BrainMaster TECHNOLOGIES

EEG recorded on: 18–Feb–2016
EEG processed on: 18–Feb–2016 22:59h

MONTAGE: Laplacian

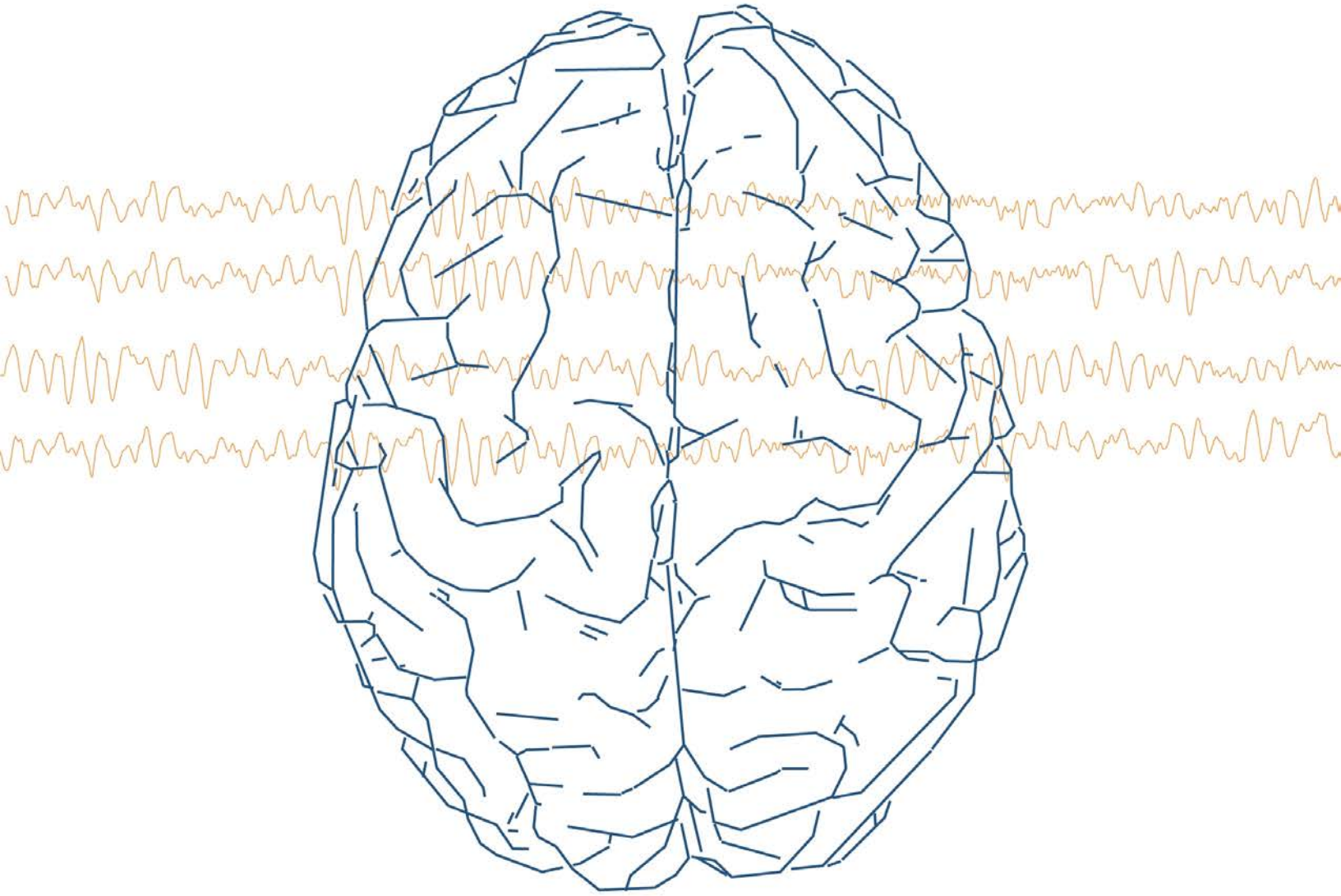
SUBJECT INFORMATION:

Original Filename: 0125 SHMA 08.001.02 AGE 10 EO.edf
Subject ID: 0125 SHMA
Age: 10.51
Gender: male
Handedness: right
Condition: Eyes Open

ARTIFACT REJECTION/CORRECTION RESULTS:

Noisy channels: F7
High frequency artifacts will be ignored in these channels.
Percentage rejected data: 29%
(High percentages indicate bad data quality)
Record length: 5:04
Edit length: 3:37
_____

QEEG PROFILE REPORT



Name:	
Date of Recording:	2017-09-21
Age:	28.43
Gender:	male
Handedness:	right

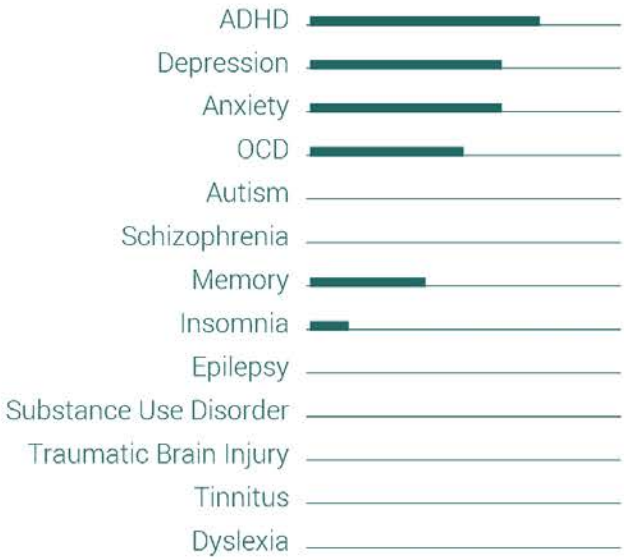
INTRODUCTION

The 'qEEG Profile Report' provides a comprehensive report on the relation between the patient's individual brain activity profile and the patient's (neuro)psychological symptoms. The current introductory page shows general information about the EEG recording and the patient's symptoms. The remainder of this report consists of two main sections:

Section 1: The 'Brain Waves Profile' addresses the surface amplitude results (page 2), the agreement between the EEG results and the patient's symptoms (page 3) and the EEG biomarkers for psychopathology and arousal (page 4).

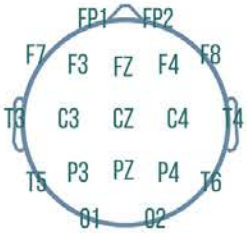
Section 2: Using source localization techniques, the activity and connectivity of well-known 'Resting-State Networks' have been assessed. From the scientific literature it is known that these networks represent functional units: The high level of communication and the high degree of coordination of the activity within these networks during rest suggest that each one of these networks has their own unique role to play. On page 5-10 the results for the 'Default Mode Network', the 'Dorsal Attention Network', the 'Emotion-Regulation Cortex', the 'Sensory-Motor Cortex, the Memory Network' and the 'Visual Cortex' are addressed.

PATIENT SYMPTOMS

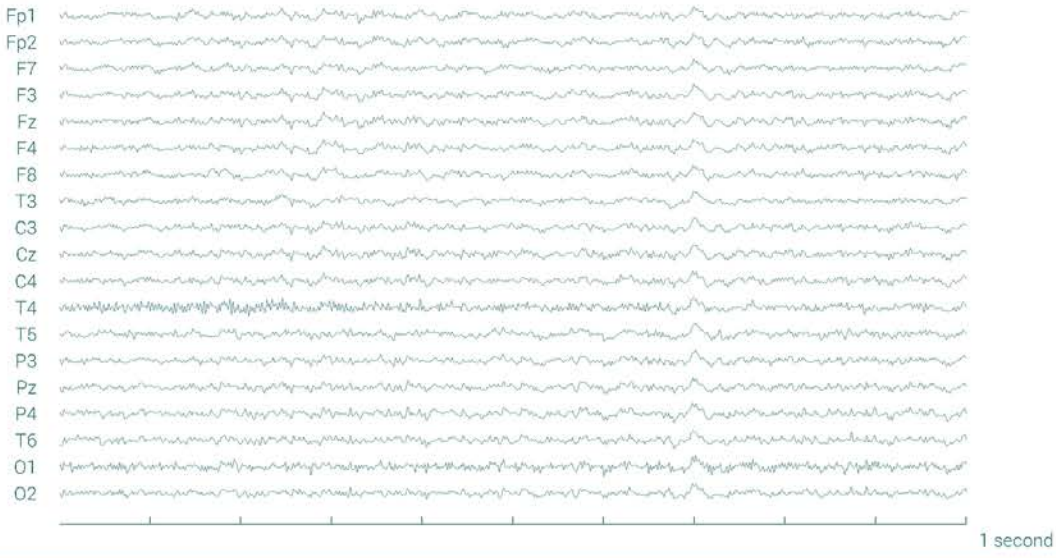


EEG RECORDING

A 19-channel resting-state EEG was recorded using the BrainMaster Discovery amplifier. The 19 channels EEG recording was referenced to the electrodes placed on the earlobes. A sampling frequency of 256 Hz was used. The EEG recording had a duration of 4:17 min for the Eyes Open condition and a duration of 4:49 min for the Eyes Closed condition. The Standardized Artifact Rejection Algorithm (S.A.R.A) was applied to the EEG data. Artifacts were automatically removed, resulting in a de-artifacted EEG recording of 2:52 min for the Eyes Open condition and 4:09 min for the Eyes Closed condition.



Electrode labels and locations, based on the International 10-20 system



A segment of raw EEG signal from the 19 electrode locations in the Eyes Closed condition.

