

Round 23: Trauma, Part 2

Kristy Snyder Colling, PhD

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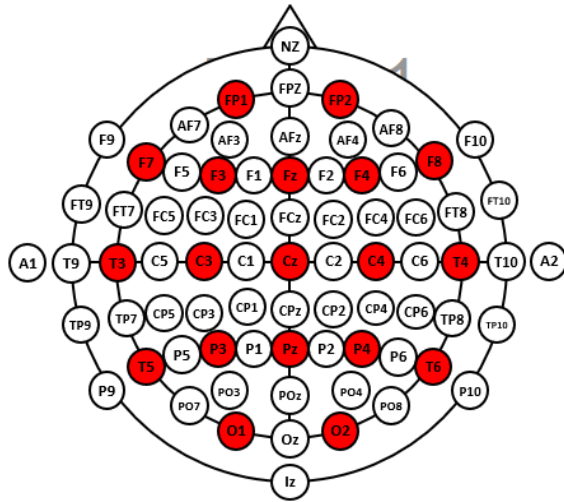
Study Details

- Subjects
 - Study 1 – 19 Channel EEG:
 - 50 Subjects abuse hx & 16 normal controls
 - 19 emotional abuse/neglect
 - 15 physical/sexual abuse
 - Study 2 – 64 Channel EEG
 - 19 Subjects
 - 12 History of abuse
 - 7 normal controls

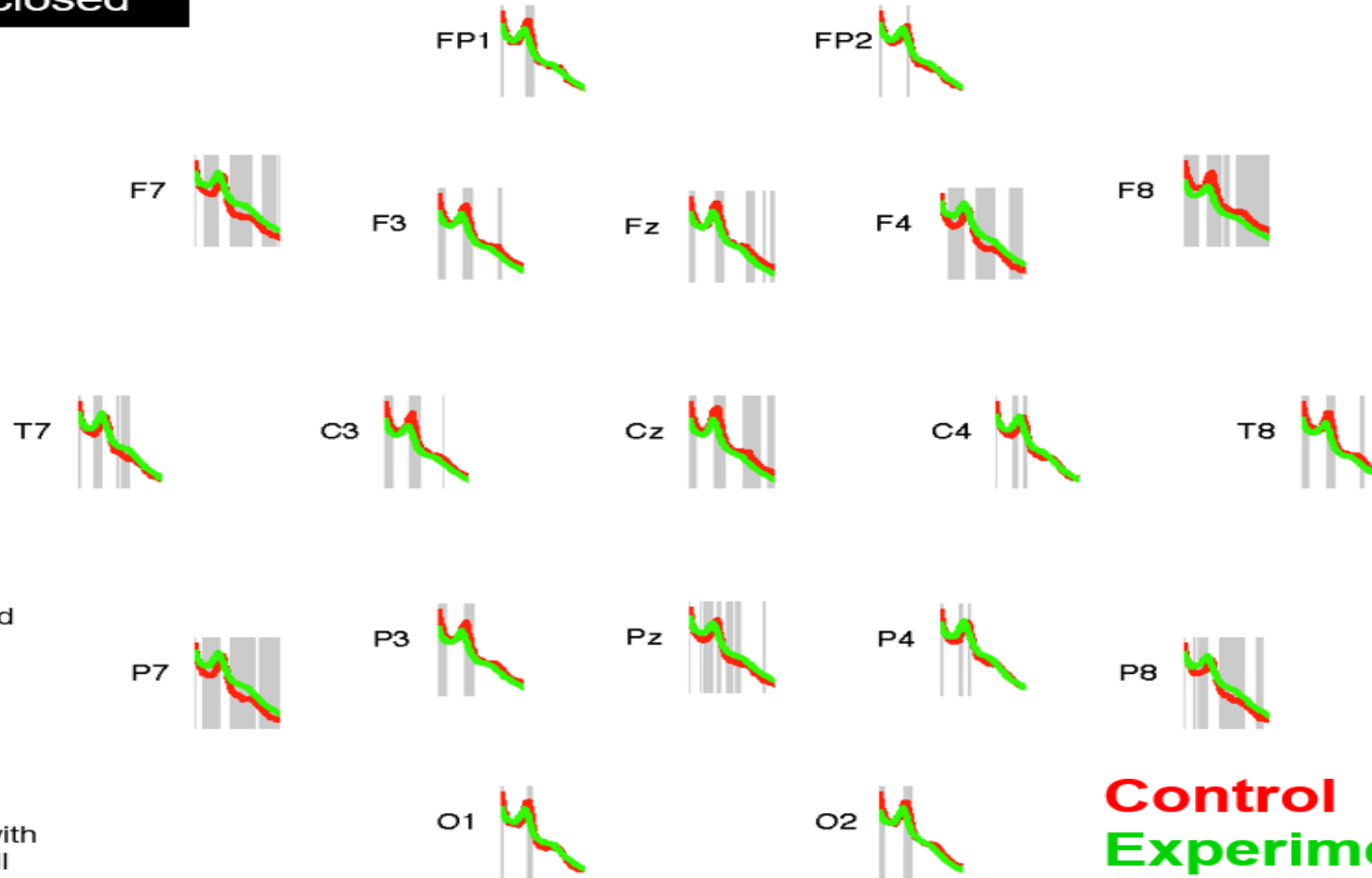


Frequency Power Differences

Channel level
19-chan eyes closed

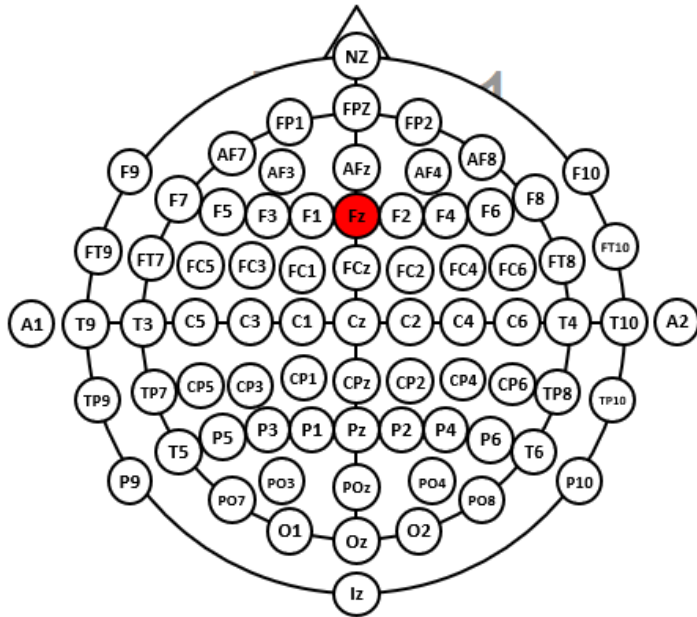
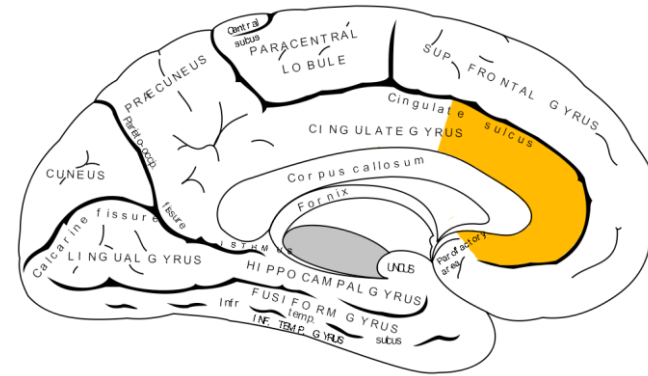


19-chan data
Eyes-closed, ICs dropped
All channel plot
Channel-level data
1-30 Hz
Grey lines indicate
significant differences
At $p < .0000000001$
And with *fdr* correction
P made small because with
normal settings almost all
bands at all channels were
significantly different

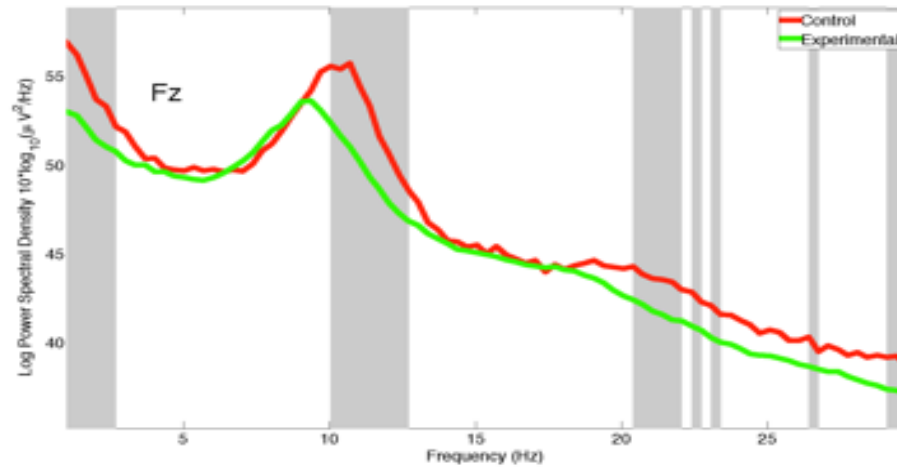


Control
Experimental

- Fz -> Anterior Cingulate Cortex
 - Conflict monitoring & Fear learning
 - Detection & appraisal of social situations
 - Emotional awareness
 - Pain perception



