

# 'When is enough, enough'?

*Dr Kerry Leahan  
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# Overview

- ▶ What is the client's goal?
- ▶ What assessments are needed?
- ▶ Psychometrics?
- ▶ Symptom Checklists.
- ▶ Initial QEEG or mini-map results.
- ▶ Hypotheses generated from EEG Assessments.
- ▶ Comparing pre/post measures.
- ▶ Tracking changes over time.
- ▶ How many sessions.
- ▶ When the client says, "I'm done".
- ▶ Follow-up.

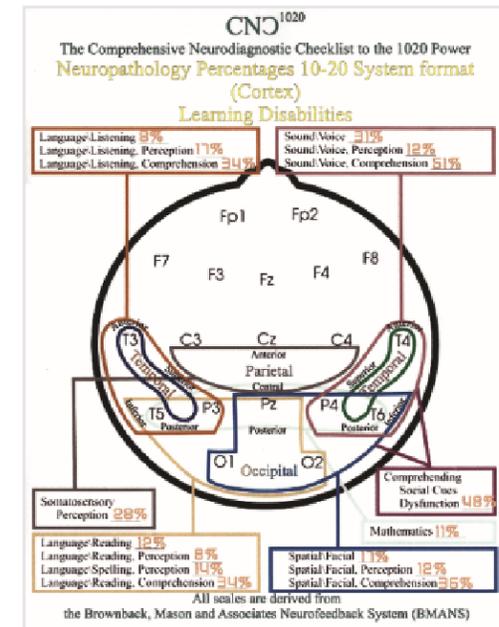
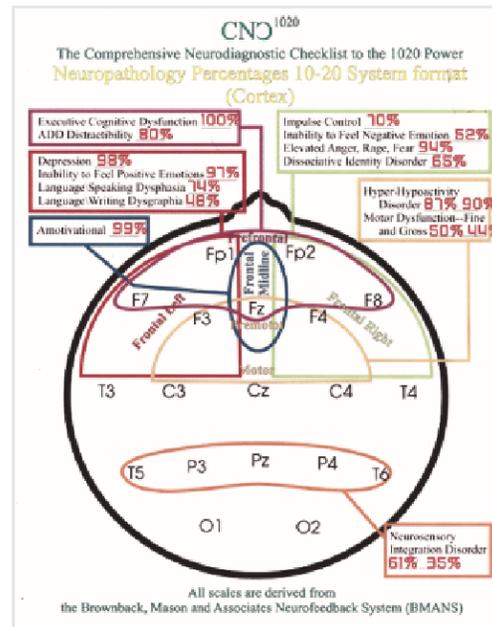
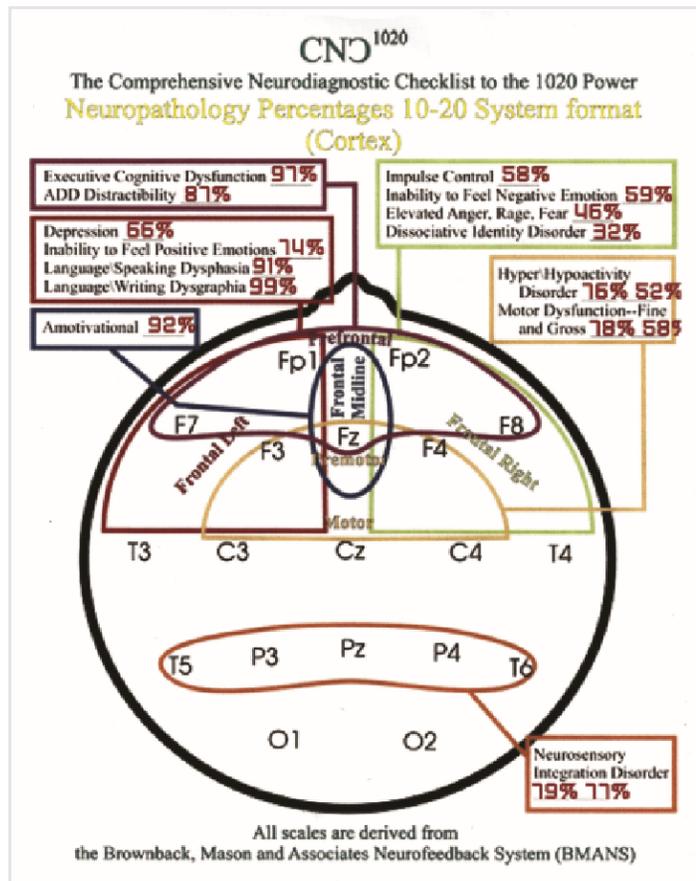
# Symptom checklists

- ▶ Brownback Mason and Associates ([www.brownbackmason.com](http://www.brownbackmason.com))
  - ▶ Neurolink by Applied Neuroscience ([www.appliedneuroscience.com](http://www.appliedneuroscience.com))
  - ▶ Peter van Deusen's Symptom Checklist ([www.brain-trainer.com](http://www.brain-trainer.com) )
  - ▶ Other neurological symptom checklists
- ▶ Comparing pre-assessment with mid and post training assessments helps to guide neurofeedback.

