



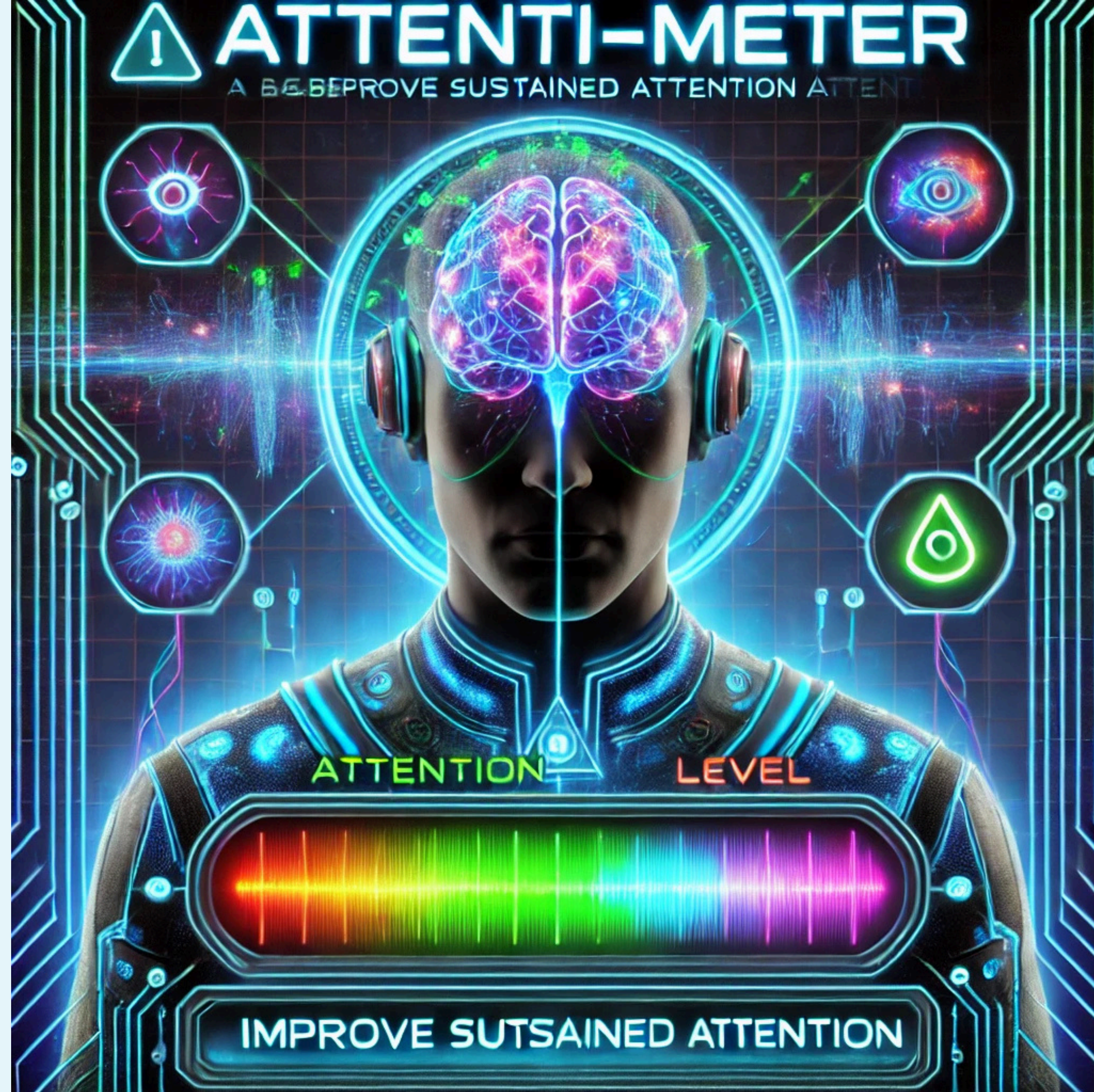
ATTENTI- METRE

Presented by: Cage, Zain, Roqaya,
Tiana, Elizabeth



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ATTENTION

LEVEL

IMPROVE SUTSAINED ATTENTION

OUR PROJECT FOUNDATION

How to Assess Gaming-Induced Benefits on Attention and Working Memory

- Sustained attention - the ability to consistently maintain attention on tasks over long periods of time
- Used a two-segmented task with less complex stimuli, to measure sustained attention and impulsivity
- Investigates recent studies with evidence that attention and working memory abilities can be enhanced by cognitive training games
- During task engagement, there was a significant increase in beta power for occipital region
- Alpha band power increased in the frontal and reduced in other regions (Xavier et al., 2020)

Sustained attention variation monitoring through EEG effective connectivity

- *Using an EEG as a noninvasive tool, to measure sustained attention*
- *The prefrontal, right parietal, and visual cortex on both sides have the most relevant activity*

(Francisco-Vicencio et al., 2022)

Comparison between Concentration and Immersion Based on EEG Analysis

- Analyzes the effect of concentration on the frequency of brain waves, within different areas of the brain
- Identifies waves and their frequencies associated with differing mental states

(Lim et al., 2019)

THE GOALS

1 The measurement and improvement of sustained attention in ADHD/ADD patients

2 The generation of scientific, quantitative data on a phenomenon usually measured by subjective experiences of symptoms (National Institute of Mental Health, 2024).

