# GGIR package

# Study aim and background

- Sickness behaviors, including fatigue, depression, and disruptions in sleep and activity, are among the most common and distressing side effects of cancer and its treatment.
- To date, research has focused on identifying the prevalence and severity of sickness behaviors at various points along the cancer continuum and establishing the efficacy of behavioral interventions to reduce sickness behaviors.
- The next generation of research should refine our current understanding of how sickness behaviors develop.

# Study aim and background

- Previous research to examine onset of sickness behaviors in women undergoing platinum-based chemotherapy for gynecologic cancer, one of the most arduous treatment regimens for cancer.
  - Found that sickness behaviors previously thought to cluster together actually occur in a cascade pattern
  - disruptions in sleep contributing to lagged increases in fatigue and fatigue in turn contributing to lagged increases in depression.
- This work is clinically important because it suggests that interventions targeted to sickness behaviors early in the cascade may have beneficial effects on multiple downstream sickness behaviors.

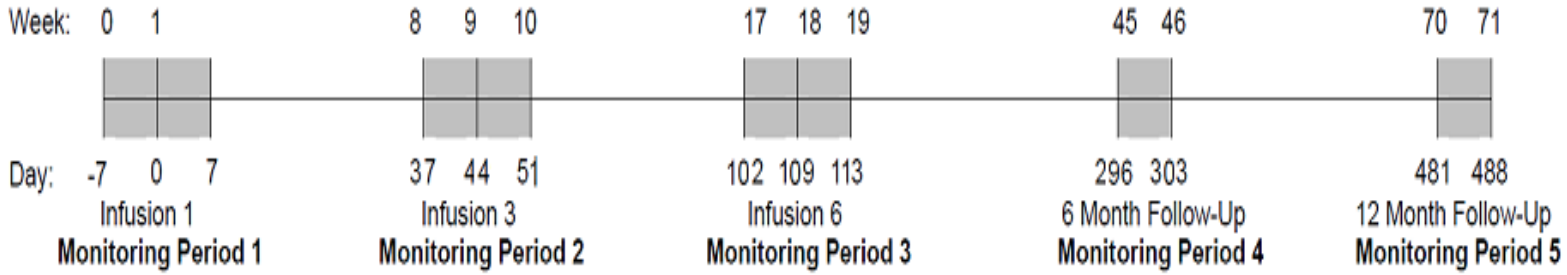
# Study aim and background

- Recruit a sample of 150 women receiving chemotherapy for gynecologic cancer and a matched comparison sample of 150 women with no history of cancer.
- Both samples will be evaluated on eight occasions during which sickness behaviors (and pro-inflammatory cytokines) will be assessed.
- Assessments will occur before, during, and at six and twelve months after chemotherapy.

# Study aim and background

- **To identify the magnitude and features of changes in sickness behaviors (i.e., fatigue, depression, and disruptions in sleep and activity) and pro-inflammatory cytokines in gynecologic cancer patients treated with chemotherapy compared to women without cancer.**
  - The cancer sample is expected to demonstrate greater increases in sickness behaviors during chemotherapy than the non-cancer sample.
  - Comparisons will also provide information on whether sickness behaviors in the cancer sample are elevated prior to chemotherapy and whether they increase, decrease, or remain stable following completion of chemotherapy.
  - Sickness behaviors in patients are expected to increase in a cascade pattern, with sleep disruptions predicting lagged increases in fatigue and fatigue predicting lagged increases in depression.

# Timing of Assessments



# GGIR

- A tool to process and analyze data collected with wearable raw acceleration sensors [as described in van Hees and colleagues (2014)]

- Developed and tested for binary data from 'GENEActiv' and GENEA devices, .csv-export data from 'Actigraph' devices, and .cwa and .wav-format data from 'Axivity'

---------- Data File Created By ActiGraph GT3X+ ActiLife v6.13.3 Firmware v2.2.1 date format M/d/yyyy at 30 Hz  Filter Normal ----------
Serial Number: MRA3B09130251
Start Time 14:00:00
Start Date 5/24/2013
Epoch Period (hh:mm:ss) 00:00:00
Download Time 12:48:47
Download Date 6/7/2013
Current Memory Address: 0
Current Battery Voltage: 3.99     Mode = 12
---

Accelerometer X,Accelerometer Y,Accelerometer Z
1.079,-0.176,-0.126
1.05,-0.155,-0.076
1.012,-0.155,-0.029
1.009,-0.15,0
0.997,-0.158,0.044
1.041,-0.147,0.135
1.097,-0.129,0.176
1.047,-0.12,0.185
1.018,-0.114,0.17
1.032,-0.114,0.17
1.062,-0.114,0.147
0.982,-0.085,0.15
0.965,-0.073,0.176
.
.
.
.
14,000,000 plus…. rows

# Main GGIR functions

The function arguments need to be tailored to your experimental protocol.

GGIR is structured in 5 parts.

- Part 1: Loads the data and stores derived features (aggregations) needed for the other parts. This is the time consuming part.

- Part 2: Data quality analyses and low level description of signal features per person per day and per file. At this point a day is defined from midnight to midnight

- Part 3: Estimation of sustained inactivity and sleep periods, needed for input to Part 4 for sleep detection

- Part 4: Labels the sustained inactive periods detected in Part 3 as sleep, or daytime sustained inactivity, per night and per file

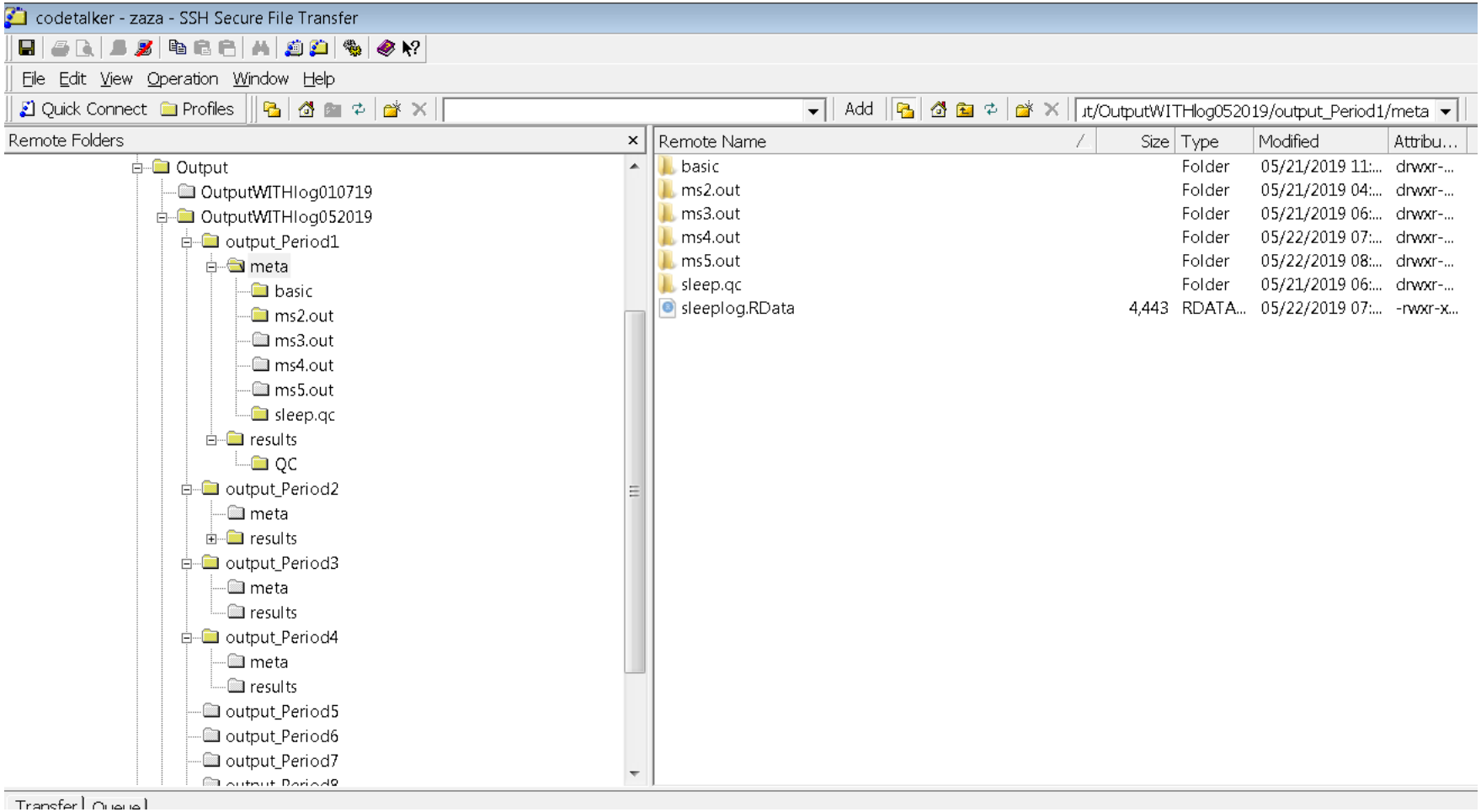
- Part 5: Derives sleep and physical activity characteristics by re-using information derived in part 2, 3 and 4. Total time in intensity categories, the number of bouts, time spent in bouts and average acceleration (overall activity) is calculated.