Channel level
19-chan eyes closed



Delta 1-3 Hz Alpha 9-14 Hz Beta 15-30 Hz

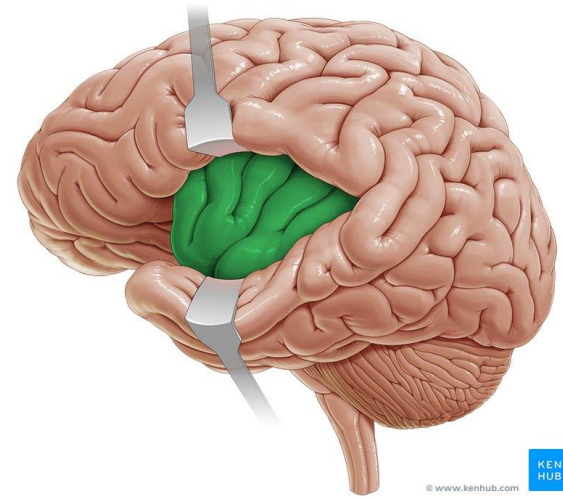
Theta 4-8 Hz

Control
Experimental

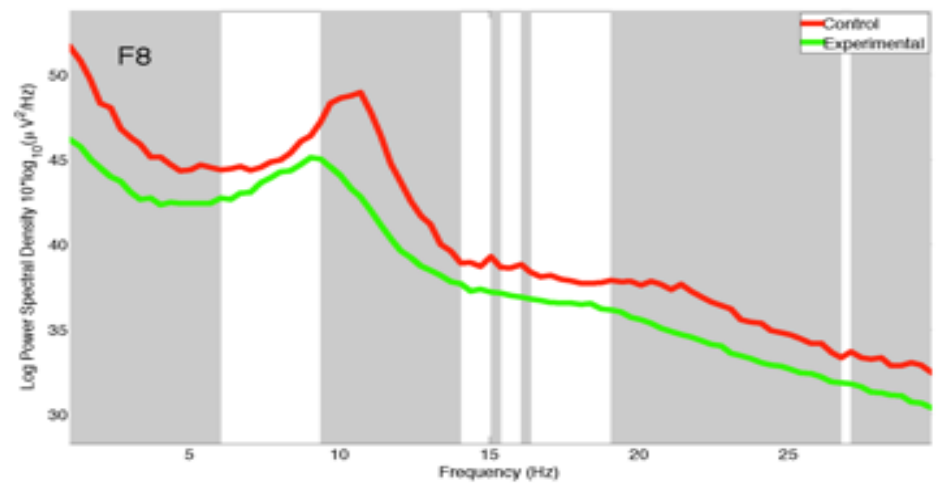
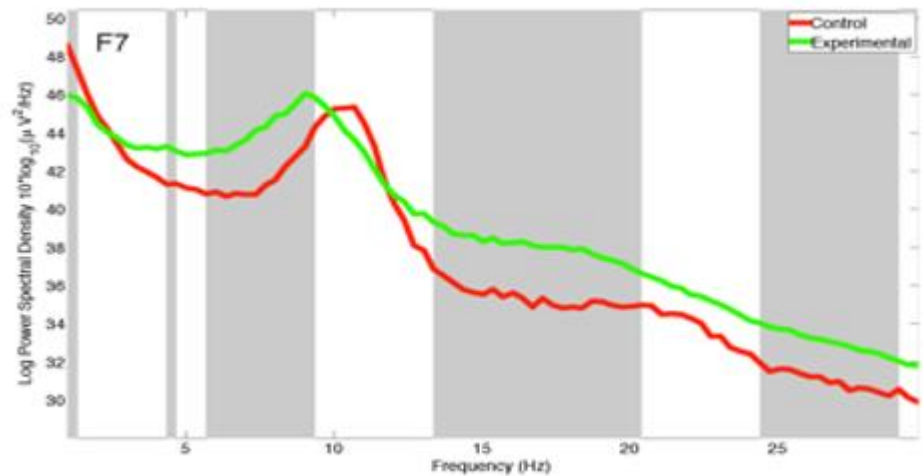
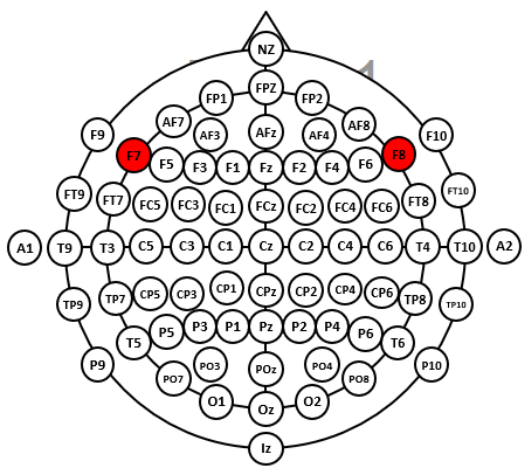
- **Delta** – Deep, dreamless sleep
- **Theta** – Deep relaxation, meditation
- **Alpha** – Relaxed, calm
- **Beta** – Awake, alert

- F7 & F8 -> Insula

- Self-awareness, interpersonal experience, sense of agency
- Social experience -> norm violations, emotional processing, empathy, social decision making
- Dysfunctional anticipatory processing



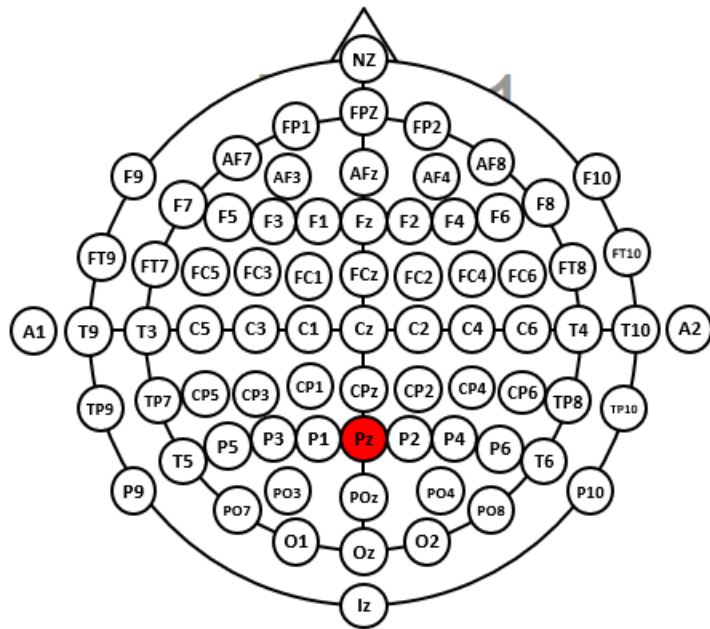
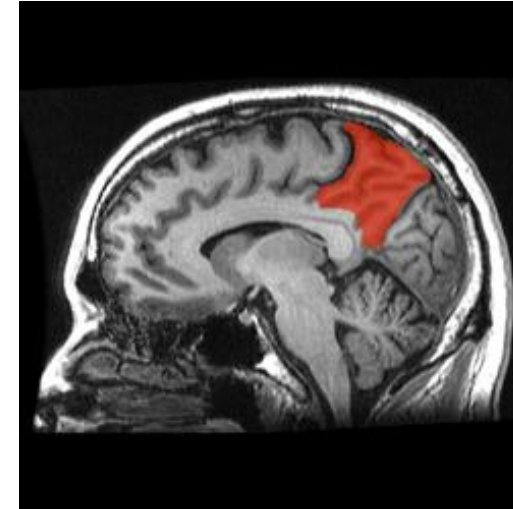
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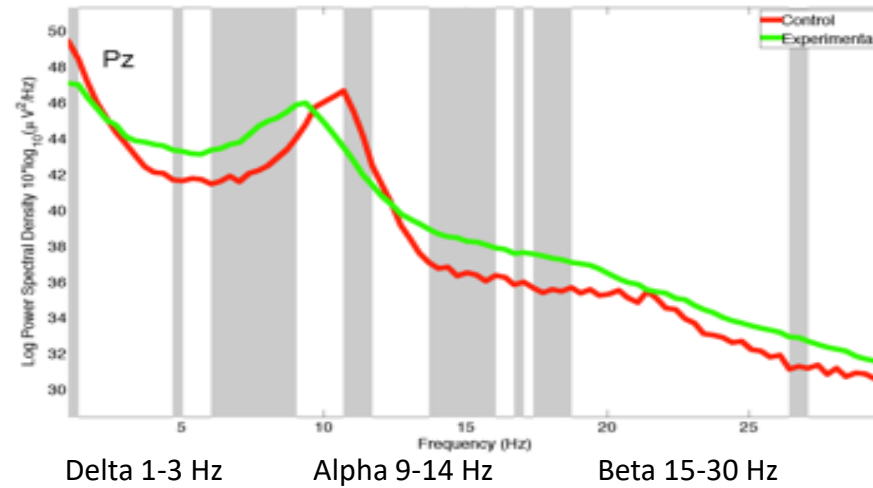
Delta 1-3 Hz Alpha 9-14 Hz Beta 15-30 Hz
Theta 4-8 Hz

- Pz -> Precuneus

- Episodic memory
- Self-consciousness
- Self-awareness
- Integration of self with environment



