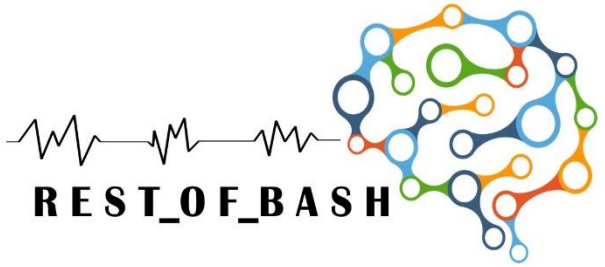
Philipps Universität Marburg

REST_OF_BASH

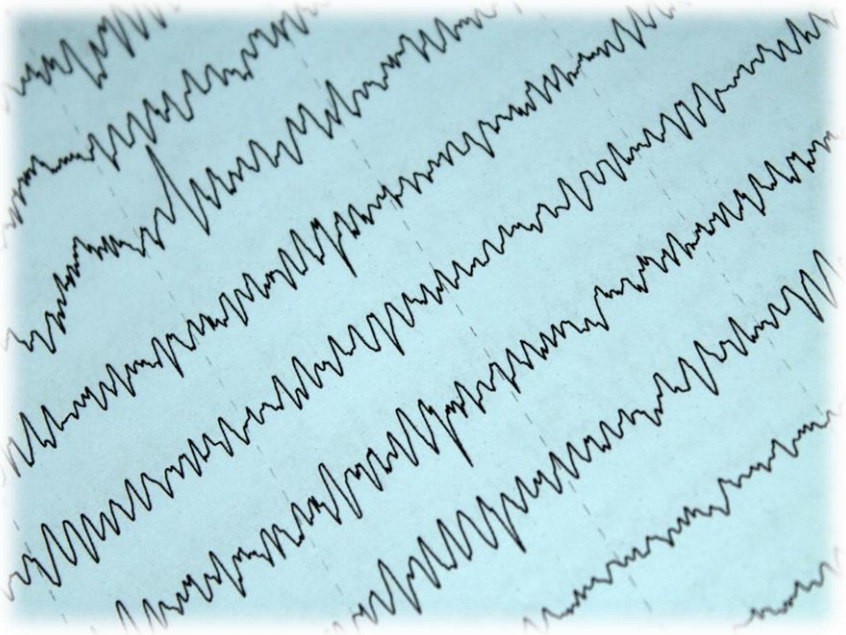
Differences in Resting-State Oscillations and Frequency Bands in Schizophrenia Patients and Healthy Controls



Alexander Dolge & Anna-Maria Strinzel

1.

ABOUT THE PROJECT



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1.1 Thinking about things (eeg stuff)

- What shall we do? (despair!)
  - Analysing eeg data
  - Something with Schizophrenia
  - (something with language)

    → didn‘t happen, because we didn‘t get the kind of data we wanted (ahhhhh!1!!1)

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1.2 We got data!

- It‘s raw eeg (.edf) data from E. Olejarczyk and W. Jernajczyk (2017)
  - Thanks again btw!
- But we can‘t do anything with it about language because it‘s resting-state eeg data
  - → let‘s do something else
  - → Frequency-band analysis and comparison between schizophrenics and healthy ones
  - → Now we are talking about something!

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1.3 Time for literature search!

- Bates et al. (2009):
  → Delta and theta increased during rest

- Uhlhaas and Singer (2010); Moran et al. (2011):
  → During rest alpha and beta show a reduced activation

- Light et al. (2006); Moran et al. (2011):
  → Patients with schizophrenia show abnormalities in gamma oscillations

- Basar-Eroglu et al. (2007):
  → Higher gamma activity because of cortical hyperexcitability

