

Synchrony in Psychotherapy, example with F1044 patient data

Thomas Gargot

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Lists

Functions list

```
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(subject, index0fvideos=1:Number0fvideos, interval, data){
  x <- c()
  for (file in indexlist[index0fvideos]){
    print(file)
    dataVector <- data[which(data$file==file), subject]
    print (length(dataVector))
    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")

Number0fvideos <- 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 ...  
## $ 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 ...
```

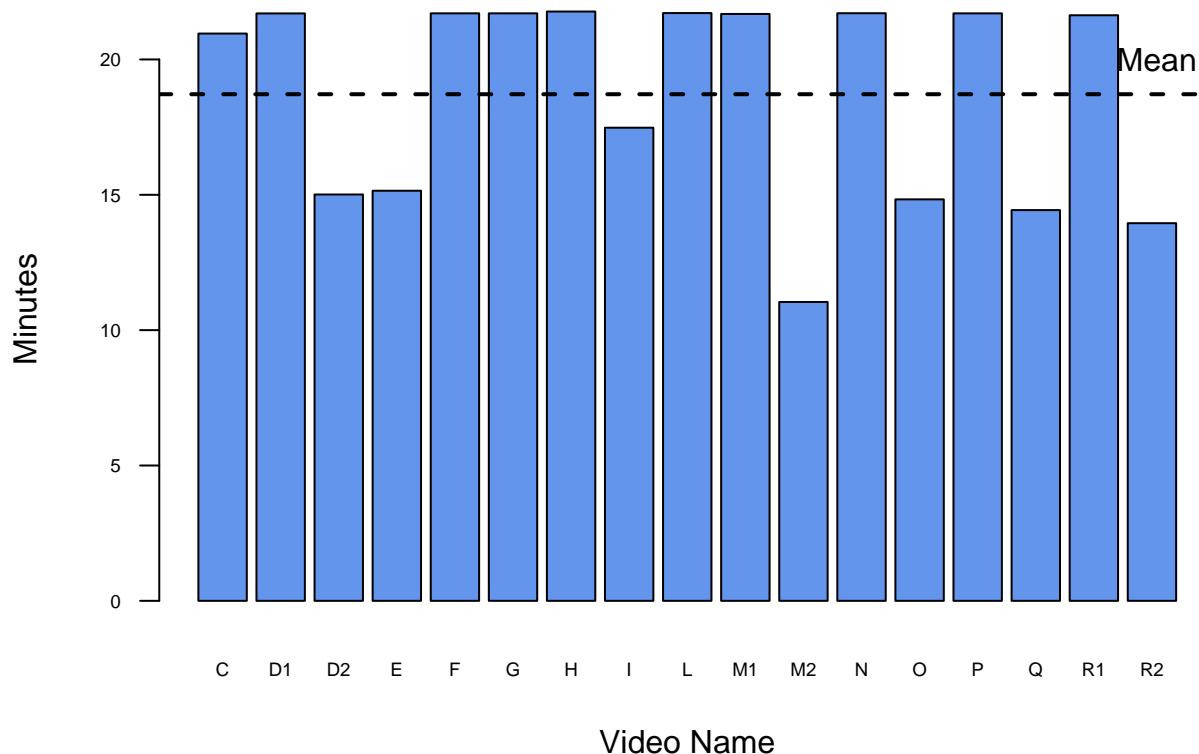
```
summary(data)
```

```
##      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

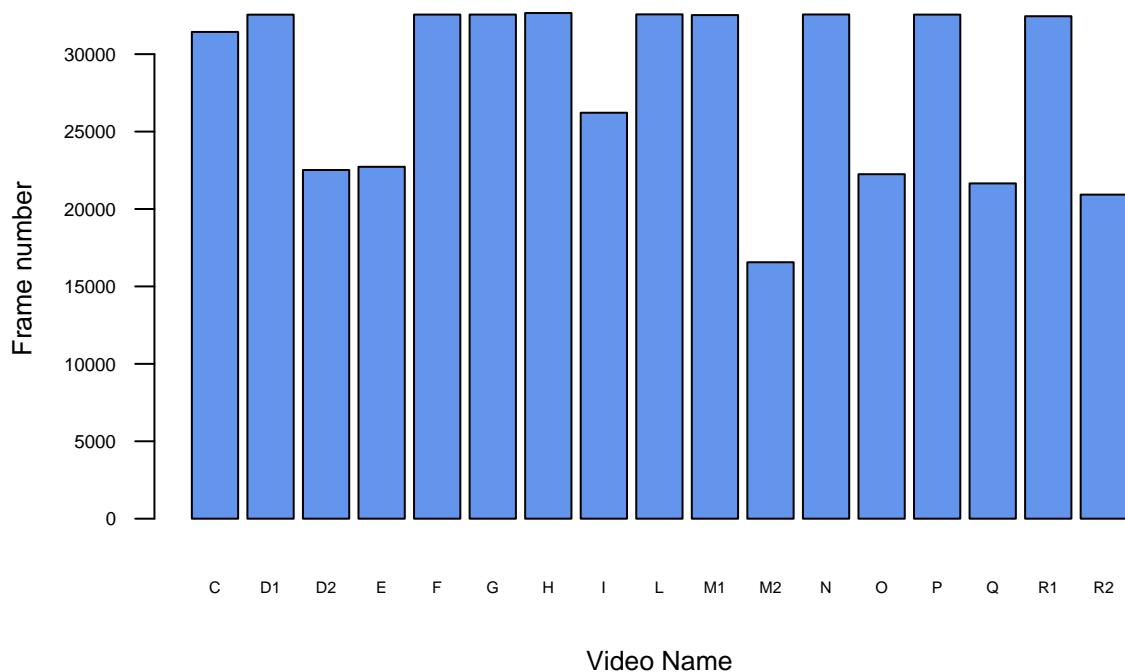
```