Channel level
19-chan eyes closed

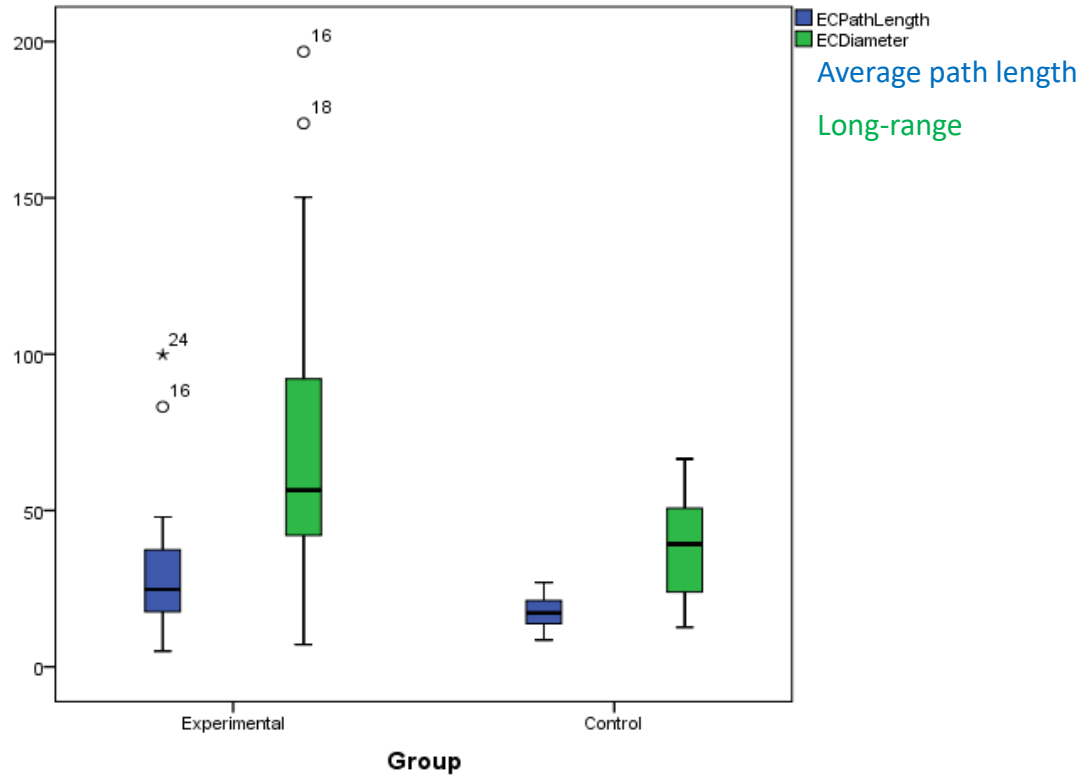


Delta 1-3 Hz Alpha 9-14 Hz Beta 15-30 Hz

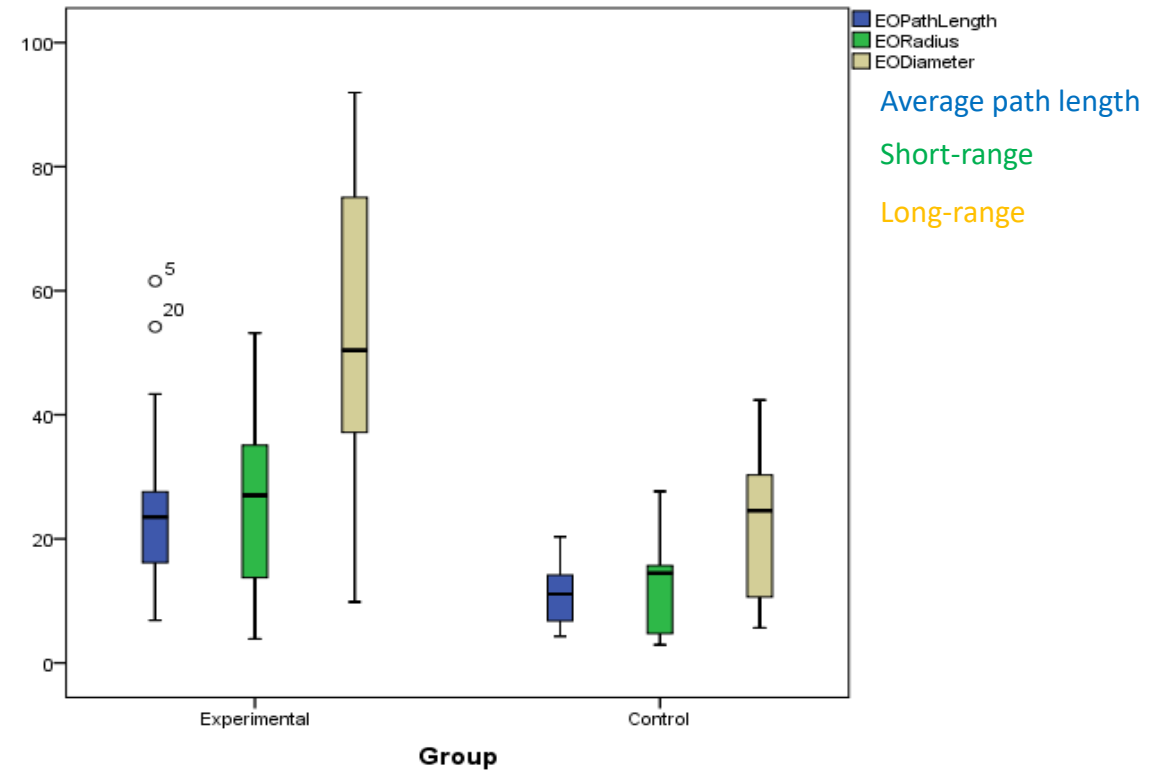
Theta 4-8 Hz

Control
Experimental

Connectivity Differences



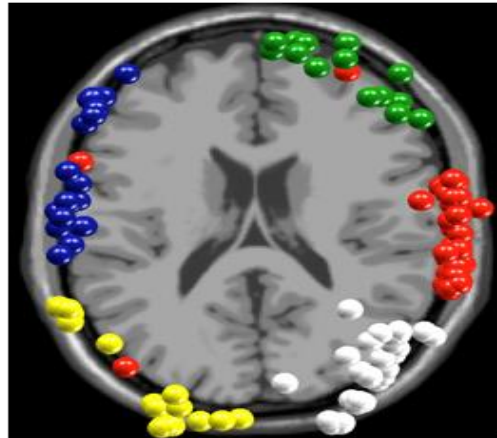
Eyes Closed



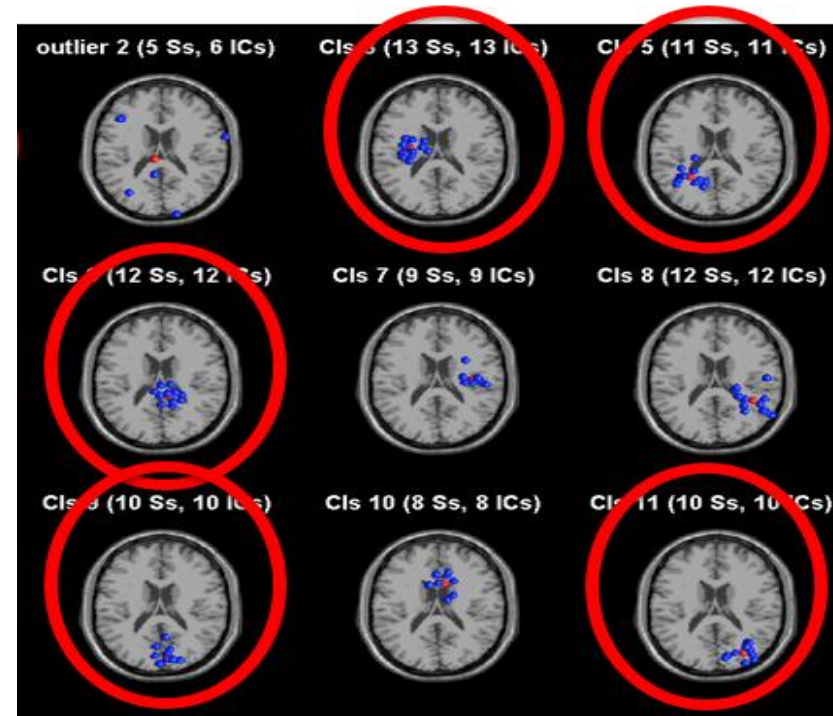
Eyes Open

No significant differences in connectivity between abuse/neglect groups

Localization Differences between 19 & 64 Channel EEG



19 Channel

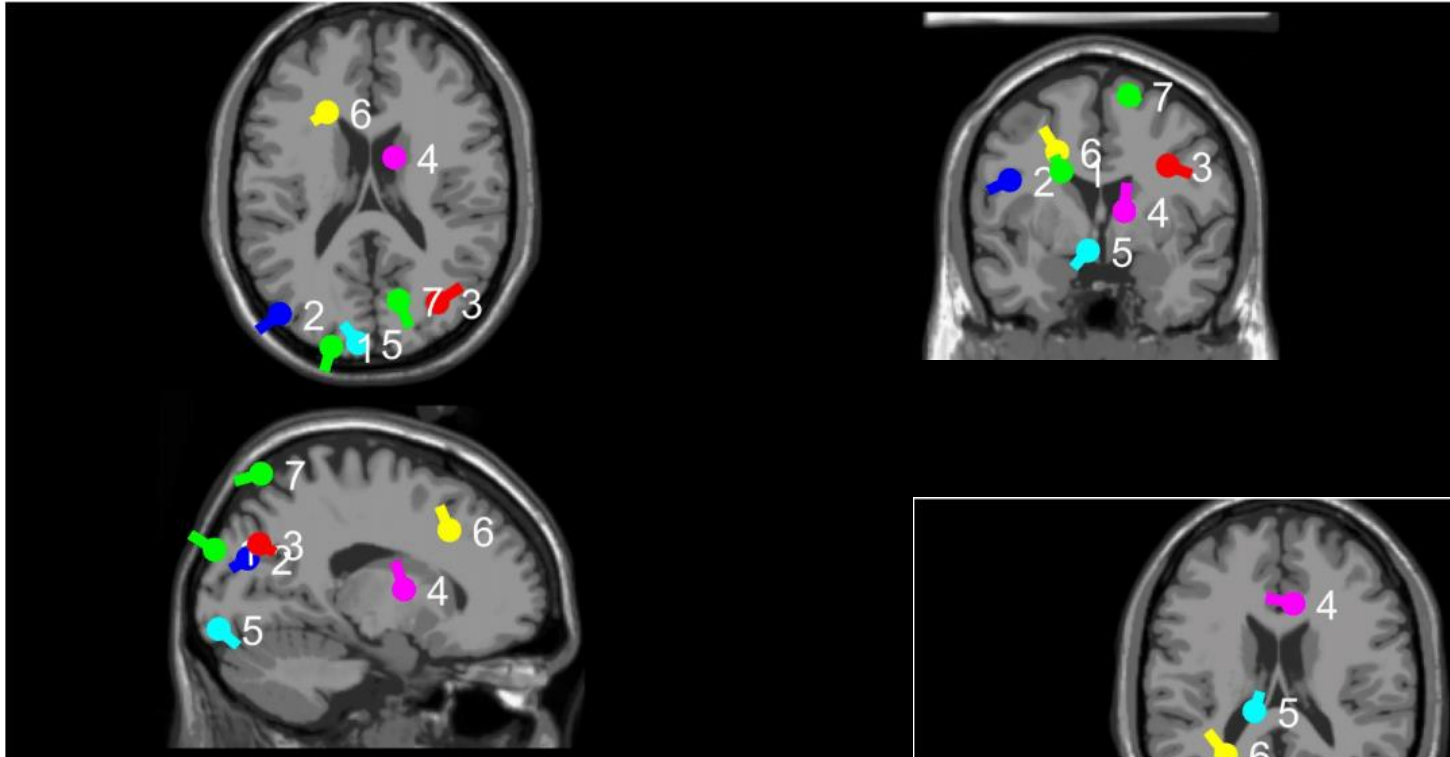


64 Channel

Case Study 1

- 10 year old male
- History
 - Developmental Trauma
 - Biological parents & grandparents meth & alcohol addicts
 - In and out of foster care starting at age 9 months
 - Removed from home 3 times
 - Sexual abuse 3-4 y/o
 - Adopted age 4.5
- Symptoms
 - Difficulties with attention, distraction, getting/staying on task
 - Daydreaming
 - Poor Coordination