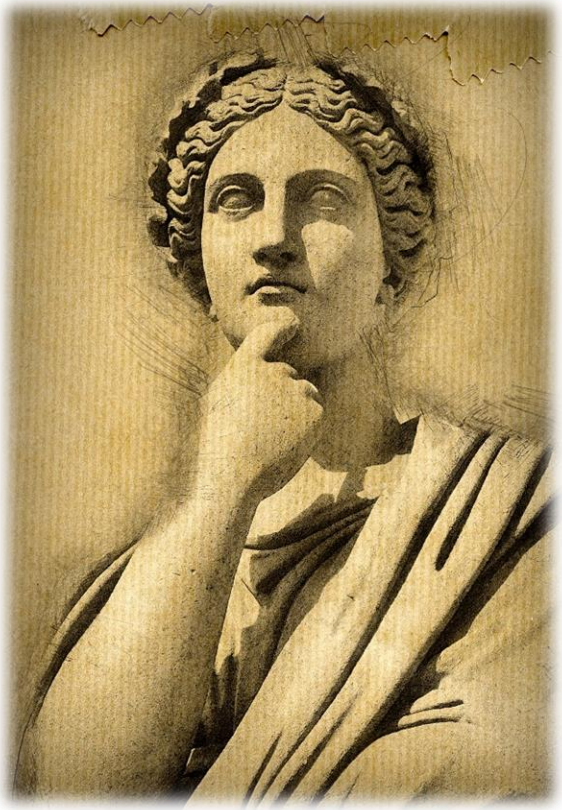
1.4 Thinking about hypotheses!

H1: Delta and theta oscillations are increased in schizophrenic patients during rest.

H2: Alpha oscillations are reduced in schizophrenic patients during rest.

H3: Beta oscillations are reduced in schizophrenic patients during rest.

H4: Gamma oscillations are increased in schizophrenic patients during rest.



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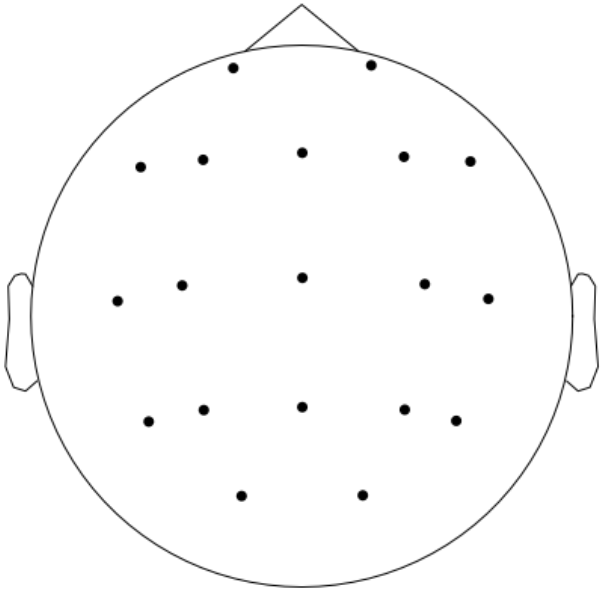
1.5 Let‘s clean the data!

- Preprocessing with José
  - Using MNE python
  - Setting standard montage (19 electrodes according to 10-20-system)
  - Filter data with bandpass filter between 0.5 and 45 Hz



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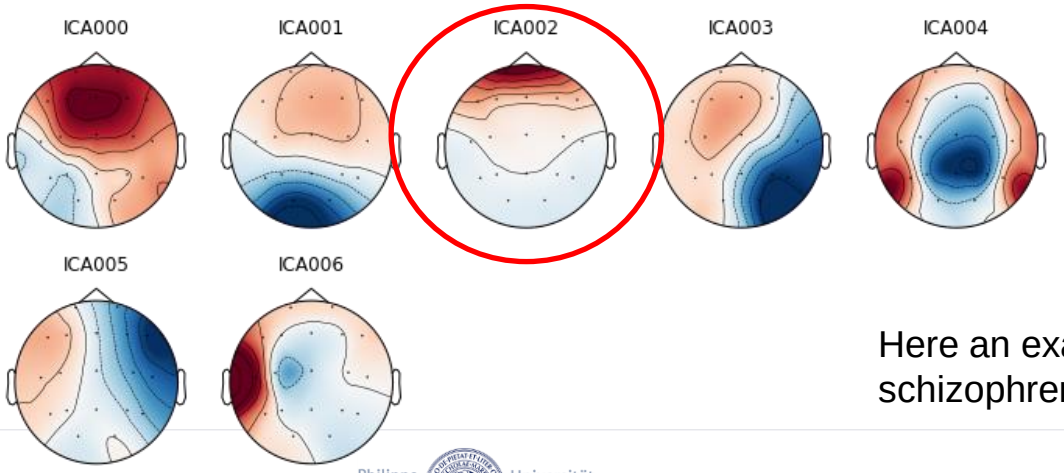
1.6 Let‘s do an ICA!

