PULSED TECHNOLOGIES RESEARCH

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An Introduction to PulsedTech's tDCS Technologies

Transcranial Direct Current Stimulation

Pulsed Technologies

Pulsed Technologies'

Transcranial Direct Current Stimulation

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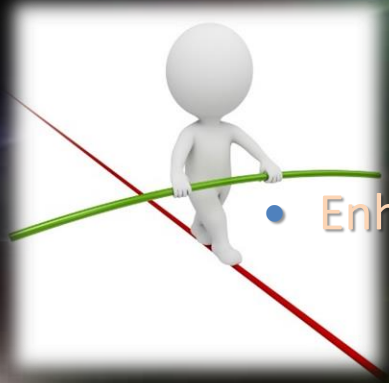
www.PulsedTechResearch.com www.PulsedTech.com www.PulsedTech.RO

Physical & Functional Changes to the Brain



- Focus, Attention, Concentration, Learning

- Enhanced Motor Control and Endurance

- Mood, Depression, Addiction, Sleep

- Physical Repair & Regeneration

Physical & Functional Changes to the Brain

- Focus, Attention, Concentration, Learning

- Enhanced Motor Control & Endurance

- Mood, Depression, Addiction, Sleep, ADHD, Autism

- Physical Repair, Regeneration, & Retraining

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Functional Enhancements to the Brain

- Competitive “Edge” in the Workplace

- Memory Enhancement

- Accelerated Learning and Recall

- Meditation/ Focus

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Brain Enhancement & Repair

- Maintain superior cognitive function and health throughout life

- Realize true repair and reversal from brain damage of stroke and other trauma related assaults

Competitive “Edge”

- Increase Endurance and Precise Motor Control

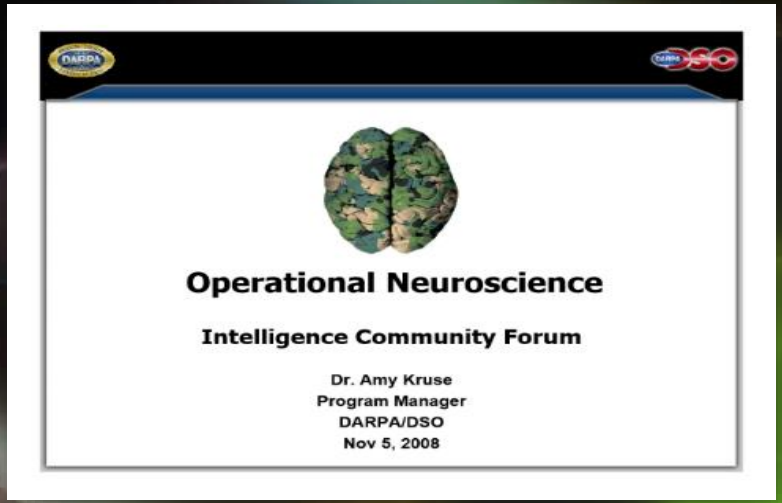
Competitive “Edge” in Learning or Work

- Actor
  (Learning Lines)

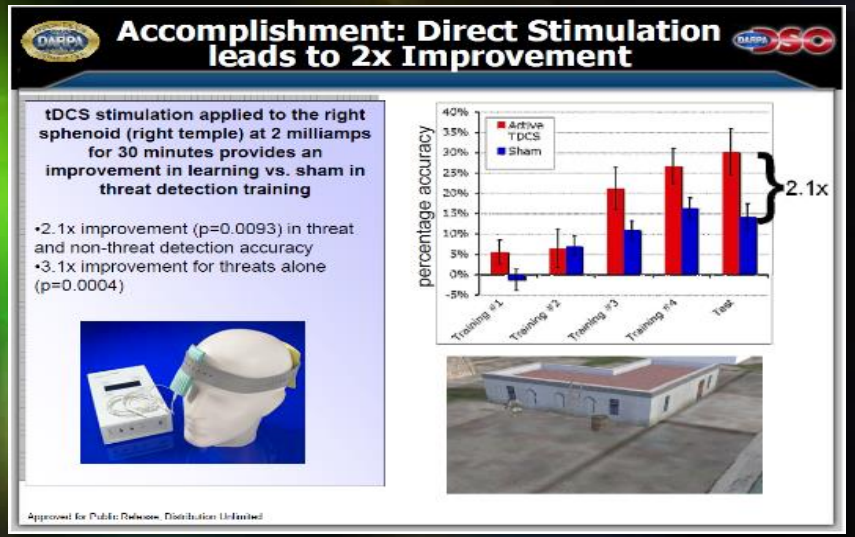
- Learning Disabilities
  (ADHD/Autism)

- Students

DARPA



- tDCS Stimulation applied at 2 milliamps for 30 minutes = **IMPROVEMENT IN LEARNING**



- **2.1x** Improvement in non-threat detection accuracy
- **3.1x** Improvement for threats alone

"Safe" Brain Enhancement

November 25, 2011

SCIENTIFIC AMERICAN

Amping Up Brain Function:

Transcranial Stimulation Shows Promise in Speeding Up Learning

Credit: Courtesy of Richard A. McKinley, USAF

R. Douglas Fields

Electrical stimulation of the brain is found to accelerate learning in military and civilian subjects, although researchers are wary of drawing larger conclusions about the mechanism

- Numerous Articles are emerging as the practical advantages of tDCS are becoming public

NEWS IN FOCUS

ARTIFICIAL INTELLIGENCE What next in wake of computer Go victory? p.284 | PET OF DOMES Cave genome plays into dawn of Neanderthals p.286 | MARS Joint Europe–Russia mission attempts to make history p.288 | ASTRONOMY The heat five worlds at the fringes of the Solar System p.290

Ski jumpers rely on finely tuned skills to glide through the air and land safely.