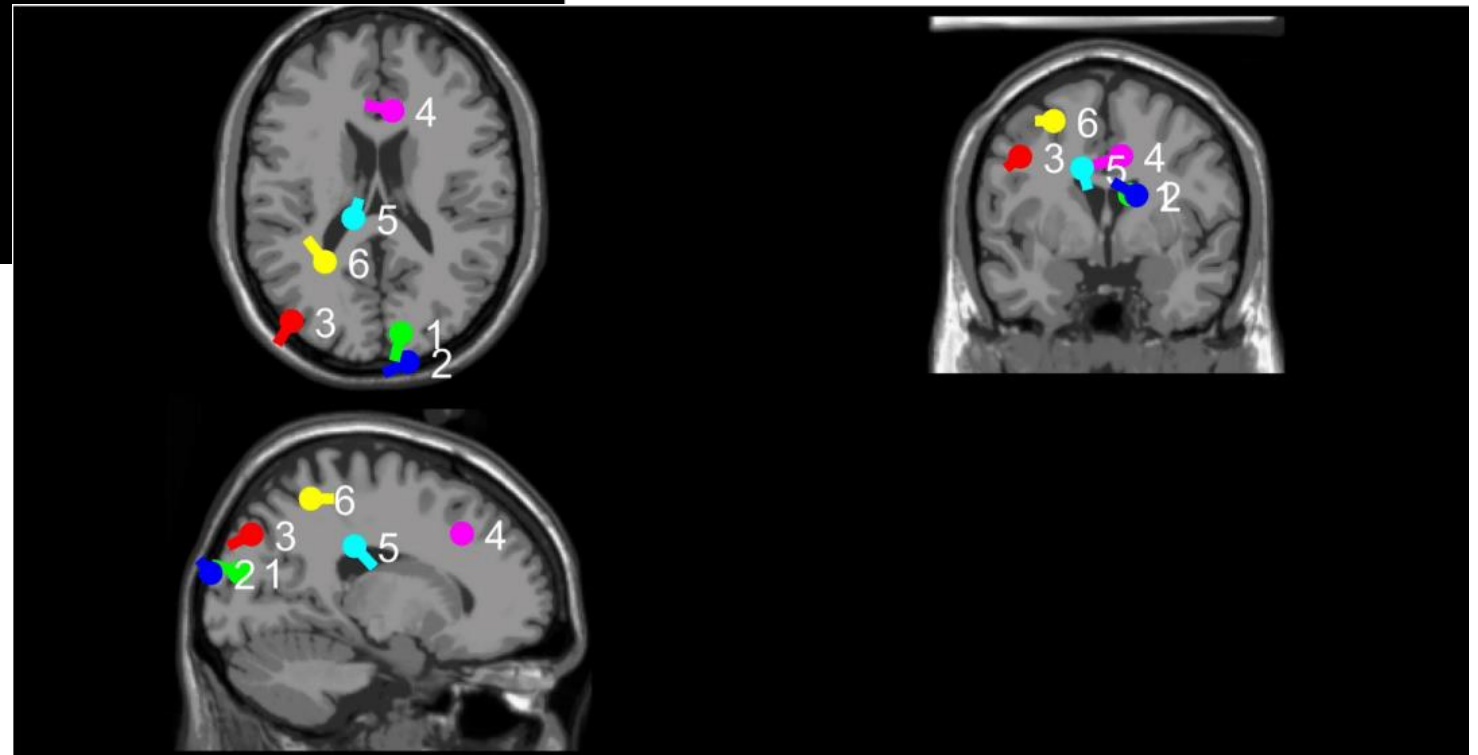
Eyes Closed



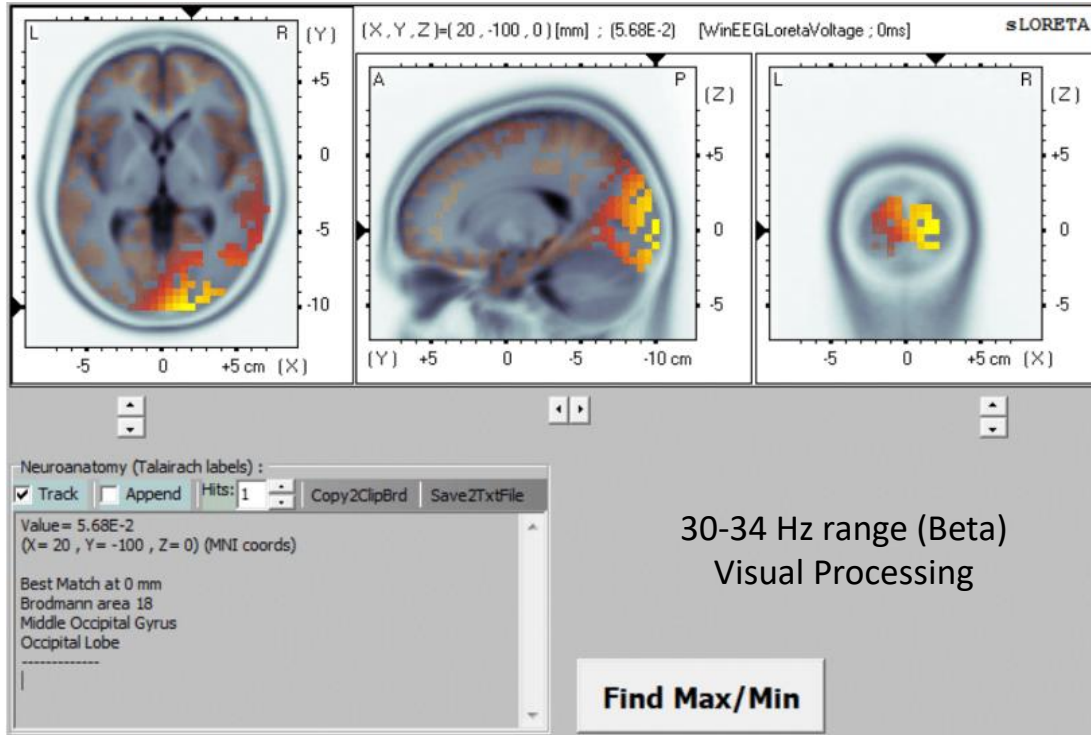
6 - Supplemental Motor Area
7 - Precuneus

