

What is HEG? (Hemoencephalography)

HEG

- **Part of Whole-Brain Training**
- **Used along side of EEG training**

Whole-Brain Training

➤ ElectroEncephaloGraphy = EEG

- Measures electricity
- Eye muscles create too much artifact to train Prefrontal Cortex (PFC)



➤ HemoEncephaloGraphy= HEG

- Measures blood flow
- Trains Prefrontal Cortex (PFC) – the executive center of the brain



Why training blood flow is important

- Oxygen & glucose are metabolized to make energy > neurons use that energy to fire
- The more oxygen & glucose metabolized, the faster and more efficient neurons can be
- Blood moves oxygen and glucose in the body
- By teaching brain to change blood flow to PFC, that area's ability to activate and stay activated is increased

History and Technology of HEG

- **Developed near the end of the 20th century by Hershel Toomim and Robert Marsh to help people with attention problems**

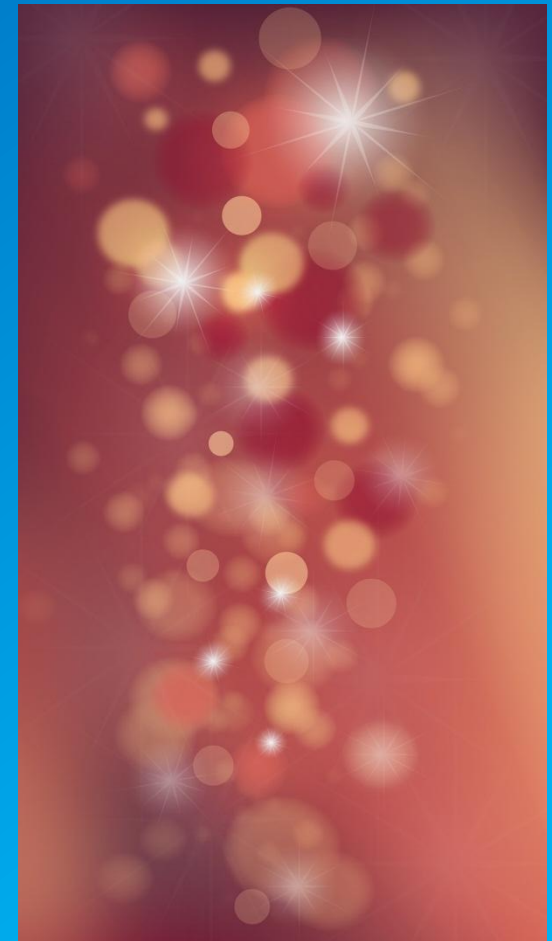


History and Technology of HEG

- Measures blood flow through the skull
- Red LED and infrared LED flashing at different frequencies and in contact with the forehead
- Light passes through skull, through the meninges and hits the surface of the brain
- The light is either reflected back or absorbed
- Lights go in 3 cm to surface of brain and sensor is waiting to receive the signal – similar to radar and sonar

History and Technology of HEG

- More red, oxygenated, hemoglobin-rich blood on the surface = more light reflected back
- Less blood on surface = more light absorbed
- The infrared LEDs act as a constant
- The ratio shows increases or decreases in blood flow



History and Technology of HEG

➤ nIR – Near Infrared

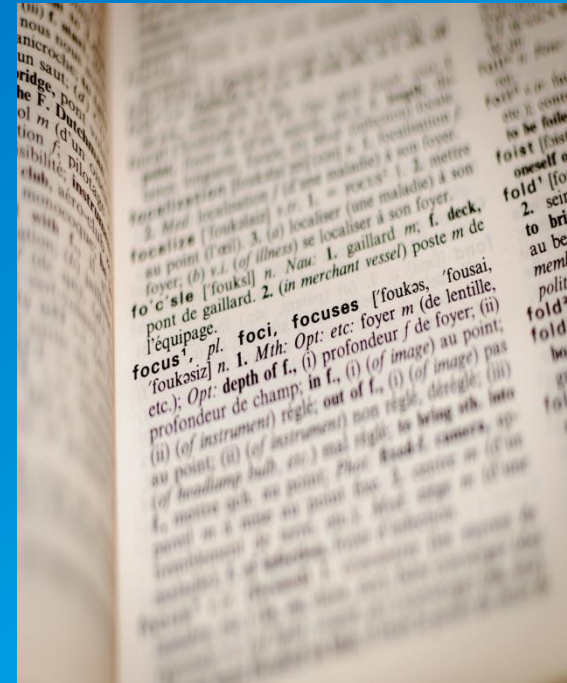
- Measures amount of oxygen and capacity to produce more energy

➤ pIR – Passive Infrared

- Jeffrey Carmen
- Measures temperature and amount of activity

History and Technology of HEG

- Proved to be effective
- Quick responses in ability to sustain attention & concentration
- Brain-Trainer started using nIR HEG in early 21st century
- Some people had overactive PFC's



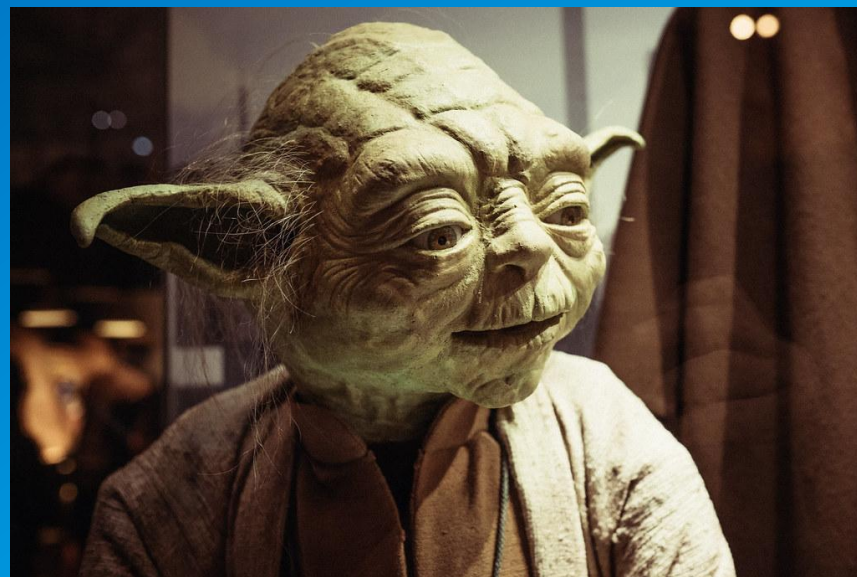
Peak Performance: Two Kinds of Attention

➤ Closed Focus

- Concentration

➤ Open Focus

- Pure awareness
- Consciousness
- Here & now
- Not thinking, trying, judging
- Zone/Flow state
- Don't try, just do



Brain-Trainer's Expansions

- People with overactive PFC's would get irritable or headaches with HEG
- Brain-Trainer started training to decrease blood supply to PFC
 - Helps turn off control functions and helps brain move to awareness state
 - Worked well!
- Brain-Trainer developed the LIFE game
 - Helps people move between open focus and closed focus states

Whole-Brain Training

- HEG is integral part of whole-brain training
- HEG and EEG help train toward peak brain
- EEG trains behind the PFC
- HEG trains the PFC

- And the LIFE game is fun for clients :)