## [1] 20.95667 21.70067 15.01133 15.15067 21.70333 21.70400 21.77067  
## [8] 17.47800 21.71333 21.68133 11.04000 21.70800 14.83133 21.70267  
## [15] 14.43533 21.63267 13.95200
```

Length in each F1044 video (min)

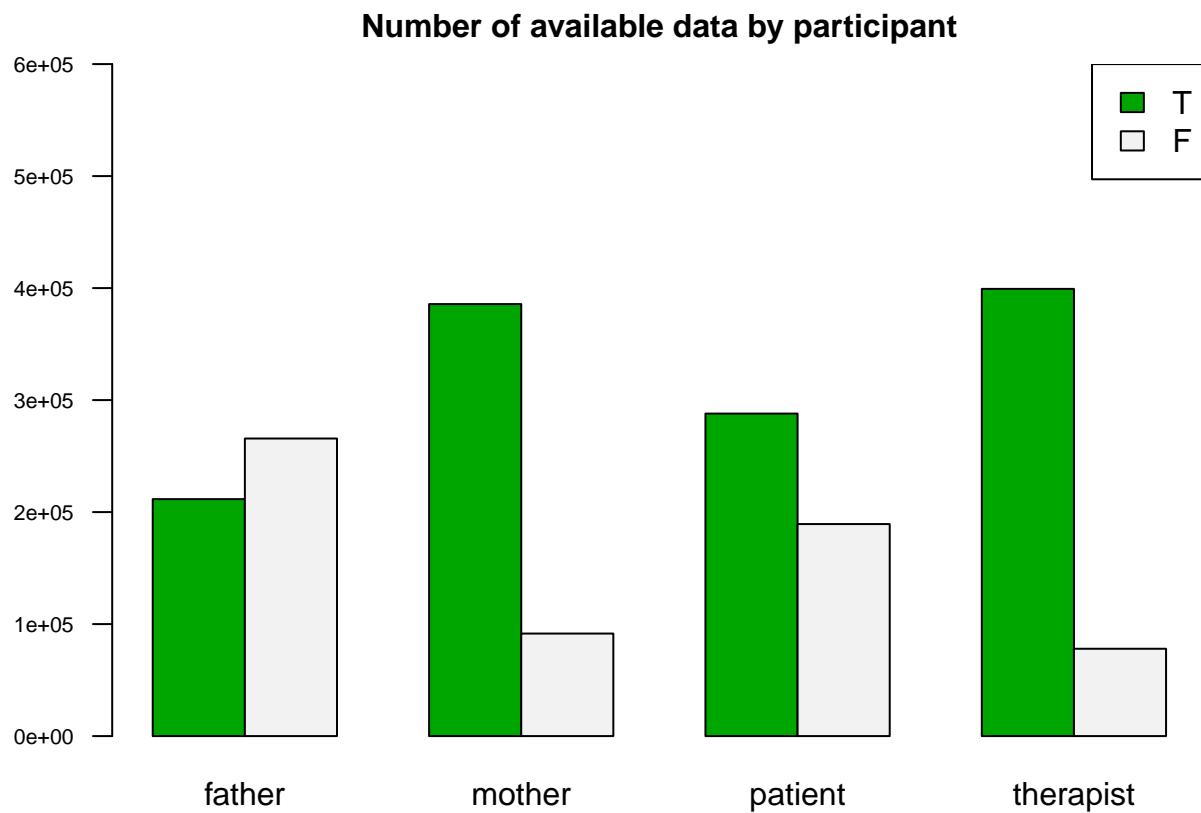


Length of the videos in number of frames

Number of frames in each F1044 video



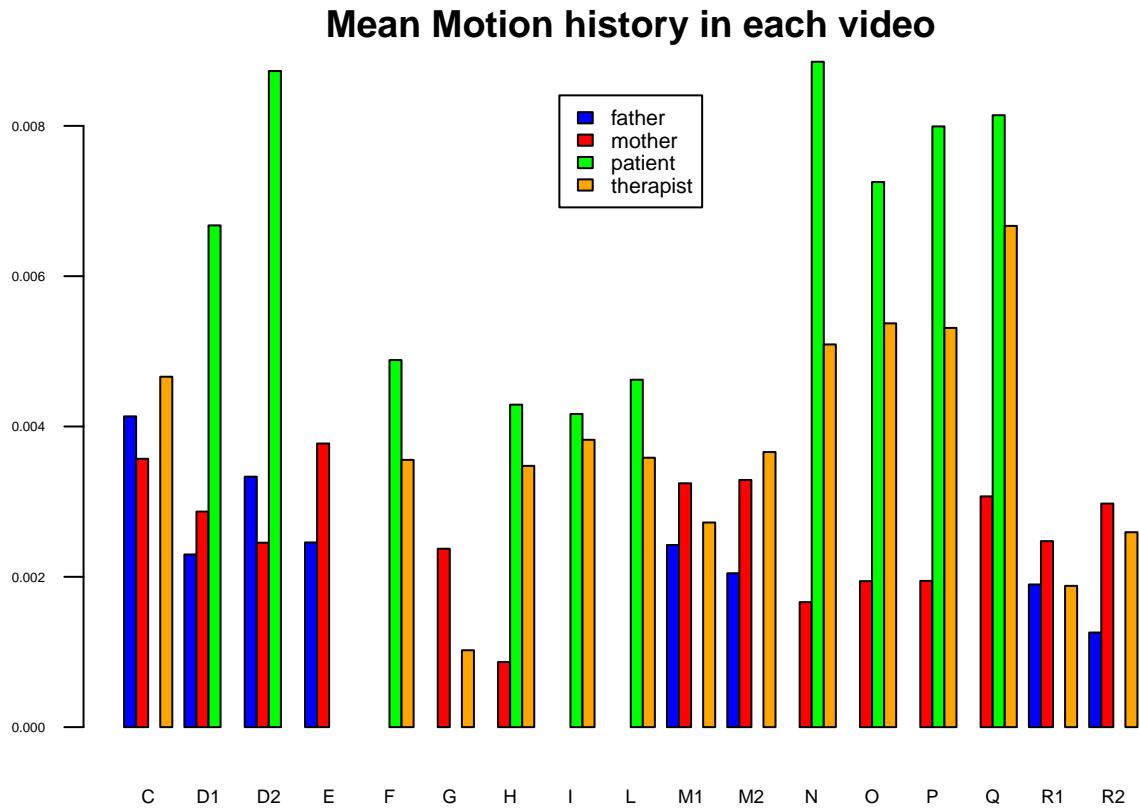
Number of Available (True) and Not Available (False) data for each participant



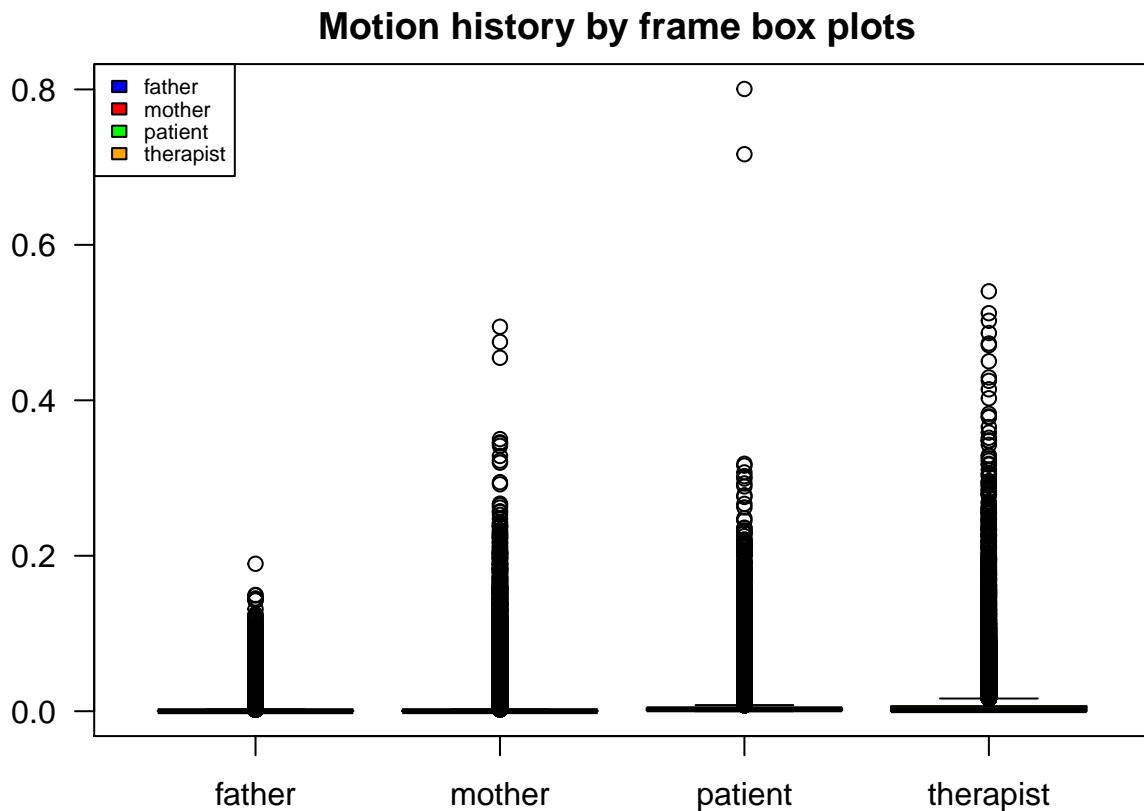
Mother and therapist are the more often present participants.

Raw Motion history

Mean Motion history by video by participant



Motion history box plots by frame (raw data)



Motion history box plots by frame(sliding interval mean)

Too long to display

Motion History on sliding and non overlapping intervals

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

Sliding interval function on a 11 frames interval