NEUROSCIENCE

Performance boost paves way for 'brain doping'

Electrical stimulation seems to boost endurance in preliminary studies.

BY SARA REARDON

Elite ski jumpers rely on extreme balance and power to descend the steep slopes of hills that allow them to reach up to 100 kilometres per hour. But the US Ski and Snowboard Association (USSA) is seeking to give its elite athletes an edge by training a different muscle: the mind.

Working with Halo Neuroscience in San Francisco, California, the sports group is testing whether stimulating the brain with electricity can improve the performance of ski jumpers by making it easier for them to hone their skills. Other research suggests that targeted brain stimulation can reduce an athlete's ability to perceive fatigue[1]. Such technologies could aid recovery from injury or let athletes try "brain doping" to gain a competitive advantage.

Yet many scientists question whether brain stimulation is as effective as its proponents claim, pointing out that studies have looked at only small groups of people. "They're cool findings, but who knows what they mean," says cognitive psychologist Jared Horvath at the University of Melbourne in Australia.

The USSA is working with Halo to judge the efficacy of a device that delivers electricity to the motor cortex, an area of the brain that controls physical skills. The company claims that the stimulation helps the brain to build new connections as it learns a skill. It tested its device on an unpublished study of seven elite Nordic ski jumpers, including Olympic athletes.

Four times per week, for two weeks, the skiers practise ski jumping onto an unstable platform. Four athletes received transcranial direct-current stimulation (tDCS) as they trained, the other three received a sham procedure. The ▶

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Practical Application

- The process is really as simple as strategically placing 2 color coded electrodes and running for 20-30 minutes.

What is tDCS?

- Method used to **modulate cortical excitability**, producing **faciliatory or inhibitory effects** upon a variety of behaviors
- Involves emission of **weak electrical current** via placement flowing between two electrodes to the scalp [**Anode (+)** & **Cathode (-)**]
- **Positive Anode** current **facilitates** behaviors associated with cortical region under target
- **Negative Cathode** currrent **inhibits** behaviors under target

[Nitsche et al 2008]

Current Direction Flow (Polarity)

- Direction of current flow differentiates anodal and cathodal stimulation by modulating and resting membrane potential of the neurons stimulated [Nitsche & Paulus, 2000]

- Anodal stimulation DEPOLARIZES the neurons, increasing the probability of action potentials occurring [Nitsche et al., 2008]

- Cathodal Stimulation HYPERPOLARIZES neurons, decreasing the likelihood of action potentials occurring [Nitsche et al., 2008]

- The polarity specific effects have been demonstrated both during and continuing after stimulation [Antal et al., 2003; Priori, 2003]

Do I really have to understand all that?

NO !

“Safe” Brain Enhancement

- We can safely enhance certain parts and activities of the brain by stimulating and increasing the electrical activity.
- We can tone down certain areas and activities of the brain, reducing electrical activity by controlling the direction of electrical flow.
- Regular use of tDCS has shown long term repair and improvement in the selectively targeted activities.
- The PulsedTech Workbook, Guide, and Kit makes the tDCS procedure really safe and easy!

Potentially Affected Fields of Science

- Medicine
- Psychology
- Neuroscience
- Physiology
- Pharmacology
- Biochemistry

tDCS Known Functional Improvements

- Sensory
- Motor
- Memory
- High-Level Cognitive Function
- Attention
- Mathematics
- Language
- Learning

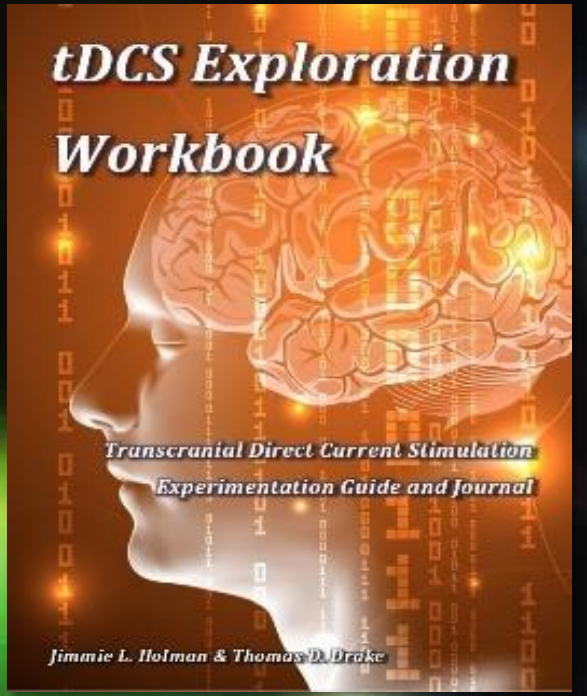
Published Literature

- Restoration of Memory
- Enlivenment (lasting for hours)
- Exhilaration
- Relief from Pain
- Reduction of Wariness
- Increased Capacity for Labor and Thinking
- Increased Capacity for Exertion