SURFACE AMPLITUDE RESULTS

INTRODUCTION

Specific deviances in neural oscillations as measured with resting-state EEG have been associated with specific disorders in the scientific literature and these deviances can therefore be characterized as 'EEG biomarkers'. On page 2 and 3 of this report, the presence or absence of these biomarkers and their relation with the patient's psychological symptoms will be addressed. However, the cause of deviant brain activity can be multiform and often cut across different psychological disorder categories. A general profile of deviances can be associated with a more general description of CNS functioning and its resulting psychological functioning. The majority of scientific studies on resting-state EEG have been focusing on EEG amplitudes and a general model for understanding deviances in EEG amplitudes is to define these deviances in terms of the level of arousal. Low frequencies (<12Hz) are related with low arousal and high frequencies (>15Hz) are related with high arousal. Here we discuss the qEEG of the patient in relation with what is known about the association between deviant EEG amplitudes in different frequency bands and psychopathology. Finally, it must be stated that EEG should not be used in isolation to diagnose a disorder: The presence of certain EEG biomarkers may represent the vulnerability for developing a psychological disorder, but there are many other factors that determine whether a disorder is expressed in an individual or not.

DELTA (1-3 HZ)

The amplitude of Delta activity was high at temporal electrode sites.
High Delta power is associated with impaired memory and traumatic brain injuries. Delta is dominant during deep sleep and is associated with low arousal during wakefullness. However, localized excessive Delta activity can also be a sign of neural tissue damage. Delta is also extremely sensitive to artifacts caused by eye blinks and eye movements, which results in high frontal Delta amplitudes.

THETA (4-8 HZ)

The amplitude of Theta activity was high at temporal sites.
The most reliable EEG biomarker for attentional disorders is the presence of excessive fronto-central Theta power, reflecting a hypo-arousal in those areas resulting in sub-optimal functioning of brain areas that are important for the regulation of attention and emotions, impulse control and planning.

ALPHA (8-12 HZ)

The 'Alpha Arrest Reaction (ARR)' was not clearly present at occipital electrode sites. This is caused by an absence of dominant Alpha activity during the Eyes Closed condition.

Dominant Alpha activity during the Eyes Closed condition in occipital regions can be seen as a reflection of the idling state of the visual cortex in the absence of afferent stimulation. The absence of a clear ARR can be related to impaired vigilance regulation: The patient is either hypo-aroused, resulting in abnormally high Alpha power during the Eyes Open condition, or the patient is hyper-aroused, resulting in low Alpha power in the Eyes Closed condition.

On average, the patient showed normal Alpha activity.
In general, excessive Alpha reflects hypo-arousal and deficient Alpha reflects hyper-arousal. Moreover: as vigilance decreases, Alpha activity shifts from posterior areas to anterior areas.

The Alpha Peak Frequency (APF) was normal. A high APF has been associated with general intelligence or cognitive performance: Individuals with relatively high APFs tend to score higher on IQ tests. Also, high APFs have been related to high arousal.

SMR (12-15 HZ)

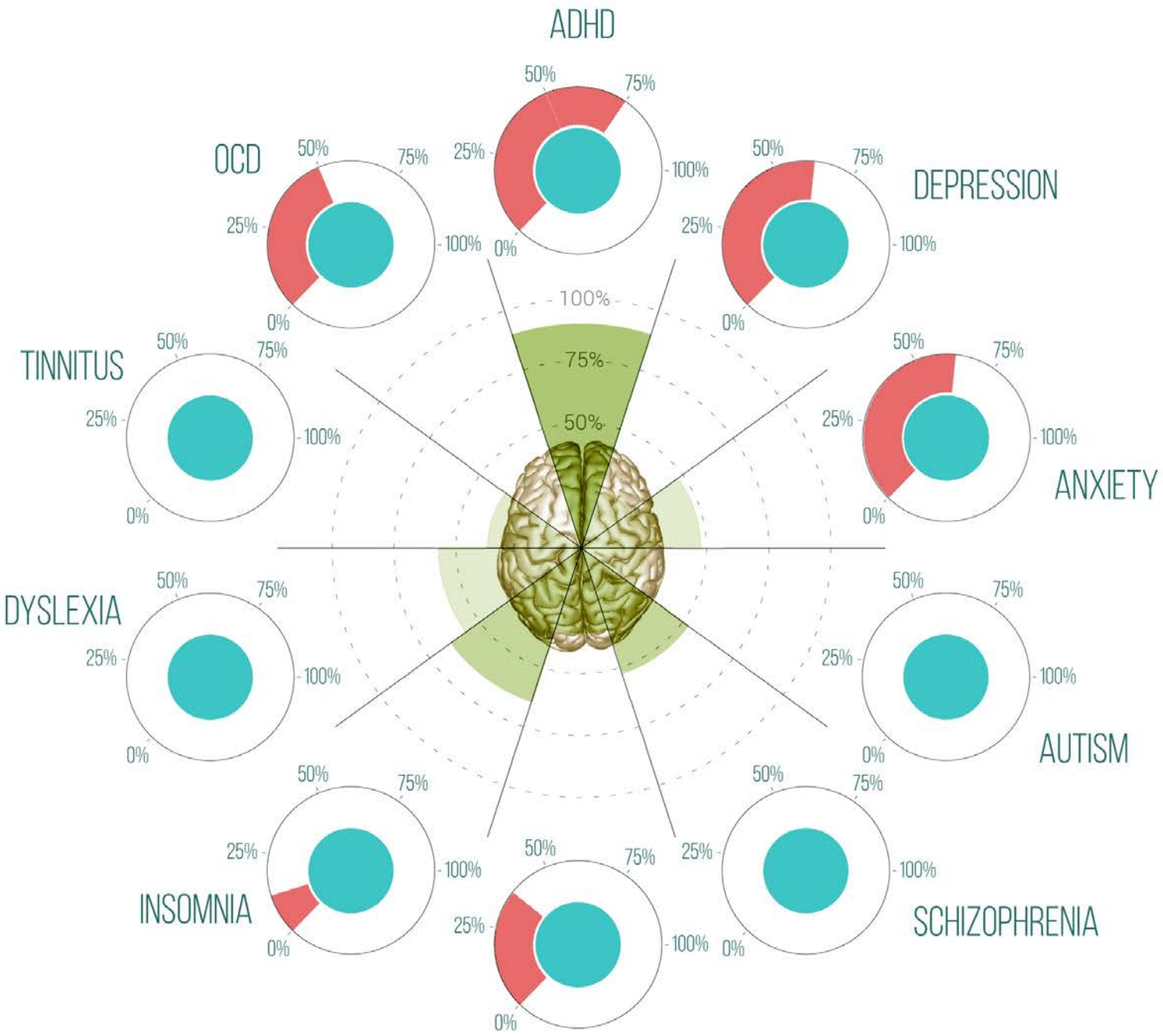
Slow Beta activity (12-15 Hz) on central brain areas is called 'Sensory-Motor Rythm' (SMR). The amplitude of SMR was high. Spindling SMR activity during sleep is important for deep sleep: It's role is to inhibit motor output. Excessive SMR during wakefullness can be a sign of hypo-arousal and impaired vigilance regulation and has been associated with attentional disorders.

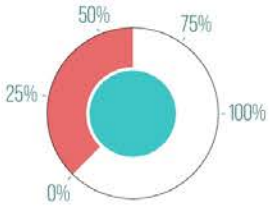
BETA (15-30 HZ)

The patient showed high Beta activity at parietal sites.
A deficit in Beta activity has been linked with attentional disorders and often coincides with high Theta power. However, about 15% of the patients with attentional disorders will show excessive Beta. Excessive Beta amplitudes are associated with hyper-arousal and can be also associated with anxiety disorder and insomnia. Beta amplitudes are very susceptible to muscle artifacts: Excessive Beta in frontal, temporal and occipital Beta can be caused by tension in the forehead (e.g. frowning or raised eye brows), jaw muscles and neck muscles, respectively.

BRAIN WAVES PROFILE:

EEG BIOMARKER MATCH





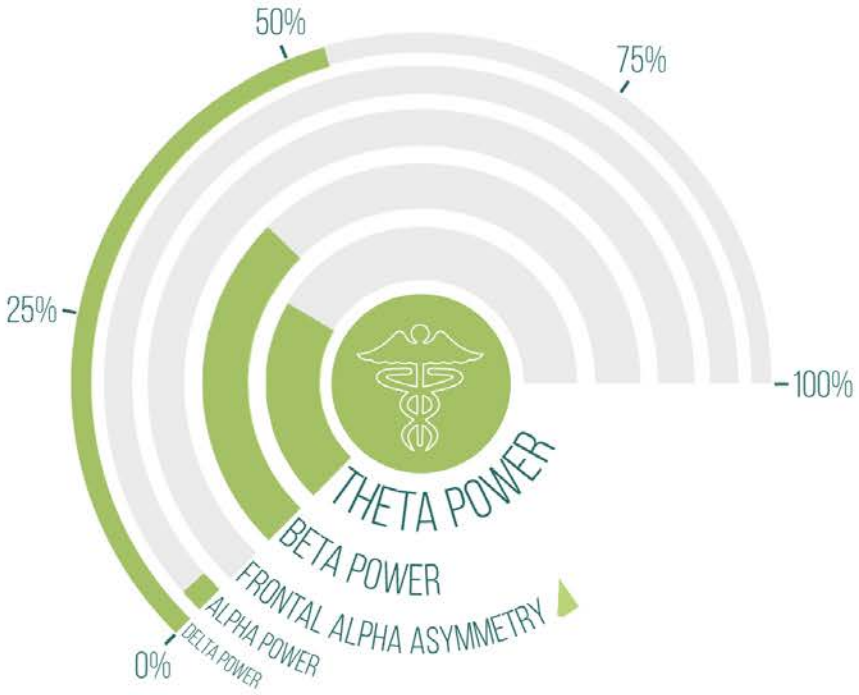
The red bars reflect the patient's symptom severity. Epilepsy, Substance Use Disorder and Traumatic Brain Injury are not depicted, since these disorders have not shown to be reliably associated with EEG biomakers.