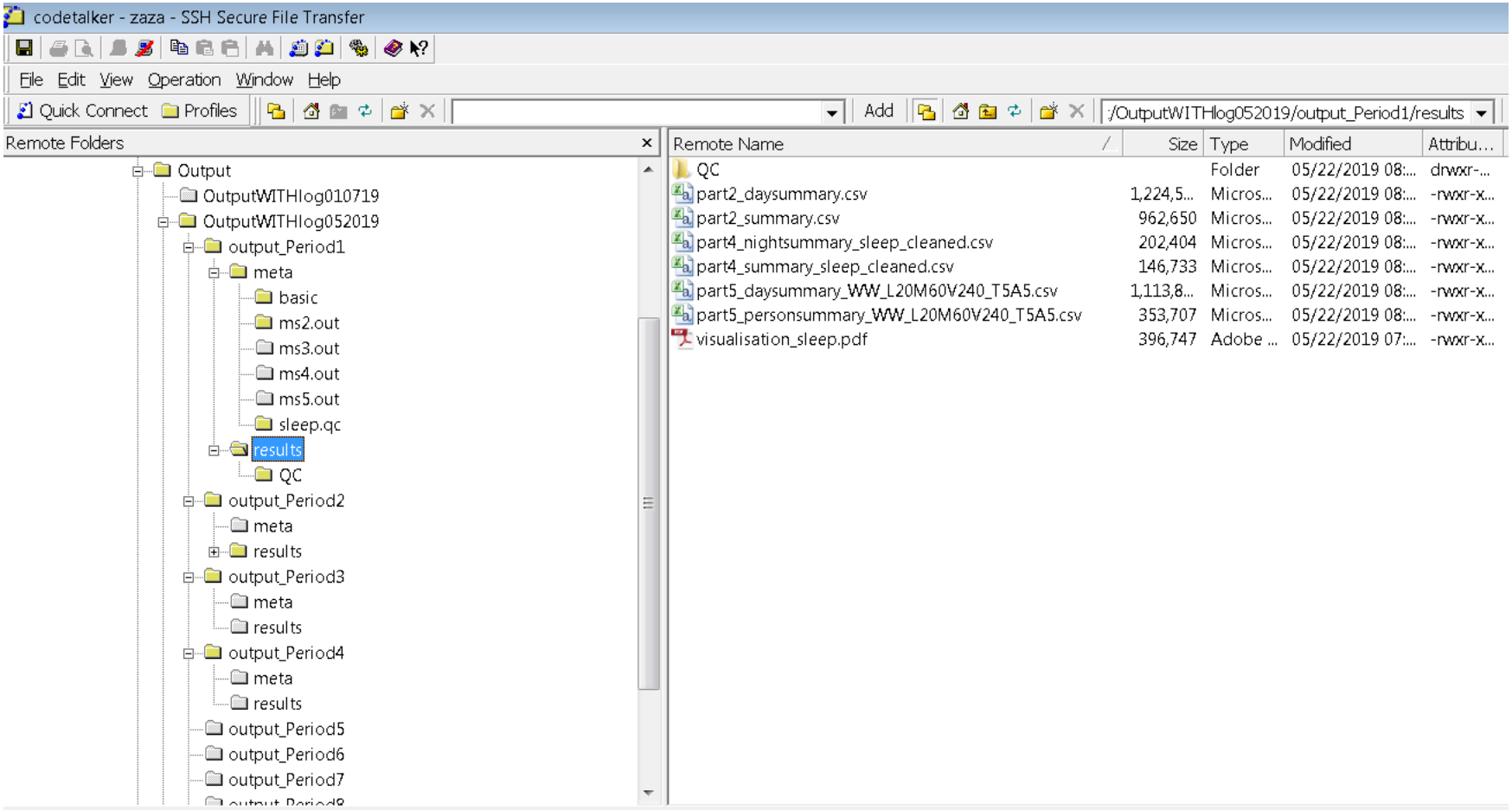
# Part 1

- Part 1: Loads the data, creates file structure, and stores derived features (aggregations) needed for the other parts. This is the time consuming part. Once this is done, parts 2-5 can be run (or re-run with different parameters in parts 2-5) relatively quickly.

# Part 1

- Calls function g.getmeta and g.calibrate, and converts the output to .RData-format which will be the input for g.part2
- Function generates a folder structure to keep track of various output files.
- g.part 1 takes much longer to run than other parts and involves only minor decisions of interest to the movement scientist..


codetalker - zaza - SSH Secure File Transfer
File Edit View Operation Window Help
Quick Connect
Profiles
Add
ut/OutputWITHlog052019/output_Period1/meta
Remote Folders
Output
OutputWITHlog010719
OutputWITHlog052019
output_Period1
meta
basic
ms2.out
ms3.out
ms4.out
ms5.out
sleep.qc
results
QC
output_Period2
meta
results
output_Period3
meta
results
output_Period4
meta
results
output_Period5
output_Period6
output_Period7
Remote Name
Size
Type
Modified
Attribu...
basic
Folder
05/21/2019 11:...
drwxr-...
ms2.out
Folder
05/21/2019 04:...
drwxr-...
ms3.out
Folder
05/21/2019 06:...
drwxr-...
ms4.out
Folder
05/22/2019 07:...
drwxr-...
ms5.out
Folder
05/22/2019 08:...
drwxr-...
sleep.qc
Folder
05/21/2019 06:...
drwxr-...
sleeplog.RData
4,443
RDATA...
05/22/2019 07:...
-rwxr-x...
Transfer
Queue


codetalker - zaza - SSH Secure File Transfer
File Edit View Operation Window Help
Quick Connect
Profiles
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output_Period7
Remote Name
Size
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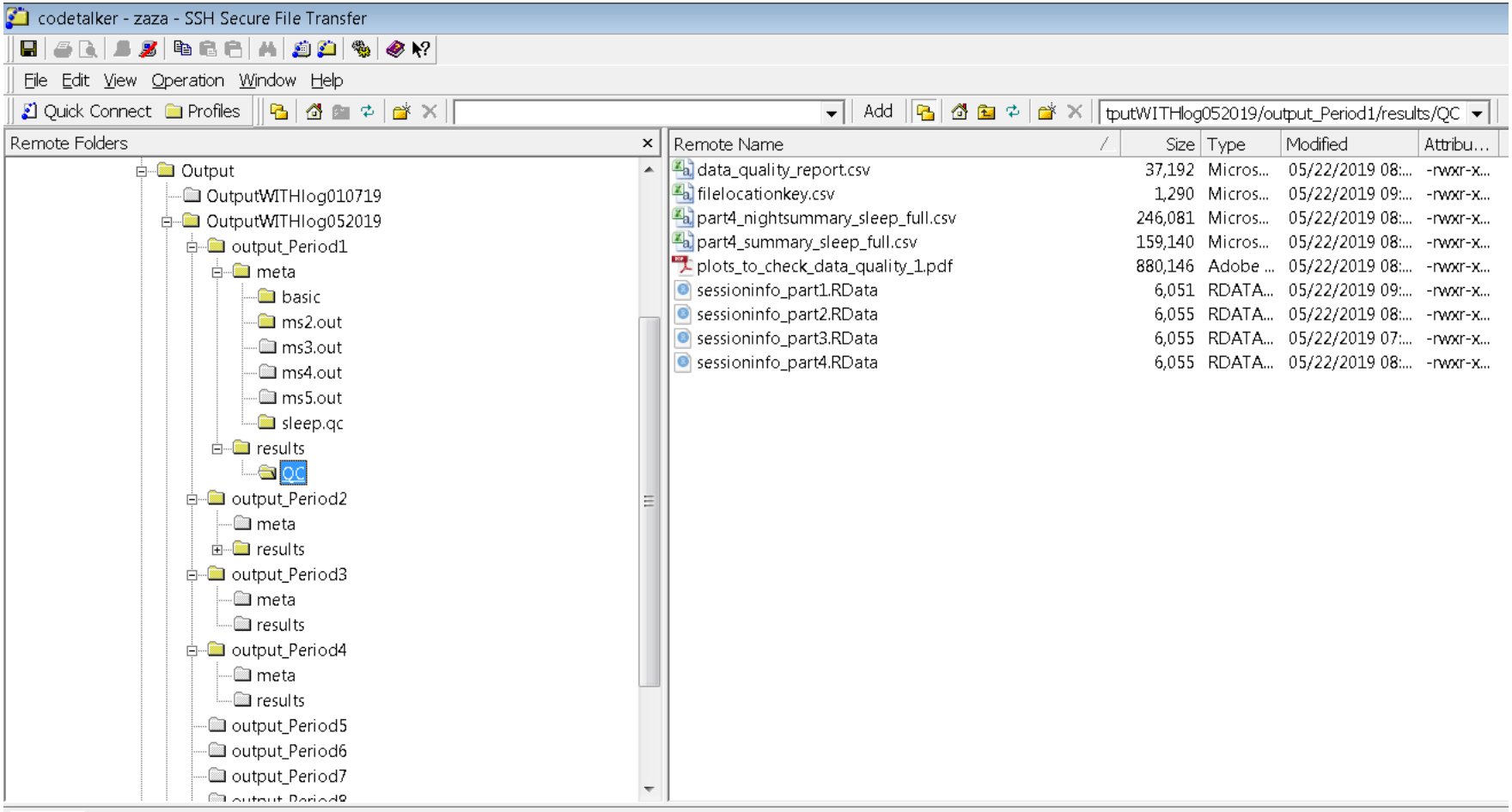
Modified
Attribu...
QC
Folder
05/22/2019 08:...
drwxr-...
part2_daysummary.csv
1,224,5...
Micros...
05/22/2019 08:...
-rwxr-x...
part2_summary.csv
962,650
Micros...
05/22/2019 08:...
-rwxr-x...
part4_nightsummary_sleep_cleaned.csv
202,404
Micros...
05/22/2019 08:...
-rwxr-x...
part4_summary_sleep_cleaned.csv
146,733
Micros...
05/22/2019 08:...
-rwxr-x...
part5_daysummary_WW_L20M60V240_T5A5.csv
1,113,8...
Micros...
05/22/2019 08:...
-rwxr-x...
part5_personsummary_WW_L20M60V240_T5A5.csv
353,707
Micros...
05/22/2019 08:...
-rwxr-x...
visualisation_sleep.pdf
396,747
Adobe ...
05/22/2019 07:...
-rwxr-x...