5 – Cingulate Gyrus
6 - Secondary Sensorimotor Cortex

Eyes Opened

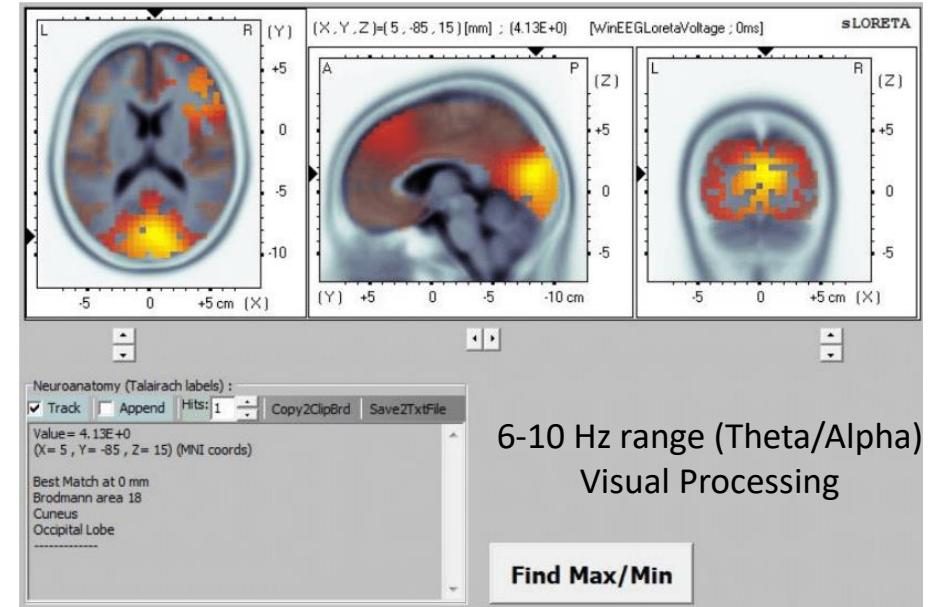


Eyes Closed

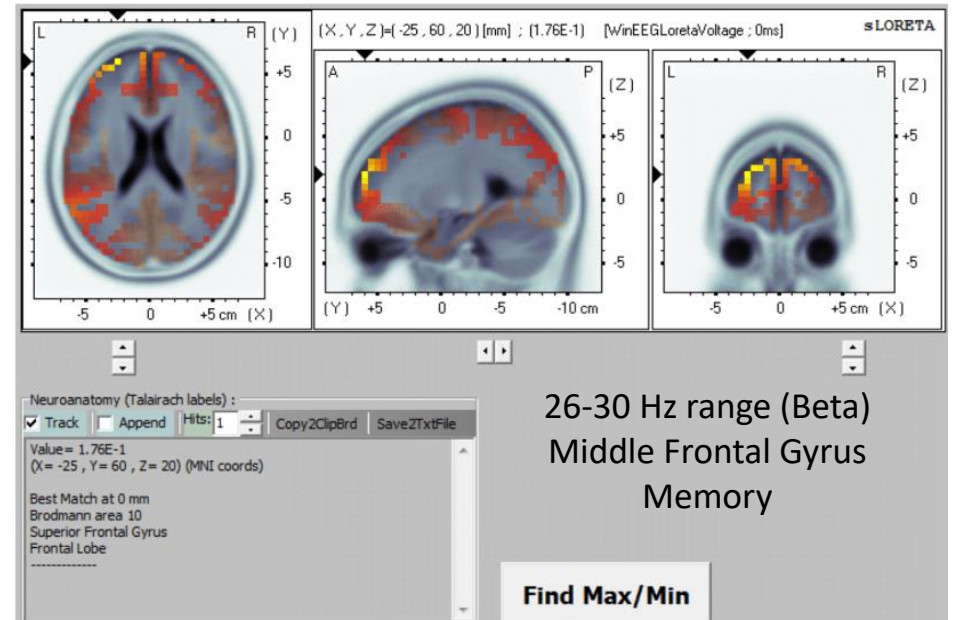


30-34 Hz range (Beta)
Visual Processing

Eyes Open

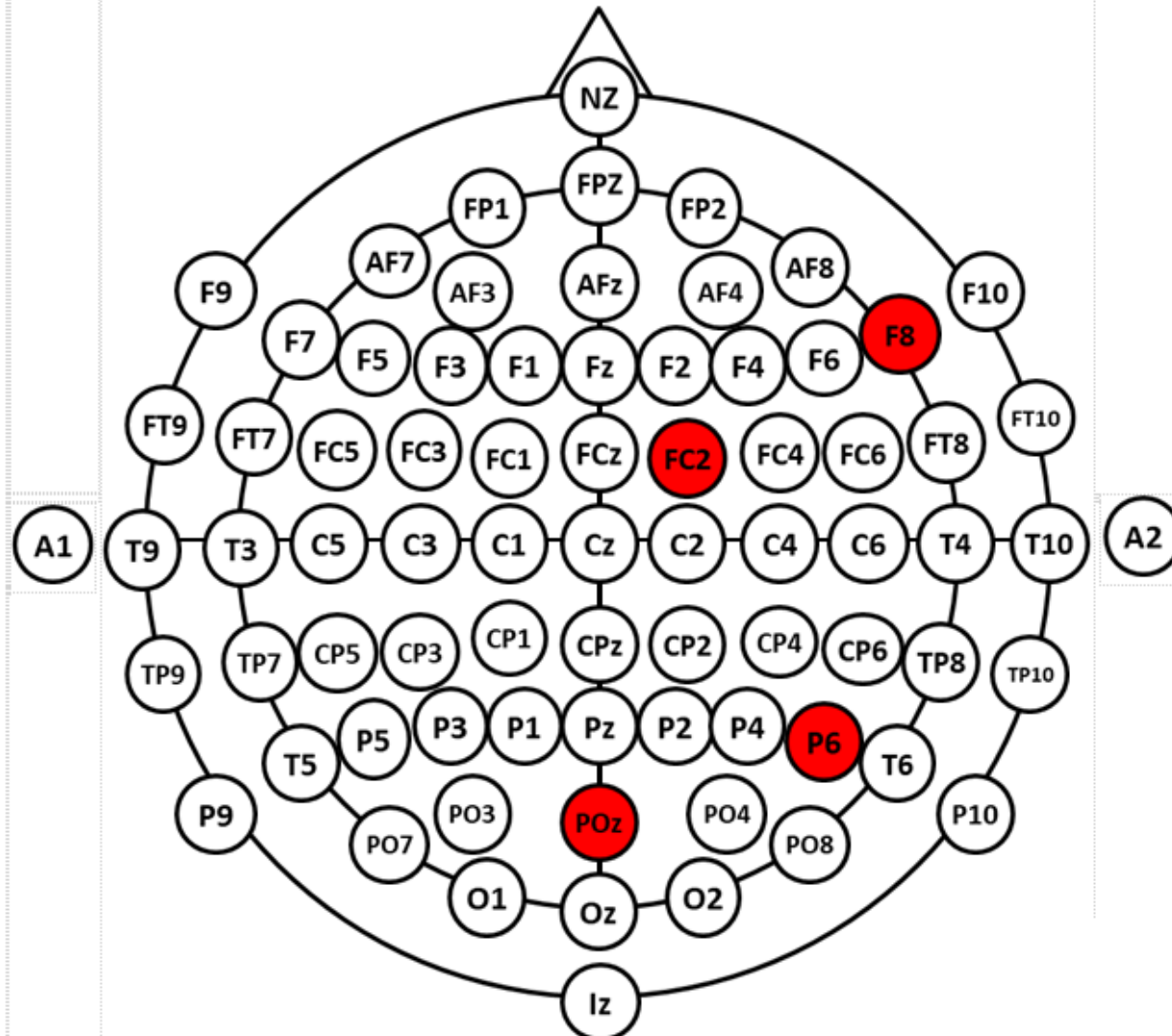


6-10 Hz range (Theta/Alpha)
Visual Processing



26-30 Hz range (Beta)
Middle Frontal Gyrus
Memory

Inhibit	6-11
Inhibit	20-30
Inhibit	45-50
Reward	4-13

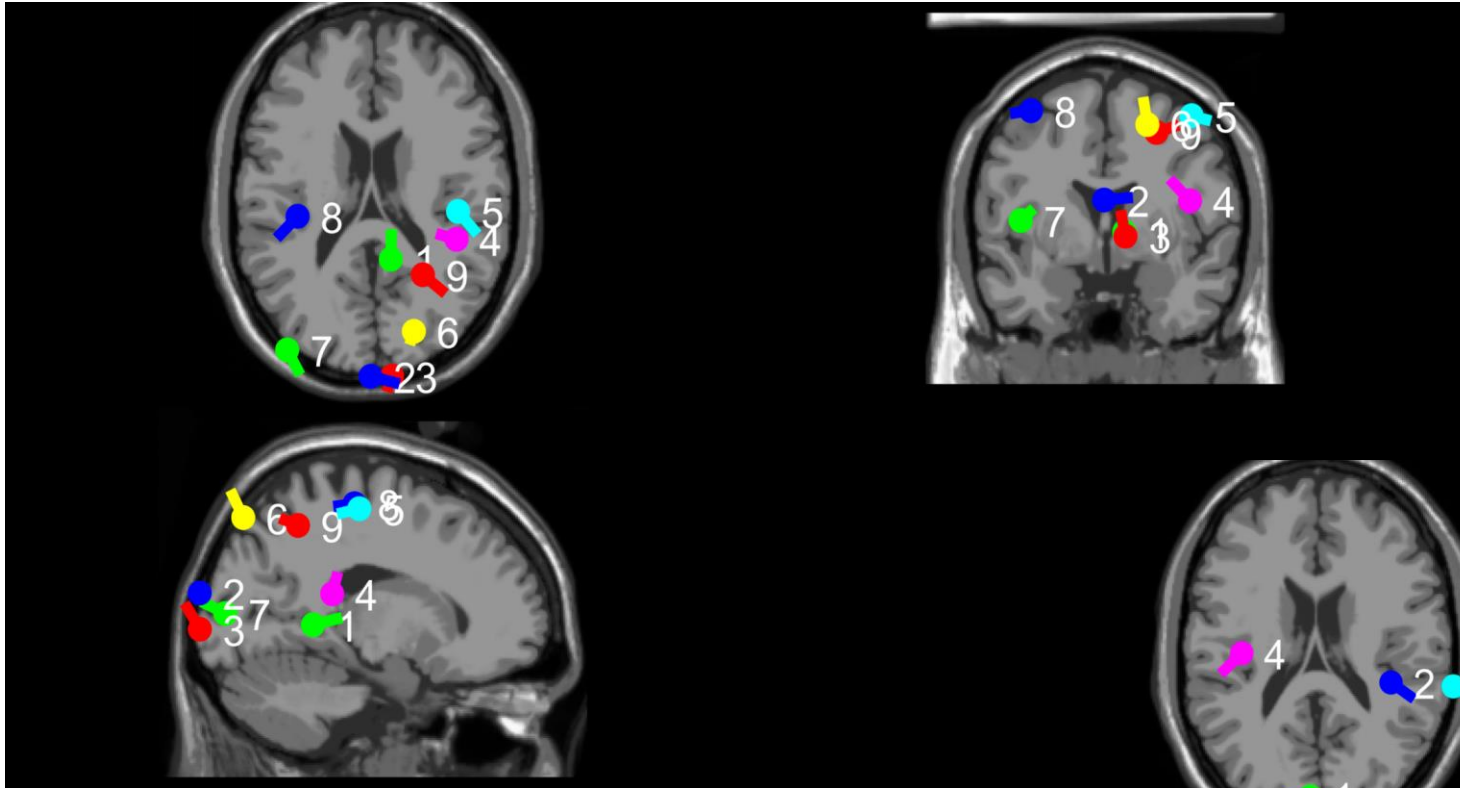


- F8 – Insula
 - Self-awareness, interpersonal experience, sense of agency
- FC2 – Cingulate
 - Appraisal of social situations
 - Emotional awareness
- P6 –
 - Heterogeneous
 - Spatial Attention/Planning
- POz – Precuneus
 - Episodic memory
 - Self-consciousness

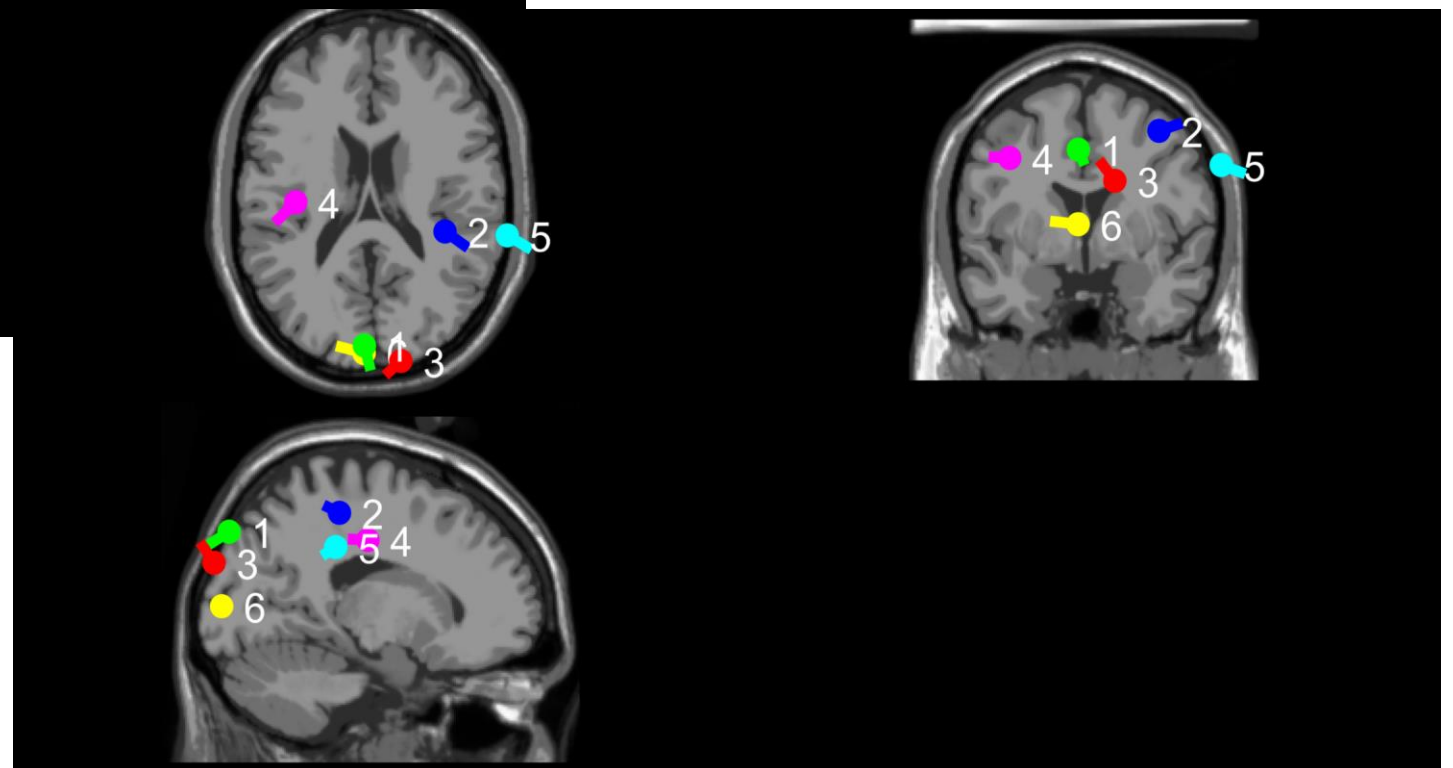
Case Study 2

- 35 year old woman
- History
 - Childhood sexual assault (age 6)
 - Domestic violence (ages 15-26) including emotional, physical, and verbal abuse
 - Parental divorce (age 16)
- Symptoms
 - Poor Memory
 - Unable to Focus
 - Inattentive (working & sustained)
 - Anxiety, exaggerated startle reflex, hyper vigilant
 - Some re-experiencing (nightmares)
- Other
 - Spelling and math challenges
 - Navigation
 - Poor hand-eye coordination
 - Clumsiness