# CNC<sup>1020</sup> THE COMPREHENSIVE NEURODIAGNOSTIC CHECKLIST

The CNC-1020 is a 300-item checklist which takes just over an hour to score and fleshes out 42 neuropathologies. Specifically developed for the professional psychological and/or neurofeedback practice, it is web based and therefore administered online in the convenience of your client's home.

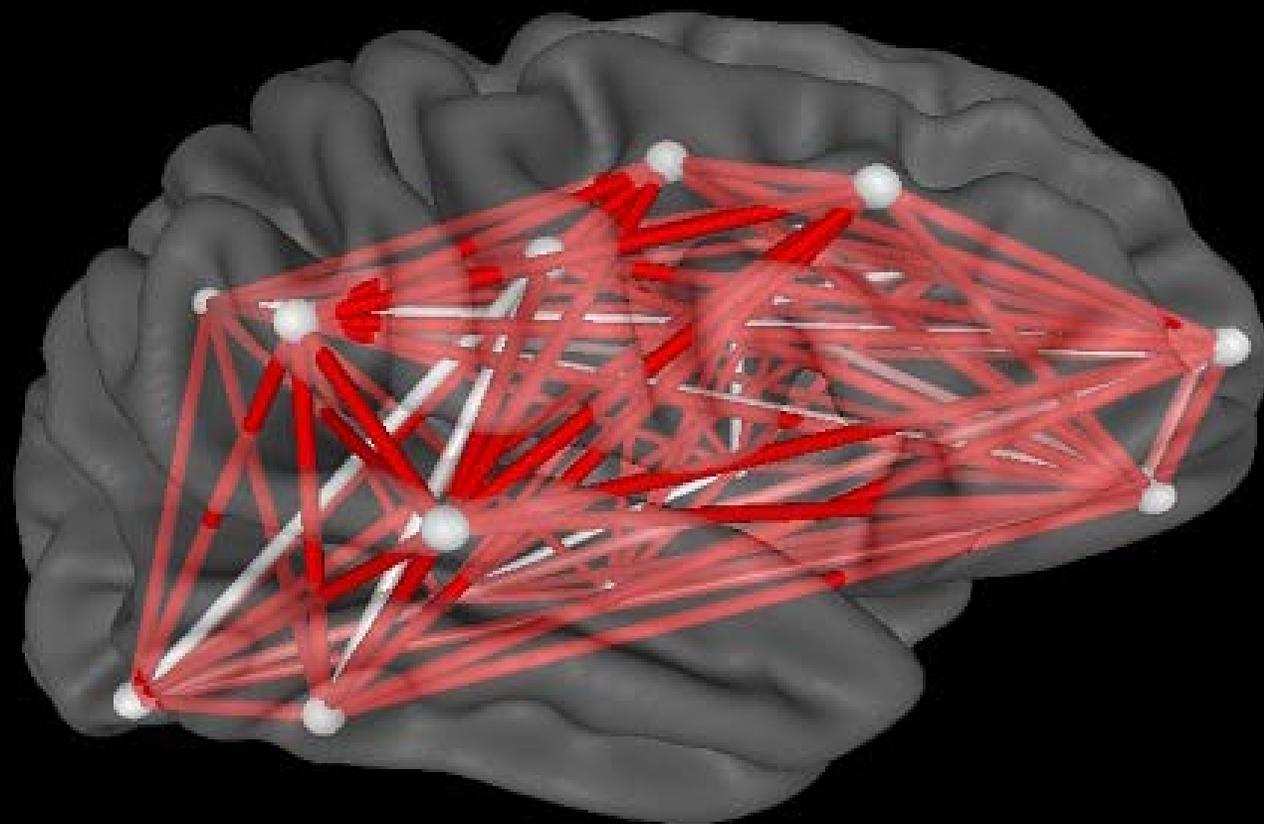
After the client has completed the checklist, the probability for the inclusion of each neuropathology is automatically calculated. The neuropathologies are then displayed on four color-coded International 10-20 System heads to indicate which placements are associated with each neuropathology.



## THE CNC-1020:

- Guides the clinical interpretation of the QEEG or mini QEEG
- Facilitates selecting the most appropriate electrode placement(s) for magnitude, coherence and **Z-Score Training**
- Enhances training without the use of a brainmap by guiding placement selection

# *NeuroLink* by Applied Neuroscience, Inc



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[www.anineurolink.com](http://www.anineurolink.com)

Brain Activity

# Neurolink

- ▶ 55 symptoms self-rated for e.g.