The relationships between the patient's brain activity deviations and the patient's symptoms are depicted in the green pie chart. The stronger the presence of certain biomarkers for a particular disorder, the larger the segment. The color intensity depicts the scientific support for the association between these markers and the disorder.

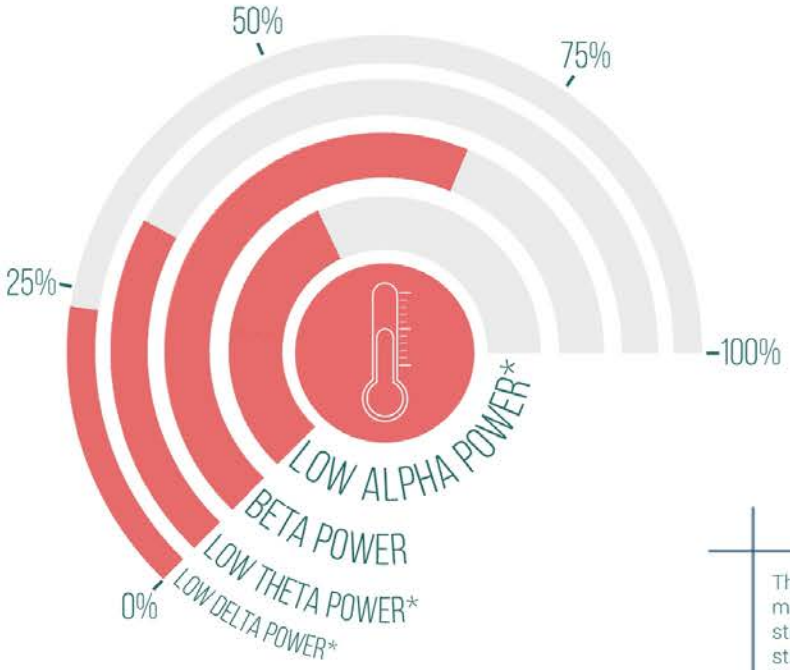
EEG BIOMARKER SCALES

PATHOLOGY

Deviations in neural oscillations have been related to different psychopathologies. Excess Theta and Alpha power as well as deviant Beta power have been associated with ADHD and frontal Alpha asymmetry is a marker for depression. Excess Delta power has been associated with TBI and memory disorders, Generally speaking, most deviations in neural oscillations are reflective of sub-optimal functioning of the brain area(s) they are manifested in. These deviations may be related to arousal level, which may explain symptomatology related to sleep, anxiety and attention. However, they can also be caused by genetic factors, brain maturation abnormalities, drug use/abuse, diet, lifestyle and life experiences.



↑ Higher percentages indicate higher risk for pathology



*Alpha, Theta and Delta power are inversely related with arousal. Higher percentages reflect lower Alpha, Theta and Delta power. Values around 50% represent normal arousal levels.

AROUSAL

Arousal can generally be described as the activation of the autonomous nervous system (ANS) and the central nervous system (CNS). It is related to mental alertness, and is reflected by heart rate, heart rate variability, pupil dilation and muscle tone. Arousal is reflected by the ratio between the amplitude of fast (>15 Hz) and slow neural oscillations (<12 Hz). High fast/slow ratios are associated with a relative high arousal level and vice versa. Arousal level is very important for mental performance. Abnormally high or low levels of arousal are often associated with psychopathology.

The EEG Biomarker Scales are graphical representations of the relationship between measures of neural activity pathology or arousal. The circular diagrams represent the strength of the association between a neural marker and pathology or arousal: The stronger the association, the thicker the bar and the closer it is to the center of the diagram. The percentage indicates the contribution of a neural marker to the level of pathology or arousal.

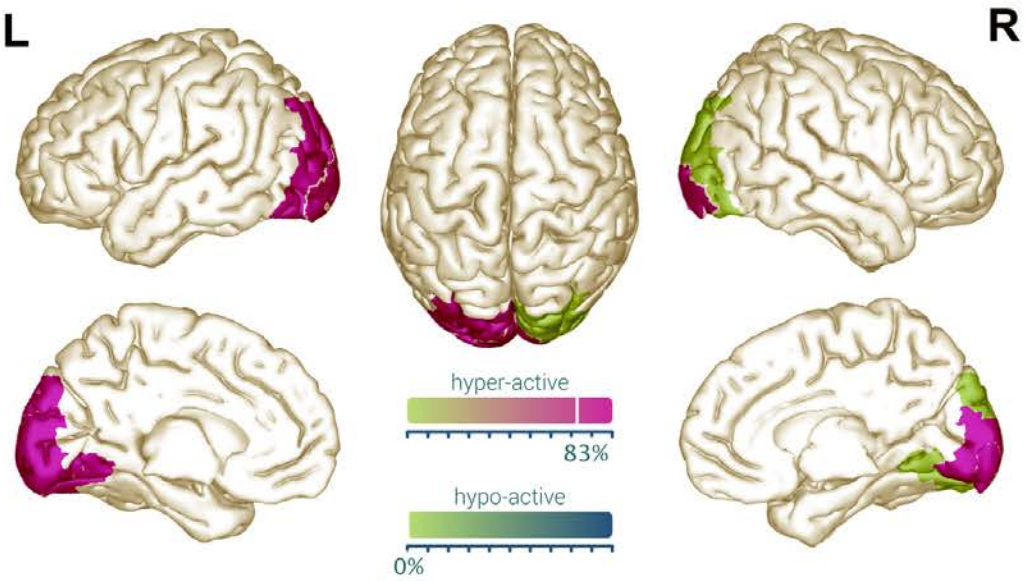
RESTING-STATE NETWORKS:

THE VISUAL CORTEX

The Visual Cortex (VC) is a group of occipital brain areas that is specialized in processing visual information.

NETWORK ACTIVITY

The VC is hiarchically organized with respect to the complexity of visual features that it processes. Low-level visual features, such as color, contrast levels and line orientations are processed in the primary visual cortex (V1, BA17). The secondary visual cortex (V2 and V3, BA18 and BA19) receives input from V1 and is involved in figure-ground segregation, object recognition (V2/BA18) and spatial working memory (V3/BA19).



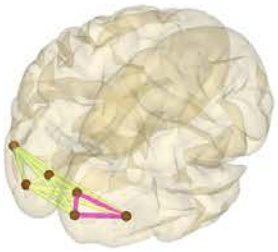
Brain Areas Involved:

Striate Cortex
Middle Occipital Gyrus
Inferior Occipital Gyrus

Brodmann Areas:

17, 18, 19

NETWORK CONNECTIVITY



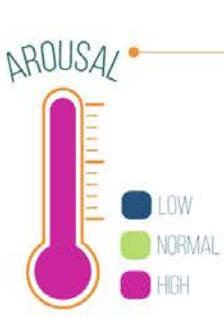
hyper-connected

20%

hypo-connected

0%

Deviations in phase coherence between the different areas of the VC may result in impaired visual processing.



Low Alpha activity during the Eyes Closed recording reflects high arousal and high Alpha activity during the Eyes Open recording reflects low arousal (see page 2 of this report).

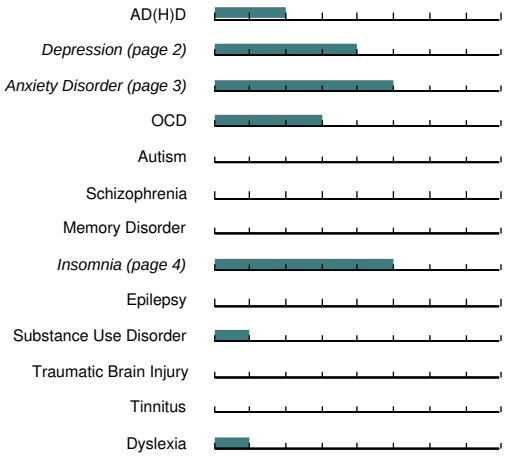
The level of arousal reflected by the Alpha activity in the VC can be related with anxiety disorders (high arousal) and with drowsiness or fatigue (low arousal).

The deviance of brain activity in a certain region is determined by the ratio between deviances in amplitude of fast (>15 Hz) and slow neural oscillations (<12 Hz). Abnormal activity means that there is either an excess or a deficit of both fast and slow wave activity. The deviance of connectivity is not determined by this ratio, but by the average hyper- or hypoconnectivity across frequencies.

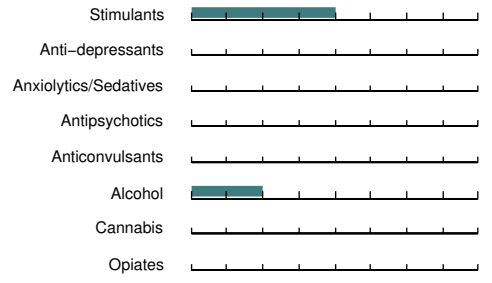
QEEG Informed Protocol Recommendation

Client ID: MIRO
Age: 34.30, Gender: Male, Eyes Closed

Psychopathology Rating



Substance Use



Recommended protocols have been determined for the disorders printed in italics.