Previous Known Uses

- Neuroanesthenia
- Depression
- Fatigue
- Neuralgia
- Tiredness

tDCS Exploration Workbook & Kit



- The new PulsedTech Workbook/Guide and Kit provides all that is needed to SAFELY experiment with and experience tDCS technology.

tDCS Exploration Kit

Pulsed Technologies' tDCS kit is a "multi" instrument:

- Safe tDCS Power Source to Electrodes*
- Book, Workbook, Reference Materials, Note & Workspace**

* user selectable current output limiting
** on internal flash drive

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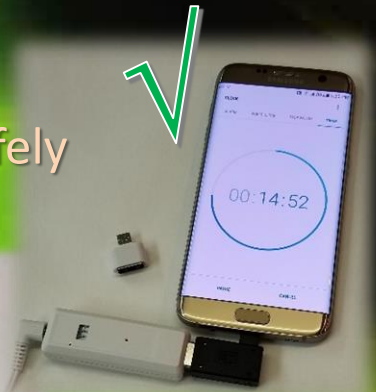
tDCS Workbook and Guide

- The Workbook and Guide is Embedded within the unit's internal Flash drive
- Updates can be downloaded and added when available.
- Workbook can be printed in parts or whole
- Notes can Journal can be kept within unit

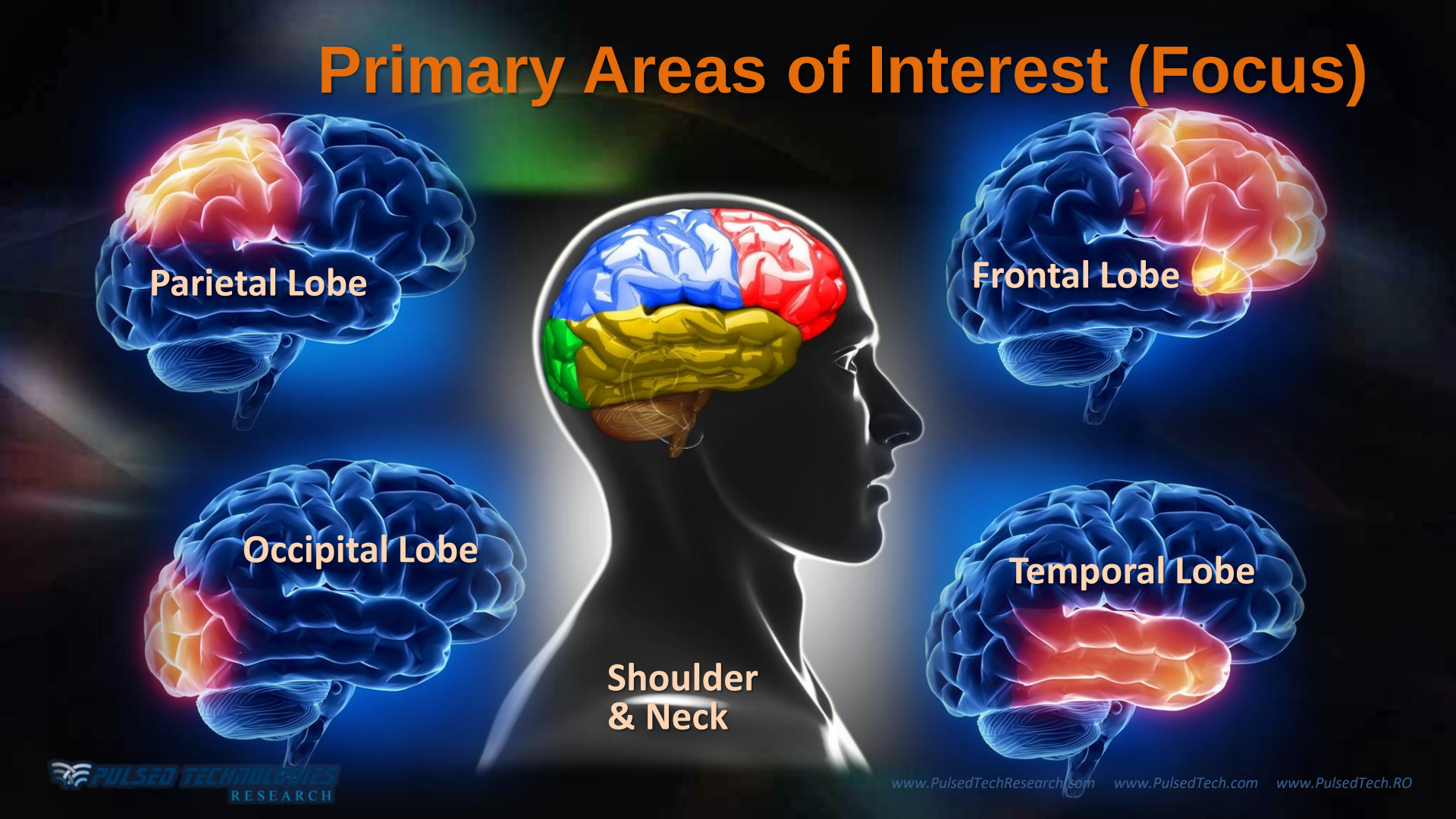
tDCS Practical Application

tDCS Safety

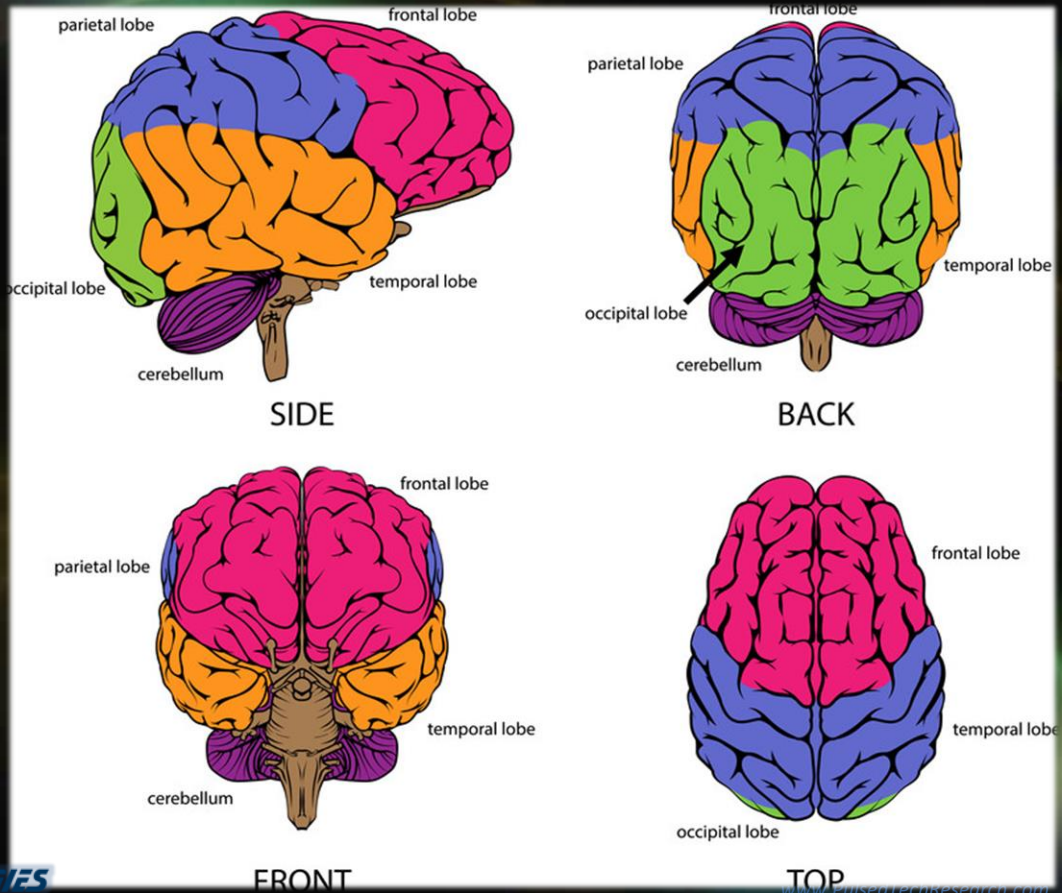
- The tDCS electronics can be safely connected in a variety of ways



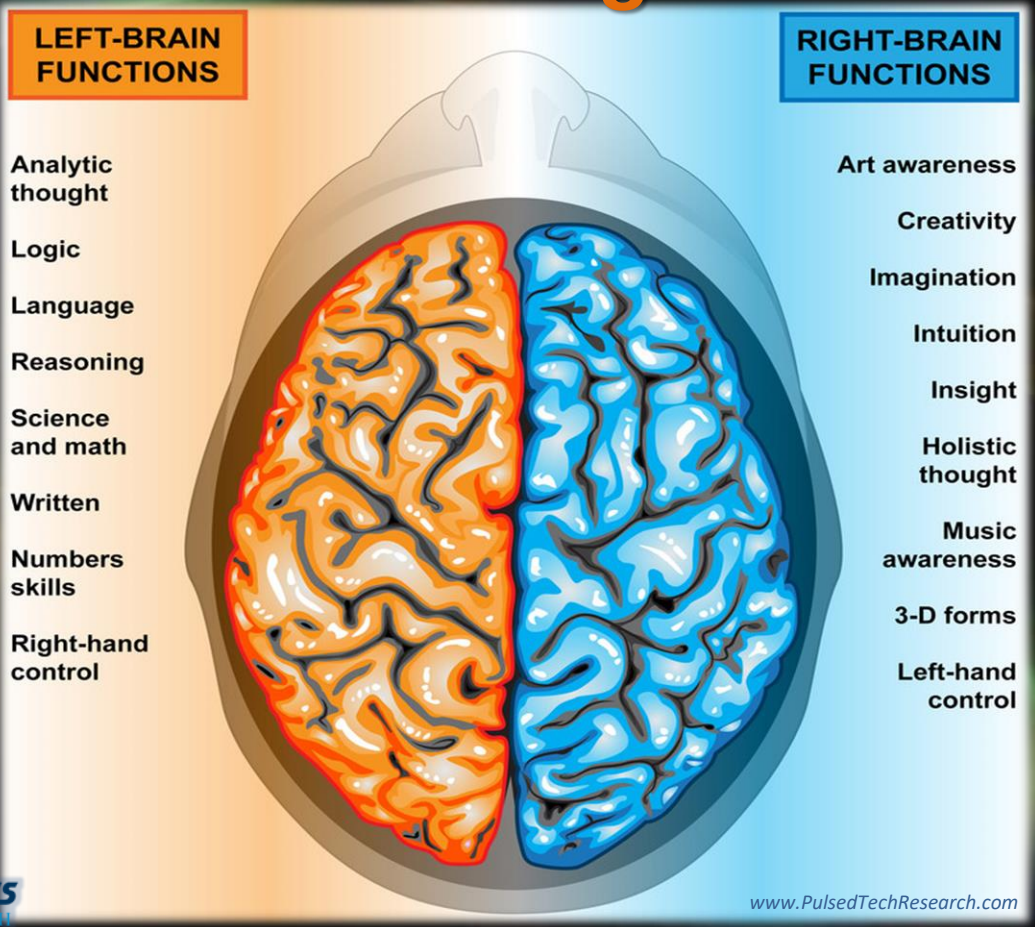
Primary Areas of Interest (Focus)