```
slidedefather <- SlidingInterval("father", 1, 11, data)
```

```
## [1] "F1044C.VOB"  
## [1] 31435
```

```
str(slidedefather)
```

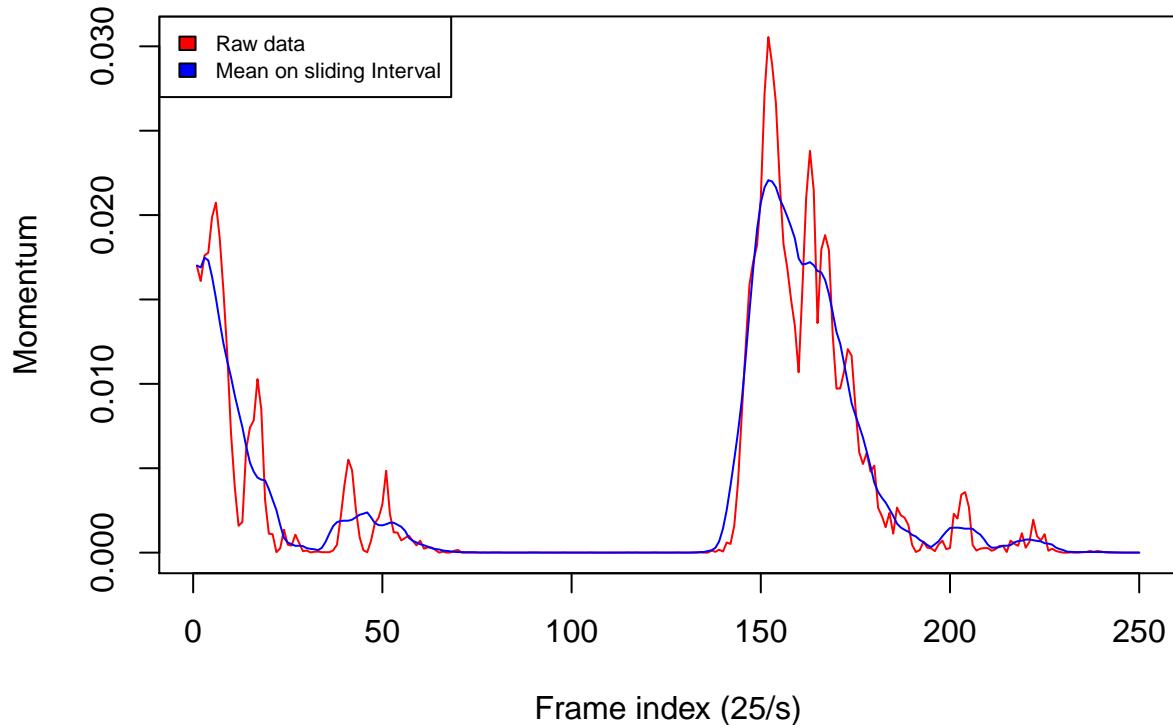
```
## num [1:31425] 0.017 0.0169 0.0175 0.0173 0.0163 ...
```

```

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="red", type="l")
lines(slidedfather[1:250], col="blue")
legend("topleft", c("Raw data", "Mean on sliding Interval"), fill=c("red", "blue"), cex=0.7)

```

Mean motion history (Sliding 11 frames interval) for father on F1044C video, 10 seconds



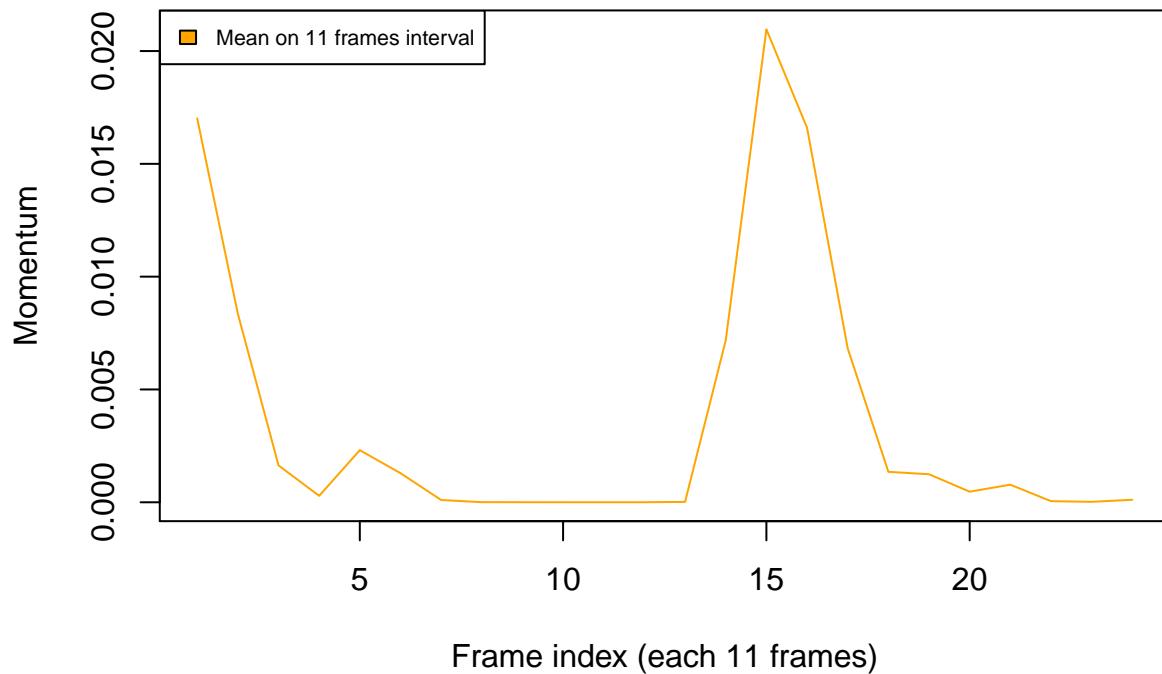
Non overlapping interval function on a 11 frames interval

