AUTOMATIC SLEEP-STATES SCORER FOR R-STUDIO

Original version by Dr. Alejandro Bassi and Dr. Javier Díaz in
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CONTEXT:

- The script will allow you to obtain a .csv file with a vector of numbers corresponding to sleep states.
- Each number corresponds to an epoch of 5 seconds classified as WAKEFULNESS = 0, NON-REM SLEEP = 1, REM SLEEP = 2.
- For a recording of 24 hrs you will get 17280 classified epochs.
- If the animal had been identified having SWDs (absence-like seizures), it will also produce a vector including SWDs epochs as = 4
- Optionally - if running full command sleep.autoscore() - you will obtain the power spectrum per sleep state on a separated .csv file

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WARNINGS:

- Make sure data folders and names are correctly formatted.
- The automatic scoring process only works for a full day of recording.
- This particular version is set at a sampling rate of 250.4 Hz, to comply with specifications of data obtained through TAINITEC WIRELESS SYSTEM.

INSTRUCTIONS:

A) Paste all the files inside the R_SleepAutoscorer_FILES (sleep_score_library.R , mgg.R , Sleep_autoscore_Beta.R) into the source folder where you will keep your data (i.e "C:\Users\yourname\Documents\POSTDOC\ANALISYS\EEG RESULTS\Sleep_Results")

B) ONCE WHEN OPENING R-STUDIO FOR NEW SESSION:

b.1) When opening for the first time: Install all required packages from CRAN (dplyr psych multitaper rgl ggplot2)
b.2) Set corresponding directories: line 21 SET SOURCE DIR FOR CODE AND LIBRARY, 42 (source dir for eeg and emg channels)
b.3) Type in console:

```
setwd("/Users/yourname/Documents/POSTDOC/ANALISYS/EEG RESULTS/Sleep_Results")
###Example source dir
source("mgg.R")
source("sleep_score_library.R")
library(rgl)
```

source('~/POSTDOC/ANALISYS/EEG RESULTS/Sleep_Results/Sleep_autoscore_Beta.R') #### example script source folder

AND TYPE VARIABLES TO CHANGE FOR EACH RAT/DAY:
rat_line<<-("CDKL5") ## CHANGE AND PASTE TO CONSOLE
animal_id<<-("1959") ## CHANGE AND PASTE TO CONSOLE
animal_day<<-("BL1") ## CHANGE AND PASTE TO CONSOLE
seizures<<-0 ##RECORD WITH SEIZURES? 1=YES 0=NO

(Example for file and Folder format for data: source_folder/CDKL5/CDKL5_1959/)

C) RUN THE MAIN FUNCTION TO OBTAIN AUTOMATIC SLEEP SCORING AND POWER SPECTRUM BY STATE sleep.autoscore()

OR RUN THE FOLLOWING FUNCTIONS JUST TO OBTAIN AUTOMATIC SLEEP SCORING WITHOUT POWER SPECTRUM BY STATE

rat.get()
rat.correct()

D) OUTPUTS:
d.1) Line 178: .csv with sleep scoring only (0=WAKE, 1=NON REM, 2=REM, EPOCHS 5 SECS)
d.2) Line 186: .csv with sleep scoring and swd for coherence analysis (0=WAKE, 1=NON REM, 2=REM, 4=SWD, EPOCHS 5 SECS).
d.3) Line 272: .csv with power spectrum by state - Column names: s_0=Wakefulness, s_1=Non-REM, s_2=REM (if SWD, s_4=SWD).
d.4) 3D graph showing the initial distribution of the epochs in the axes: Theta power, EEG (-theta) power, and EMG power.
(Green = Wakefulness, Blue = Non-REM Sleep, Red = REM sleep, Black = epochs still to be classified by context)
d.5) EEG spectrogram in 12 consecutive rows of 2 hours for the range 0.4-20 Hz (Blue to Yellow = low to high power)
d.6) Distribution of states by hour of recording in epocs (one hour = 720 epochs of 5 secs). Green = Wakefulness, Blue = Non-REM Sleep, Red = REM sleep.