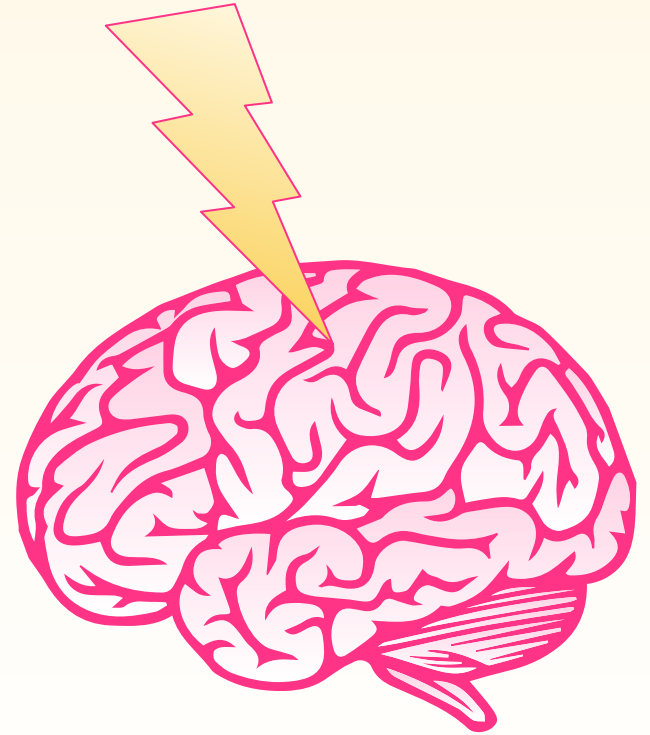


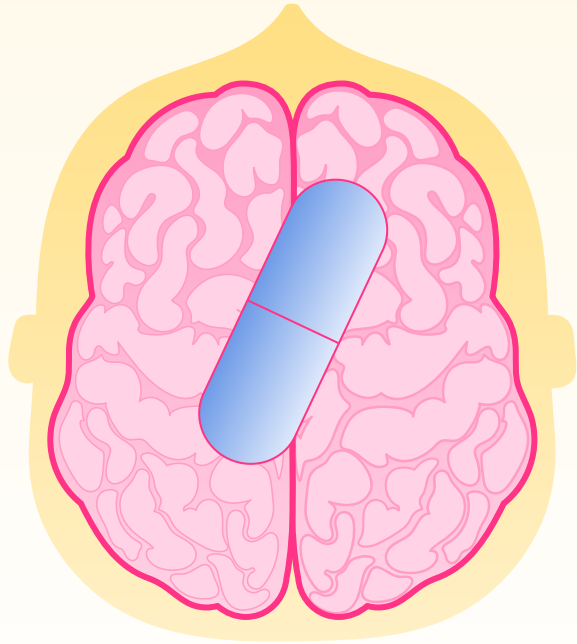
ZAPPED!

Why Brain Stimulation Does Not Equal Performance Enhancement

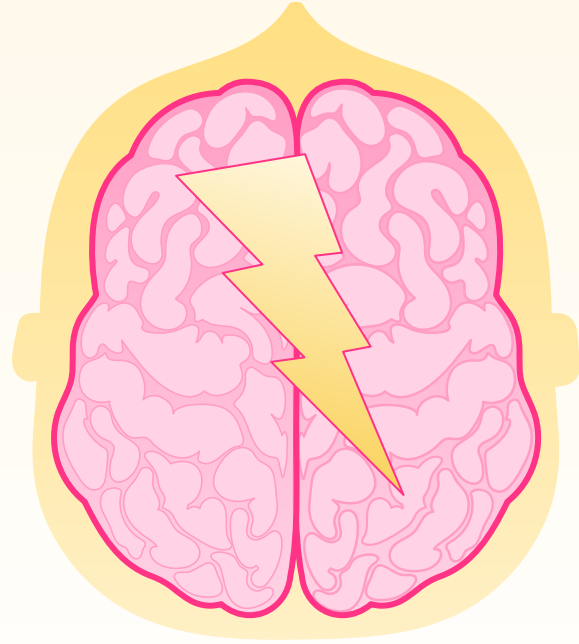
Oskar MacGregor | University of Skövde
2022-06-09 | "Is Neurodoping Different?"
International workshop | Roma Tre University