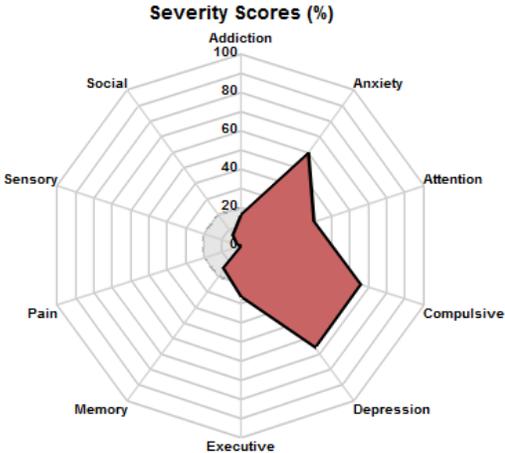
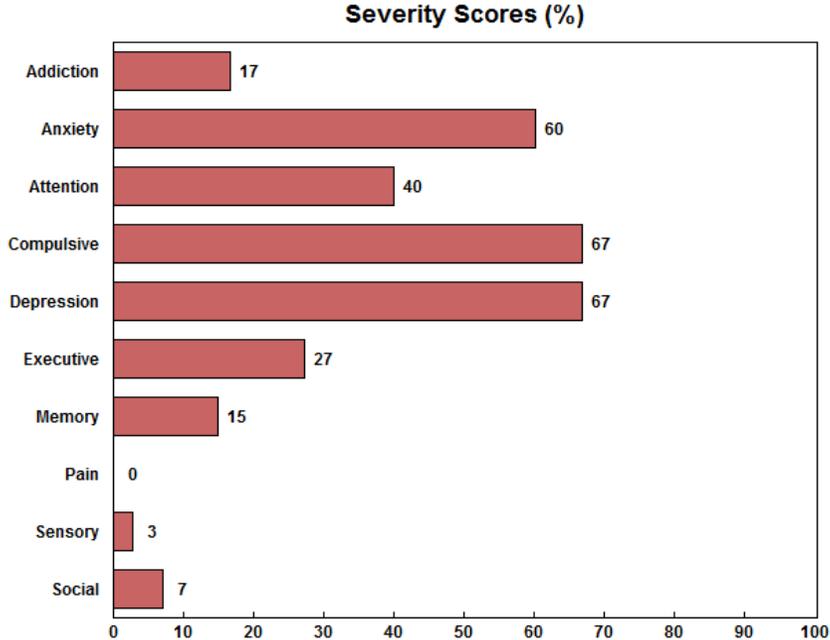
Q. I have tinnitus (noise or ringing in the ears).

Never rarely sometimes often always

Neurolink is a self assessment instrument which can be incorporated into neuroguide to guide relate to specific Brodmann Areas or hubs.

Subject ID: 003

May 10, 2016 12:08 am



# Peter van Deusen's symptom check list

142 symptoms - client responds using a likert scale 1 - 7

Symptoms are then associated with different quadrants across the scalp to guide neurofeedback.



# EEG Assessment

# Tracking changes

- ▶ Within sessions
- ▶ Between sessions.
- ▶ Pre/ mid/ post

# Within session tracking....

- ▶ Neuroguide see checklist of changes 1
- ▶ 1 channel NFB using Biograph Infinity - see checklist of changes 2 & 3
- ▶ Neuroguide LORETA NFB - train to symptoms and /or Brodmann areas. Metrics are set, then train using appropriate threshold, for e.g. 1.6SD then 1.5SD, then possibly, 1.2SD. Feedback segments run for 5 minutes then segments, a reward score is then given for each 5 min segment.
- ▶ Subjective self-reporting after each session.