codetalker - zaza - SSH Secure File Transfer
File Edit View Operation Window Help
Quick Connect
Profiles
Add
tputWITHlog052019/output_Period1/results/QC
Remote Folders
Output
OutputWITHlog010719
OutputWITHlog052019
output_Period1
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basic
ms2.out
ms3.out
ms4.out
ms5.out
sleep.qc
results
QC
output_Period2
meta
results
output_Period3
meta
results
output_Period4
meta
results
output_Period5
output_Period6
output_Period7
Remote Name
Size
Type
Modified
Attribu...
data_quality_report.csv 37,192 Micros... 05/22/2019 08:... -rwxr-x...
filelocationkey.csv 1,290 Micros... 05/22/2019 09:... -rwxr-x...
part4_nightsummary_sleep_full.csv 246,081 Micros... 05/22/2019 08:... -rwxr-x...
part4_summary_sleep_full.csv 159,140 Micros... 05/22/2019 08:... -rwxr-x...
plots_to_check_data_quality_1.pdf 880,146 Adobe ... 05/22/2019 08:... -rwxr-x...
sessioninfo_part1.RData 6,051 RDATA... 05/22/2019 09:... -rwxr-x...
sessioninfo_part2.RData 6,055 RDATA... 05/22/2019 08:... -rwxr-x...
sessioninfo_part3.RData 6,055 RDATA... 05/22/2019 07:... -rwxr-x...
sessioninfo_part4.RData 6,055 RDATA... 05/22/2019 08:... -rwxr-x...

# Part 1

- g.getmeta Reads a accelerometer file in blocks, extracts various features and stores average feature value per short or long epoch.
  - Acceleration and angle metrics are stored at short epoch length.
  - The non-wear indication score, the clipping score, temperature (if available), light (if available), and Euclidean norm are stored at long epoch length.
- g.calibrate Function starts by identifying ten second windows of non-movement. Next, the average acceleration per axis per window is used to estimate calibration error (offset and scaling) per axis. The function provides recommended correction factors to address the calibration error and a summary of the calibration procedure.

# g.Part1 key parameters

- **datadir** = Directory where the accelerometer files are stored or list of accelerometer file-names and directories
- **Outputdir** = where the output needs to be stored. Note that this function will attempt to create folders in this directory and uses those folder to organise output
- **f0**=1, File index to start with (default = 1). Index refers to the filenames sorted in increasing order
- **F1** f1File index to finish with (defaults to number of files availa

# g.Part1 key parameters

- **do.bfen** if TRUE, calculate metric BFEN with band-pass filter configuration set by lb and hb
- **do.enmo** if TRUE (default), calculate metric ENMO
- **do.lfenmo** if TRUE, calculate metric LFENMO with low-pass filter
  - **do.hfen**
  - **do.hfenplus**
- **do.mad** if TRUE, calculate metric MAD (Mean Amplitude Deviation)
- **mvpathreshold** Threshold for MVPA estimation. Threshold needs to be based on metric ENMO. This can be a single number or an vector of numbers, e.g. c(100,120). In the latter case the code will estimate MVPA seperately for each threshold.
- **do.cal** Whether to apply auto-calibration or not, see g.calibrate. Default and recommended setting is TRUE

# g.Getmeta key parameters

- **windowsizes**
  - Three values to indicate the lengths of the windows as in c(window1,window2,window3):
  - window1 is the short epoch length in seconds and by default 5 this is the time window over which acceleration and angle metrics are calculated,
  - window2 is the long epoch length in seconds for which non-wear and signal clipping are defined, default 900.
  - window3 is the window length of data used for non-wear detection and by default 3600 seconds.

# Metrics

- **Euclidean Norm Minus One**
- **Mean Amplitude Deviation**
- **Others:** BFEN with band-pass filter
  HFEN with low-pass filter
  etc… etc…
- **No one metric systematically outperforms all others across a wide range of standardized kinematic conditions.**
- **ENMO and MAD and certain thresholds in Bakrania et al. 2016 are robust for separating sedentary behaviors from light activity**

# ENMO

$$r_i = \sqrt{{x_i}^2 + {y_i}^2 + {z_i}^2} - 1000$$

1000 = 1000 milligravitational units = 1 g

# MAD

$$MAD = \frac{1}{n}\sum_{i=1}^{n}|r_i - \bar{r}|$$

Where $r_i = \sqrt{{x_i}^2 + {y_i}^2 + {z_i}^2}$

Is the $i^{th}$ $vector\ magniture\ at\ each\ time\ point$

and $\bar{r} =$

$mean\ vector\ magnitude,\ n = length\ of\ time$

# g.Calibrate key parameters

- **chunksize** number between 0.2 and 1 to specifiy the size of chunks to be loaded as a fraction of a 12 hour period, e.g. 0.5 equals 6 hour chunks. The default is 1 (12 hrs). For machines with less than 4Gb of RAM memory a value below 1 is recommended.
- **minloadcrit** the minimum number of hours the code needs to read for the autocalibration procedure to be effective. After loading these hours only extra data is loaded if calibration error has not been reduced to under 0.01 g.

# Autocalibration

An acceleration sensor works on the principle that acceleration is captured mechanically and converted into an electrical signal.

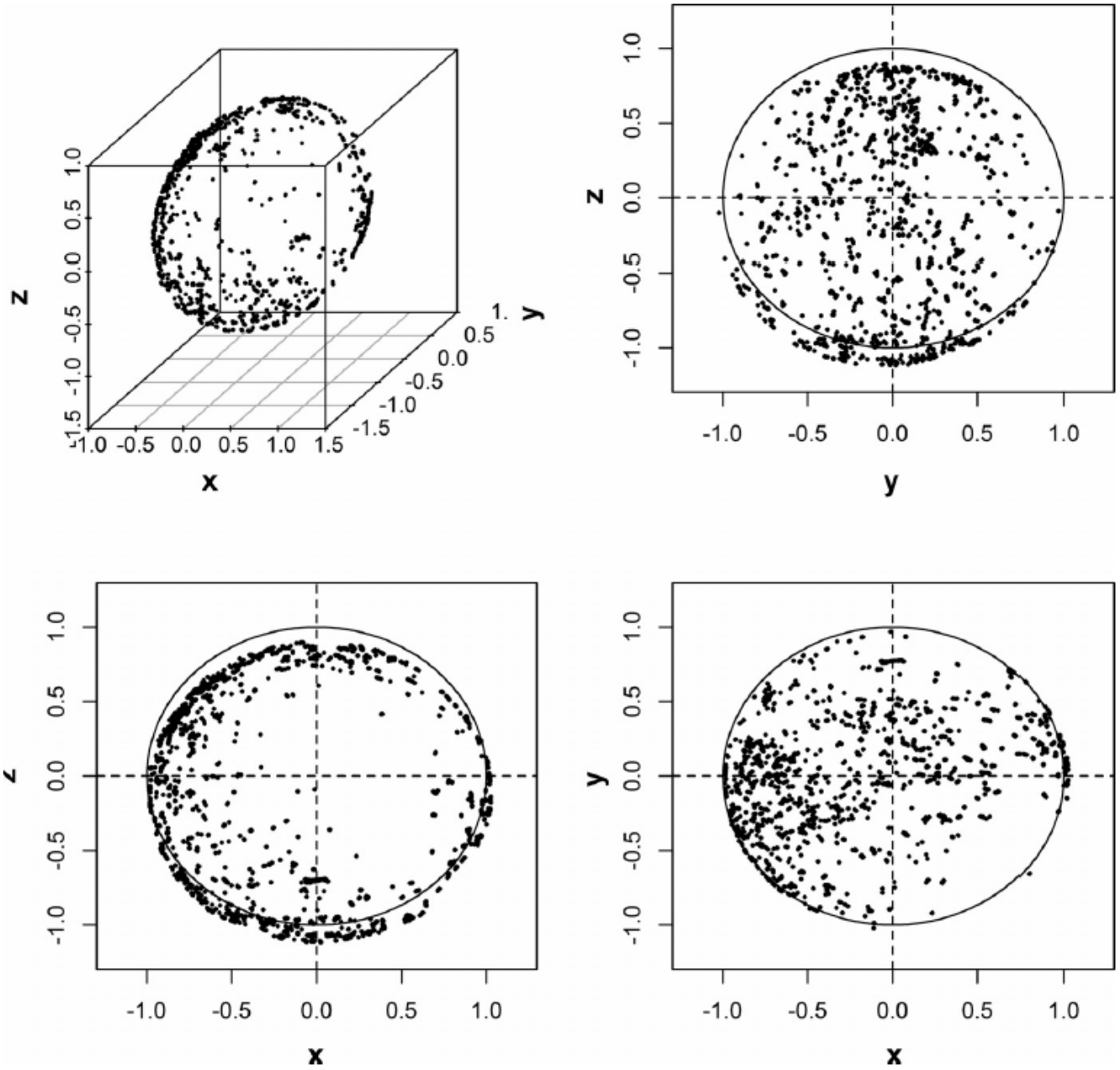
The relationship between the electrical signal and the acceleration is usually assumed to be linear, involving an offset and a gain factor.