Brain Area Physical Relationship

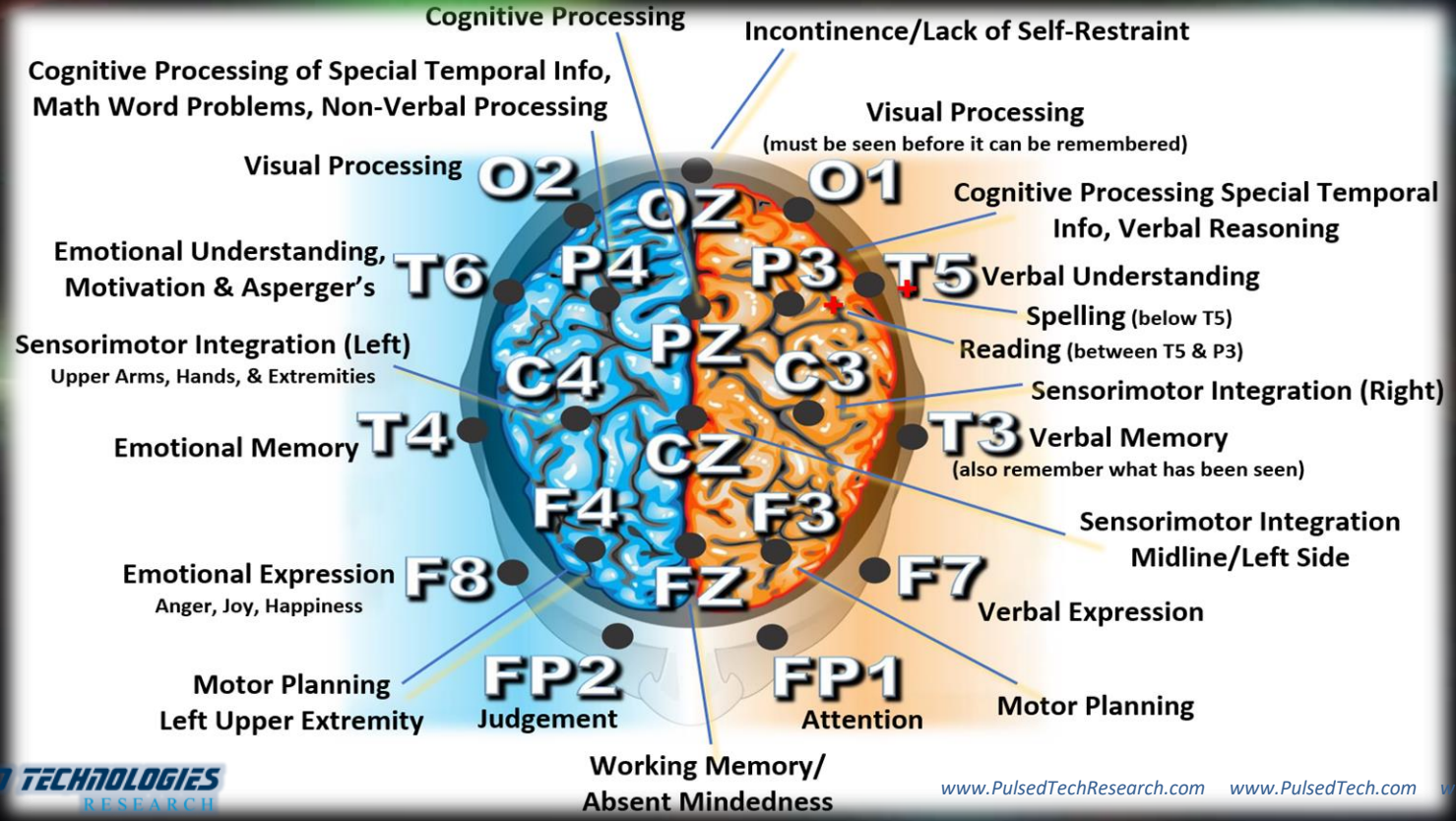


Generalized Left-Right Brain Function

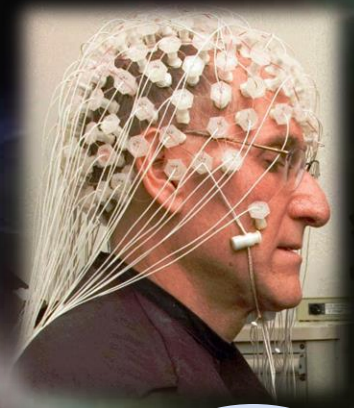


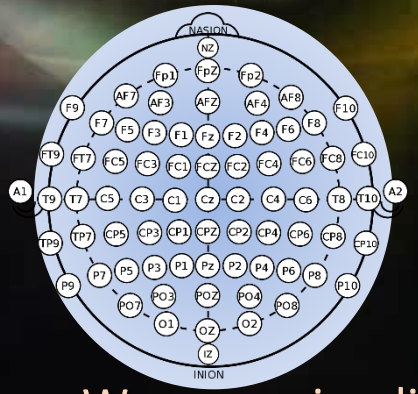
Functional Locations

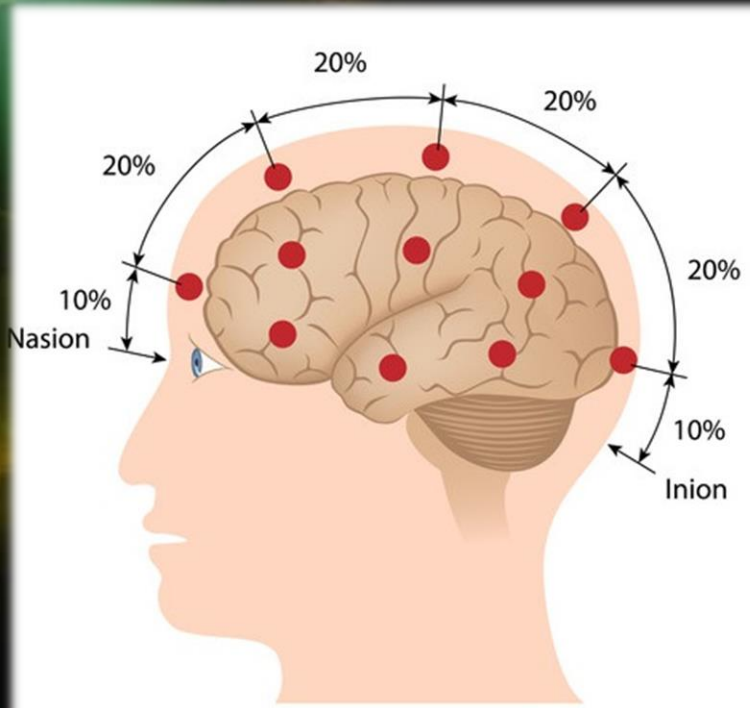
- Understanding WHERE certain types of processing occurs and the relationship to other areas is "key" to targeted enhancement!