- ICA with José
  - We want to exclude eye movement artifacts
  - We tried it with Fp1 and Fp2 as reference but that wasn‘t good enough
    - →We created an own template
  - We used seven components and defined some bad channels (with a too noisy signal)
  - Then finally, we could throw away the clearest eye movement artifacts



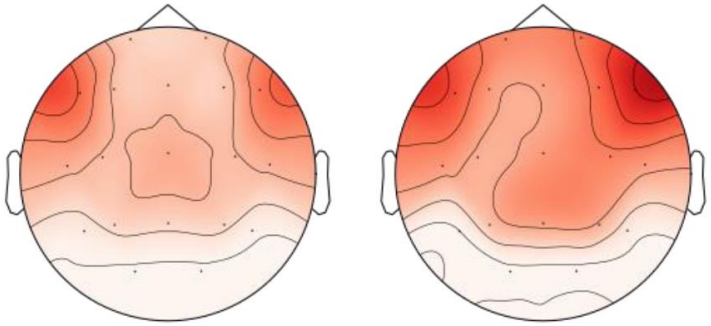
Here an example of schizophrenic patient #1

1.7 Let‘s analyse epochs and bands!

- Setting up fixed epochs length (2 seconds)
- Averageing the activation for each person and each frequency
- Averageing the activation for each group and each frequency
- After that, we detected and defined critical electrodes for the comparison between healthy ones and schizophrenics
  → Each frequency separately

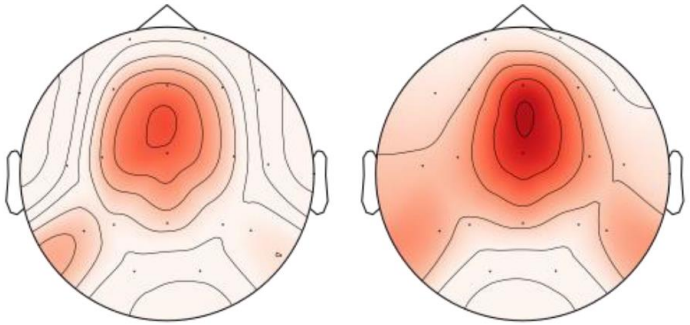
Delta (1-4 Hz)

schizophrenia healthy



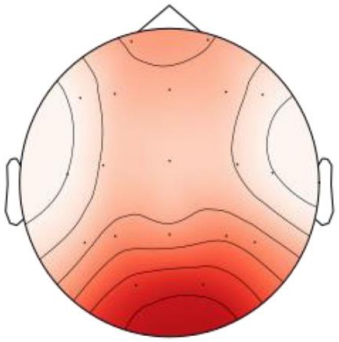
Theta (4-9 Hz)

schizophrenia healthy

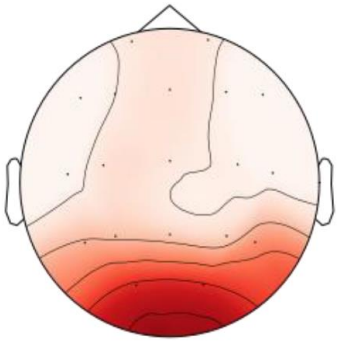


Alpha (9-12 Hz)

schizophrenia

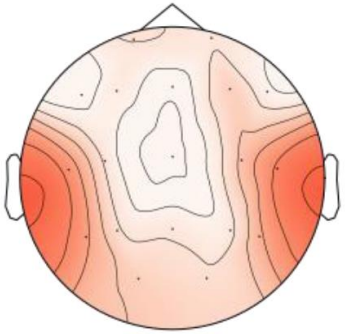


healthy

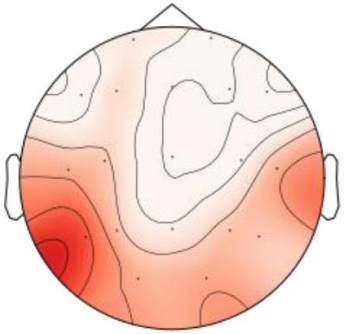


Beta (12-30 Hz)