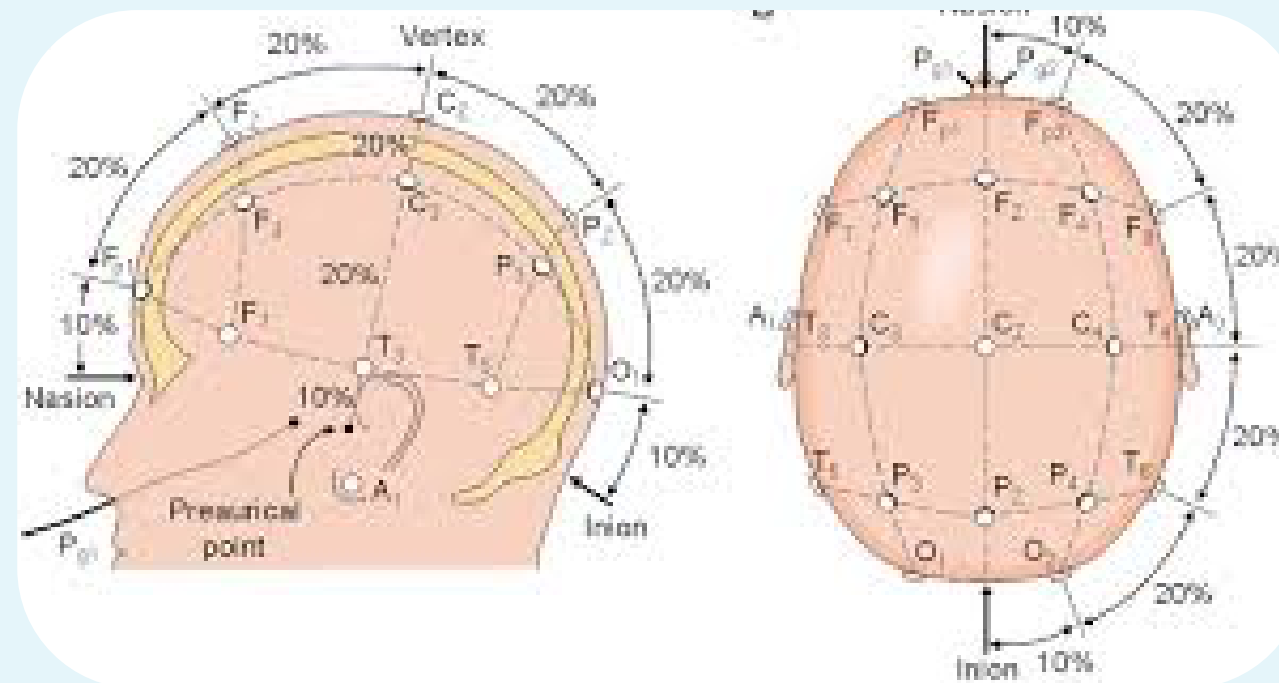
3 Understanding how important attention can be for the application of assistive technologies for ADHD/ADD patients and those who suffer from short attention span (Souza, R & Naves, E., 2021).

4 The 'Gamification' of research tasks for more adolescent engagement

ABSTRACT

Attention Measurement Through EEG Usage and Recording of Beta Waves associated with Concentration; Neurofeedback- based Approach

EEG Brain Wave Frequencies






INTRODUCTION

What is an EEG machine?

An **electroencephalogram (EEG)** is a test that measures electrical activity in the brain.

- Uses small, metal discs called electrodes that attach to the scalp
- Brain cells communicate via electrical impulses, and this activity shows up as wavy lines on an EEG recording.

(Mayo Clinic, 2024)



METHODOLOGY

Attention Test

Where's Waldo

- Aim is to measure beta waves during the image concentration period
- Participants were asked to find Waldo after each round, with purpose to maintain engagement
- Image quadrants are to maintain reliability in answer recognition

Data processing

Brain Waves

- The baseline of brainwave frequencies during attention state is captured during a 10s period.
- The program recognizes wave frequency to target the mental state of sustained attention (13-32hz)

The Game

The program acknowledges the specific frequencies and the longer it is sustained, the more you win

RESULTS

The results explained...