General Information

Input EEG: 498976

EEG recorded on: 25−Jan−2017
Protol recommendation processed on: 01−Feb−2017 19:01h

MONTAGE: Linked Ears

SUBJECT INFORMATION:

Original Filename: MIRO Discovery Test 04.000.02 AGE 34 EC.edf
Subject ID: MIRO
Age: 34.30
Gender: male
Handedness: right
Condition: Eyes Closed

ARTIFACT REJECTION/CORRECTION RESULTS:

Noisy channels:
High frequency artifacts will be ignored in these channels.
Percentage rejected data: 4%
(High percentages indicate bad data quality)
Record length: 4:33
Edit length: 4:21

Relevant EEG Biomarker Overview

Delta excess
(Schizophrenia/Memory/Epilepsy)
YES

Theta excess
(ADHD/OCD/Schizophrenia/Memory/Tinnitus)
YES

Alpha excess
(ADHD/OCD/Autism)
YES

Alpha deficit
(Anxiety/Schizophrenia/Memory/Tinnitus)
NO

Beta excess
(ADHD/Anxiety/Schizophrenia/Sleep/Tinnitus)
YES

Beta deficit
(ADHD/Memory)
NO

Gamma excess
(Sleep/Tinnitus)
YES

Gamma deficit
(Schizophrenia)
YES

Low voltage
(ADHD)
NO

Low Alpha peak frequency
(ADHD)
NO

Frontal Alpha Asymmetry
(Depression/Anxiety)
NO

QEEG Informed
Protocol Recommendation

Client ID: MIRO
Age: 34.30, Gender: Male, Eyes Closed

Anxiety Disorder

Rationale

Anxiety disorder has been associated with increased beta activity (Isotani et al., 2001; Pavlenko et al., 2009), decreased alpha activity in occipital brain regions (Pavlenko et al., 2009) and increased alpha activity in right fronto–lateral brain regions (Davidson et al., 2000). Research on the effectiveness of neurofeedback for treating anxiety disorder suggests that increasing alpha activity may have anxiolytic effects (Hardt & Kamiya, 1978; Wang et al., 2014; but see: Plotkon and Rice; 1981). However, large well–controlled studies are currently missing. Cheon et al. (2015) suggest that in order for neurofeedback protocols to be effective in treating anxiety, they should be guided by the baseline QEEG of the patient.

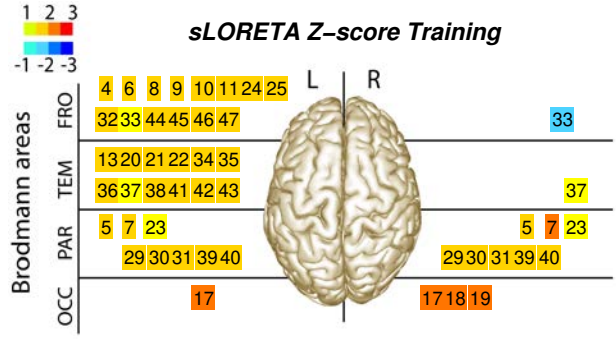
Recommended Protocol, Classic Neurofeedback

1st: 21–23 Hz Down on C3
Reward percentage: 50%
Sustained reward criterion: 300 ms

Recommended Protocol, Z–score Training

Locations: F7 F8 C3 C4
Excess beta activity found on C3 at 22 Hz

sLORETA Z–score Training



	Delta	Theta	Alpha	loBeta	Beta	hiBeta	Gamma
Frontal	R		L				
Temporal			L			R	
Parietal	L+R					L+R	L+R
Occipital	R					L+R	

Scientific Support

Specificity

Degree Of Deviance

Data Quality

Scientific Support:
The level of Scientific Support is determined by the current scientific status of neurofeedback treatment of the diagnosis to treat and the level of agreement between the EEG results and the symptoms of the patient.

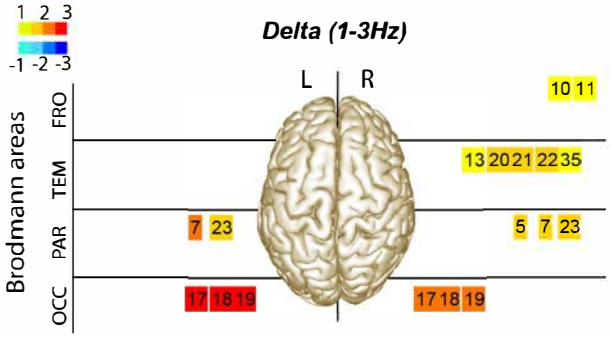
Specificity:
Deviant activity can have a broad or narrow distribution across frequencies and electrode sites. Moreover, the relevant deviant activity can be accompanied by other distinct deviant EEG measures.

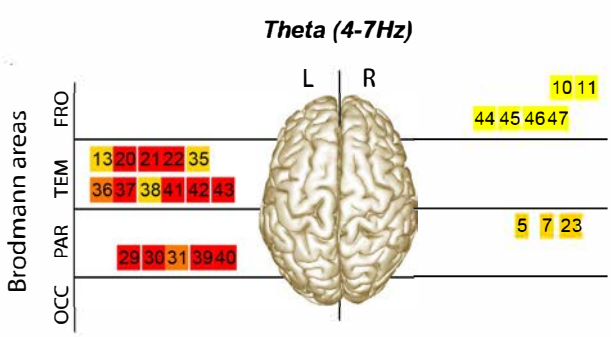
Degree Of Deviance:
The more extreme the z–score of the relevant deviant activity, the higher the Degree Of Deviance.

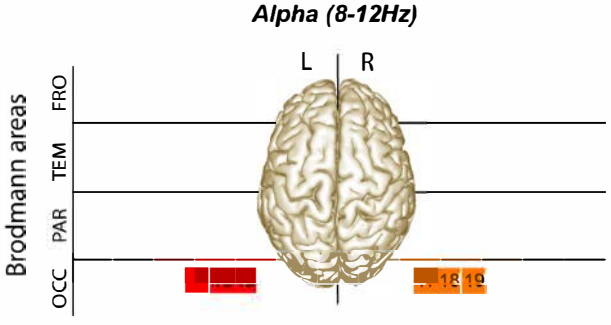
Data Quality:
The percentage rejected data, the detection of bad channels and the total artifact free recording time contribute to the level of Data Quality.

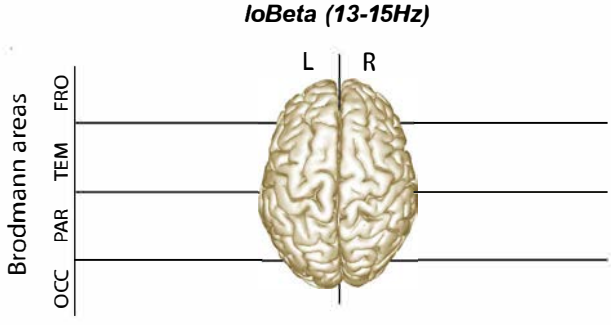
sLORETA Z-score Training
Frequency Band-Specific Recommendations

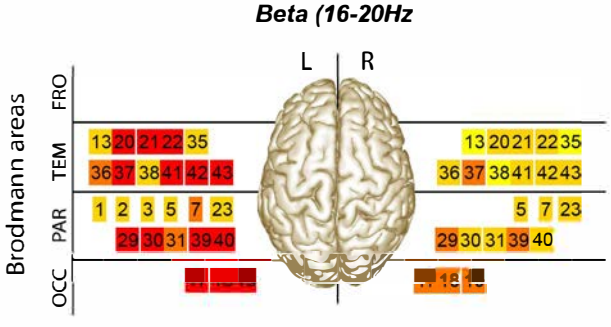
Client ID: John Doe
Age: 60.14, Gender: Female, Eyes Open

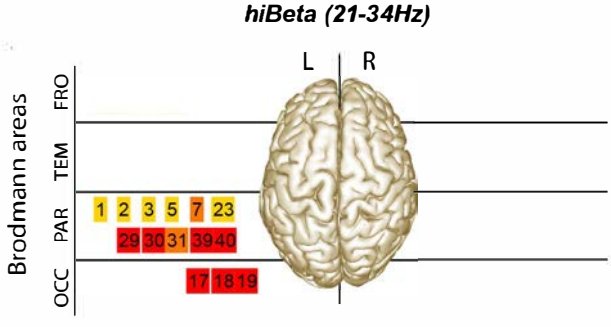












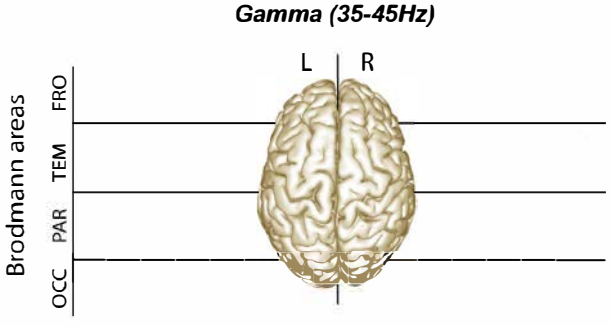
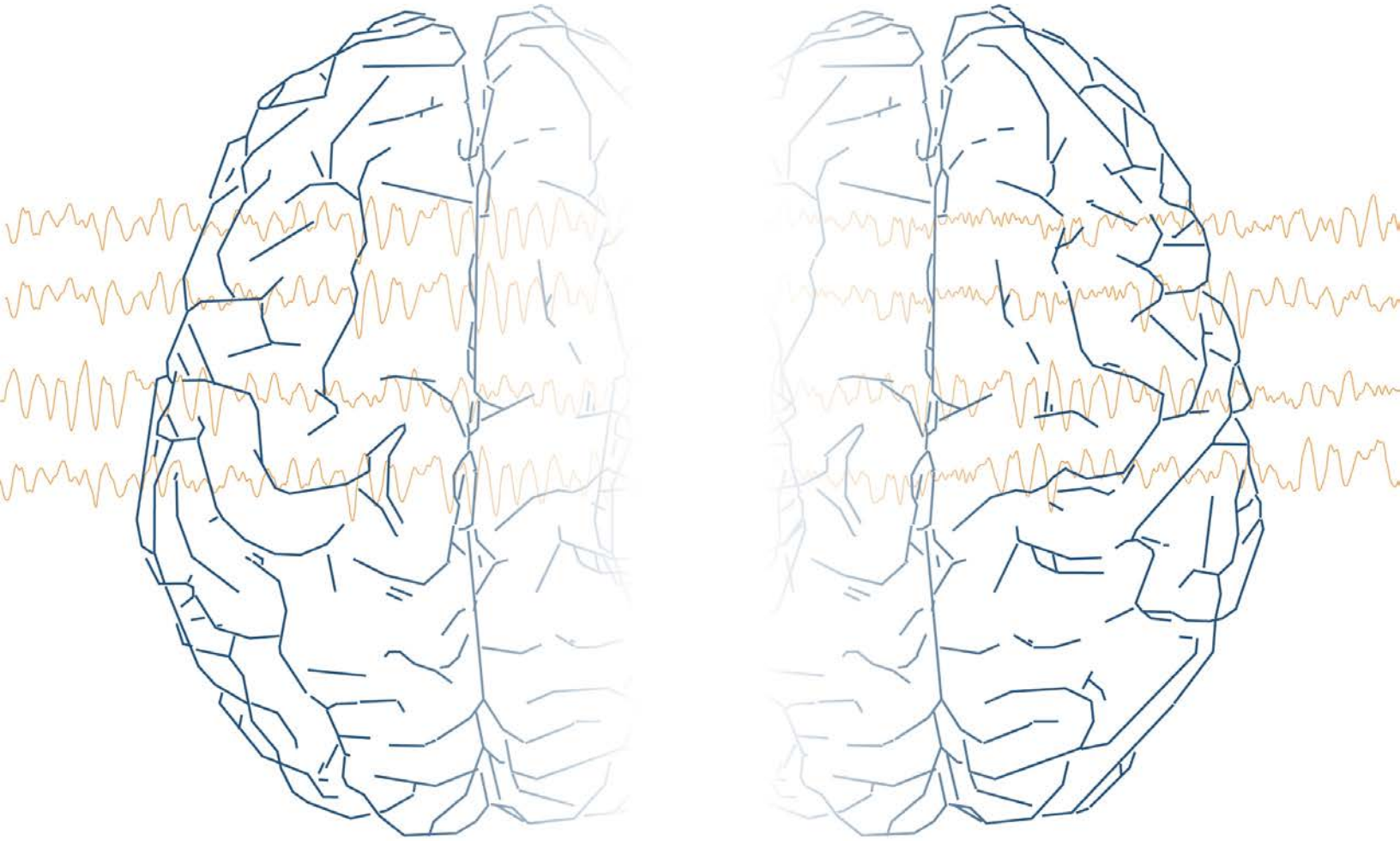