# Autocalibration

- A recording of acceleration is screened for non-movement periods.

- Next, the moving average over the non-movement periods is taken from each of the three orthogonal sensor axes and used to generate a three-dimensional ellipsoid representation that should ideally be a sphere with radius 1 g
  - g- units (1 standard g = 9.80665 m/s^2)

- Deviations between the radius of the three-dimensional ellipsoid and 1 g (ideal calibration) can then be used to derive correction factors for sensor axis-specific calibration error

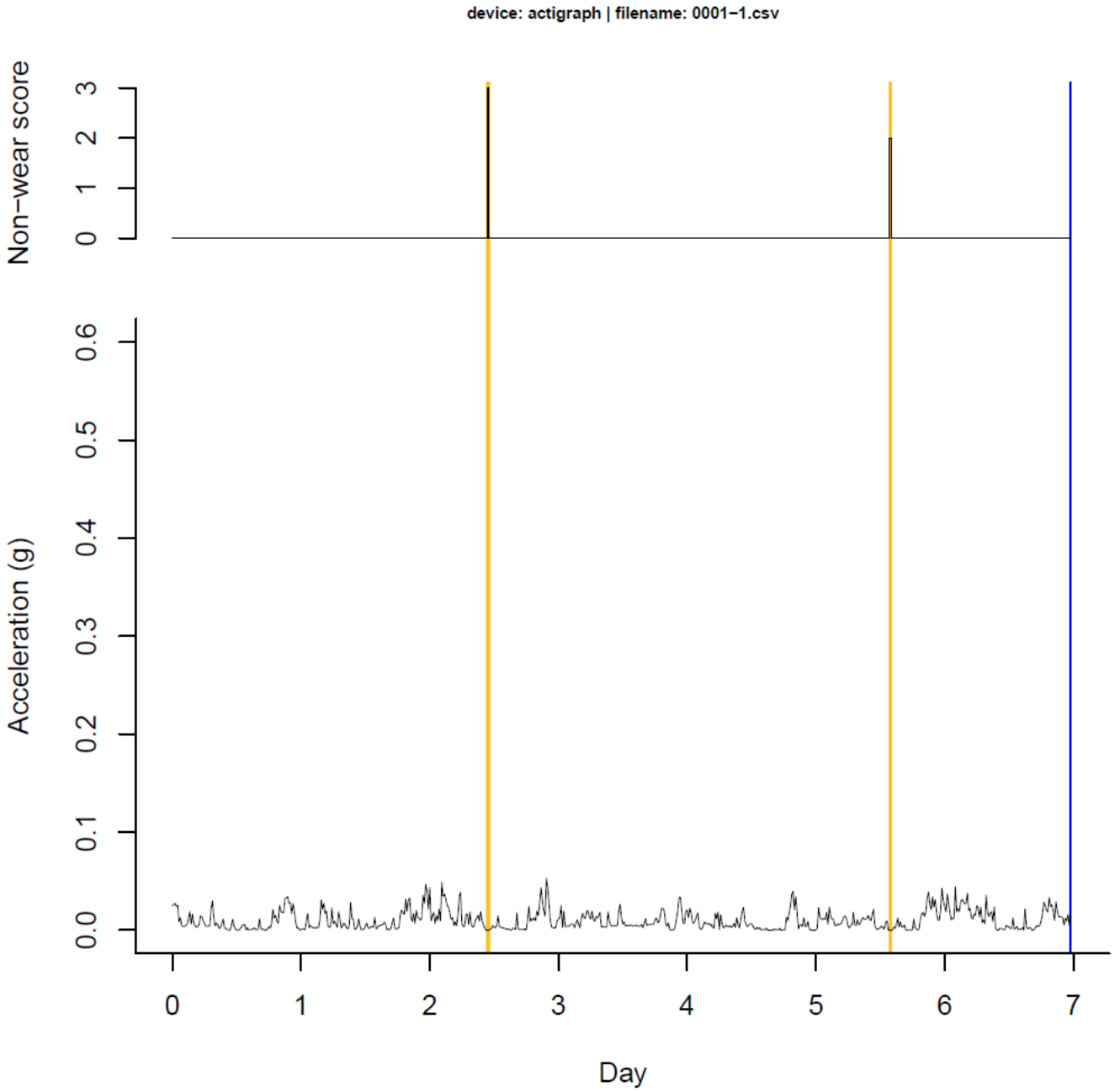

z
x
y
-1.0 -0.5 0.0 0.5 1.0 1.5
1.
0.5
0.0
-0.5
-1.0
-1.5
z
y
x
y

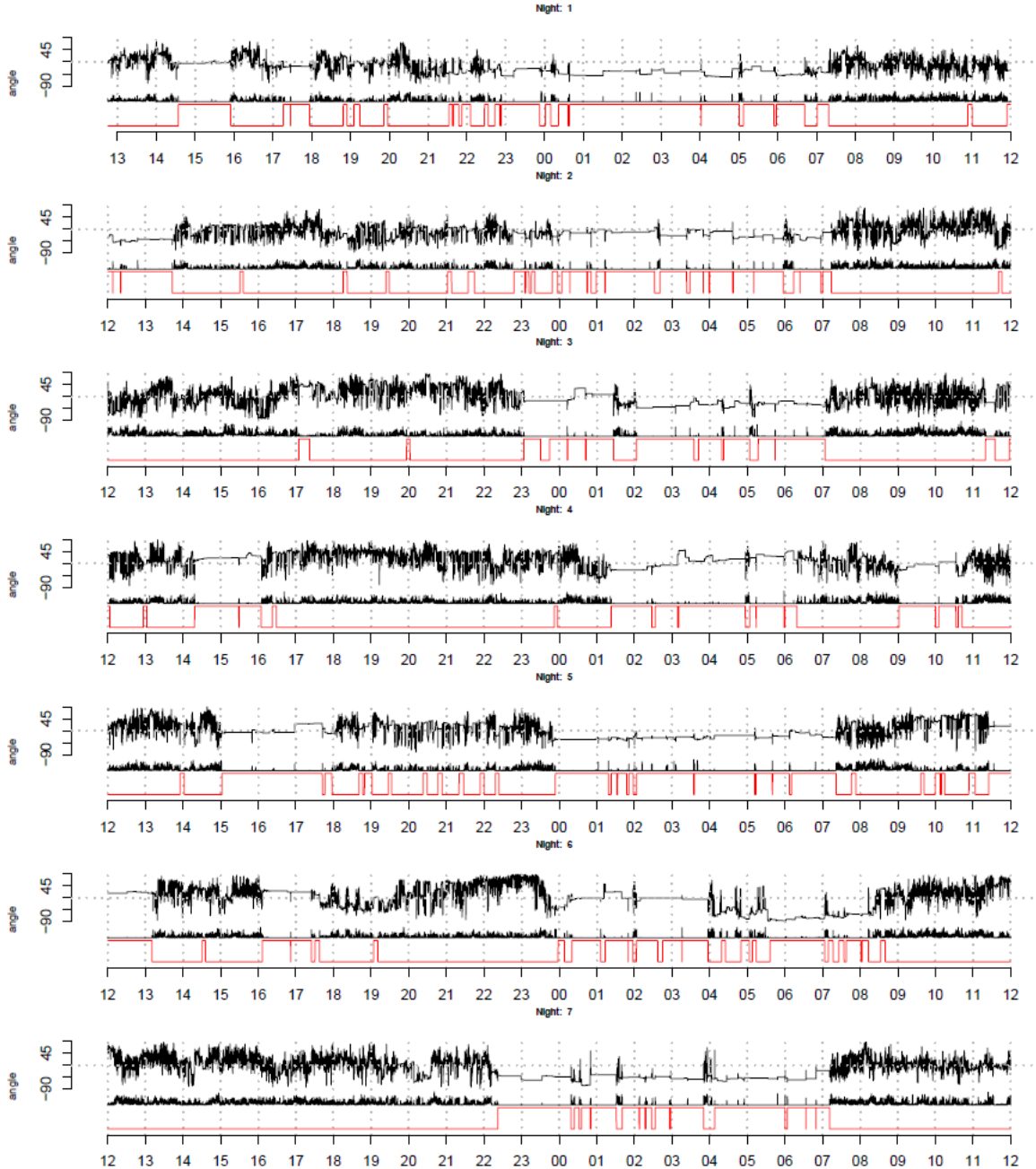
# Part 2

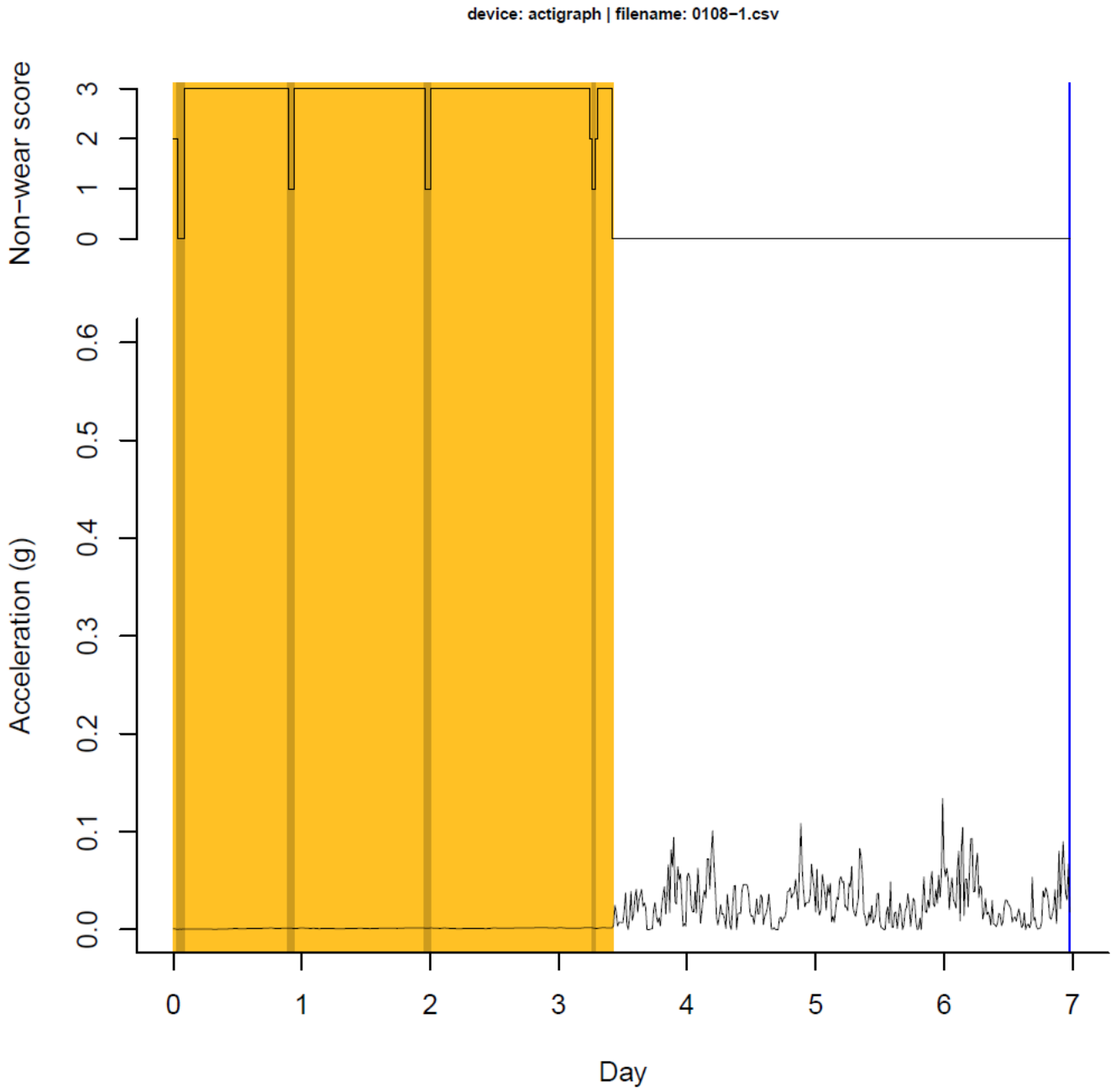
- Loads the output from g.part1 and then applies g.impute and g.analyse, after which the output is converted to .RData-format which will be used by g.shell.GGIR to generate reports.
- Part 2 generates:
  - part2_summary.csv
  - part2_daysummary.csv
  - QC/data_quality_report.csv
  - QC/plots to check data quality 1.pdf