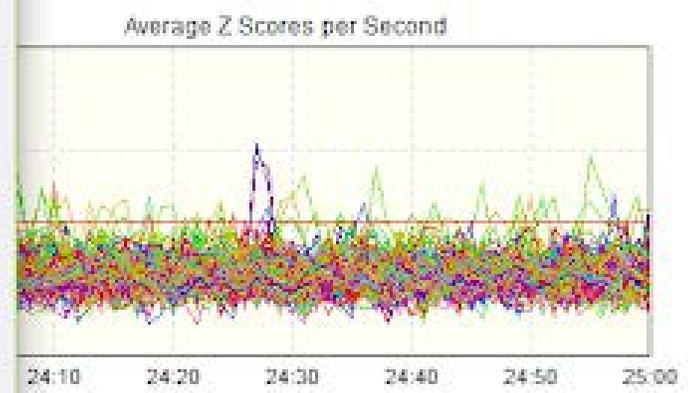
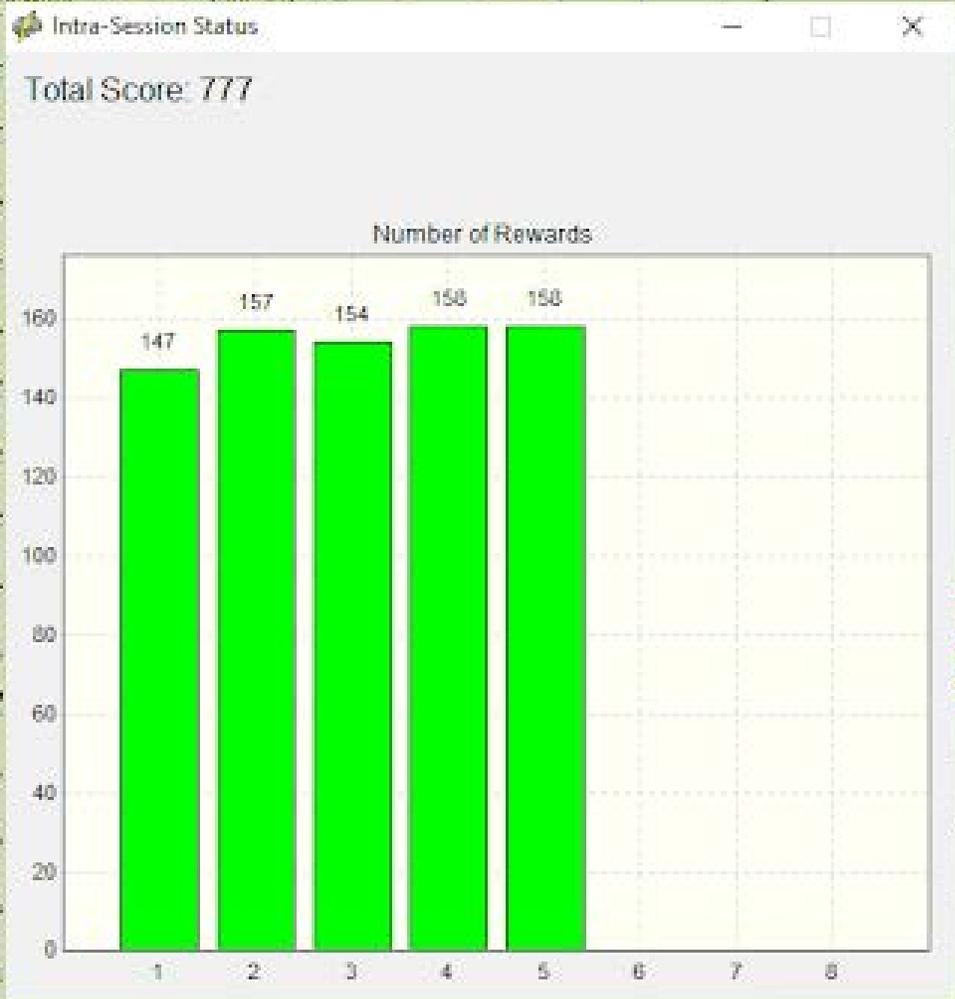
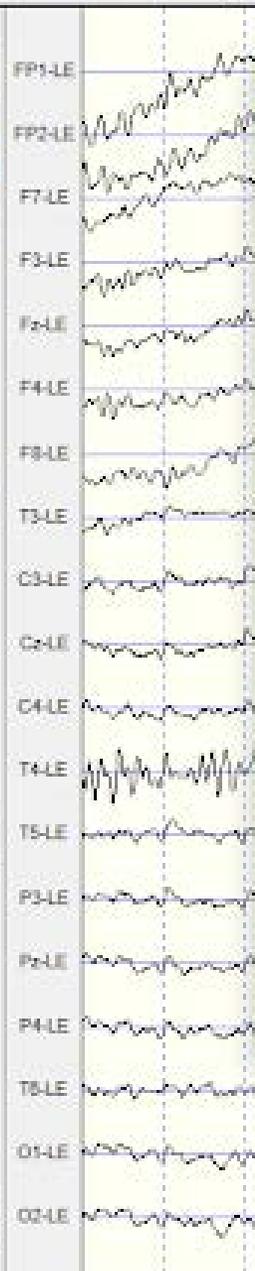
Scale (uV)  
50.00  
Edit Time  
00:00  
Montage

Split Hall

Test Robot

Collection

Display Time



Z Max

Display Time

Display Type

Metric	Brod	Brod	Band	Z
AP	6 L		D	
AP	6 L		T	
AP	6 L		B	
AP	6 L		H8	
AP	6 L		B2	
AP	6 L		B3	
AP	6 R		D	
AP	6 R		B	
AP	6 R		H8	
AP	6 R		B1	
AP	6 R		B2	
AP	6 R		B3	
AP	8 L		D	
AP	8 R		D	
AP	8 R		H8	
AP	9 L		D	
AP	9 L		H8	
AP	9 R		D	
AP	9 R		H8	
AP	10 L		D	
AP	10 R		D	
AP	10 R		B	
AP	10 R		B3	
AP	24 L		D	
AP	24 L		B	
AP	24 L		H8	

00:00 00:01 00:02 00:03 00:04 00:05

## Checklist of Changes

Name: LT

Date: 18/6/2018

Neurolink symptoms checklist. Main symptom – memory issues.

Neuroguide 'Memory network' SD 1.5 191 metrics

Trained at SD1.6 rewards: 149, 158, SD 1.5 rewards 147, 158, 156

DVD David Attenborough insects. Feedback- colour saturation.

*Please respond for any categories that apply based on any changes you notice since the last session.*

Indicate “B” for Better    “W” for Worse    “NC” for No Change



- |  |   |
|--|---|
| <input type="checkbox"/> Impulsiveness             | <input type="checkbox"/> Spaciness or foggy               |
| <input type="checkbox"/> Aggressiveness            | <input type="checkbox"/> Feeling or acting drunk          |
| <input type="checkbox"/> Hyper focus (over focus)  | <input type="checkbox"/> Motivation                       |
| <input type="checkbox"/> Agitation                 | <input type="checkbox"/> Energy                           |
| <input type="checkbox"/> Anxiety                   | <input type="checkbox"/> Depression                       |
| <input type="checkbox"/> Anger                     | <input type="checkbox"/> Loss of emotional control        |
| <input type="checkbox"/> Obsessive thoughts        | <input type="checkbox"/> Night sweats                     |
| <input type="checkbox"/> Compulsive behavior       | <input type="checkbox"/> Ability in tasks requiring steps |
| <input type="checkbox"/> Difficulty falling asleep | <input type="checkbox"/> Snoring                          |
| <input type="checkbox"/> Nightmares                | <input type="checkbox"/> Trouble staying asleep           |
| <input type="checkbox"/> Body tension              | <input type="checkbox"/> Pain threshold                   |
| <input type="checkbox"/> Tics                      | <input type="checkbox"/> Nausea                           |
| <input type="checkbox"/> Headaches                 | <input type="checkbox"/> Irritability                     |
| <input type="checkbox"/> Racing thoughts           | <input type="checkbox"/> Feeling dull                     |
| <input type="checkbox"/> Hyperactivity             | <input type="checkbox"/> Confused thinking                |
| <input type="checkbox"/> Feeling jumpy             | <input type="checkbox"/> Memory                           |
| <input type="checkbox"/> Can't slow down           | <input type="checkbox"/> Punctuality                      |
| <input type="checkbox"/> Negative thoughts         | <input type="checkbox"/> Forgetfulness                    |
| <input type="checkbox"/> Skin crawling sensation   | <input type="checkbox"/> Cry easily                       |