Figure Legend

The above tables depict the Brodmann areas which are recommended to include in sLORETA live z-score training, for each frequency band seperately. The background colors of the Brodmann area numbers represent the mean z-score for that area and frequency band.

QEEG COMPARISON REPORT



Name:	
Date of Analysis:	2018-1-31
Gender:	male
Handedness:	right

INTRODUCTION

The 'qEEG Comparison Report' includes comparative analyses of qEEG results based on two different qEEG datasets. The comparative analyses shows the difference between these two datasets for z-scored surface amplitudes, z-scored surface coherence, z-scored source amplitudes and z-scored source coherence, based on the sLORETA source reconstruction technique.

In order to get a comprehensive understanding of the changes between the first and the second qEEG results, this report depicts bar charts which show the percentage of deviant z-scores for both the first and the second EEG.

Using easy-to-understand color coding, a distinction is made between the percentage of z-scores that lie outside the +-2 standard deviations range, indicating rather extreme deviations from normal, and the percentage of z-scores that lie outside the +-1 standard deviations range, indicating moderate deviations from normal.

Changes between the first and second qEEG results can be the result of an intervention (treatment). However, there are a number of other factors that may determine a difference, such as differences in the day and time of the EEG recording, substance use, sleep quality of the night(s) before the recording, but also differences in the number and severity of artifacts in the EEG recording.

GENERAL INFORMATION

FIRST EEG RECORDING

Input EEG: 282165

EEG recorded on: 27-Nov-2017

Montage: Linked Ears

SUBJECT INFORMATION:

Original Filename: 0190 ENJA 10.000.02 AGE 9 EC.edf
Subject ID: 0190 ENJA
Age: 10.53
Gender: male
Handedness: right
Condition: Eyes Closed

ARTIFACT REJECTION/CORRECTION RESULTS:

Noisy channels: O1 O2
High frequency artifacts will be ignored in these channels.
Percentage rejected data: 25%
(High percentages indicate bad data quality)
Record length: 8:15
Edit length: 6:10

SECOND EEG RECORDING

Input EEG: 622721

EEG recorded on: 08-May-2017

Montage: Linked Ears

SUBJECT INFORMATION:

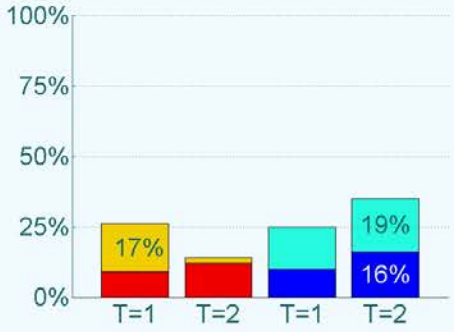
Original Filename: 0190 ENJA 01.000.02 AGE 9 EC.edf
Subject ID: 0190 ENJA
Age: 9.97
Gender: male
Handedness: right
Condition: Eyes Closed

ARTIFACT REJECTION/CORRECTION RESULTS:

Noisy channels: O2
High frequency artifacts will be ignored in these channels.
Percentage rejected data: 66%
(High percentages indicate bad data quality)
Record length: 8:07
Edit length: 2:43

SOURCE COHERENCE

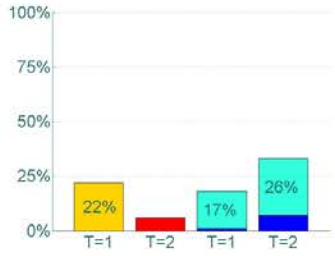
% DEVIANCE: SOURCE COHERENCE



The '% Deviance: Source Coherence' chart compares the percentage z-scores that are considered deviant between the first EEG recording (T=1) and the second EEG recording (T=2). The percentages are calculated based on the z-scored sLORETA coherence between all the available brodman areas (42) and across all the available frequency bands (9). The charts below show the change in deviant z-scores for different frequency bands.

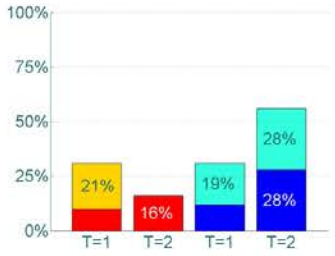
% Z>2 % Z<-2
% Z>1 % Z<-1

DELTA (1-3 HZ)

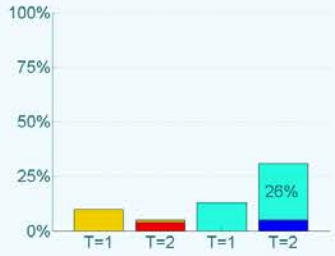


THETA (4-8 HZ)

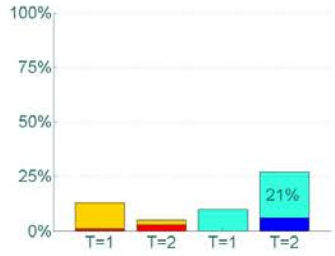
ALPHA (8-12 HZ)



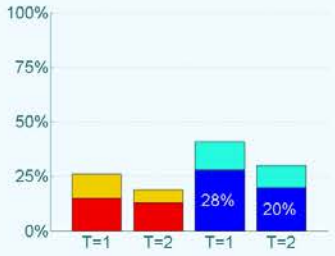
LOBETA (12-15 HZ)



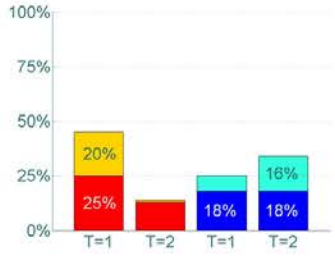
BETA (15-20 HZ)



HIBETA (20-30 HZ)

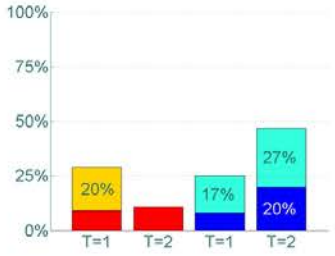


GAMMA (35-35 HZ)