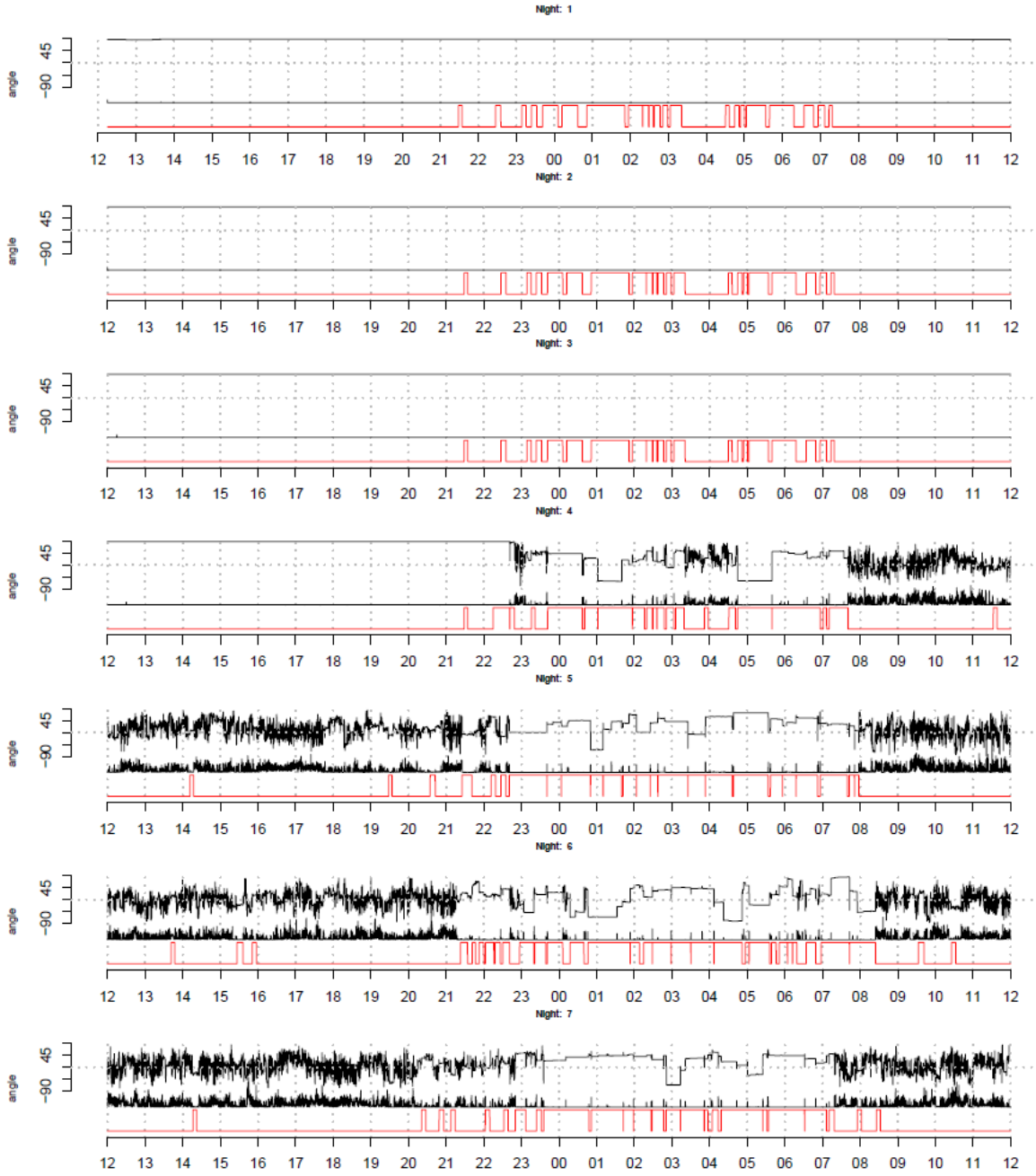
# g.Impute key parameters

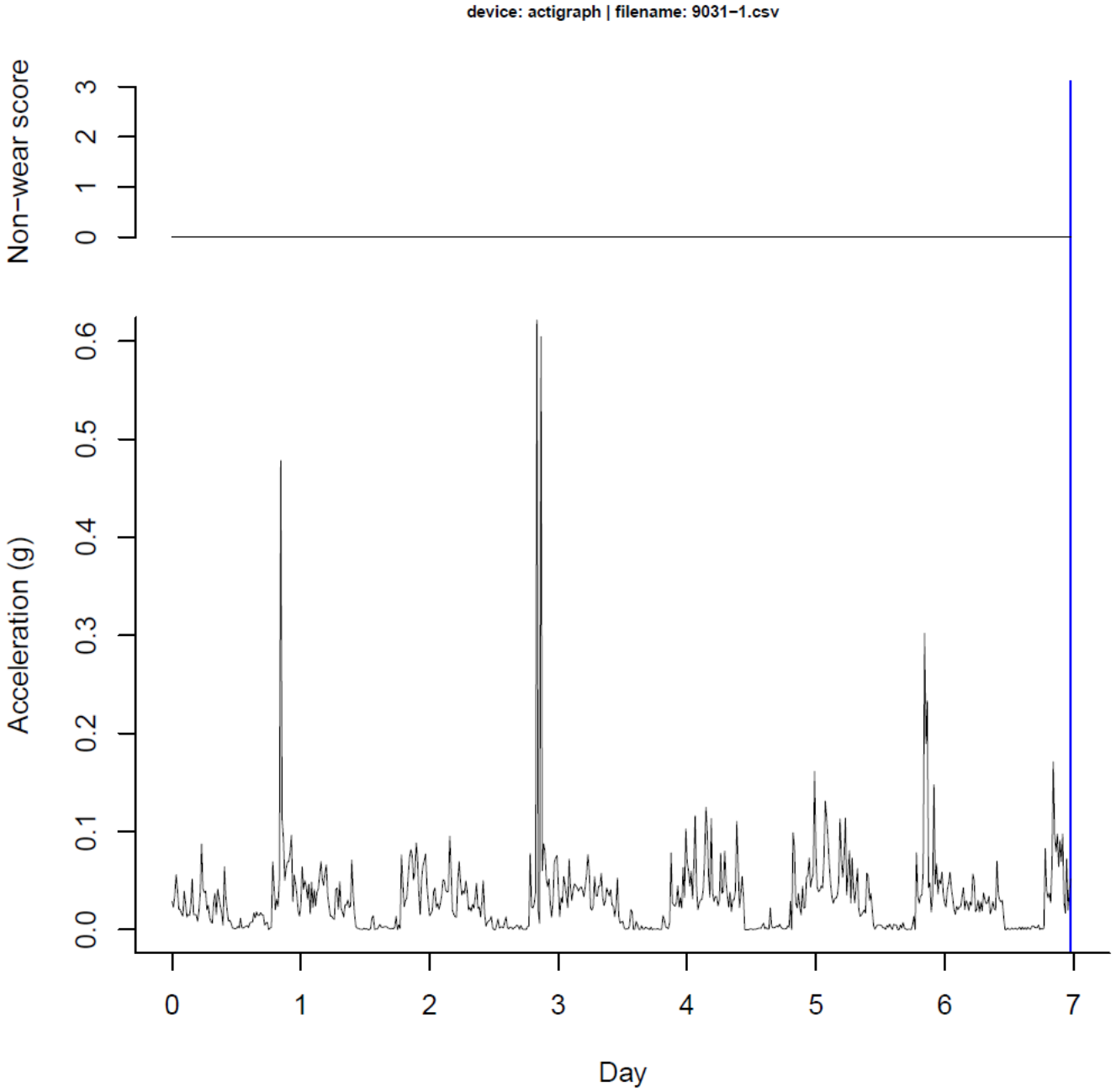
- **strategy** how to deal with knowledge about study protocol.
  - value = 1 to select data based on hrs.del.start, hrs.del.end, and maxdur.
  - Value = 2 to only use the data between the first midnight and the last midnight
  - value = 3 only selects the most active X days in the files. X is specified by argument ndayswindow
- Others depend on value of **strategy**


device: actigraph | filename: 0001-1.csv
Non-wear score
0
1
2
3
Acceleration (g)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0
1
2
3
4
5
6
7
Day


Night: 1
Night: 2
Night: 3
Night: 4
Night: 5
Night: 6
Night: 7
angle
45
-90
13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11 12
12 13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11 12


device: actigraph | filename: 0108−1.csv
Non−wear score
0
1
2
3
Acceleration (g)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0
1
2
3
4
5
6
7
Day


Night: 1
Night: 2
Night: 3
Night: 4
Night: 5
Night: 6
Night: 7
angle
45
−90
12 13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11 12


device: actigraph | filename: 9031−1.csv
Non−wear score
0
1
2
3
Acceleration (g)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0
1
2
3
4
5
6
7
Day

# Part 3

- Estimates the sustained inactivity periods in each day

- Used as input for g.part4 which then labels them as nocturnal sleep or day time sustained inactivity periods.