```

fatherEleven<- MeanMomentumByTime("father", index0fvideos=1, interval=11, data)
plot (1:24, fatherEleven[1:24], type="l", col="orange", main="Mean Momentum (non overlapping 11 frames
intervals) for father on F1044C video, between 10-20 seconds", ylab="Momentum", xlab="Frame index"
legend("topleft", c("Mean on 11 frames interval"), fill=c("orange"), cex=0.7)

```

Mean Momentum (non overlapping 11 frames intervals) for father on F1044C video, between 10–20 seconds

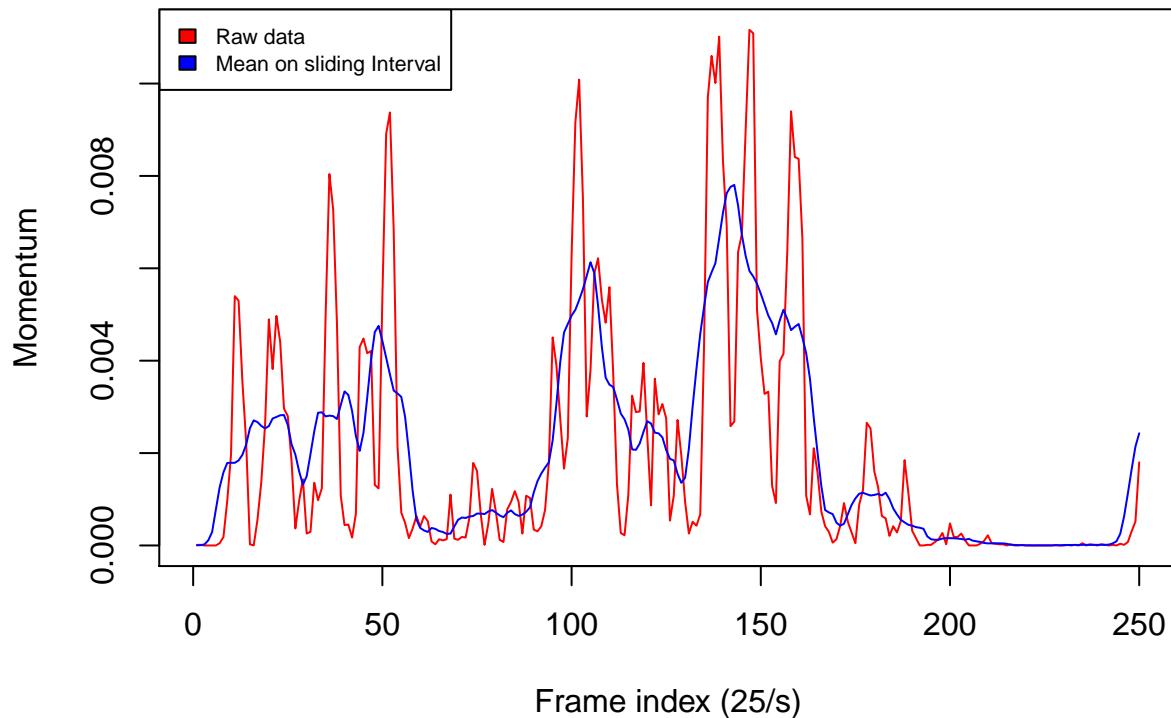


Motion history of the father during the 10 first seconds of the first video(C)

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="red", type="l")
lines(slidedfather[251:500], col="blue")
legend("topleft", c("Raw data", "Mean on sliding Interval"), fill=c("red", "blue"), cex=0.7)
```