## Checklist of Changes

Name: ER

Date: 12/4/2017

15mins: 1C referential C3-A2 rew 11-14Hz inh1 6-8Hz (20% at 10.2uV then reduced to 8.2 uV) Inh2 16-38Hz, main focus on inhibiting theta. Reward kept at 85%.

15 mins C4 -A1 SMR rew 12-14Hz (80% 3.1uV)  
inh1: 6-8Hz (30% 9.2uV then 7.5uV)  
inh2:16-38Hz- main focus on inhibiting theta.  
DVD Beethoven

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| <input type="checkbox"/> Feeling jumpy             | <input type="checkbox"/> Memory                           |
| <input type="checkbox"/> Can't slow down           | <input type="checkbox"/> Punctuality                      |
| <input type="checkbox"/> Nervousness               | <input type="checkbox"/> Fear of change                   |

People

## Checklist of Changes

Name: ER

Date: 12/4/2017

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DVD Beethoven

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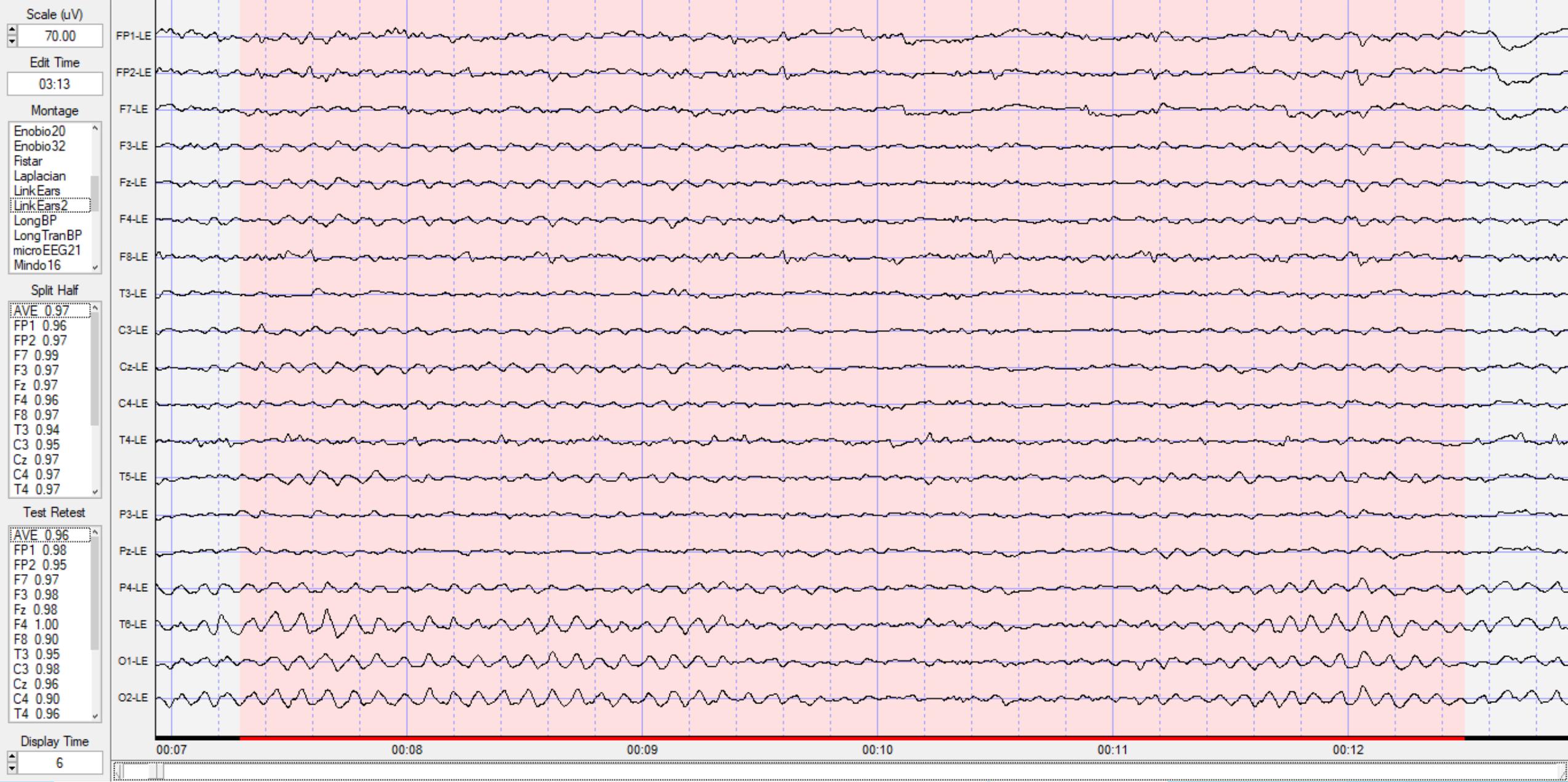
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| <input type="checkbox"/> Nervousness               | <input type="checkbox"/> Fear of failure                  |