# Part 3 key parameters

- anglethreshold Angle threshold (degrees) for sustained inactivity periods detection, default = 5
- timethreshold Time threshold (minutes) for sustained inactivity periods detection, default = 5. This can be specified as multiple thresholds, each of which will be implemented. For example, timethreshold = c(5,10)
- ignorenonwear If TRUE then ignore detected monitor non-wear periods to avoid confusion between monitor non-wear time and sustained inactivity (default = TRUE)

# Part 4

- Loads output from g.part3 as stored in milestone data and sleep log information (if available)
- Uses these information sources to define nocturnal sleep and daytime sustained inactivity
- Part 4 generates the following output:
  - part4_nightsummary_sleep_cleaned.csv
  - part4_summary_sleep_cleaned.csv
  - visualisation_sleep.pdf (optional)

# Part 4

- **Loglocation** Location of the spreadsheet (csv) with sleep log information.
- **outliers.only** = FALSE will visualize all subjects, if TRUE will visualize only for nights with a difference in onset or waking time larger than the variable of argument **criterror.**

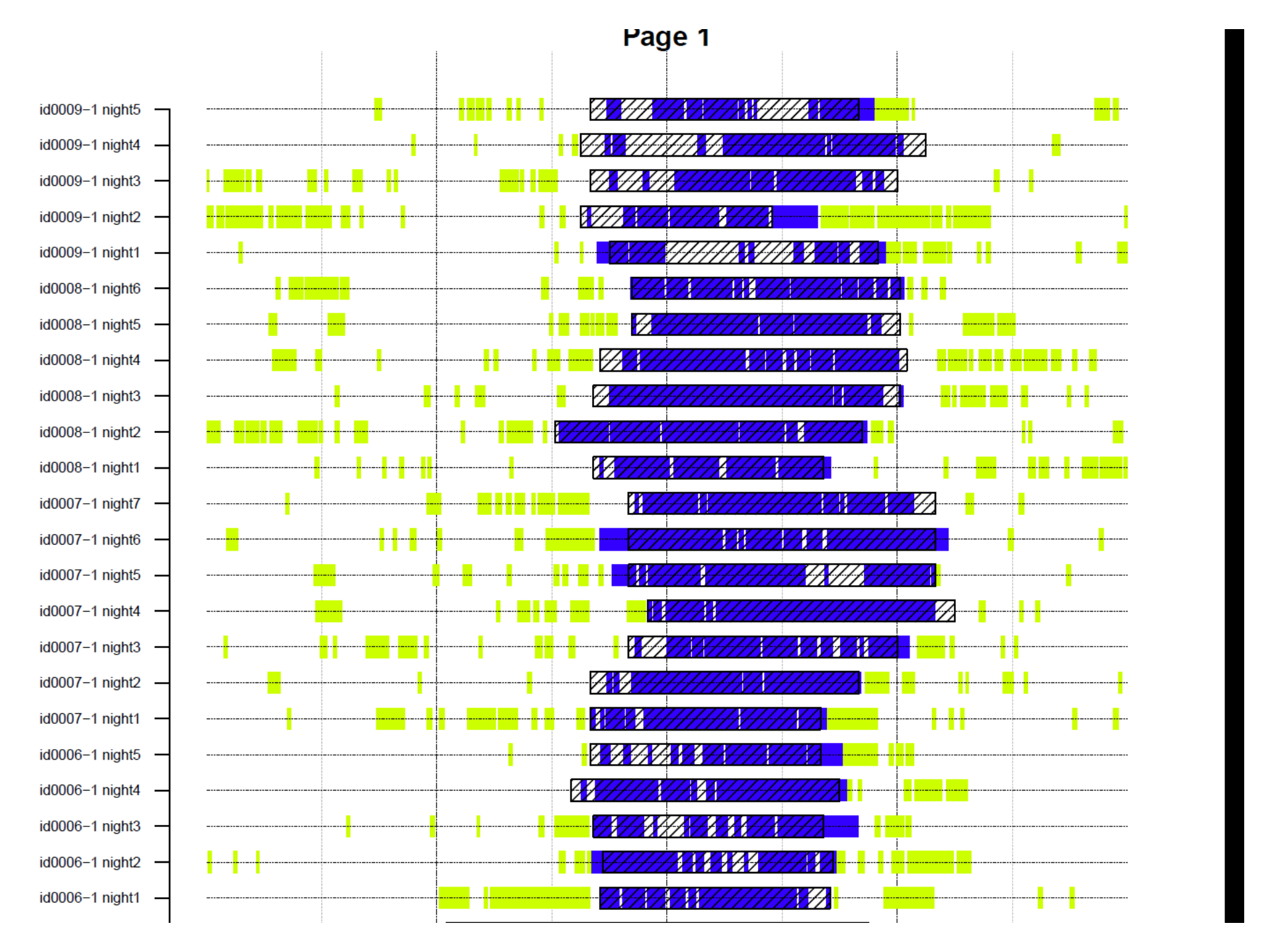
- **relyonsleeplog** = If TRUE then sleep onset and waking time are defined based on timestamps derived from sleep log if FALSE (default) the sleep log is only used to guide the accelerometer-based detection. If participants were instructed NOT to wear the accelerometer during waking hours then set to TRUE, in all other scenarios set to FALSE.