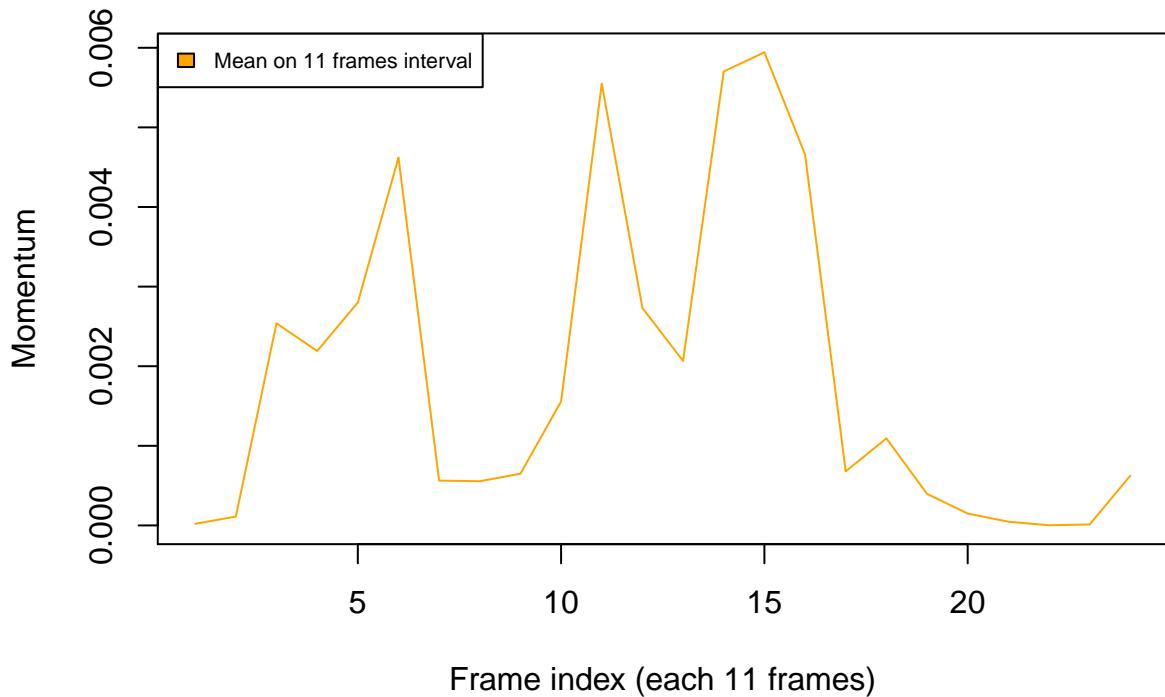
Mean motion history (Sliding 11 frames interval) for father on F1044C video, 10–20 seconds



Contiguous interval function on a 11 frames interval

```
fatherEleven<- MeanMomentumByTime("father", index0fvideos=1, interval=11, data)
plot (1:24, fatherEleven[23:46], type="l", col="orange", main="Mean Momentum (non overlapping 11 frames
intervals) for father on F1044C video, between 10-20 seconds", ylab="Momentum", xlab="Frame index"
legend("topleft", c("Mean on 11 frames interval") , fill=c("orange"), cex=0.7)
```

Mean Momentum (non overlapping 11 frames intervals) for father on F1044C video, between 10–20 seconds