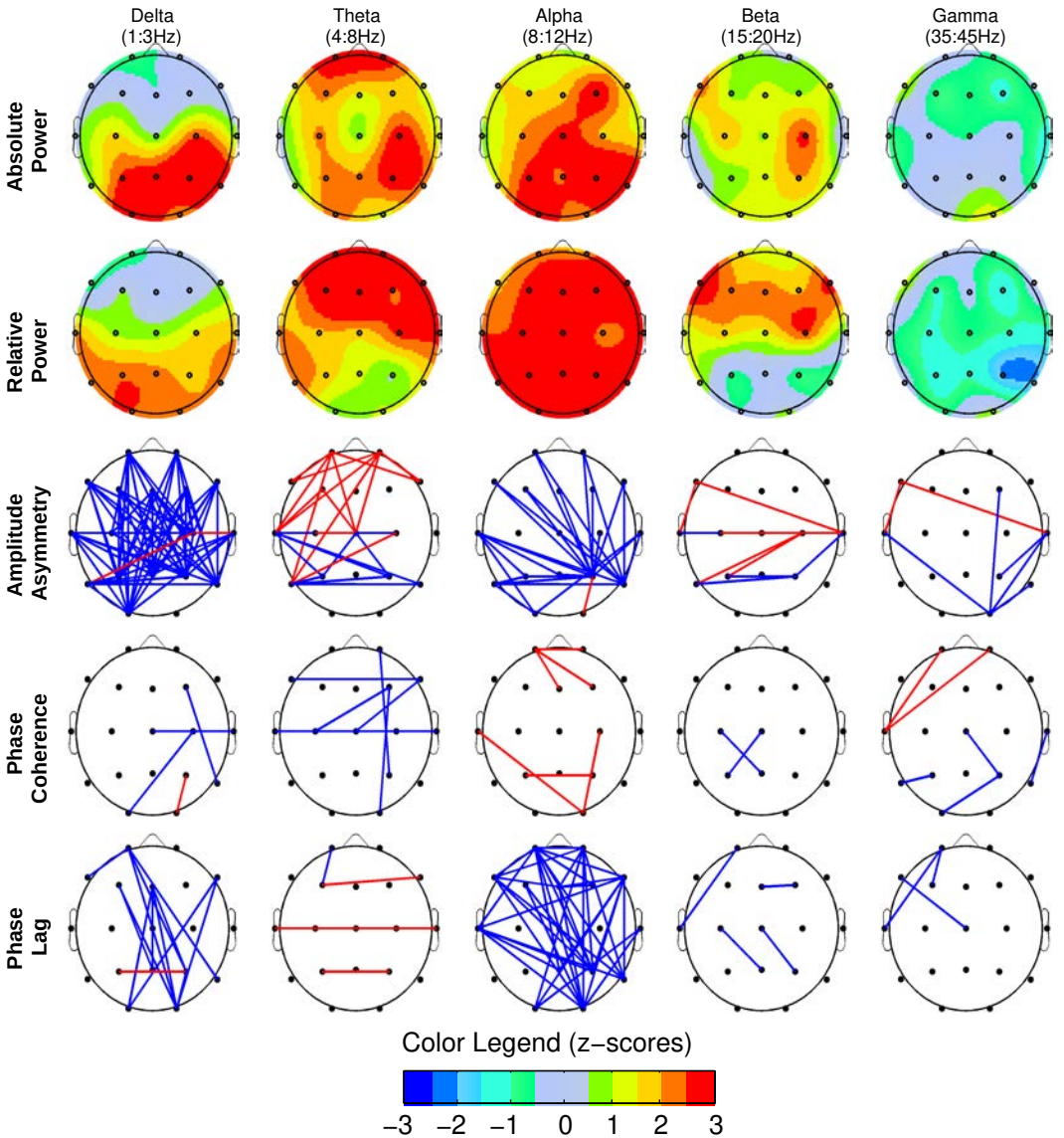
ALPHA1 (8-10 HZ)

ALPHA2 (10-12 HZ)



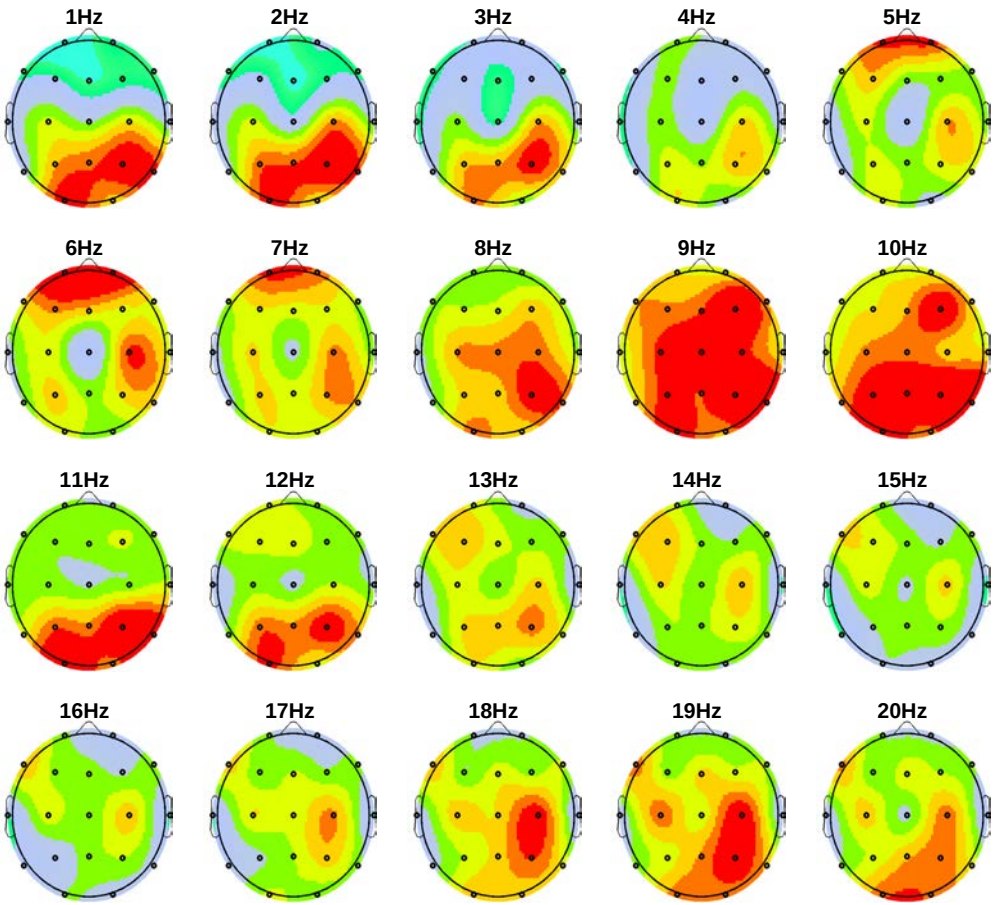
Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Laplacian
Eyes Open

Summary of the Z–score analyses



Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Laplacian
Eyes Open

Z–scored FFT Absolute Power



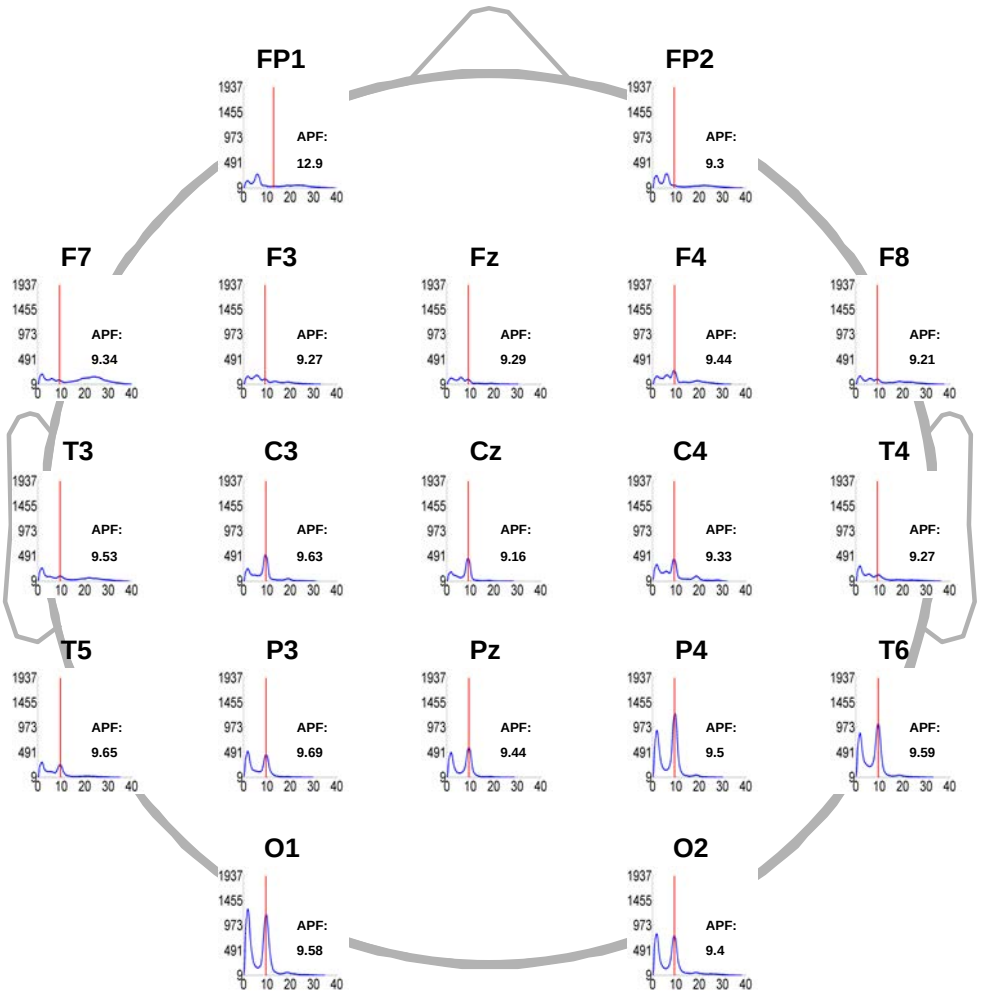
Color Legend (z–scores)

Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Laplacian
Eyes Open

FFT power distribution and Alpha Peak

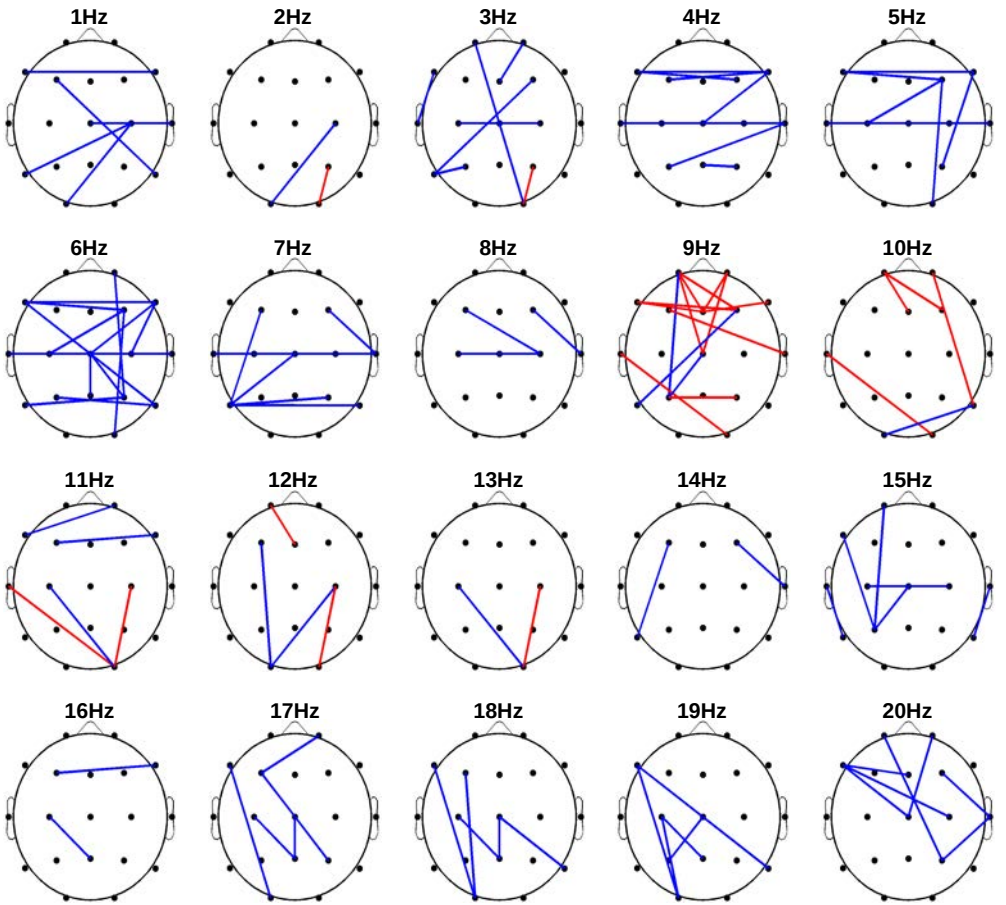
X–axis: Frequency (Hz)