- **do.visual** = TRUE generate a pdf with a visual representation of the overlap between the sleeplog entries and the accelerometer detections.
- **nnights** = Number of nights for which sleep log information should be available. It assumes that this is constant within a study. If sleep log information is missing for certain nights then leave these blank

# Sleep Log

- The spreadsheet needs to have the following structure: one column for participant id, and then followed by alternatingly one column for onset time and one column for waking time (see example below). There can be multiple sleeplogs in the same spreadsheet. The first raw of the spreadsheet needs to be filled with column names, it does not matter what these column names are. Timestamps are to be stored without date as in hh:mm:ss. If onset corresponds to lights out or intention to fall asleep, then it is the end-users responsibility to account for this in the interpretation of the results.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | STNO | FGASLP2 | FGAWK2 | FGASLP3 | FGAWK3 | FGASLP4 | FGAWK4 | FGASLP5 | FGAWK5 | FGASLP6 | FGAWK6 | FGASLP7 | FGAWK7 | FGASLP8 | FGAWK8 | FGASLP9 | FGAWK9 | FGASLP10 | FGAWK10 |
| 2 | 10002 | 21:40:00 | 5:35:00 | 23:30:00 | 6:45:00 | 22:20:00 | 6:30:00 | 22:45:00 | 7:45:00 | 22:30:00 | 6:20:00 | 22:20:00 | 6:30:00 | 22:20:00 | 6:10:00 | 22:30:00 | 6:40:00 | 23:25:00 | 6:55:00 |
| 3 | 10004 | 23:30:00 | 7:00:00 | 22:50:00 | 7:20:00 | 22:45:00 | 7:45:00 | 22:30:00 | 7:30:00 | 22:15:00 | 6:45:00 | 22:45:00 | 6:45:00 | 22:45:00 | 6:45:00 | 23:00:00 | 6:30:00 | 23:00:00 | 7:00:00 |
| 4 | 10005 | 22:15:00 | 6:45:00 | 23:00:00 | 6:45:00 | 22:30:00 | 8:00:00 | 20:00:00 | 7:00:00 | 21:00:00 | 6:30:00 | 22:00:00 | 6:45:00 | 22:00:00 | 6:45:00 | 22:00:00 | 7:15:00 | 22:00:00 | 7:30:00 |
| 5 | 10011 | 0:00:00 | 7:25:00 | 23:30:00 | 7:25:00 | 23:30:00 | 7:25:00 | 23:15:00 | 7:30:00 | 23:15:00 | 7:30:00 | 23:30:00 | 7:45:00 | 0:00:00 | 8:30:00 | 23:35:00 | 7:30:00 | 23:15:00 | 7:35:00 |
| 6 | 10013 | 23:00:00 | 6:23:00 | 22:50:00 | 6:30:00 | 22:50:00 | 6:45:00 | 22:50:00 | 6:20:00 | 23:00:00 | 6:40:00 | 22:50:00 | 6:30:00 | 22:55:00 | 6:30:00 | 23:00:00 | 6:30:00 | 23:10:00 | 6:40:00 |
| 7 | 10016 | 23:30:00 | 7:10:00 | 0:00:00 | 6:30:00 | 23:45:00 | 7:00:00 | 23:45:00 | 6:00:00 | 23:30:00 | 6:45:00 | 0:00:00 | 6:15:00 | 0:15:00 | 6:50:00 | 23:50:00 | 5:50:00 | 23:45:00 | 6:15:00 |
| 8 | 10017 | 23:00:00 | 8:00:00 | 23:00:00 | 8:15:00 | 22:30:00 | 9:00:00 | 0:00:00 | 9:00:00 | 20:22:00 | 8:00:00 | 22:30:00 | 8:15:00 | 22:15:00 | 8:15:00 | 23:30:00 | 8:00:00 | 23:00:00 | 8:30:00 |


Page 1
id0009−1 night5
id0009−1 night4
id0009−1 night3
id0009−1 night2
id0009−1 night1
id0008−1 night6
id0008−1 night5
id0008−1 night4
id0008−1 night3
id0008−1 night2
id0008−1 night1
id0007−1 night7
id0007−1 night6
id0007−1 night5
id0007−1 night4
id0007−1 night3
id0007−1 night2
id0007−1 night1
id0006−1 night5
id0006−1 night4
id0006−1 night3
id0006−1 night2
id0006−1 night1

# Some output variables

- **acc_onset** Detected onset of sleep expressed as hours since the midnight of the previousnight.
- **acc_wake** Detected waking time (after sleep period) expressed as hours since the midnight ofthe previous night

# Some output variables

- acc_SptDuration  = Difference between onset and waking time.
- acc_def = Definition of sustained inactivity by accelerometer
- sleeplog_onset Start of Sleep Period Time window derived from (in order of priority)sleeplog, detected by the HDCZA algorithm, detected by L5HR6 algorithm, or specified by researcher,
- sleeplog_wake End of Sleep Period Time window derived from (in order of priority) sleeplog, detected by the HDCZA algorithm, detected by L5HR6 algorithm, or specified by resear

# Part 5

- Merges the output from g.part2 and g.part4 into one report enhanced with profiling of sleep and physical activity stratified across intensity levels

# Part 5 key parameters

- **threshold.lig** = Threshold for light physical activity to separate inactivity from light activity. Value can be one number or an vector of multiple numbers, e.g. threshold.lig = c(30,40). If multiple numbers are entered then analysis will be replicated for each combination of threshold values.
  - **threshold.mod** (similar)
  - **threshold.vig** (similar)

- Bouts of MVPA are identified as all 5- or 10-min time windows that start with a 5-s epoch value equal to or higher than ie. 100 m*g* and for which 80% of subsequent 5-s epoch values are equal to or higher than the 100-m*g* threshold

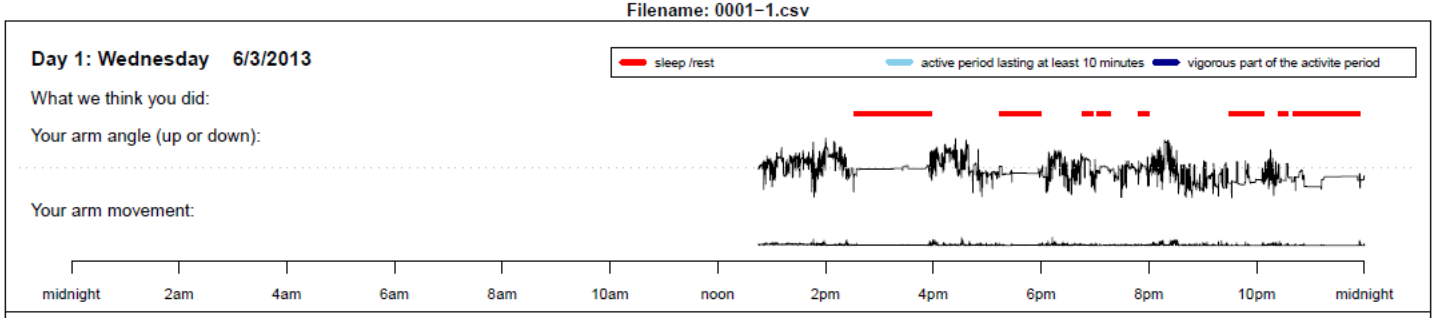
- **boutcriter.mvpa** = A number between 0 and 1 and defines what fraction of a bout needs to be above the mvpa threshold
  - **boutcriter.in**
  - **boutcriter.lig**

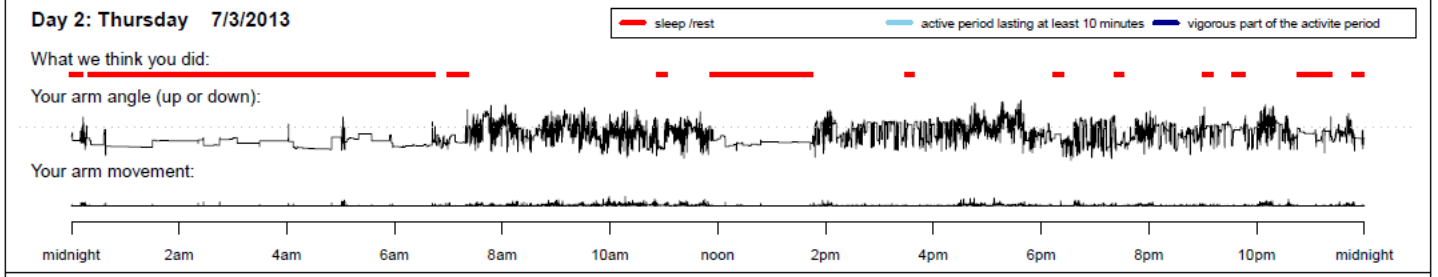
# Part 5 key parameters

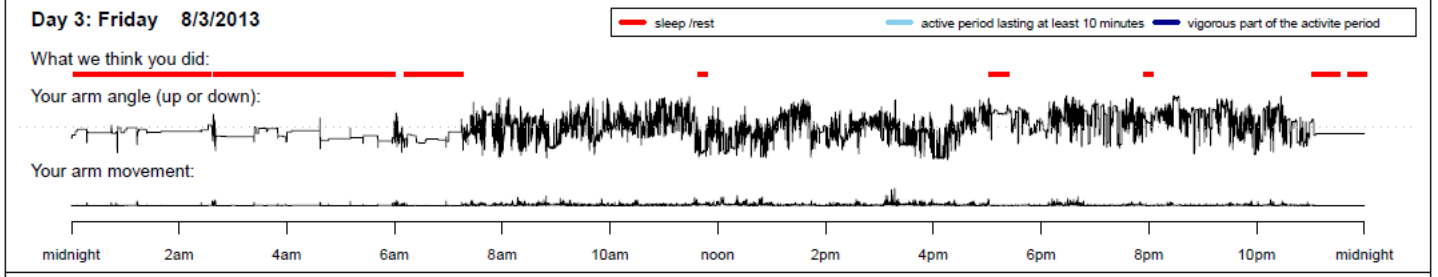
- **boutcriter.mvpa** = Durations of mvpa bouts in minutes to be extracted. The default values are c(1,5,10) and will start with the identification of 10 minute bouts, followed by 5 minute bouts in the rest of the data, and followed by 1 minute bouts in the rest of the data.
- **boutdur.in** = Durations of inactivity bouts in minutes to be extracted. Inactivity bouts are detected in the segments of the data which were not labelled as sleep or MVPA bouts.
  - **boutdur.lig**
  - **boutdur.mvpa**