Mean Momentum by minute plots

```

fatherMinuteC<- MeanMomentumByTime("father", indexOfvideos=1, interval=1500, data)

MotherMinuteC<- MeanMomentumByTime("mother", indexOfvideos=1, interval=1500, data)

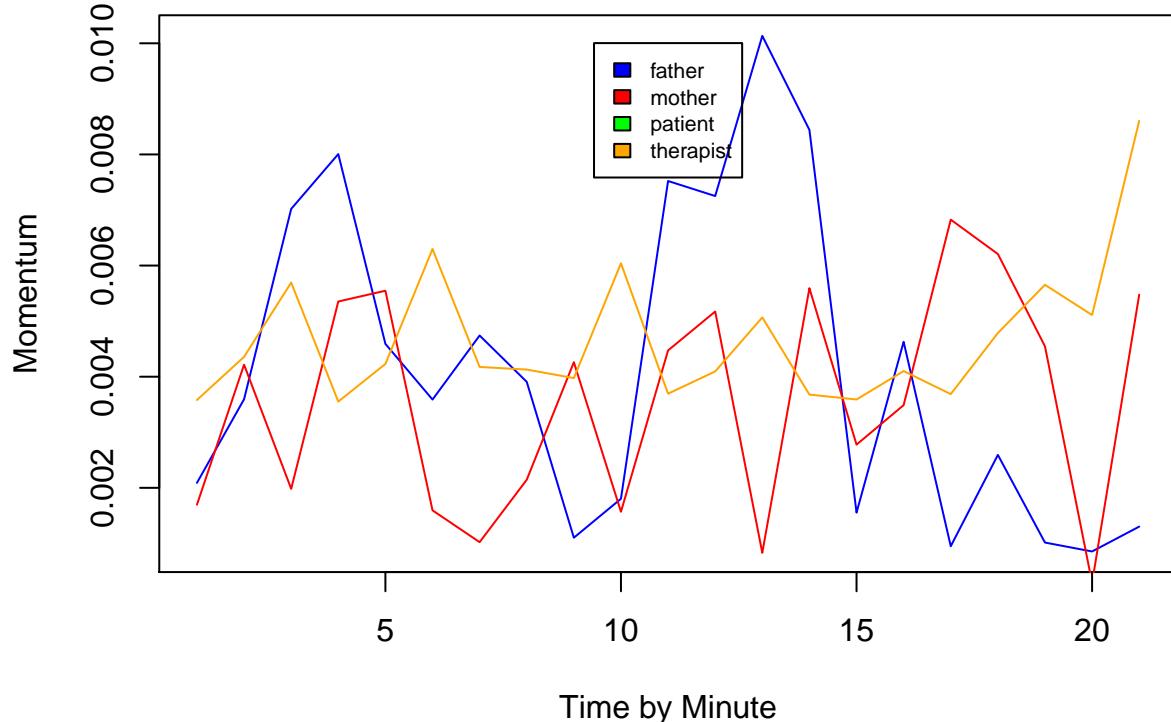
TherapistMinuteC<- MeanMomentumByTime("therapist", indexOfvideos=1, interval=1500, data)

PatientMinuteC<- MeanMomentumByTime("patient", indexOfvideos=1, interval=1500, data)

par(mar=c(4,4,4,2))
plot (1:length(fatherMinuteC), fatherMinuteC, type="l", col="blue",
main=paste("Mean Momentum (non overlaping minute intervals)
on F1044", "C", " video" , sep="")),
ylab="Momentum", xlab="Time by Minute" )
lines(MotherMinuteC, col="red")
lines(TherapistMinuteC, col="orange")
lines(PatientMinuteC, col="green")
legend("top", inset=.05, ParticipantsList,
      fill=colOrderList, cex=0.7)

```

Mean Momentum (non overlapping minute intervals) on F1044C video



```

fatherMinuteD1<- MeanMomentumByTime("father", index0fvideos=2, interval=1500, data)

MotherMinuteD1<- MeanMomentumByTime("mother", index0fvideos=2, interval=1500, data)

TherapistMinuteD1<- MeanMomentumByTime("therapist", index0fvideos=2, interval=1500, data)

PatientMinuteD1<- MeanMomentumByTime("patient", index0fvideos=2, interval=1500, data)

par(mar=c(4,4,4,2))
plot (1:length(fatherMinuteD1), fatherMinuteD1, type="l", col="blue",
main=paste("Mean Momentum (non overlapping minute intervals)
on F1044", "D1", " video" , sep=""),
ylab="Momentum", xlab="Time by Minute" )
lines(MotherMinuteD1, col="red")
lines(TherapistMinuteD1, col="orange")
lines(PatientMinuteD1, col="green")
legend("top", inset=.05, ParticipantsList,
      fill=colOrderList, cex=0.7)

```

**Mean Momentum (non overlapping minute intervals)
on F1044D1 video**