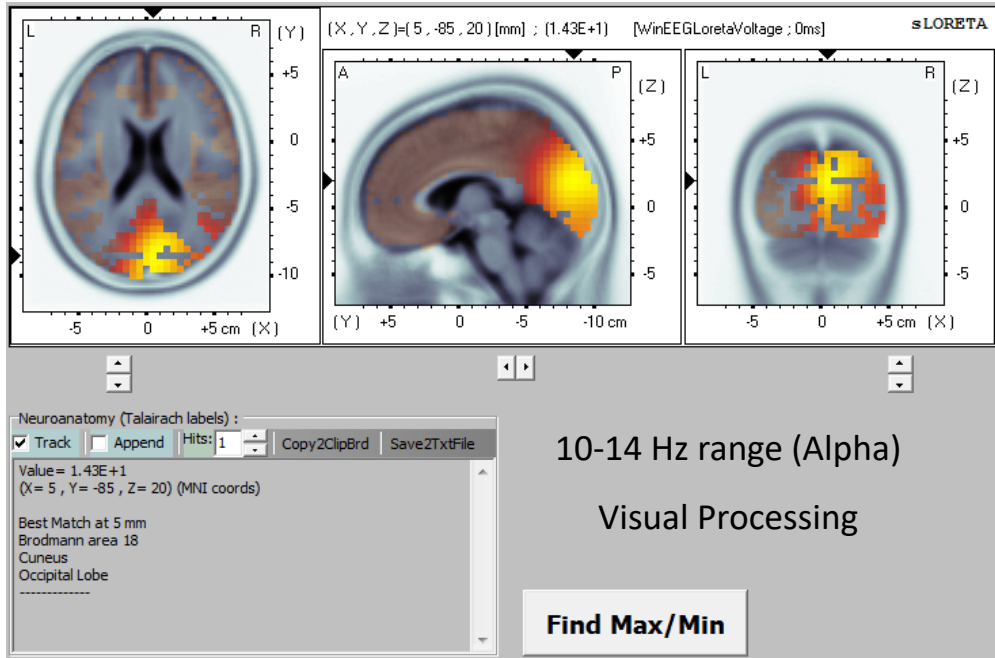
Eyes Closed



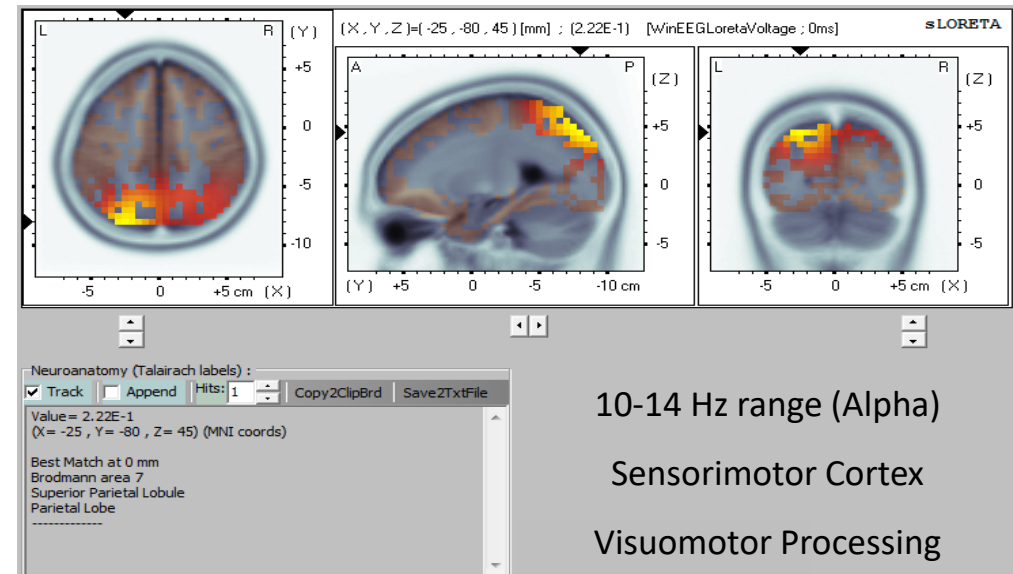
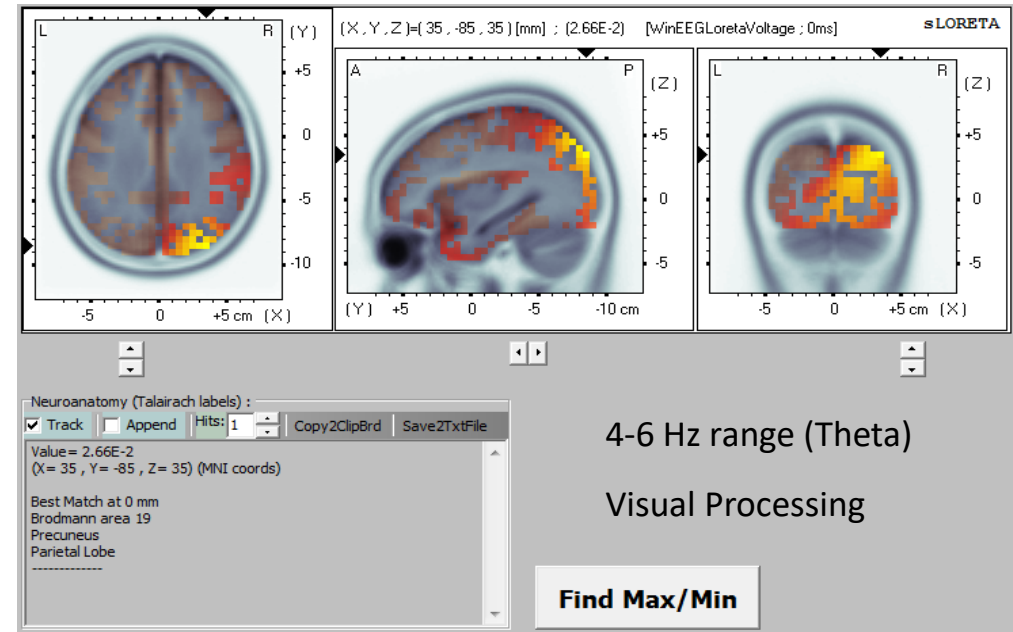
Eyes Opened



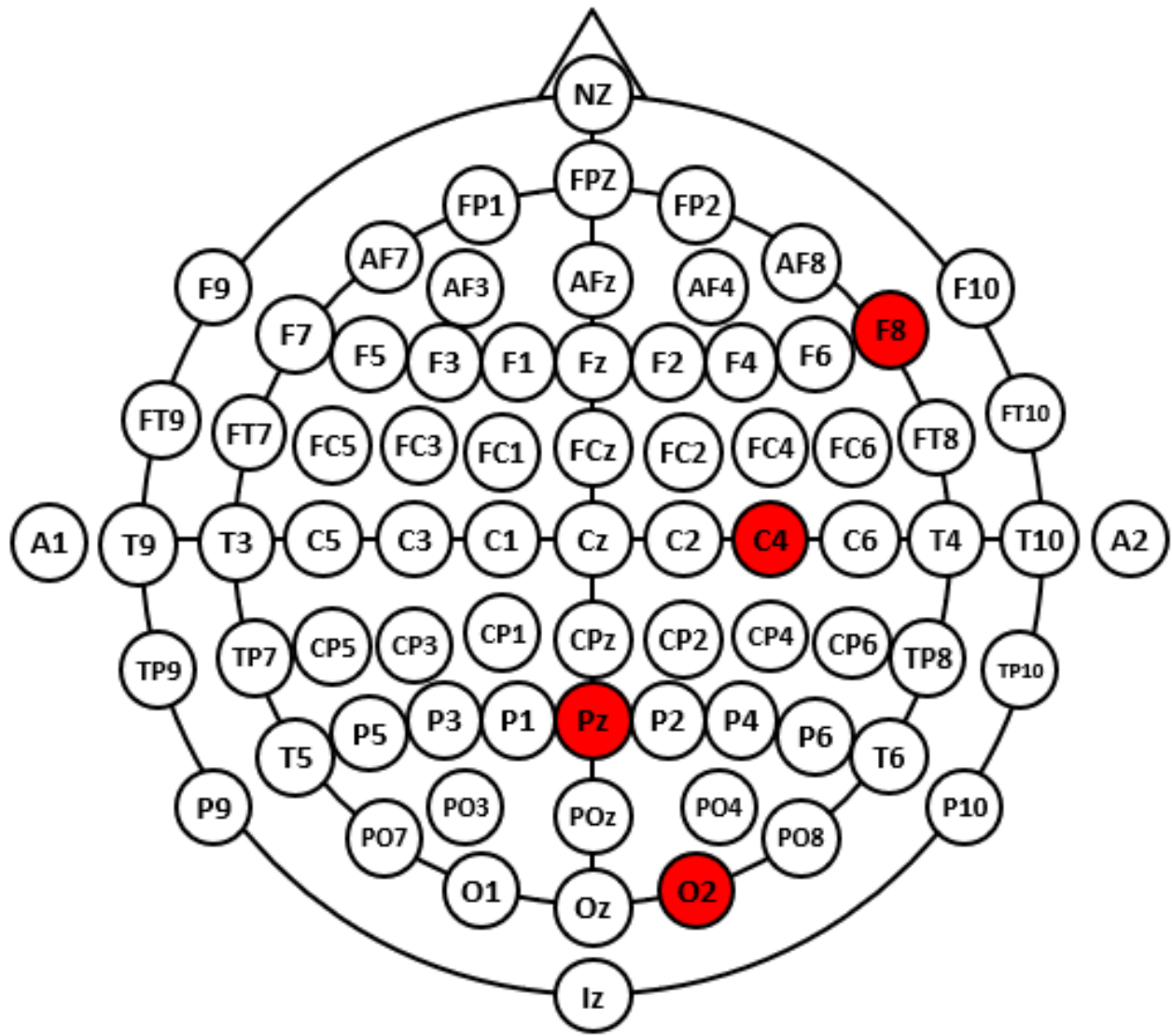
Eyes Closed



Eyes Open



Inhibit	4-8
Inhibit	10-14
Inhibit	22-30
Reward	7-22

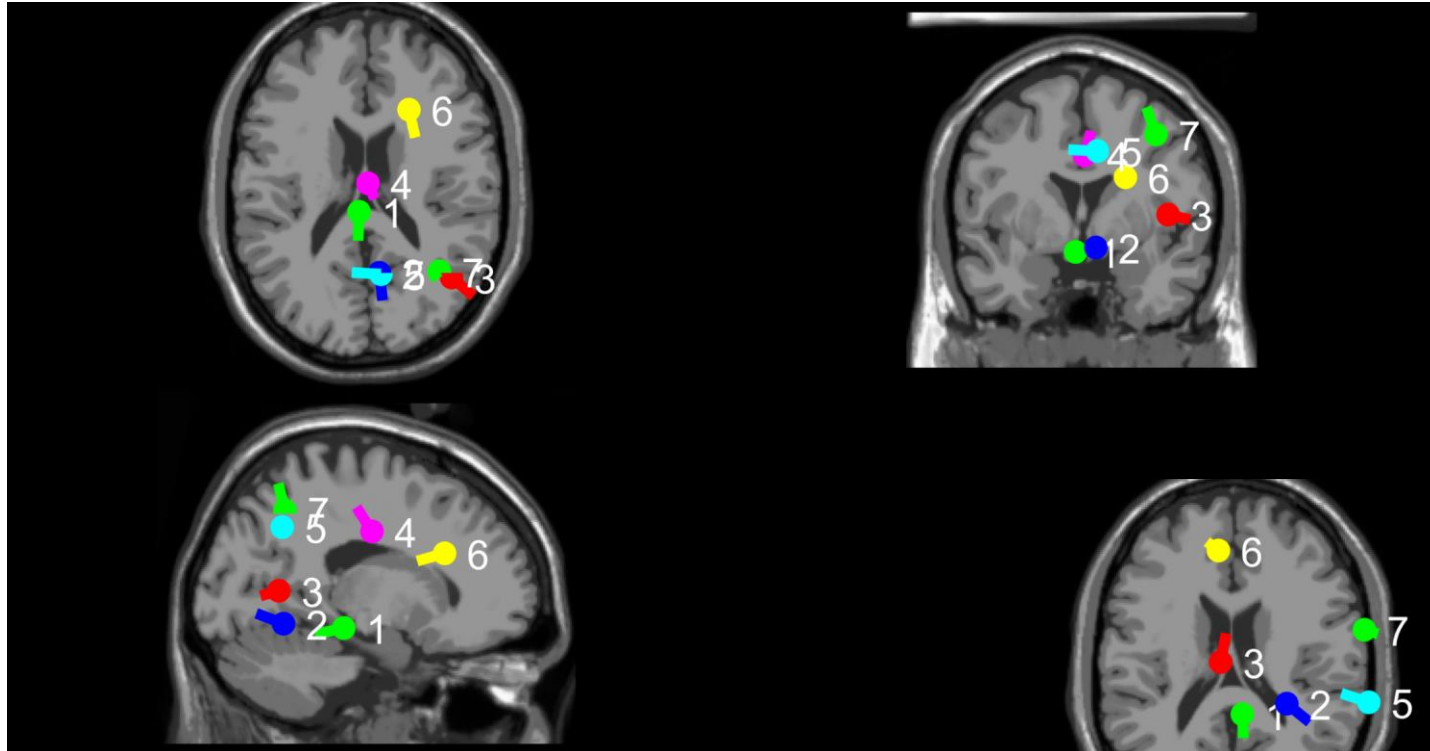


- F8 – Insula
 - Self-awareness, interpersonal experience, sense of agency
- C4 – Sensorimotor
 - Affected in sexual & physical abuse
- Pz – Precuneus
 - Episodic memory
 - Self-consciousness
- O2 – Visual Processing

