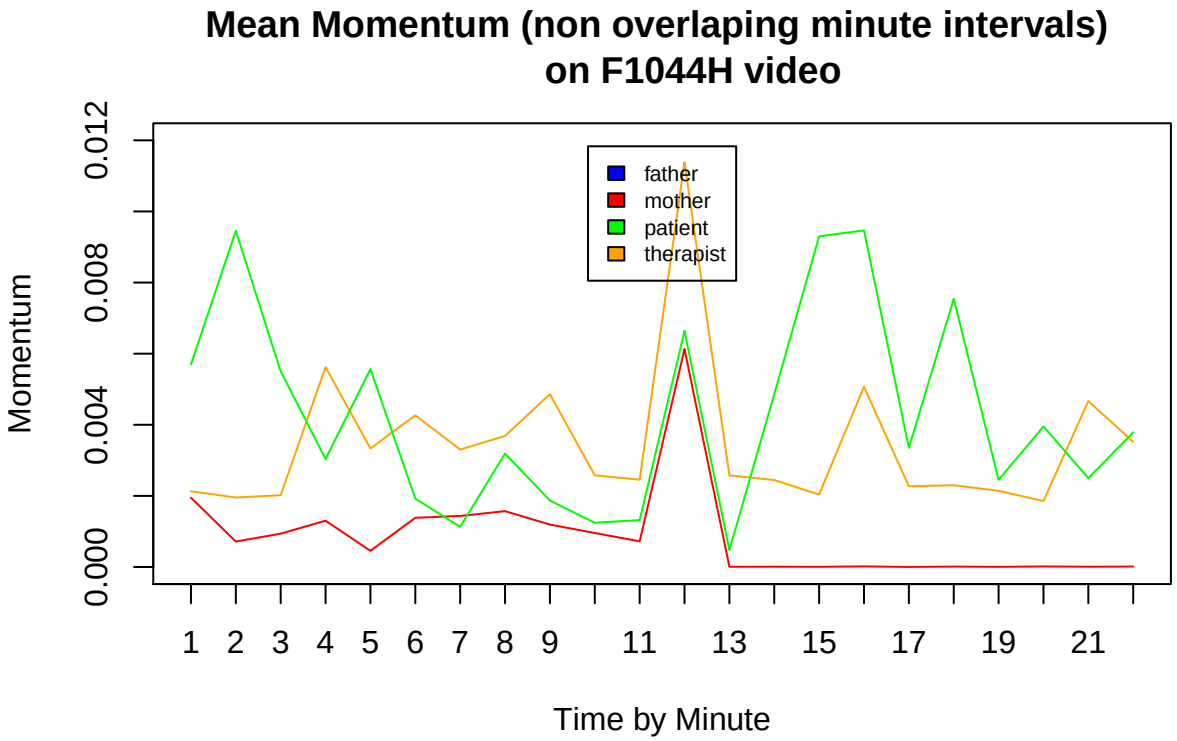

Mean Momentum (non overlaping minute intervals)
on F1044D1 video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute

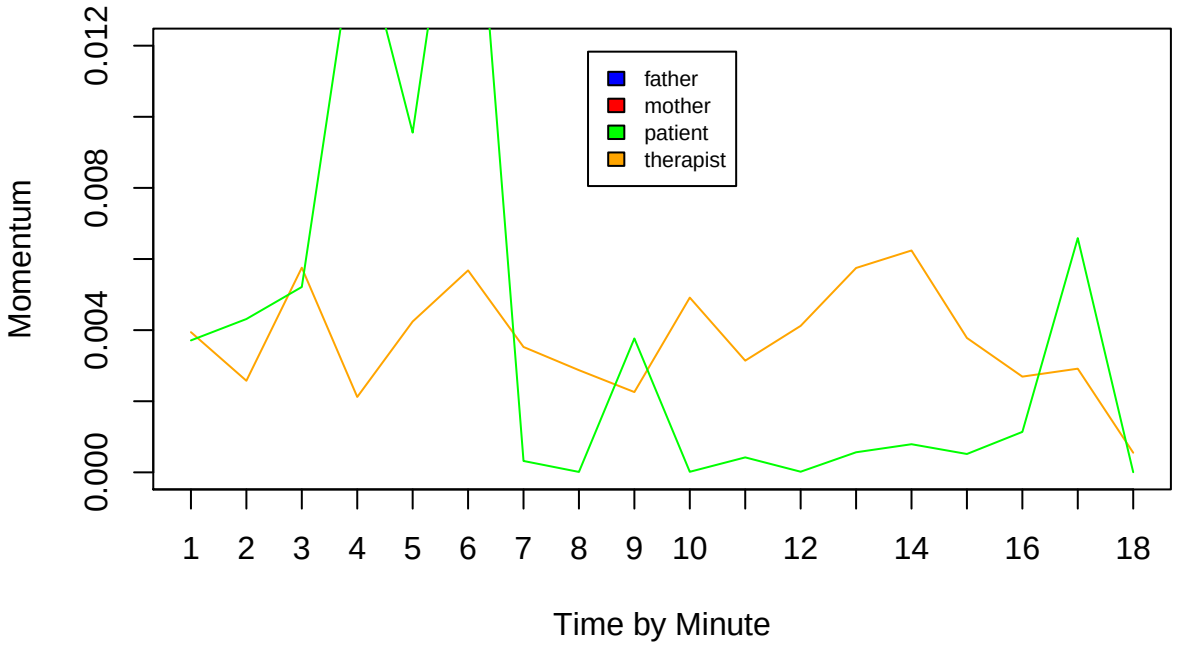

Mean Momentum (non overlaping minute intervals)
on F1044D2 video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Time by Minute

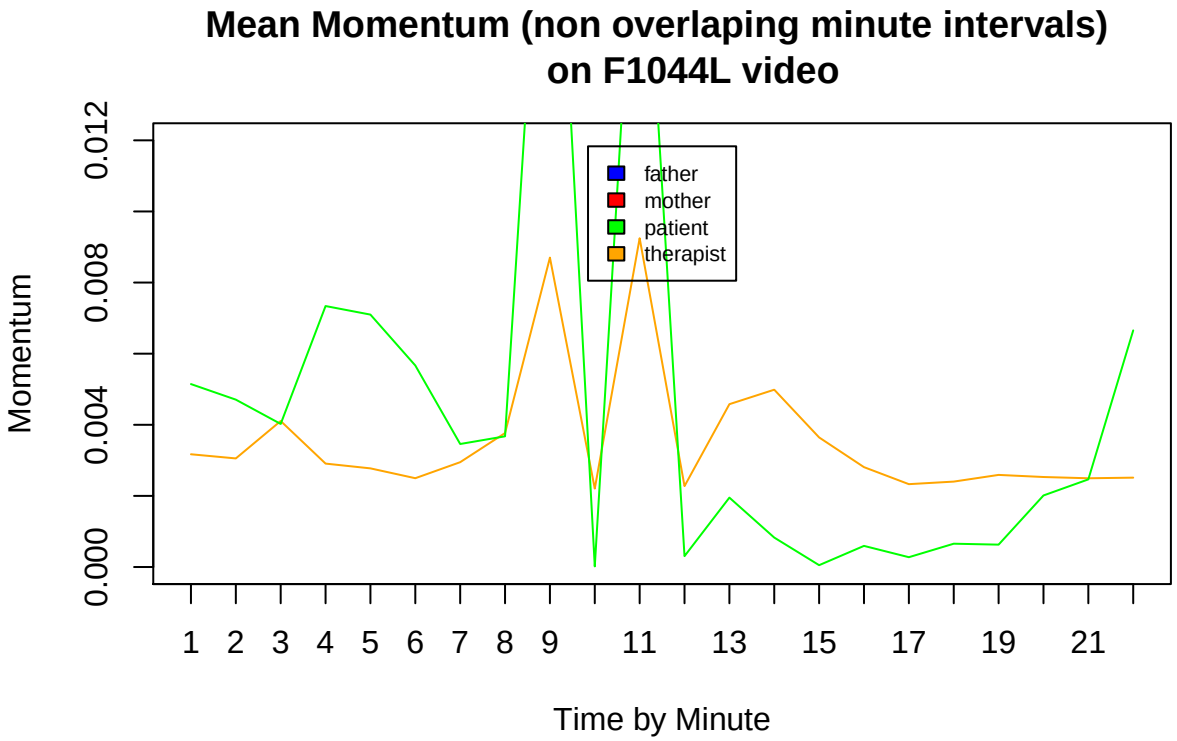

Mean Momentum (non overlaping minute intervals)
on F1044E video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Time by Minute