# Between sessions tracking.....

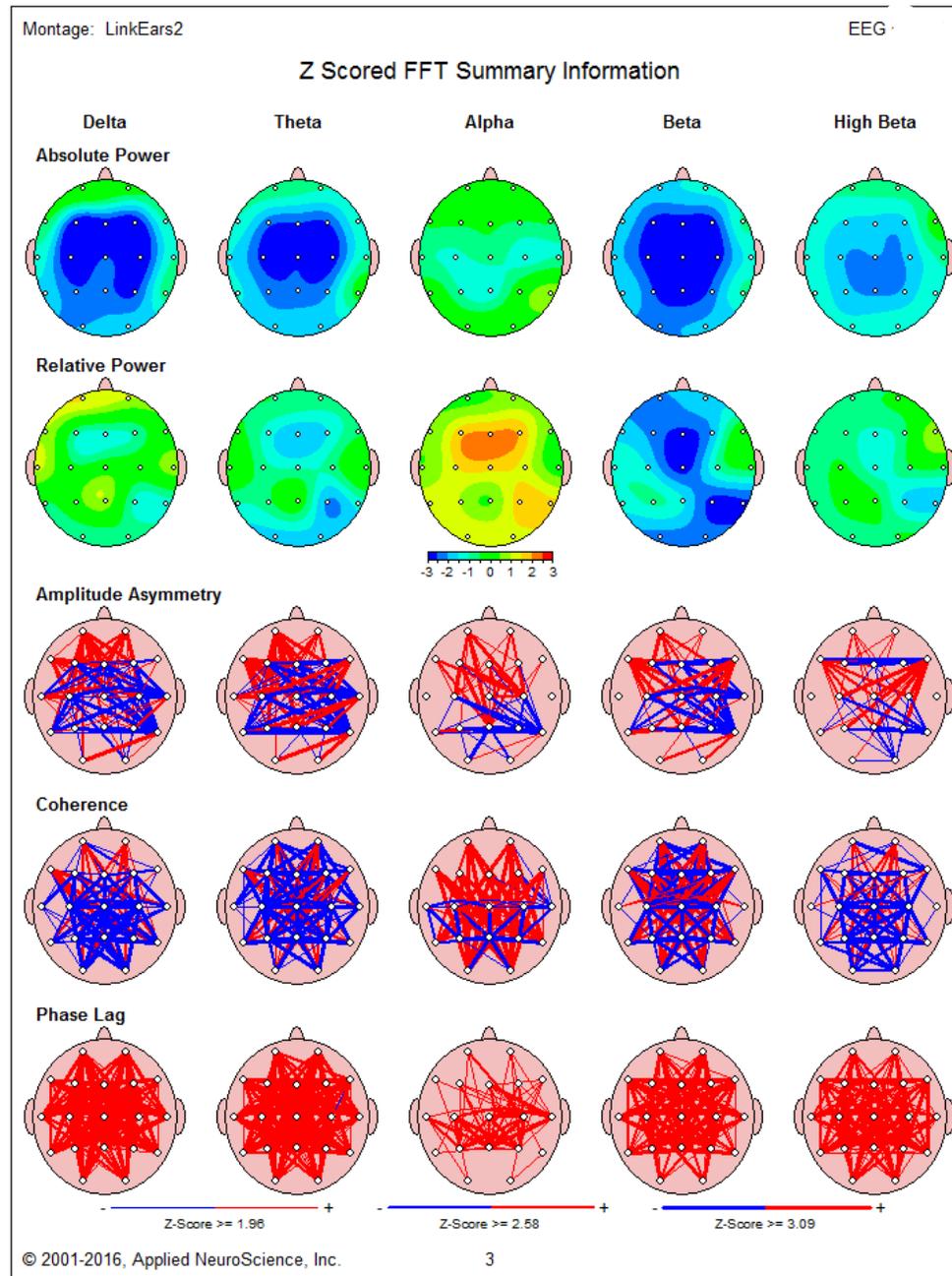
- ▶ Self report symptom checklist:
- ▶ What has improved?
- ▶ What was worse?
- ▶ What does this say about the brain or the training?
- ▶ Too stimulating or too de-activating?
- ▶ i) continue with current protocol or go to the next protocol
- ▶ ii) review QEEG and re-evaluate

# Has the desired outcome been achieved?

- ▶ Compare pre, mid, and post QEEG data
- ▶ Review changes in symptoms over time.
- ▶ What do others say about the client's mood, behaviour, or cognitive functioning.