LIMITATIONS & ADVANCEMENT POTENTIAL

1. Buffer Time

- Although the user experience is not affected by the delay due to the continuation of the activity while the processing occurs, buffer time can be focused on in future research.
- The buffer time is the time span between the brain wave detection and the data processing and filtering.

2. Accessibility

- The simplicity of the game maintains a wide age range and cognitive capacity range.
- Due to the crucial visual component of our current experimental model, people with severe visual difficulties or blindness would not be able to participate in this testing.
- Language is currently only in English, further continuation could evolve to multiple translations



LIMITATIONS & ADVANCEMENT POTENTIAL

3. Copyright

- The use of a Where's Waldo image is to compensate for time-constraints. The further usage of this model would need to have a new image created originally. Difficulty can be adjusted at this level. (All rights belong to the Entertainment Rights Group.)

4. Repetition/Distractions

- To minimize learning effects with repeated testing multiple versions should be implemented, the more familiar the patients are with the task, their scores will be affected.
- The distractions – such as external sounds – found during our testing stages, could be further prevented by using a testing room.

ETHICAL CONSIDERATIONS & USER EXPERIENCE

Privacy, AI control measures, Informed Consent, Patient Confidentiality

- The patient's privacy and information is kept within our program and the data is safely discarded after each user session
- Informed consent is given prior to any information collection and procedure



User Experience

- Where's Waldo is predominantly known in Western society, implementation of this game should be done with more generalized object search images, understandable for all backgrounds.

THE ATTENTI-METRE BEYOND THE HACKATHON

How can we implement this in the real world?

How accessible is the Attenti-metre?

- EEGs are relatively cheaper compared other neuroimaging devices
- Using the experimental model to see if it improves sustained attention
- With positive results, the game will be advertised to the public as an attention improving game
- Accessible through personal devices