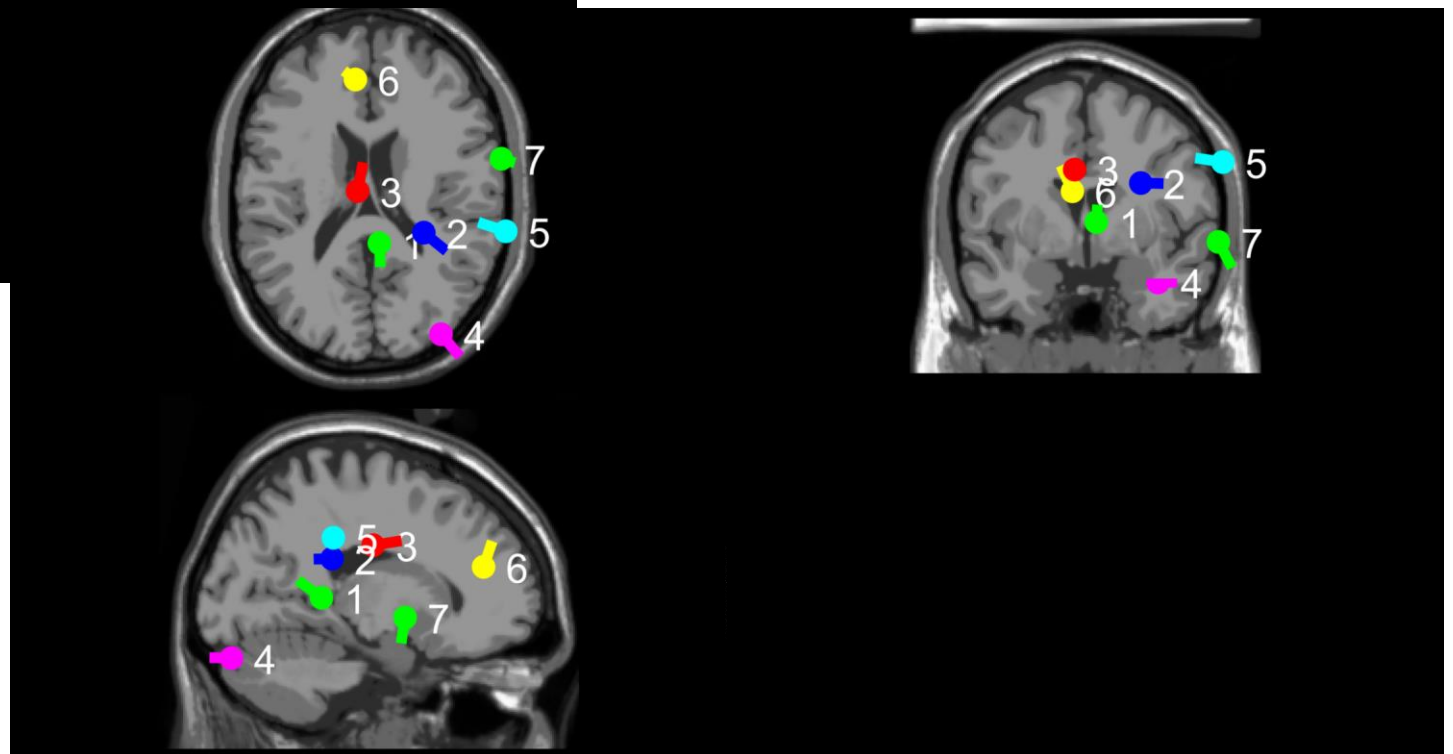
Case Study 3

- 48 year old woman
- History
 - Childhood trauma
 - Physical, sexual, and verbal abuse
 - Abandonment
 - Parental divorce (age 12)
 - Separation anxiety
- Symptoms
 - Difficulty relaxing
 - Body tension
 - Somatic - Chronic diarrhea
 - Nightmares, trouble sleeping
 - Depression, anxiety
 - Compulsions (counting)
 - Fear of abandonment
- Neuropsychological Testing
 - Moderate impairment in reaction time in tests of attention/concentration & executive functioning
 - Low average in processing speed, executive function, and working memory tests indicating problems with mental flexibility and rapid decision making
 - Beck Anxiety Inventory indicate severely elevated levels of anxiety and post-traumatic stress symptoms

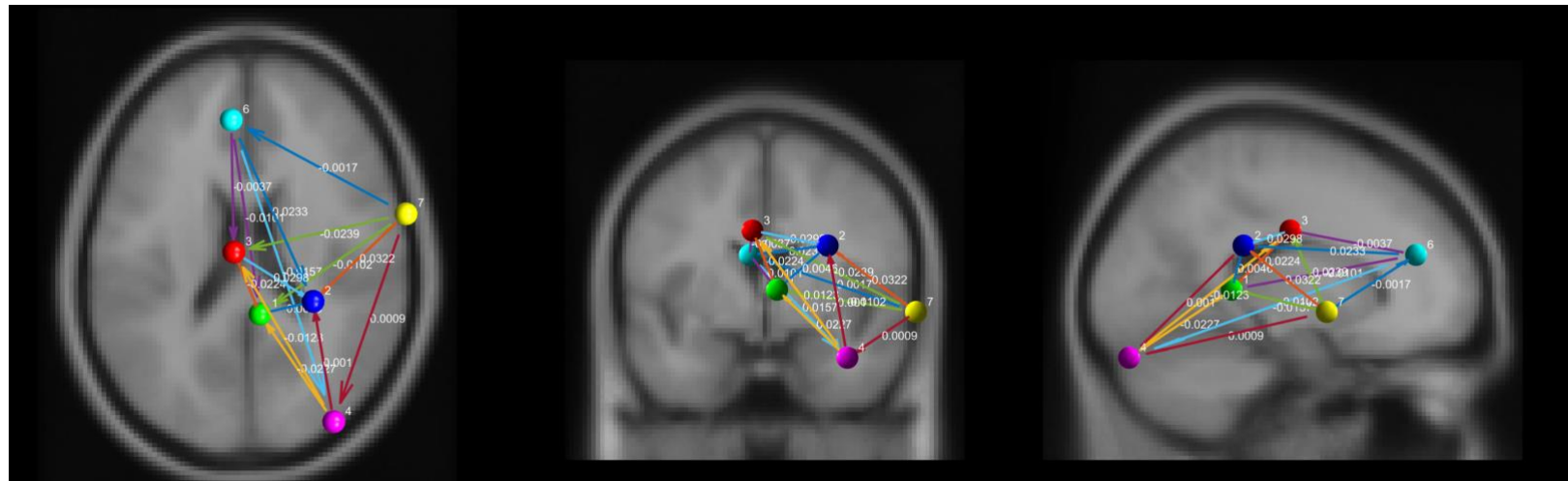
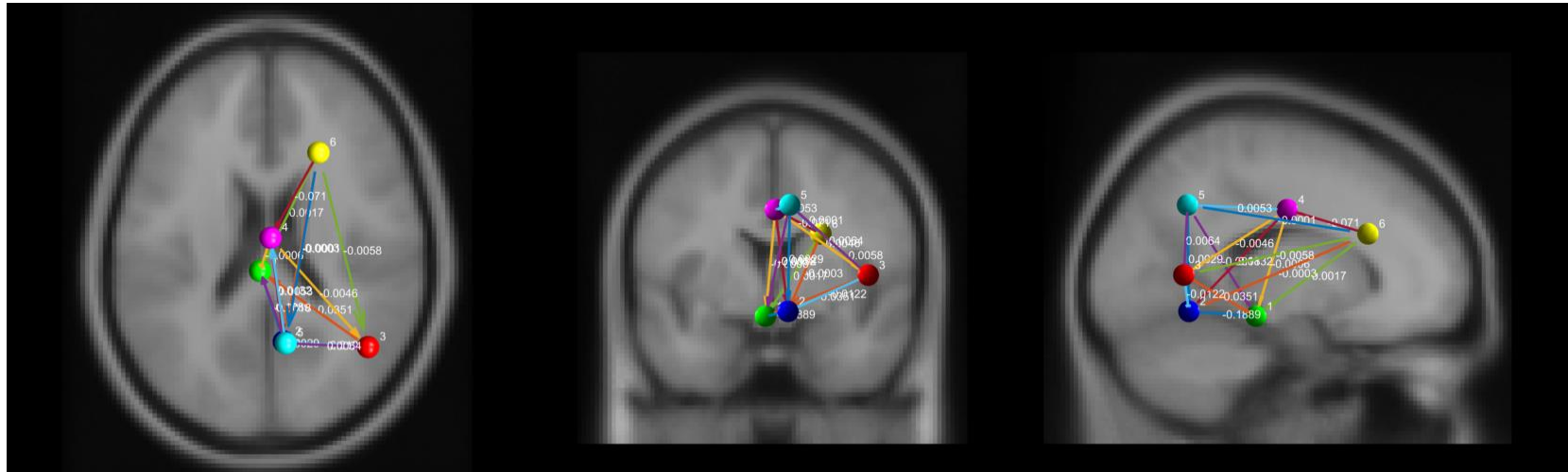
Eyes Closed