61yr male.  
EC initial assessment Oct  
2016.  
Hx. Severe neglect as a  
child, long Hx.  
depression.  
Low voltage EEG.





27Jan 2017

After 11 sessions of NFB including Neuroguide training of the depression network, then anxiety network.

Training used a combination of LORETA NFB and 1 channel training.....

Cz-T6

F3-A1 rew 15-18Hz, too difficult → changed to 13-18Hz (better range to train) inhibit 6-9 and 18-38Hz.

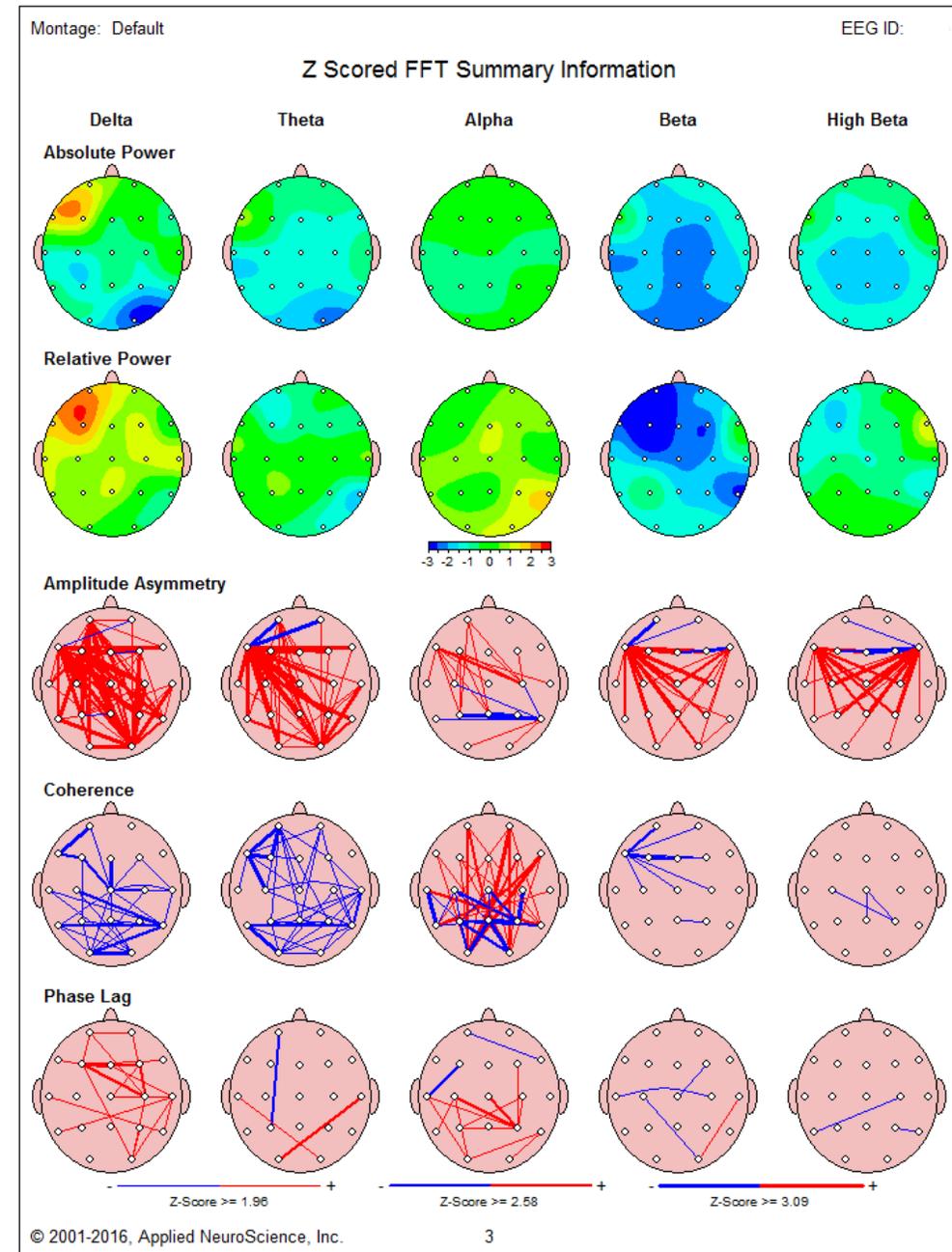
reward threshold started at 2.4uV, to 3.0 uV.

T6-P4

Reward 6-10Hz. Threshold at 2uV, then 2.4, 3.7. increased reward range to 6-15Hz and increased threshold to 4.4 then 5.4uV to ensure ~ 80% reward.

Completed 19 sessions of NFB.

Increase in EEG voltage over time.