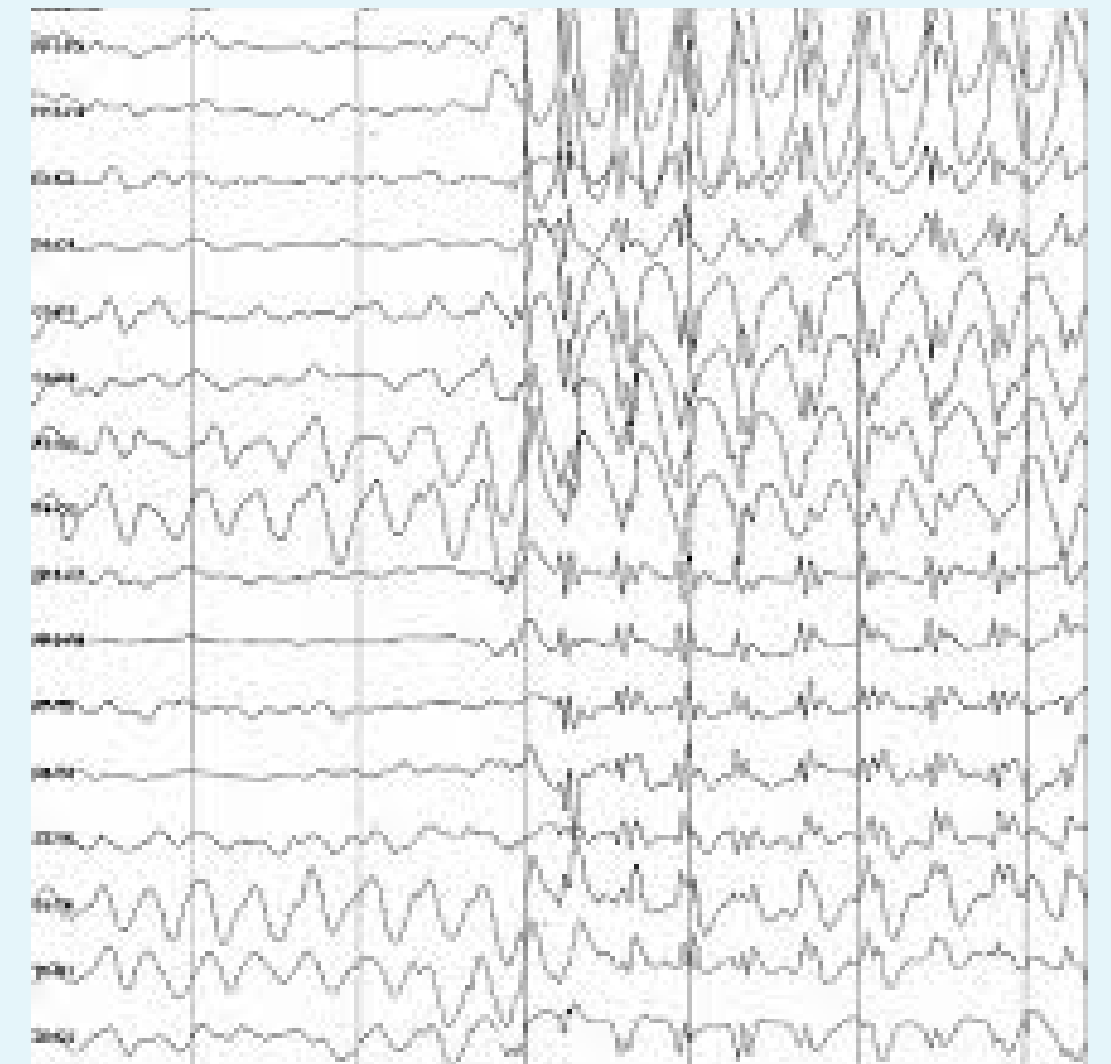
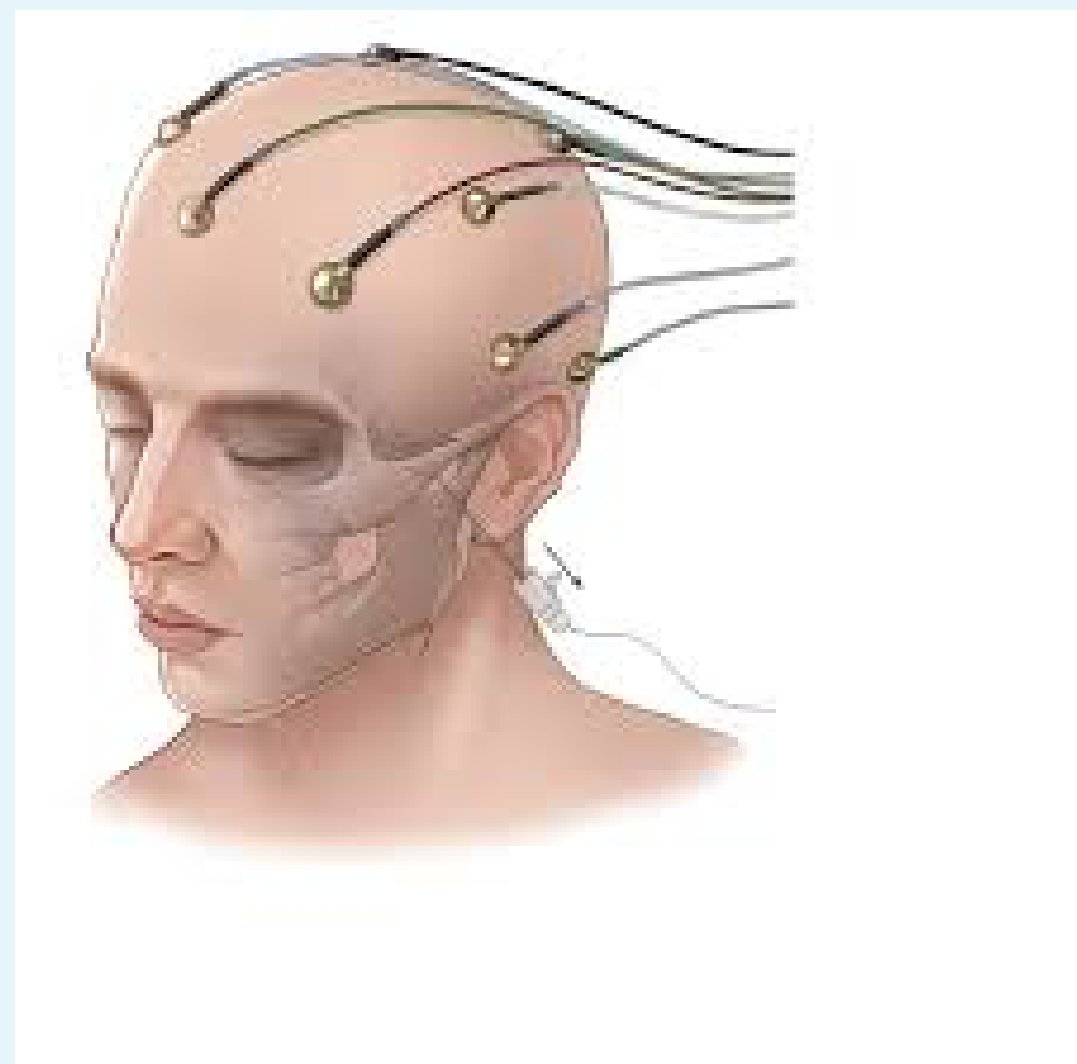
Under which domain? (which trained professional operates the test?)

Currently:

- Trained technician to perform the procedure
- Psychologist/psychiatrist to interpret individual results

Future Uses:

- Taking a neurological test without professional analysis needed
- High school learning and teaching opportunities



Thank You!

Attenti-Metre

**THE DIAGNOSTIC METHOD OF THE
FUTURE**