Eyes Opened

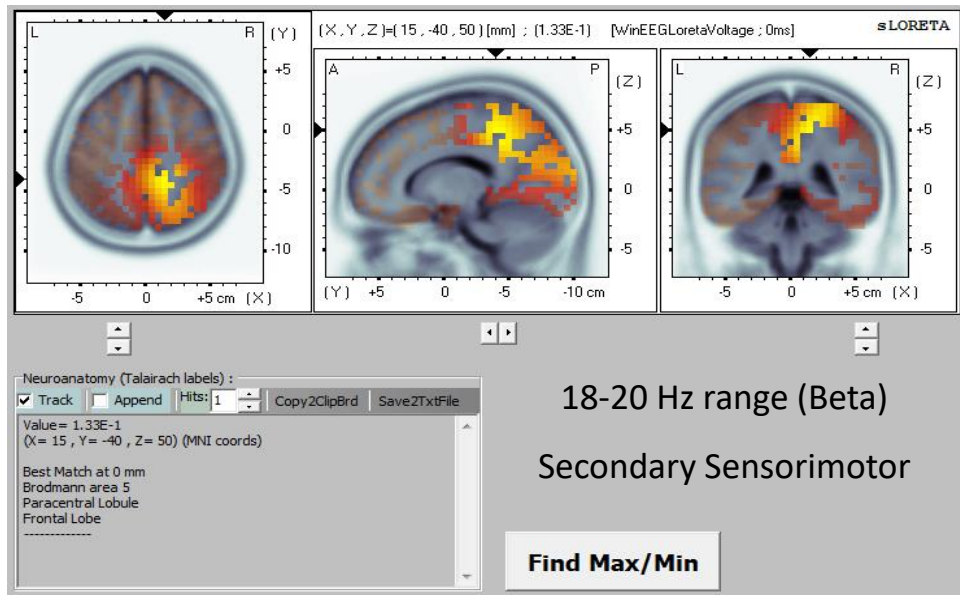
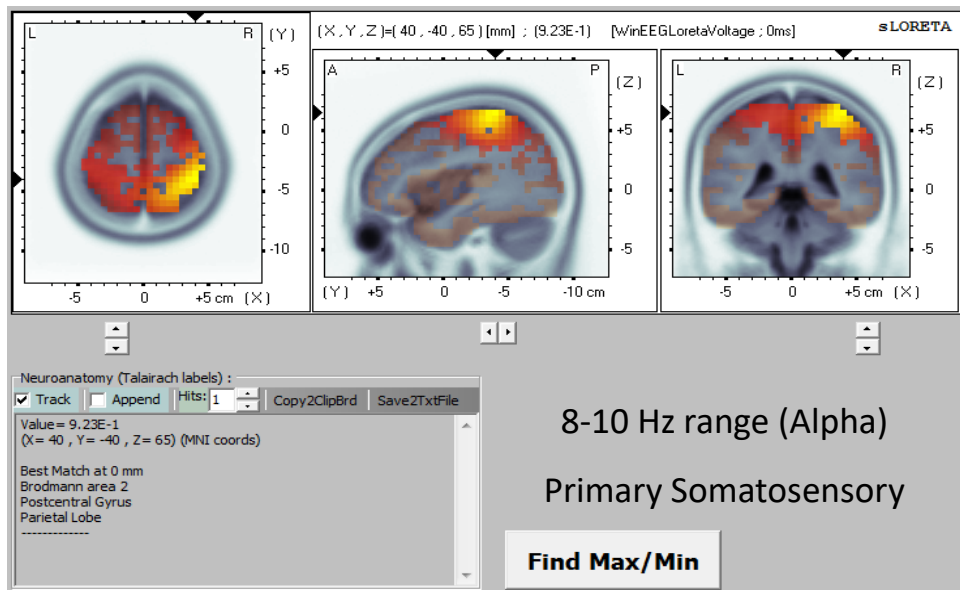


Eyes Closed

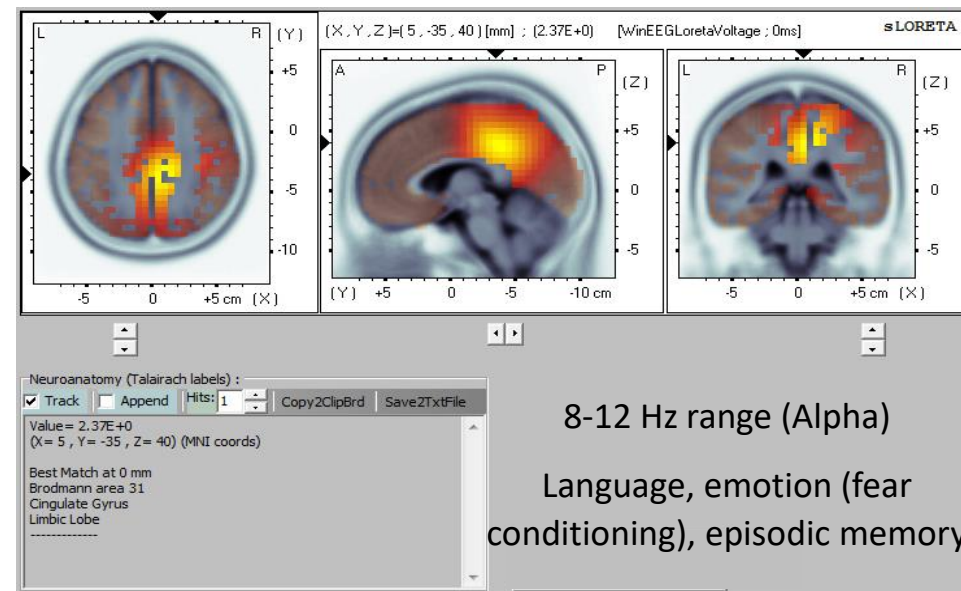


Eyes Opened

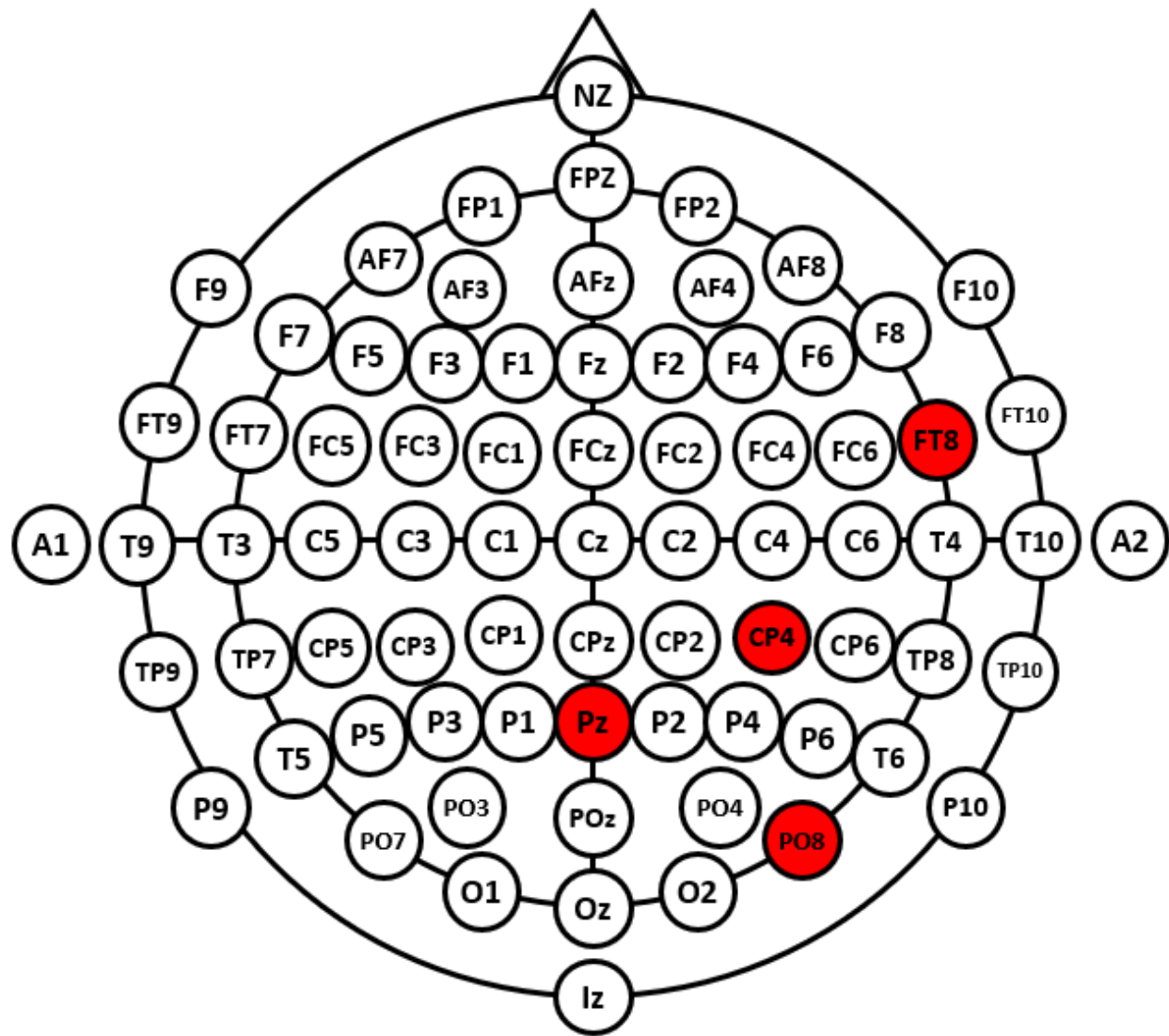
Eyes Closed



Eyes Opened

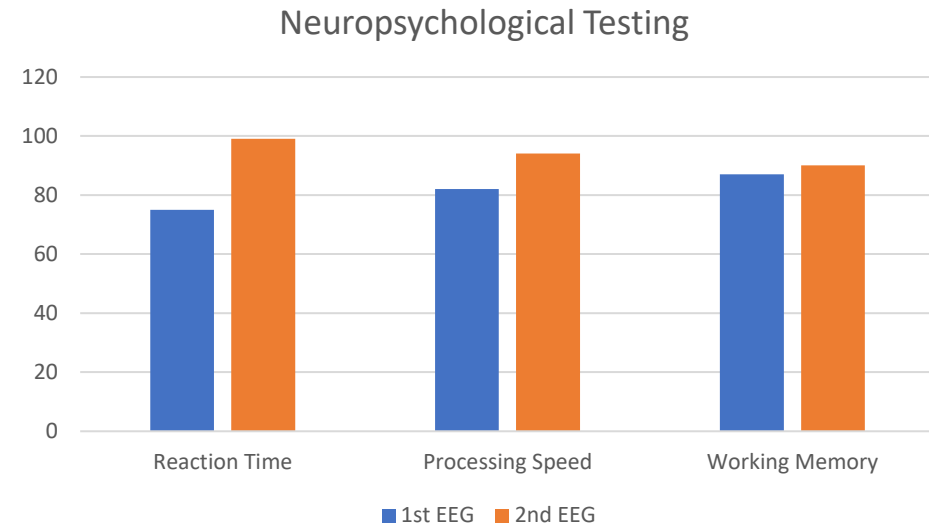


Inhibit	6-8
Inhibit	8-12
Inhibit	13-22
Reward	4-21



- FT8 – Insula
 - Self-awareness, interpersonal experience, sense of agency
- CP4 – Sensorimotor
 - Affected in sexual & physical abuse
 - Memory
 - Attribution of intention
- PO8 – Visual Processing
 - Visual association
 - Spatial Planning
 - Calculation/Symbolic manipulation
- Pz – Precuneus
 - Episodic memory
 - Self-consciousness

- Self-report
 - PTSD symptoms & Emotional Regulation -> much improved
 - More relaxed body (less tension)
 - Breathing not as short & shallow
 - Significantly less nightmares
 - Faster information processing
 - Fewer “triggers”
 - Reduction in diarrhea and migraines



Post

Time Range	Freq Range	Clust Coeff	Path Length	Global Eff	Radius	Diameter
35-70s	4-21Hz	0.028624799	32.99263212	0.040989657	27.21282	65.5724362

Previous

Time Range	Freq Range	Clust Coeff	Path Length	Global Eff	Radius	Diameter
63-94s	4-21Hz	0.017195209	58.72034041	0.023808396	74.03964	116.250171

63%

43%

Thank You