schizophrenia

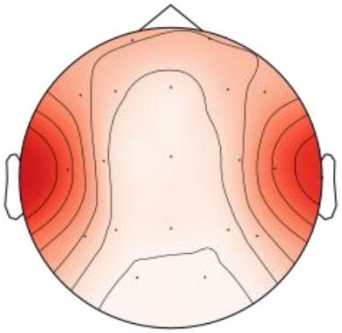


healthy

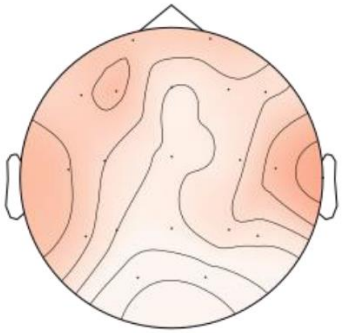


Gamma (30-45 Hz)

schizophrenia



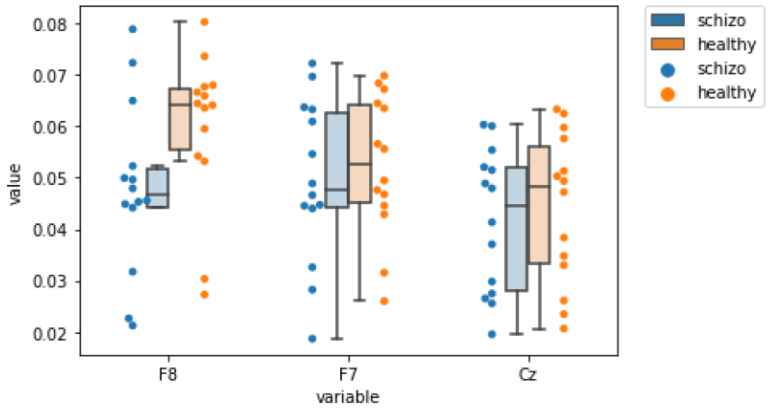
healthy



1.8 Still analysing epochs and bands

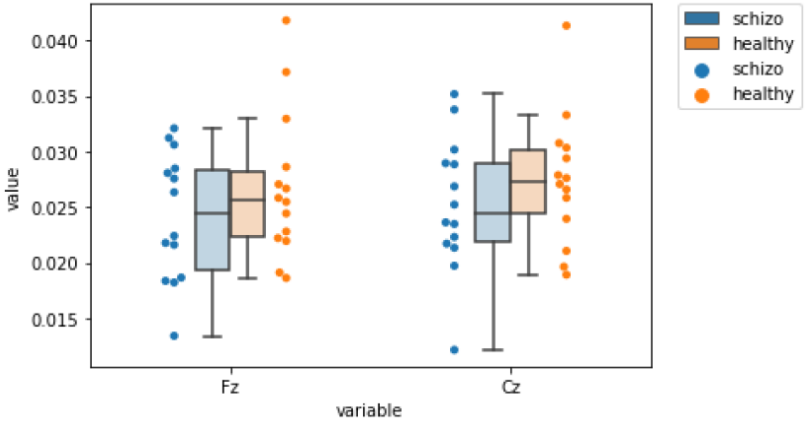
- Then, we create some nice box plots for the critical electrodes
- Finally we did some cool independent t-tests