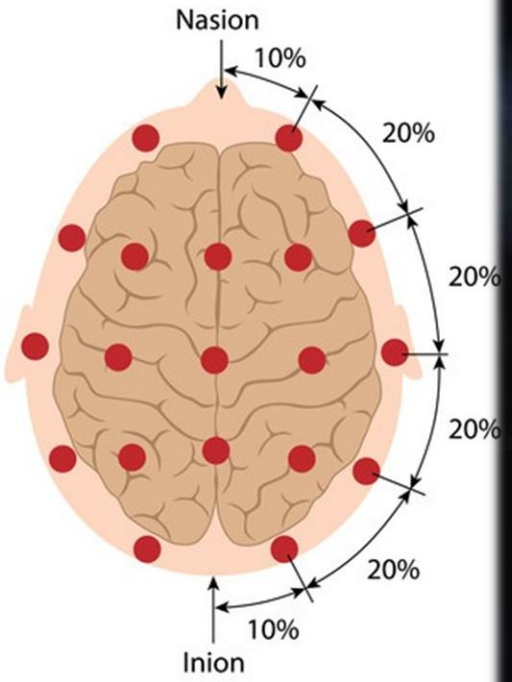


10-20 Transcranial Positioning System





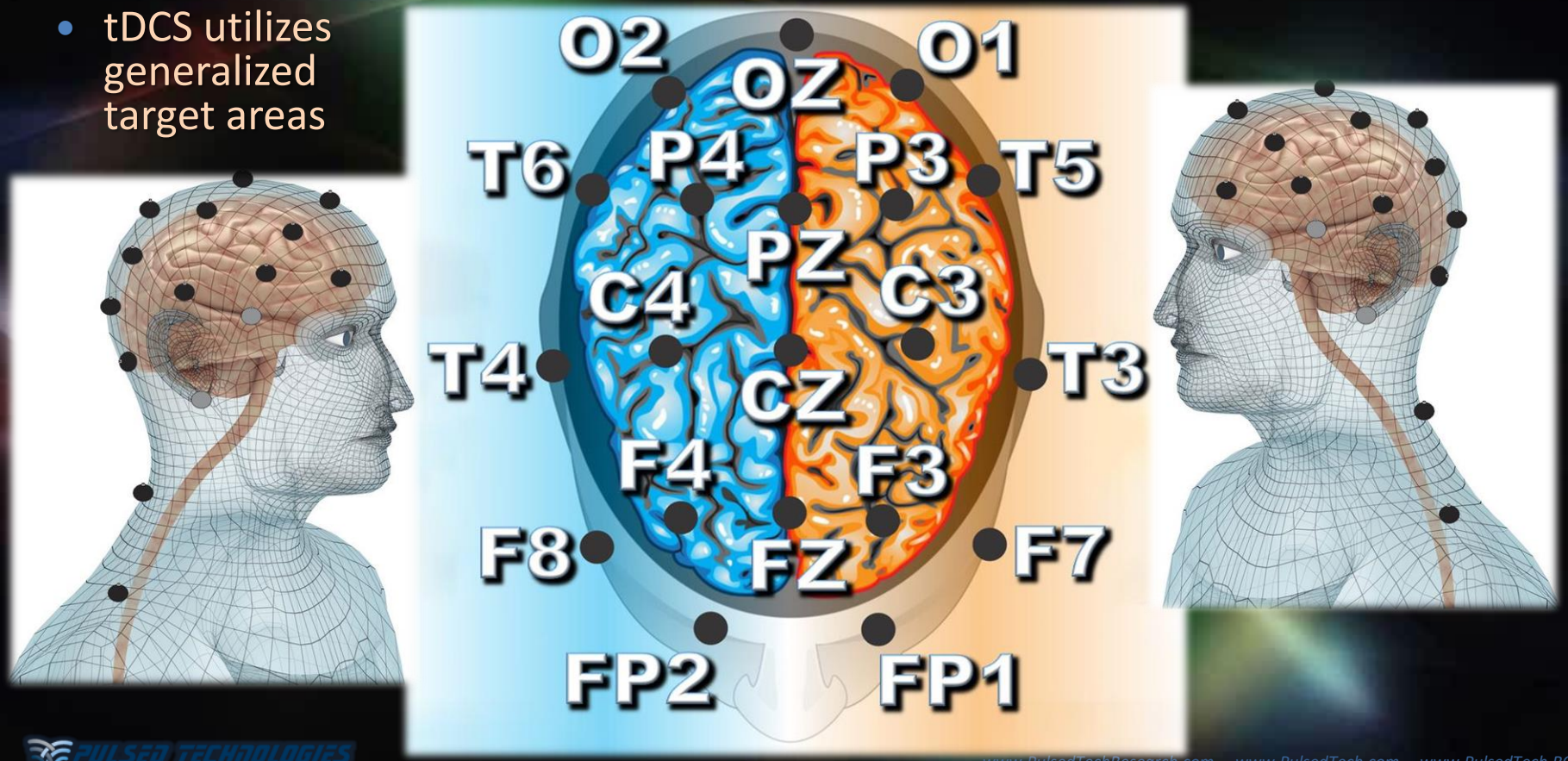




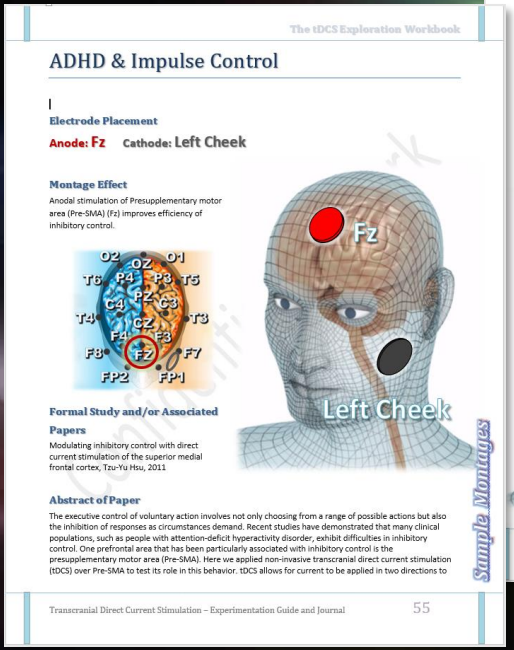