Y–axis: Amplitude (uV^2)

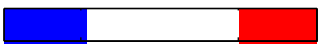


Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Laplacian
Eyes Open

Z–scored Phase Coherence

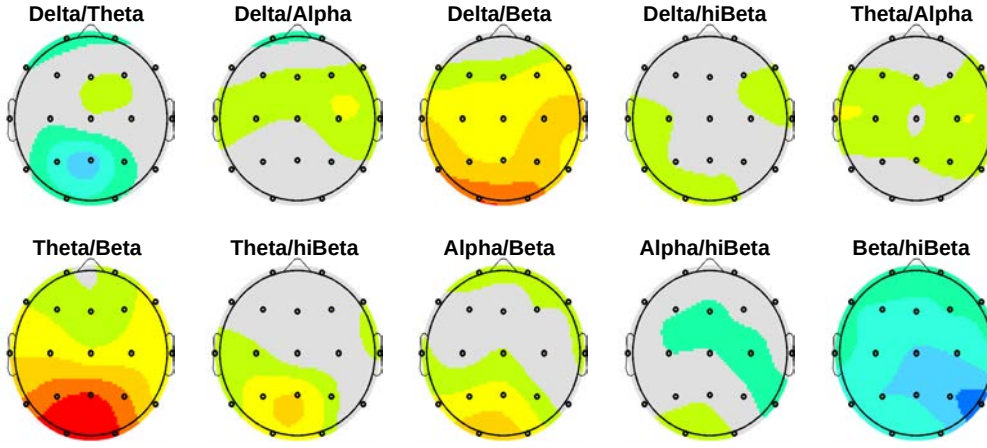


Color Legend (z–scores)

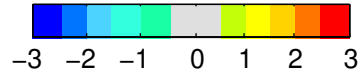


Client ID: 0180 TEKA
Test Date: 2018−05−25
Age: 14.70
Gender: Female
Montage: Linked Ears
Eyes Open

Z−scored Power Ratio



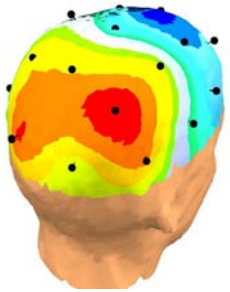
Color Legend (z−scores)



Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Laplacian
Eyes Open

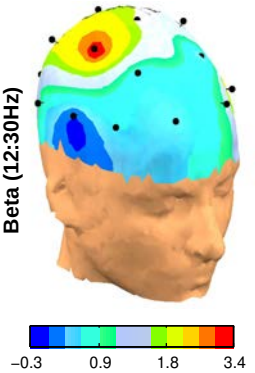
Extreme z–score development

Delta (1:3Hz)



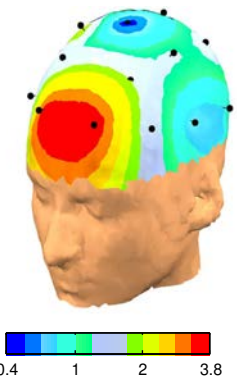
Z–score: 3.2
Channel: P4
Frequency: 2 Hz

Beta (12:30Hz)



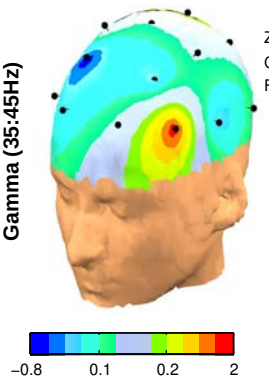
Z–score: 3.4
Channel: C4
Frequency: 28 Hz

Theta (4:8Hz)



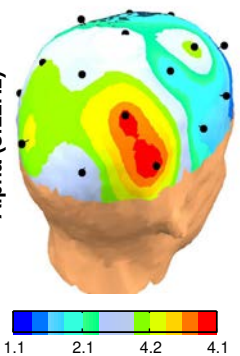
Z–score: 3.8
Channel: FP1
Frequency: 6 Hz

Gamma (35:45Hz)



Z–score: 2
Channel: F7
Frequency: 35 Hz

Alpha (8:12Hz)



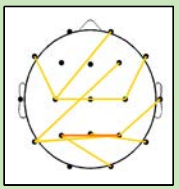
Z–score: 4.1
Channel: T6
Frequency: 10 Hz

Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Laplacian
Eyes Open

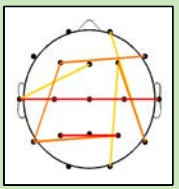
Tables: Phase Lag

Top 10 Z–scores

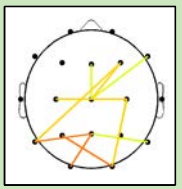
Ch	D	Z–D
P3–O2	102.3	2.0
Pz–T6	106.3	1.9
C3–C4	75.5	1.9
F7–C3	103.6	1.8
T4–P4	99.3	1.8
T5–P4	79.9	1.6
F8–C4	102.0	1.6
F4–T5	87.4	1.6
FP2–C3	93.0	1.5
F7–T4	92.1	1.4



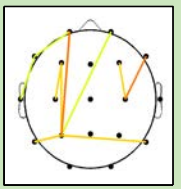
Ch	T	Z–T
T3–T4	76.9	2.7
C3–C4	79.4	2.6
F3–F8	85.8	2.4
F3–T5	85.5	2.2
T5–P4	81.6	2.0
F4–T6	84.1	2.0
F4–O2	85.7	2.0
Fz–T3	87.8	1.9
FP2–T6	83.7	1.9
T4–P4	98.6	1.7



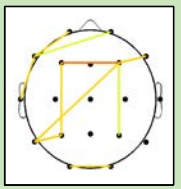
Ch	A	Z–A
T5–Pz	105.1	2.1
P3–O2	106.1	2.0
F4–T5	91.3	1.9
F4–Cz	105.0	1.8
C3–C4	90.0	1.8
C4–O2	94.7	1.5
F8–Cz	101.9	1.4
Fz–Cz	100.5	1.4
Pz–T6	103.5	1.3
P3–P4	97.0	1.3



Ch	B	Z–B
F8–C4	105.9	2.0
F4–C4	110.6	2.0
T5–P3	72.2	1.9
F3–C3	106.0	1.7
F3–P3	101.1	1.6
P3–T6	83.2	1.6
FP2–P3	88.1	1.5
F7–T3	116.6	1.4
FP1–F7	115.0	1.3
FP1–P4	87.5	1.3



Ch	G	Z–G
F4–F8	92.3	1.9
F3–P3	98.0	1.9
FP1–F7	133.5	1.9
F7–T3	131.1	1.7
T5–P3	78.5	1.6
O1–O2	108.7	1.6
F4–T5	89.7	1.6
F4–P4	92.3	1.5
FP2–F7	104.6	1.4
F7–F3	88.2	1.4

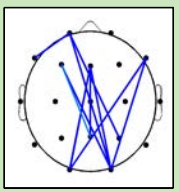


Font
Color Legend (z-scores)
-3 -2 -1.5 0 1.5 2 3

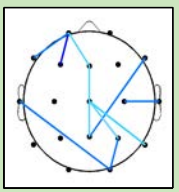
Headplot
Color Legend (z-scores)
-3 -2 -1 0 1 2 3

Bottom 10 Z–scores

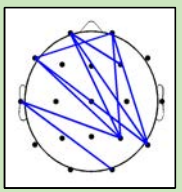
Ch	D	Z–D
F8–O1	67.3	–4.1
Fz–Pz	77.8	–3.9
Fz–O2	73.8	–3.7
FP1–F7	72.3	–3.2
Fz–O1	76.7	–3.2
F8–O2	67.5	–3.1
FP1–P4	67.1	–2.6
FP1–O2	72.5	–2.6
F3–O2	71.9	–2.5
F3–Pz	77.1	–2.4



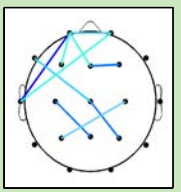
Ch	T	Z–T
FP1–F3	52.1	–2.8
FP1–F7	77.7	–2.2
P4–O2	62.9	–2.1
F8–Pz	77.1	–2.1
C4–T4	74.2	–2.0
T3–O2	79.3	–2.0
Cz–P4	94.7	–2.0
Fz–Pz	87.1	–1.8
FP1–Fz	70.8	–1.8
Cz–T6	96.1	–1.7