Delta



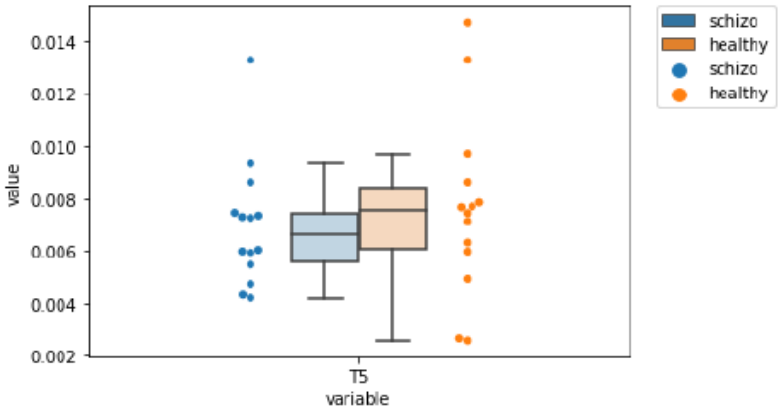
F8: t-test (t=2.015; p=0.054)

Theta



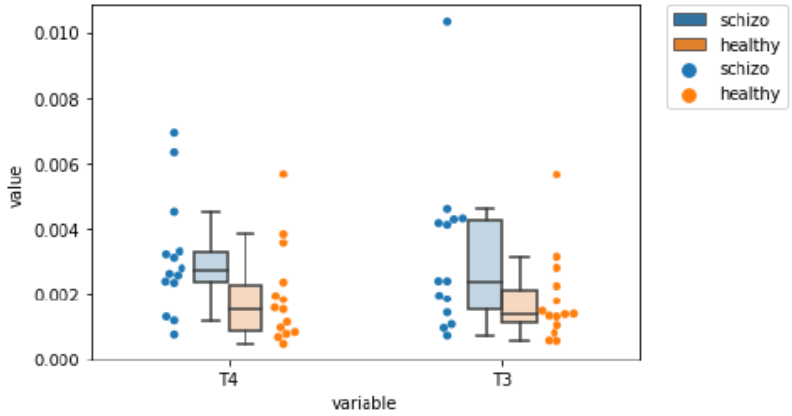
Cz: t-test (t=0.968; p=0.342)

Beta



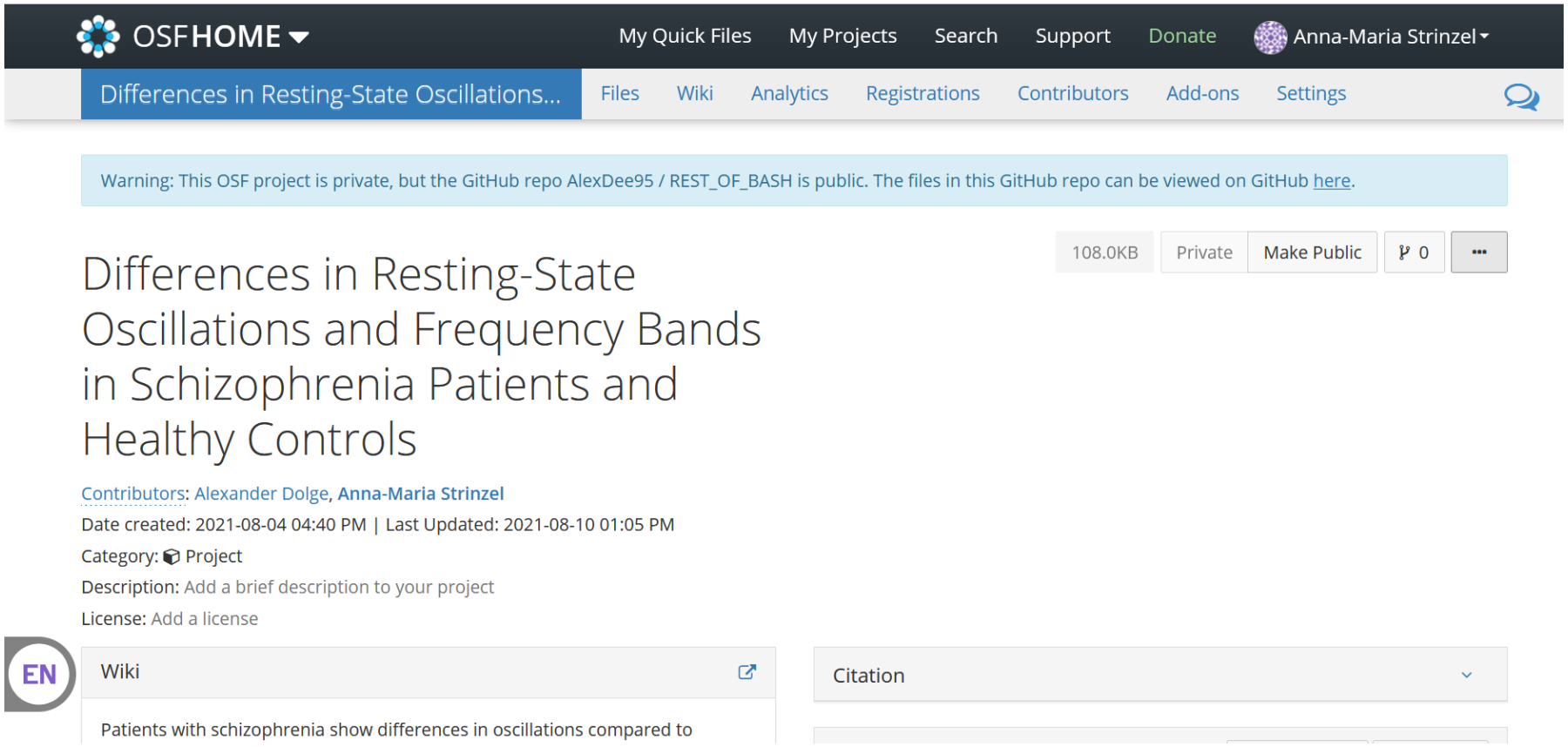
T5: t-test (t=0.601; p=0.554)