- We use a simplified version of the 10-20 positioning system used for EEG

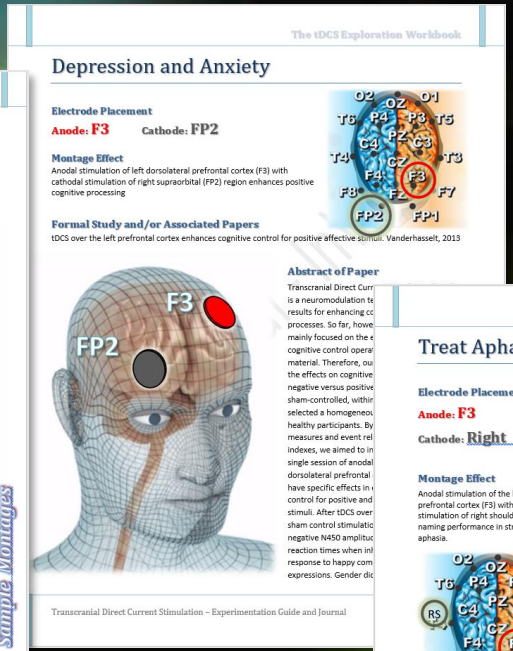
Simplified Target Locations

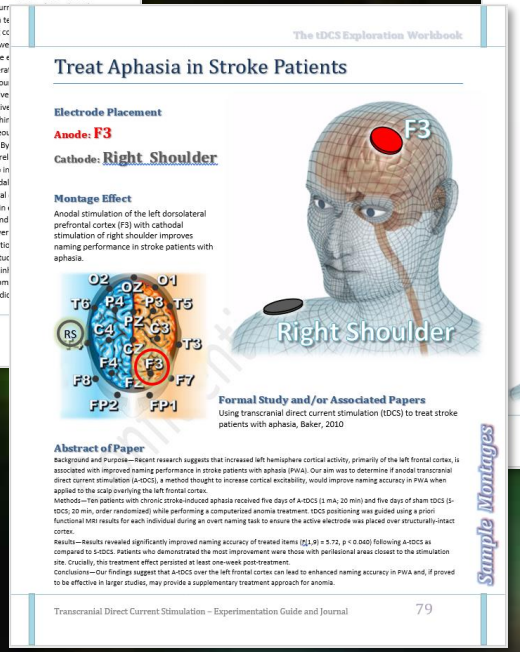
- tDCS utilizes generalized target areas