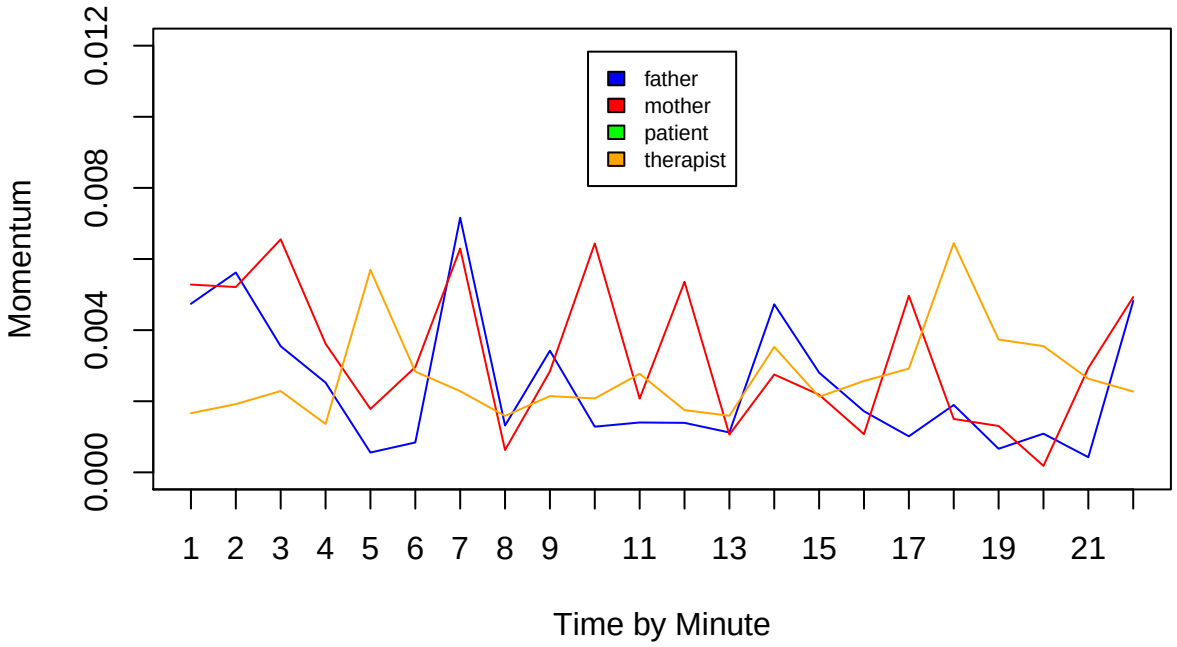

Mean Momentum (non overlaping minute intervals)
on F1044F video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute

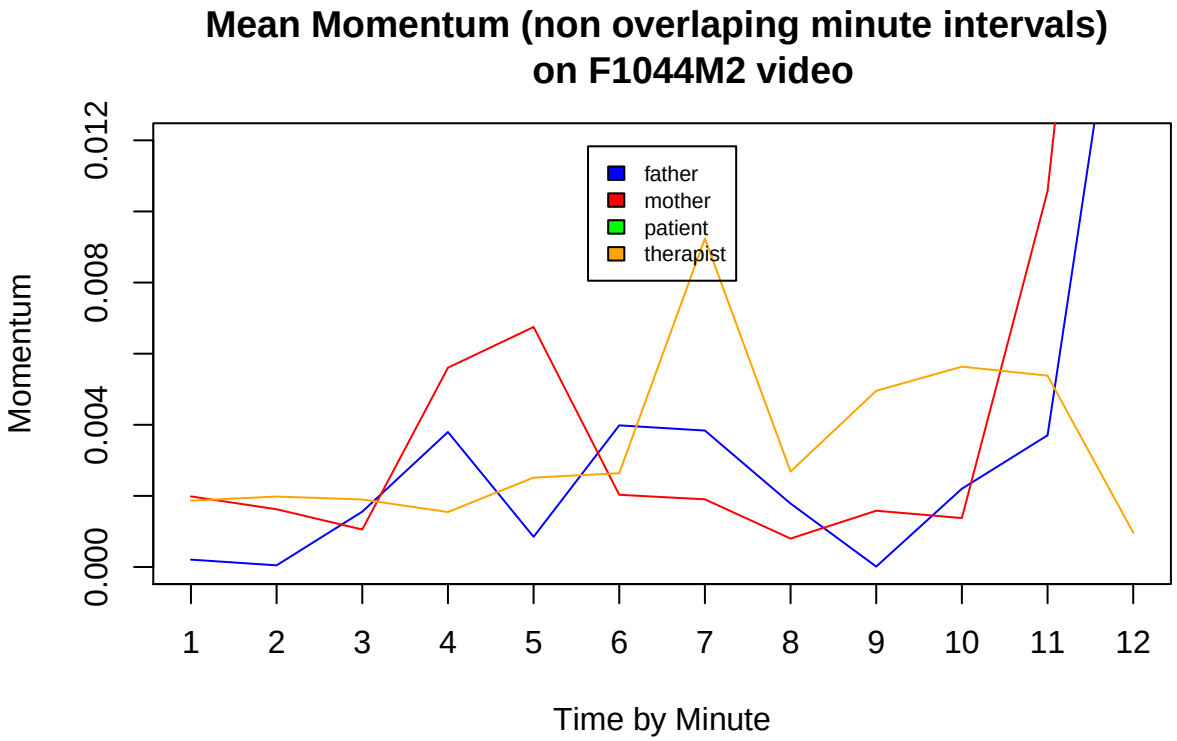

Mean Momentum (non overlaping minute intervals)
on F1044G video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute

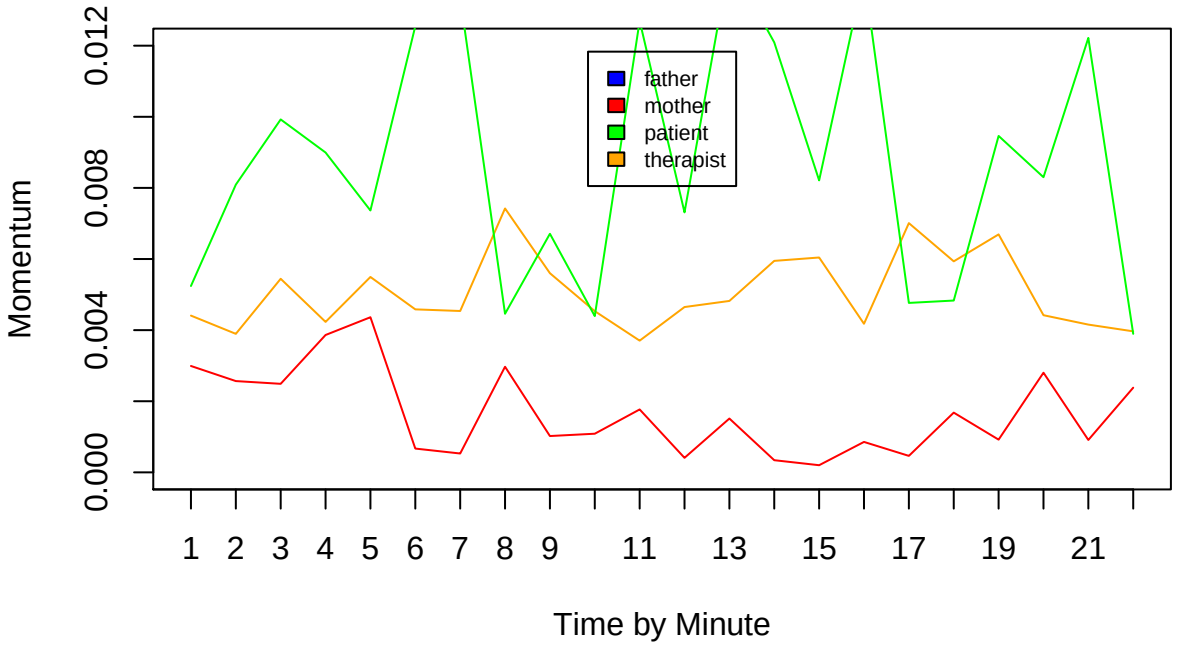

Mean Momentum (non overlaping minute intervals)
on F1044H video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute

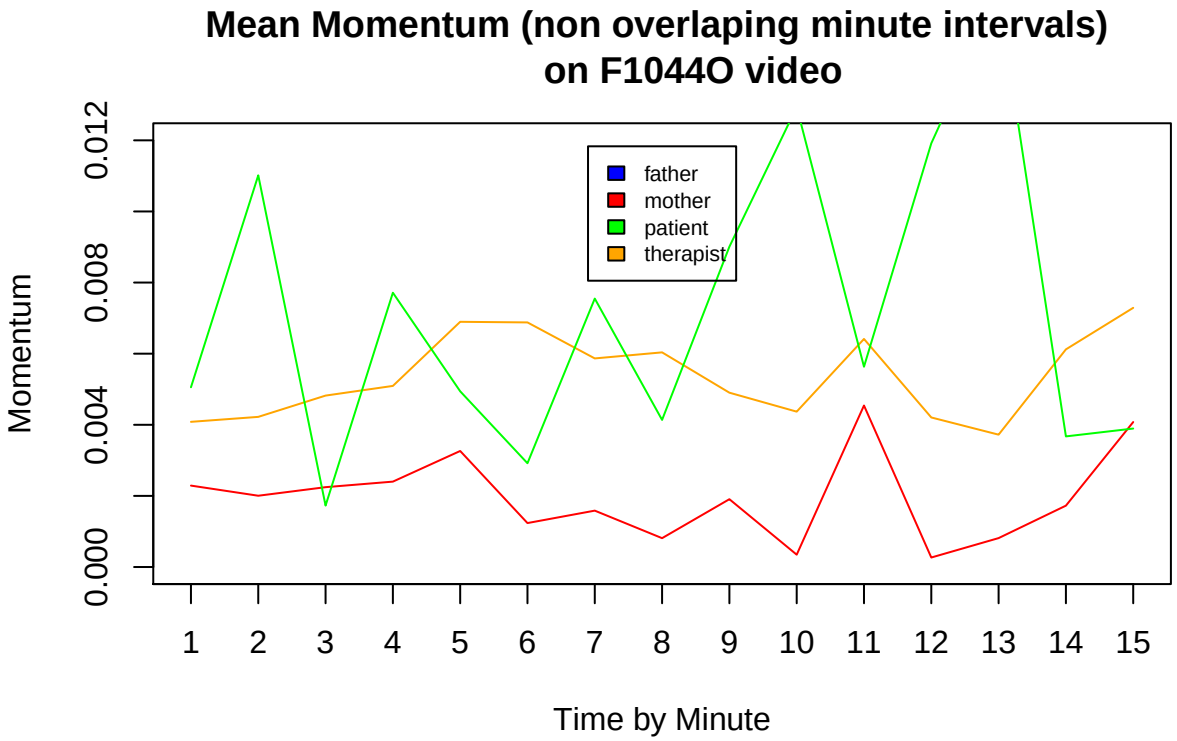

Mean Momentum (non overlaping minute intervals)
on F1044I video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 10 12 14 16 18
Time by Minute

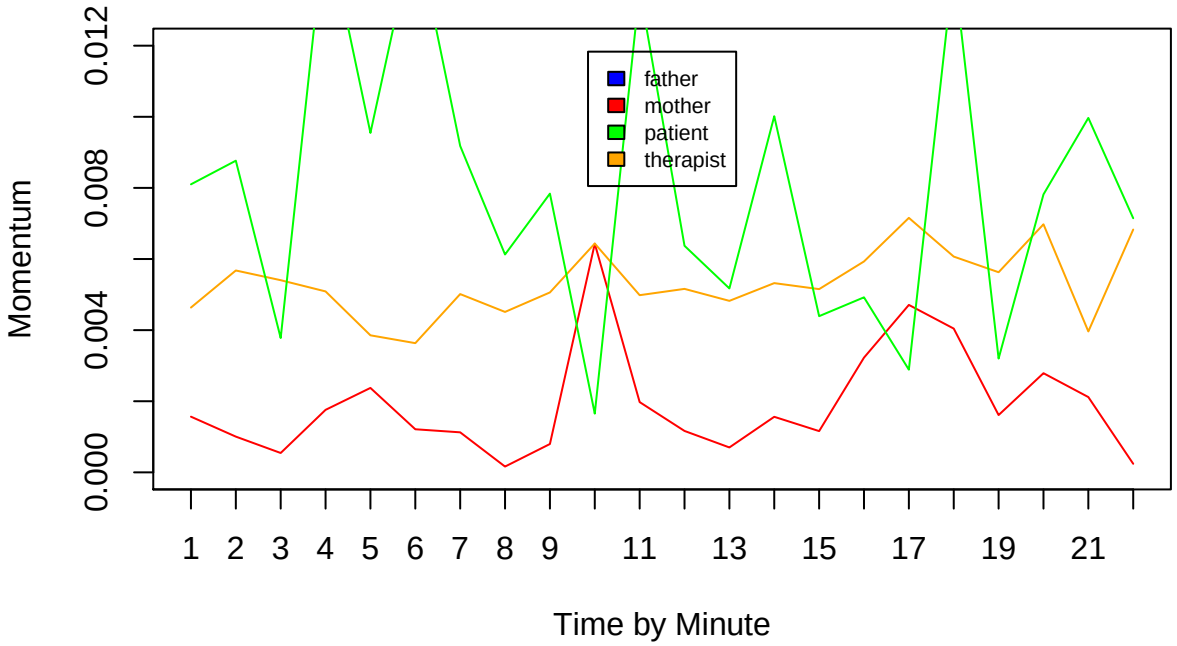

Mean Momentum (non overlaping minute intervals)
on F1044L video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute

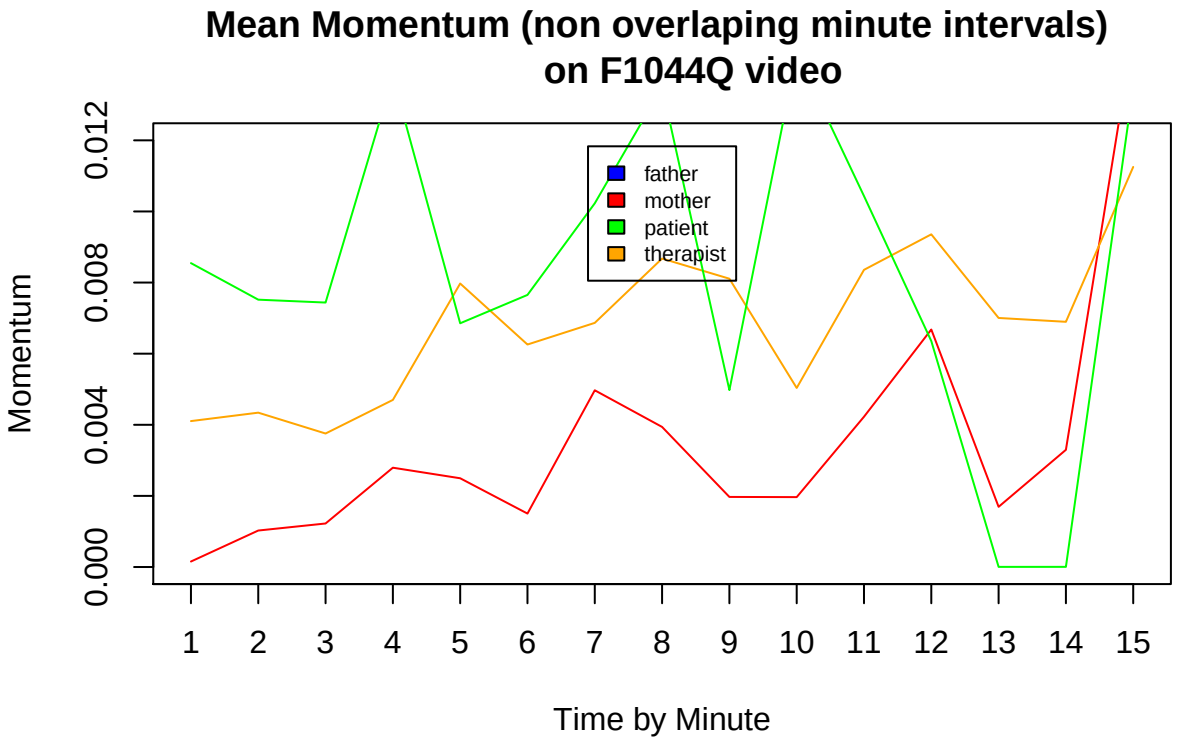

Mean Momentum (non overlaping minute intervals)
on F1044M1 video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute

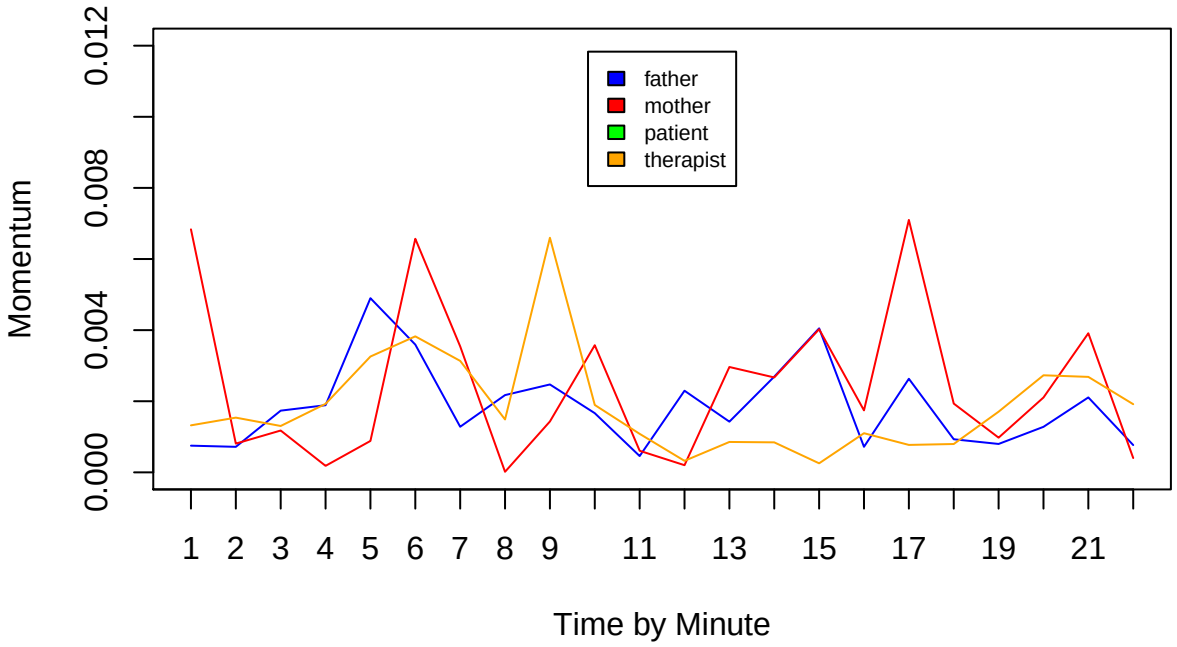

Mean Momentum (non overlaping minute intervals)
on F1044M2 video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1
2
3
4
5
6
7
8
9
10
11
12
Time by Minute

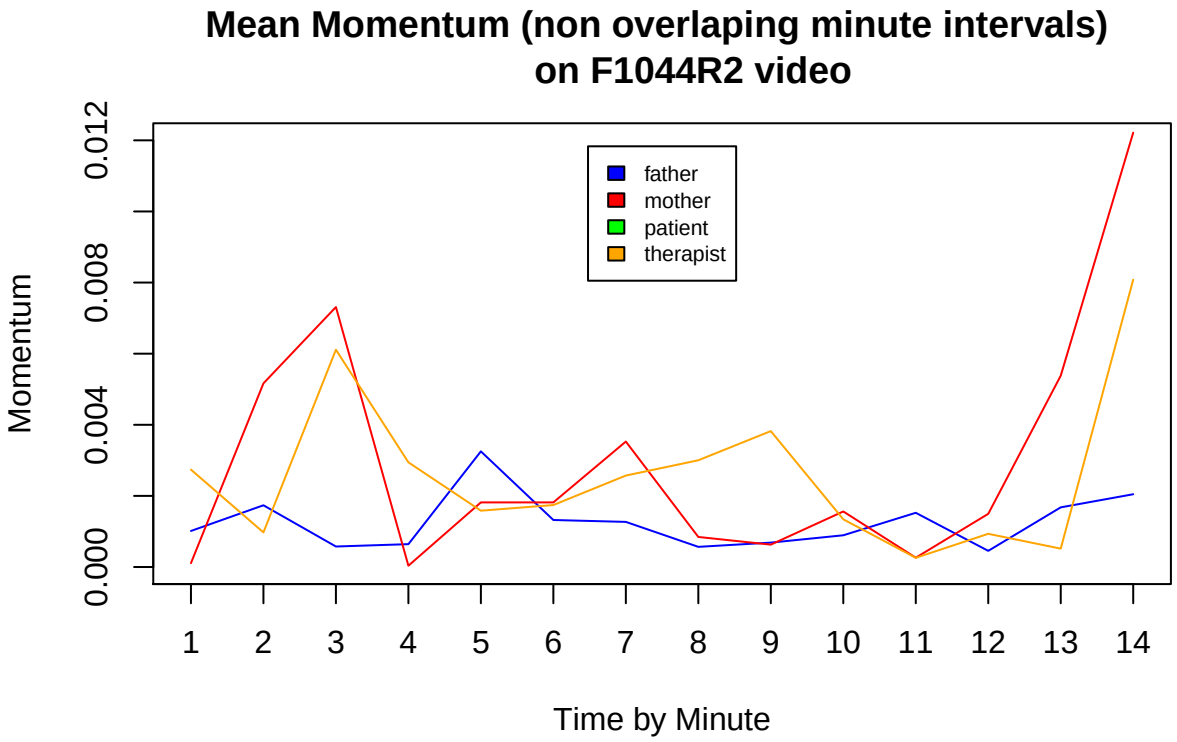

Mean Momentum (non overlaping minute intervals)
on F1044N video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1
2
3
4
5
6
7
8
9
11
13
15
17
19
21
Time by Minute