Gamma



T3: t-test (t=1.812; p=0.085)
T4: t-test (t=1.859; p=0.075)

1.9 Let‘s do a preregistration on OSF



1.10 Thinking about results

H1: Delta and theta oscillations are increased in schizophrenic patients during rest.

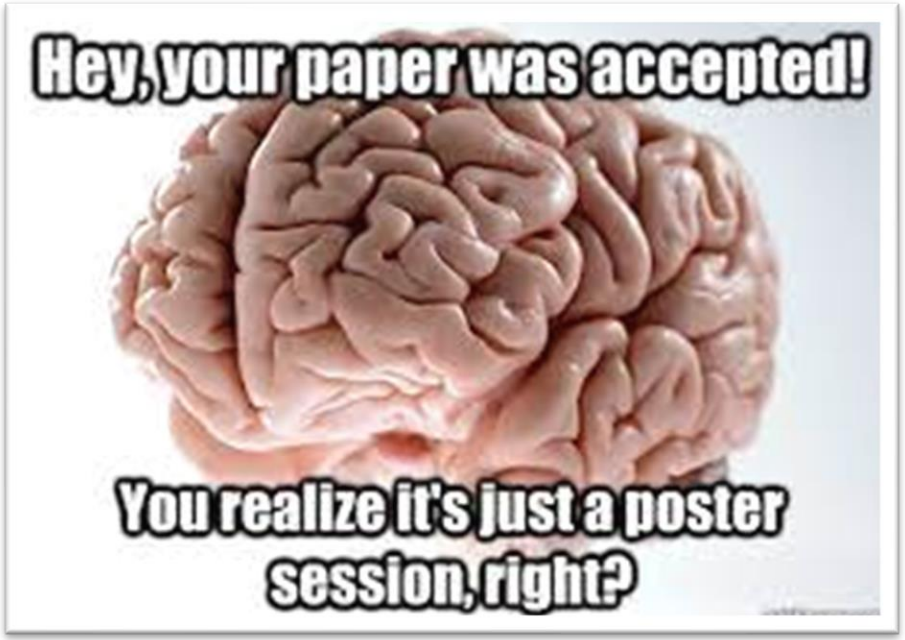
H2: Alpha oscillations are reduced in schizophrenic patients during rest.

H3: Beta oscillations are reduced in schizophrenic patients during rest.

H4: Gamma oscillations are increased in schizophrenic patients during rest.

2.

POSTER SESSION!



http://www.quickmeme.com/meme/368xjc

2.1 Poster

https://exquise-me.blogspot.com/2019/07/funny-presentation-any-questions-images.html

References

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