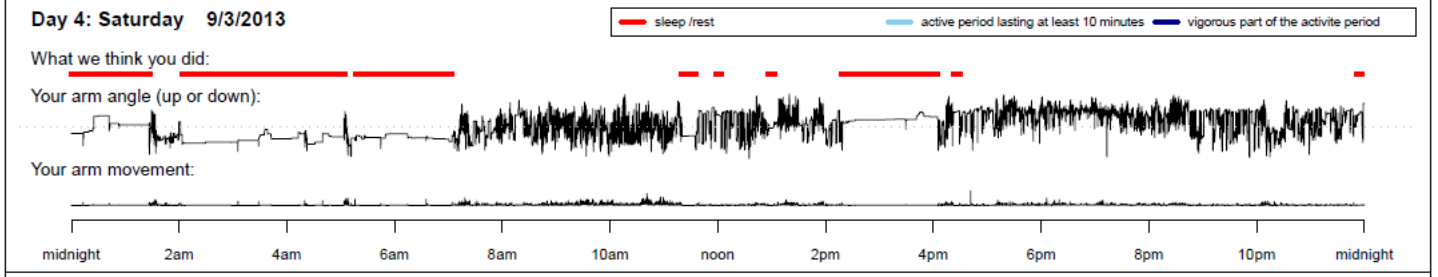
- **timewindow** = Time window over which summary statistics are derived. Value can be "MM"(midnight to midnight), "WW" (waking time to waking time)

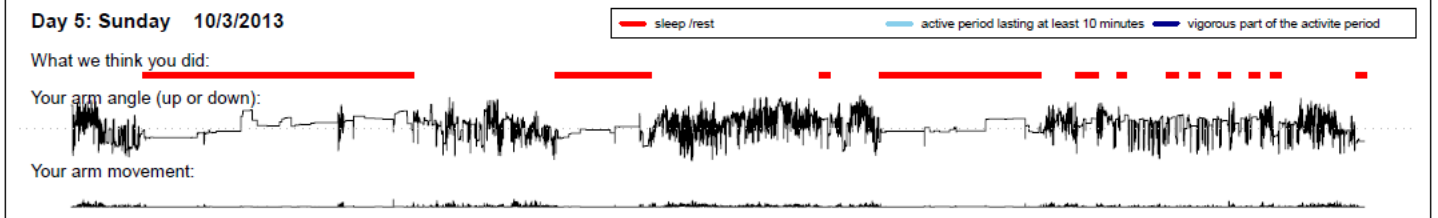
Filename: 0001−1.csv



- https://cran.r-project.org/web/packages/GGIR/vignettes/GGIR.html#introduction

mainscript_GGIR_demo.R

```
outputdir= "C:/Users/FlorianHuber/OneDrive - Netherlands eScience Center/Sprint_project_GGIR/Test-Data/Output" #Name directory whe
studyname="Data" #name of study, only needed if datadir is a list of filenames
#===========================================================

library(GGIR)

g.shell.GGIR(#------------------------------
             # General parameters
             #------------------------------
             mode=mode, #specify above
             datadir=datadir, #specify above
             outputdir=outputdir, #specify above
             studyname=studyname, #specify above
             f0=f0, #specify above
             f1=f1, #specify above
             overwrite = TRUE, #overwrite previous milestone data?
             do.imp=TRUE, # Do imputation? (recommended)
             idloc=2, #id location (1 = file header, 2 = filename)
             print.filename=TRUE,
             storefolderstructure = FALSE,
             #------------------------------
             # Part 1 parameters:
             #------------------------------
             # Key functions: reading file, auto-calibration, and extracting features
             windowsizes = c(5,900,3600), #Epoch length, non-wear detection resolution, non-wear detection evaluation window
             do.cal= TRUE, # Apply autocalibration? (recommended)
             do.enmo = TRUE, #Needed for physical activity analysis
             do.anglez=TRUE, #Needed for sleep detection
             chunksize=1, #size of data chunks to be read (value = 1 is maximum)
             printsummary=TRUE,
             #------------------------------
             # Part 2 parameters:
             #------------------------------
             # Key functions: Non-wear detection, imputation, and basic descriptives
             strategy = 2, #Strategy (see tutorial for explanation)
             ndayswindow=7, #only relevant when strategy = 3
             hrs.del.start = 0, # Only relevant when strategy = 2. How many HOURS need to be ignored at the START of the measureme
             hrs.del.end = 0, # Only relevant when strategy = 2. How many HOURS need to be ignored at the END of the measurement?
             maxdur = 8, # How many DAYS of measurement do you maximumally expect?
             includedaycrit = 16, # number of minimum valid hours in a day to attempt physical activity analysis
             M5L5res = 10, #resolution in minutes of M5 and L5 calculation
             winhr = c(5, 10), # size of M5 and L5 (5 hours by default)
             qlevels = c(c(1380/1440),c(1410/1440)), #quantiles to calculate, set value at c() if you do not want quantiles
             qwindow=c(0,8,21,24), #window over which to calculate quantiles
             ilevels = c(), #c(0,100,400,8000), #acceleration values (metric ENMO) from which a frequency distribution needs to be
             iglevels = TRUE,
             mvpathreshold =c(100), #MVPA (moderate and vigorous physical activity threshold
             bout.metric = 4,
             #------------------------------
             # Part 3 parameters:
             #------------------------------
             # Key functions: Sleep detection
             anglethreshold=5,
             timethreshold= 5,
             ignorenonwear = TRUE, # if TRUE non-wear is not detected as sleep (if FALSE then it will work with imputed data)
             do.part3.pdf = TRUE,
```

24:36 (Untitled) R Script

Environment History Connections

```
            qwindow=c(0,8,21,24), #window over which to calculate quantiles
            ilevels = c(), #c(0,100,400,8000), #acceleration values (metric ENMO) from which a frequency distribution needs to be
            iglevels = TRUE,
            mvpathreshold =c(100), #MVPA (moderate and vigorous physical activity threshold
            bout.metric = 4,
            #---------------------------------
            # Part 3 parameters:
            #---------------------------------
            # Key functions: Sleep detection
            anglethreshold=5,
            timethreshold= 5,
            ignorenonwear = TRUE, # if TRUE non-wear is not detected as sleep (if FALSE then it will work with imputed data)
            do.part3.pdf = TRUE,
            #---------------------------------
            # Part 4 parameters:
            #---------------------------------
            # Key functions: Integrating sleep log (if available) with sleep detection, storing day and person specific summaries
            excludefirstlast = FALSE, # Exclude first and last night for sleep analysis?
            includenightcrit = 16, # number of minimum valid hours in a day to attempt sleep analysis
            def.noc.sleep = c(1), #c(),
            # If sleep log is available:
            # loglocation= "C:/Users/FlorianHuber/OneDrive - Netherlands eScience Center/Sprint_project_GGIR/Test-Data/sleeplogw.
            outliers.only = FALSE,
            criterror = 4,
            relyonsleeplog = FALSE,
            sleeplogidnum = TRUE, # Is the participant in the sleep log stored as a number (TRUE) or as a character (FALSE)
            colid=1, #colomn in which the participant id or filename is stored
            coln1=2, #column number for first day
            do.visual = TRUE,
            nnights = 9, #number of nights in the sleep log
            #---------------------------------
            # Part 5 parameters:
            #---------------------------------
            # Key functions: Merging physical activity with sleep analyses
            excludefirstlast.part5 = FALSE,
            save_ms5rawlevels = FALSE,
            threshold.lig = c(30), #40 #threshold(s) for inactivity (can be more than one number)
            threshold.mod = c(100), #100 120 #threshold(s) for moderate activity (can be more than one number)
            threshold.vig = c(400), #500 #threshold(s) for vigorous activity (can be more than one number)
            boutcriter = 0.8,
            boutcriter.in = 0.9, #0.8 #fraction of an inactivity bout that needs to be below the threshold (needs to be 1 number)
            boutcriter.lig = 0.8, #fraction of an light activity bout that needs to be between the thresholds (needs to be 1 numb
            boutcriter.mvpa = 0.8, #fraction of an light activity bout that needs to be above the threshold (needs to be 1 number
            boutdur.in = c(1,10,30), # duration of bouts to be calculated
            boutdur.lig = c(1,10), # duration of bouts to be calculated
            boutdur.mvpa = c(10), # duration of bouts to be calculated
            timewindow = c("WW"), #,
            #---------------------------------
            # Report generation
            #---------------------------------
            # Key functions: Generating reports based on meta-data
            do.report=c(2,4,5), #for what parts does and report need to be generated? (option: 2, 4 and 5)
            visualreport=TRUE,
            dofirstpage = TRUE, #first page of pdf-report with simple summary histograms
            viewingwindow=2) #viewingwindow of visual report: 1 centres at day and 2 centers at night
```

Thank you and d**R**ink up!

# Notes

- https://www.youtube.com/watch?v=RuFBCAqFJ2M

- https://www.youtube.com/watch?v=S8YPTrYNWdU&feature=youtu.be