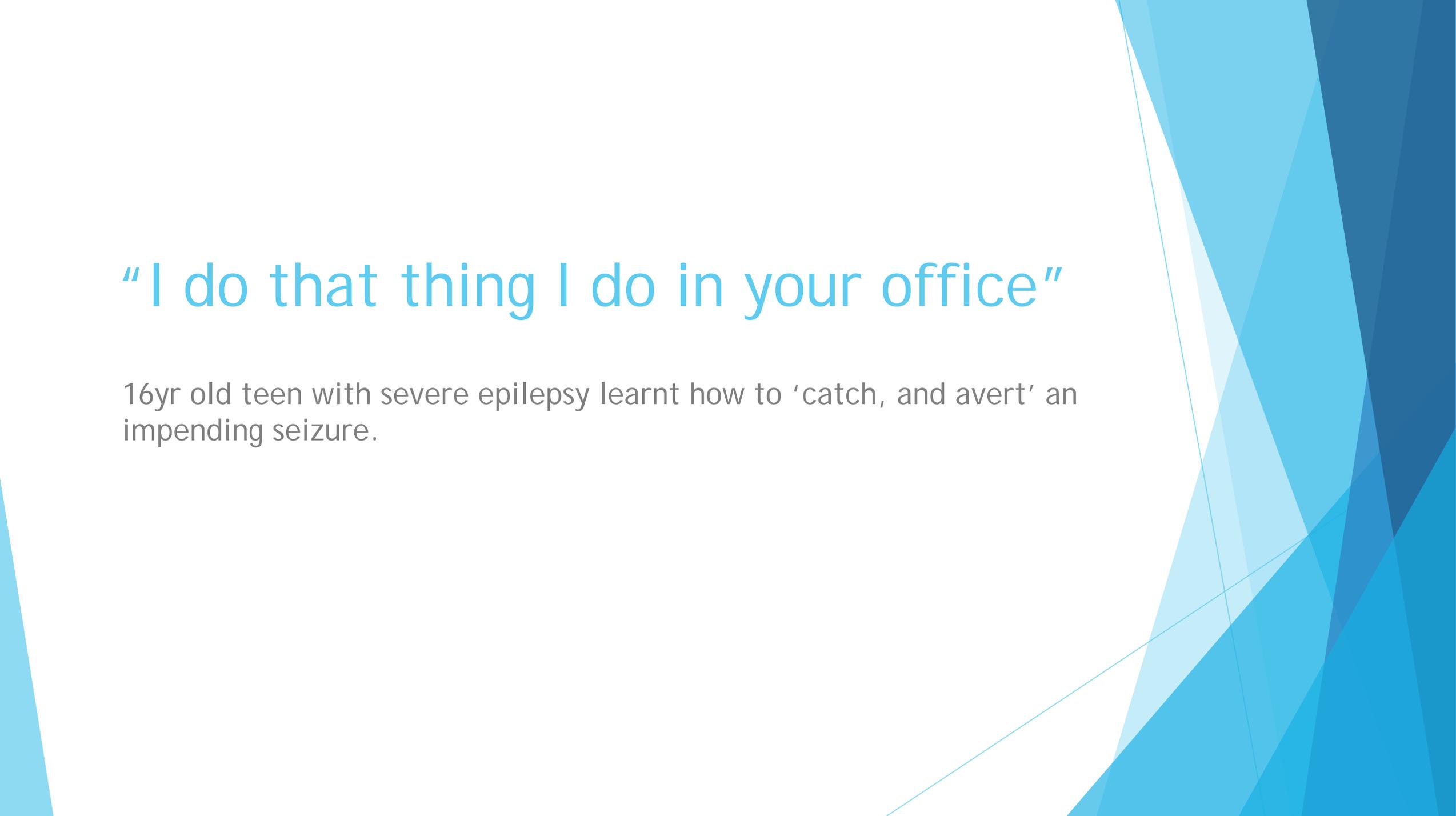


# What does the literature suggest?

- ▶ Depression: e.g. Baehr, Rosenfeld, and Baehr (2001) follow up on 3 subjects who had an average of 27 NFB sessions, using a right hemisphere alpha asymmetry protocol for depression.
- ▶ Peters, (2014) alpha asymmetry neurofeedback in 9 Ss. Who did a maximum of 30 sessions.
- ▶ Escalano et al. (2013) found just 8 NFB sessions, twice a week, 20 minutes of actual training, in 49 participants. Results showed an increase in upper alpha power within and across training sessions.

# What does the literature suggest? Tinnitus

- ▶ Hartmann et al. (2014) tinnitus is disordered excitatory-inhibitory balance.  
Ss. Who received 10 sessions of auditory alpha neurofeedback, did better than the sham group, and rTMS group.
- ▶ Sedley et al. (2015) found tinnitus suppression correlates with suppression of delta and theta in the auditory cortex → guides NFB protocols.
- ▶ Gosepath et al. (2001) 15 sessions of NFB reward alpha and inhibit beta.
- ▶ Dohrmann et al. (2007, 2014) 10 sessions, 30 minutes ea. Over 4 weeks. F3, F4, Fc1, Fc2. Enhance tau-to-delta power. (tau - 10Hz alpha)
- ▶ Moazami-Goudarzi, et al. (2010) in tinnitus Ss. "Using LORETA source analysis, the generators of delta, theta, alpha and beta power increases were localized dominantly to left auditory (Brodmann Areas (BA) 41,42, 22), temporo-parietal, insular posterior, cingulate anterior and parahippocampal cortical areas." → useful for choosing NFB regions to train.
- ▶ [www.trackyourtinnitus.org/](http://www.trackyourtinnitus.org/) a mobile phone app for tracking symptoms.

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The overall composition is clean and modern, with the text centered on a white background.

“I do that thing I do in your office”

16yr old teen with severe epilepsy learnt how to ‘catch, and avert’ an impending seizure.