Mean Momentum (non overlaping minute intervals)
on F1044O video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time by Minute


Mean Momentum (non overlaping minute intervals)
on F1044P video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute


Mean Momentum (non overlaping minute intervals)
on F1044Q video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time by Minute


Mean Momentum (non overlaping minute intervals)
on F1044R1 video
Momentum
0.000
0.004
0.008
0.012
father
mother
patient
therapist
1 2 3 4 5 6 7 8 9 11 13 15 17 19 21
Time by Minute



labelvideolist

Export data in text files

```
#slidedfatherwoNA <- slidedfather[which(is.na(slidedfather)==FALSE)]
#slidedmotherwoNA <- slidedmother[which(is.na(slidedmother)==FALSE)]
#slidedtherapistwoNA <- slidedtherapist[which(is.na(slidedtherapist)==FALSE)]
#slidedpatientwoNA <- slidedpatient[which(is.na(slidedpatient)==FALSE)]

dfexport <- data.frame(slidedfather, slidedmother, slidedtherapist)
write.csv(dfexport, "/Users/Ofix/Documents/Fac/internat/Recherche/projets/synchro/synchroData/slideddata
```

SyncPy utilisation for creating synchrony dataframe

After extracting filtered motion motion history with mean on non overlapping interval of 11 frames

And after puting this data on a CSV file

We import this data on python Script with panda module Call_S_Estimator.py

This script will calculate the synchrony between each dyad of the interaction and of the whole group

It will return a csv file SSI.csv that we can import with R with

this following function

```
## [1] "/Users/Ofix/Documents/Fac/internat/Recherche/projets/synchro/synchroData"
```

Description of SSI data frame

```
str(SSI)
```

```
## 'data.frame':    20 obs. of  7 variables:
##  $ X           : int  0 1 2 3 4 5 6 7 8 9 ...
##  $ SSI_fa_mo   : num  5.32e-06 9.35e-04 3.95e-03 5.41e-03 2.34e-02 ...
##  $ SSI_fa_mo_th: num  0.04866 0.00633 0.00964 0.00485 0.02661 ...
##  $ SSI_fa_th   : num  0.00673 0.00208 0.01773 0.00357 0.01903 ...
##  $ SSI_mo_th   : num  0.1085 0.01183 0.00159 0.00227 0.01692 ...
##  $ Time_min    : int  0 1 2 3 4 5 6 7 8 9 ...
##  $ filename    : Factor w/ 1 level "F1044C": 1 1 1 1 1 1 1 1 1 1 ...
```

Synchrony scores for each dyad and for the whole group

```
par(mar=c(4,4,4,3))
plot(SSI$Time_min, SSI$SSI_fa_mo, type="l", col=rainbow(4)[1], main=paste("Synchrony scores for each dya
abline(h=mean(SSI$SSI_fa_mo), col=rainbow(4)[1], lwd=2, lty=2)

lines(SSI$SSI_fa_th, col=rainbow(4)[2], lwd=2)
abline(h= mean(SSI$SSI_fa_th), col=rainbow(4)[2], lwd=2, lty=2 )

lines(SSI$SSI_mo_th, col=rainbow(4)[3], lwd=2)
abline(h= mean(SSI$SSI_mo_th), col=rainbow(4)[3], lwd=2, lty=2)

lines(SSI$SSI_fa_mo_th, col=rainbow(4)[4], lwd=2)
abline(h= mean(SSI$SSI_fa_mo_th), col=rainbow(4)[4], lwd=2, lty=2)

legend("topleft", inset=.05, c("fa_mo", "fa_th", "mo_th", "fa_mo_th"),
            col=rainbow(4), cex=0.6, lwd=2)
legend("topright", inset=.05, c(
```

```
paste ("Mean fa_mo :", round(mean(SSI$SSI_fa_mo),3)),
paste ("Mean fa_th :", round(mean(SSI$SSI_fa_th),3)),
paste ("Mean mo_th :", round(mean(SSI$SSI_mo_th),3)),
paste ("Mean fa_mo_th :", round(mean(SSI$SSI_fa_mo_th),3))
), col=rainbow(4), cex=0.5, lty=2, lwd=1)
```