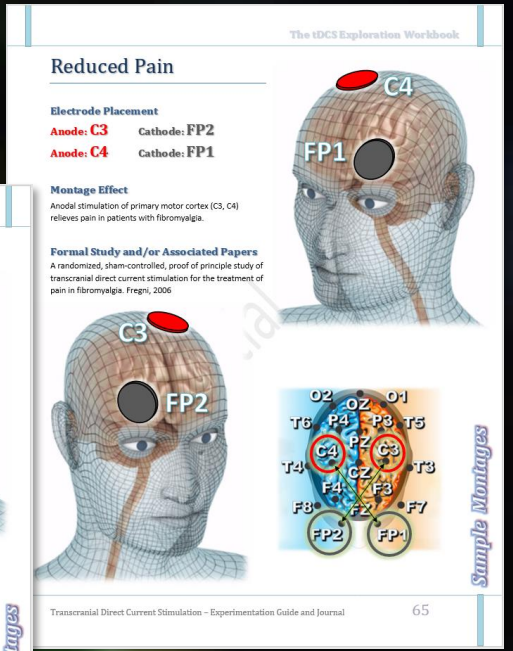


Sample Montages





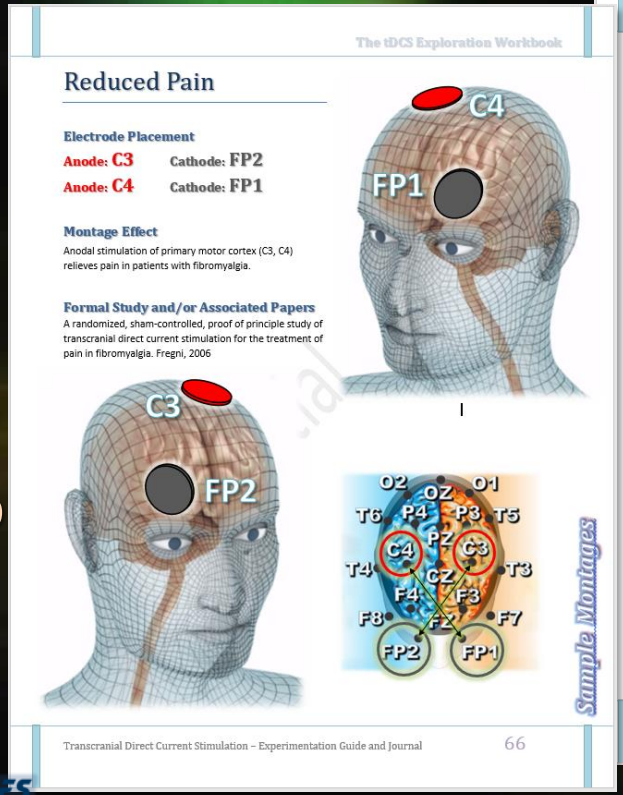


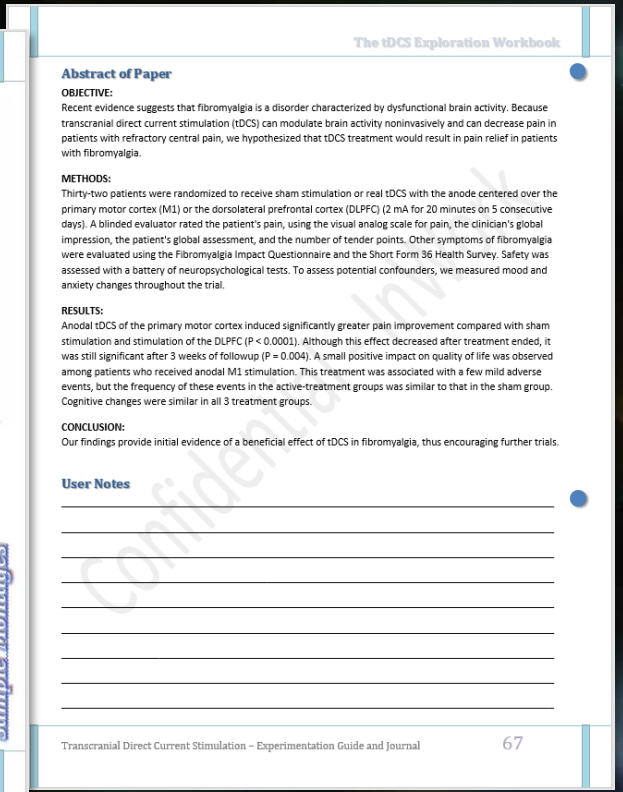


- Easy-to-follow montage diagrams are included in the workbook within the tDCS instrument

Montage Information Highlights

- TITLE
- CLEARLY ILLUSTRATED LOCATIONS
- ELECTRODE PLACEMENT
- INTENDED EFFECT
- FORMAL STUDY and/or ASSOCIATED PAPERS
- ABSTRACT/ SUMMARY
- USER NOTES





Journal Worksheet

- Printable Journal Worksheets are included for recording users' progress, experimentation, and planning