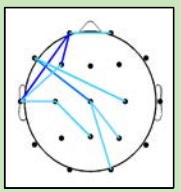
Ch	A	Z–A
T3–P4	59.2	–5.8
FP2–P4	49.0	–5.5
FP2–T6	53.3	–5.2
T3–O2	60.6	–5.2
FP1–T6	56.6	–4.8
F7–P4	60.2	–4.6
FP1–P4	54.7	–4.5
FP1–F4	61.1	–4.4
FP2–F7	75.8	–4.0
F7–T6	65.2	–4.0



Ch	B	Z–B
FP1–T3	77.0	–2.6
Fz–F4	60.3	–2.4
Cz–P4	90.4	–2.4
C3–Pz	90.9	–2.3
C4–P3	81.7	–2.0
FP1–FP2	75.6	–1.7
F7–Cz	80.6	–1.6
FP1–Fz	76.8	–1.4
FP2–T3	71.3	–1.3
FP1–F3	69.2	–1.2



Ch	G	Z–G
FP1–T3	61.5	–3.2
FP1–F3	62.6	–2.5
F7–Cz	60.0	–2.4
Cz–P4	90.8	–2.0
T3–C3	70.5	–1.9
Cz–O2	71.6	–1.9
F3–T3	66.5	–1.8
FP1–FP2	82.4	–1.7
C3–Pz	94.9	–1.7
F7–C4	71.1	–1.7

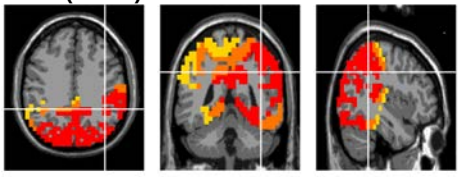


Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Linked Ears
Eyes Open

sLORETA Extreme Z–scores

Delta (1–3Hz)

Z–score: 3.5, Frequency: 2 Hz



Brain Area:

Parietal Lobe
Supramarginal Gyrus
Brodmann area 40

Function:

Somatosensory

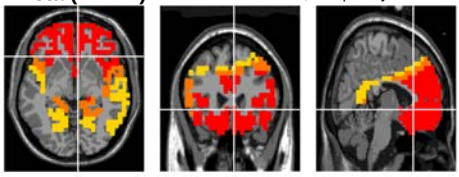
Symptoms of Defect:

Fibromyalgia
Migraines
Slow Reading
Difficulty with Social Cues (R)
Dyscalculia
Dyslexia (L)
Agnosia (R)
Denial (R)
Letter Perception Problems (L)
Insensitive to Others' Emotional Expressions (R)
Receptive Language Problems (L)
Facial Recognition Problems
Spacial Orientation Problems (R)
Poor Social Skills (R)

Online information:
https://en.wikipedia.org/wiki/Brodmann_area_40
www.fmriconsulting.com/brodmann/BA40.html

Theta (4–7Hz)

Z–score: 3.8, Frequency: 6 Hz



Brain Area:

Limbic Lobe
Anterior Cingulate
Brodmann area 24

Function:

Regulating Blood Pressure and Heart Rate
Reward Anticipation
Decision–Making
Empathy
Impulse Control
Emotion
Error Detection and Conflict Monitoring
Registering Physical Pain

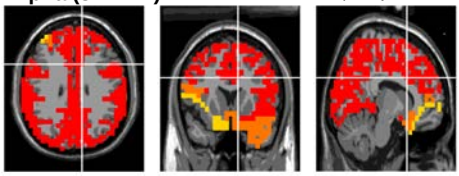
Symptoms of Defect:

Abulia and Amotivational Syndromes
Inability to Detect Errors
Difficulty Resolving Conflict
Emotional Instability
Inattention
Schizophrenia
Hyperactivity (R)
Easily Distracted
Impulsive
Compulsive Thoughts or Behaviors
Concentration Problems
Short–Term Memory Problems
Low Motivation
Depressed
Failure to Initiate Actions
Chronic Pain (R)
Obsessive Thoughts about Self
Multitasking Problems
Self–Esteem Problems (R)
Slow Thought
Easily Confused

Online information:
https://en.wikipedia.org/wiki/Brodmann_area_24
www.fmriconsulting.com/brodmann/BA24.html

Alpha (8–12Hz)

Z–score: 4.2, Frequency: 9 Hz



Brain Area:

Limbic Lobe
Cingulate Gyrus
Brodmann area 24

Function:

Regulating Blood Pressure and Heart Rate
Reward Anticipation
Decision–Making
Empathy
Impulse Control
Emotion
Error Detection and Conflict Monitoring
Registering Physical Pain

Symptoms of Defect:

Abulia and Amotivational Syndromes
Inability to Detect Errors
Difficulty Resolving Conflict
Emotional Instability
Inattention
Schizophrenia
Hyperactivity (R)
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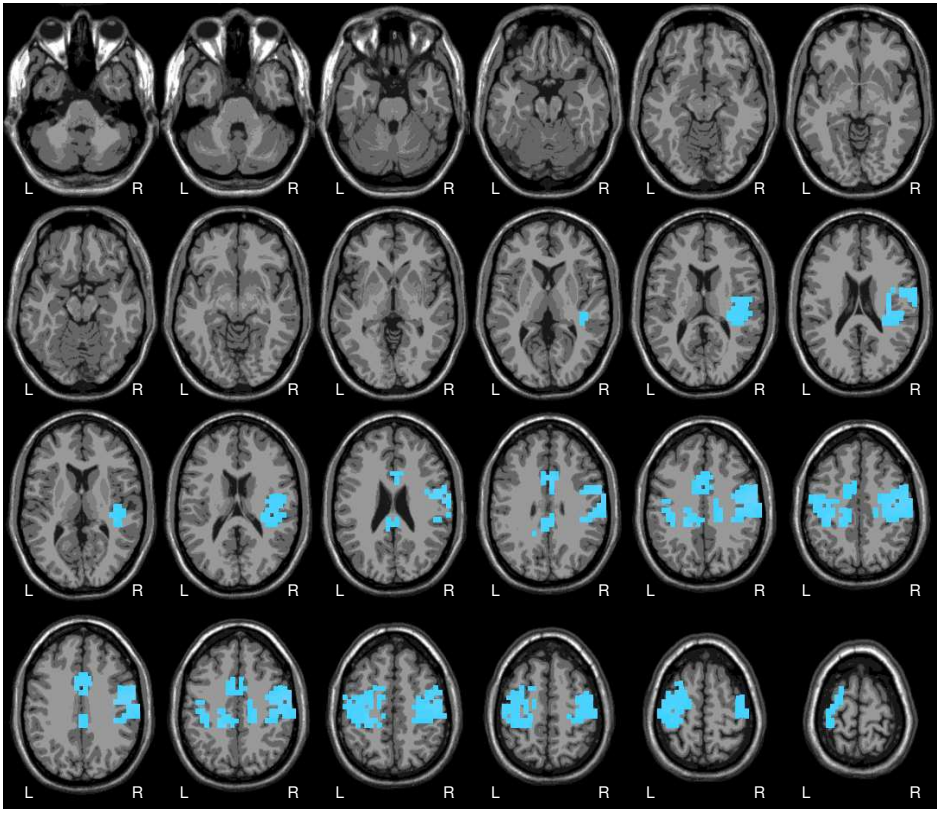
Concentration Problems
Short–Term Memory Problems
Low Motivation
Depressed
Failure to Initiate Actions
Chronic Pain (R)
Obsessive Thoughts about Self
Multitasking Problems
Self–Esteem Problems (R)
Slow Thought
Easily Confused

Online information:
https://en.wikipedia.org/wiki/Brodmann_area_24
www.fmriconsulting.com/brodmann/BA24.html

Client ID: 0125 SHMA
Test Date: 2016–02–18
Age: 10.51
Gender: Male
Montage: Linked Ears
Eyes Open

sLoreta Source Reconstruction at 45 Hz

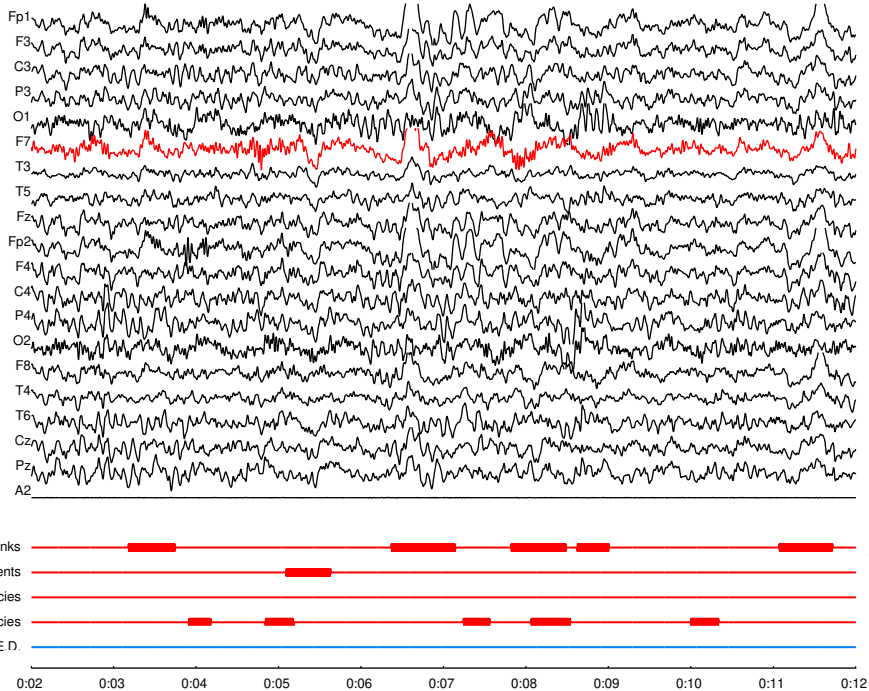


Color Legend (z-scores)

-3 -2 -1 0 1 2 3

Client ID: 0125 SHMA
Age: 10.51
Gender: Male
Eyes Open

S.A.R.A results



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