Different Forms of "Neurodoping"



Psychopharmacological

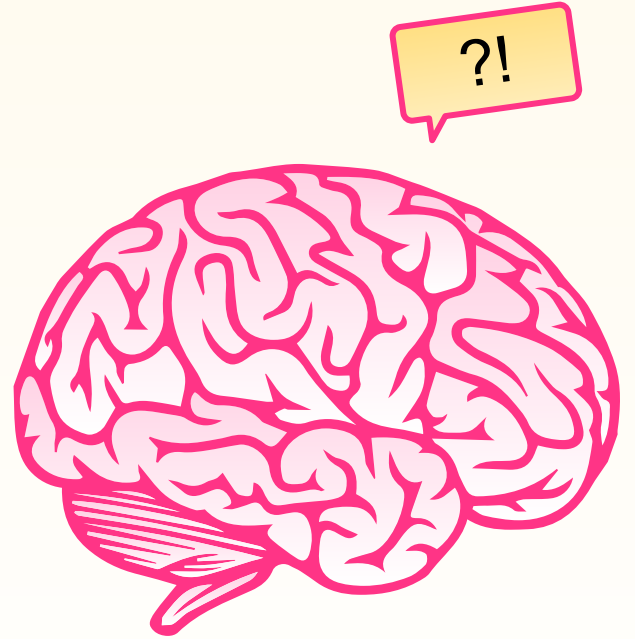


Technological

1. Is

The Technology

Even Functional?



~75%

... of tDCS attenuated by soft tissue and skull (Vöröslakos et al., 2018)

0%

... of tDCS cognitive outcome measures replicate (Horvath et al., 2015)

Many meta-analyses

... show similar results (e.g. Dedoncker et al., 2016; Hill et al., 2016)



“[The tDCS field is] a sea of bullshit and bad science—and I say that as someone who has contributed some of the papers that have put gas in the tDCS tank”

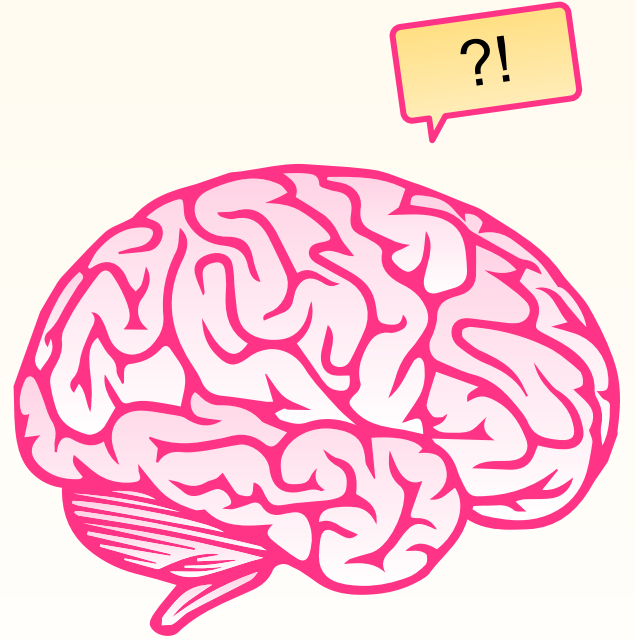
—Dr. Vincent Walsh
(As quoted in Underwood, 2016)



2. Is

The Brain

So Easy to Read?



Cognitive Neuroscience

Theory?

Often lacking... (cf. Scheel et al., 2021)

Concept?

Empiricists need to use philosophers!

Measure?

Based on what? (cf. Hedge et al., 2018)

Specificity?

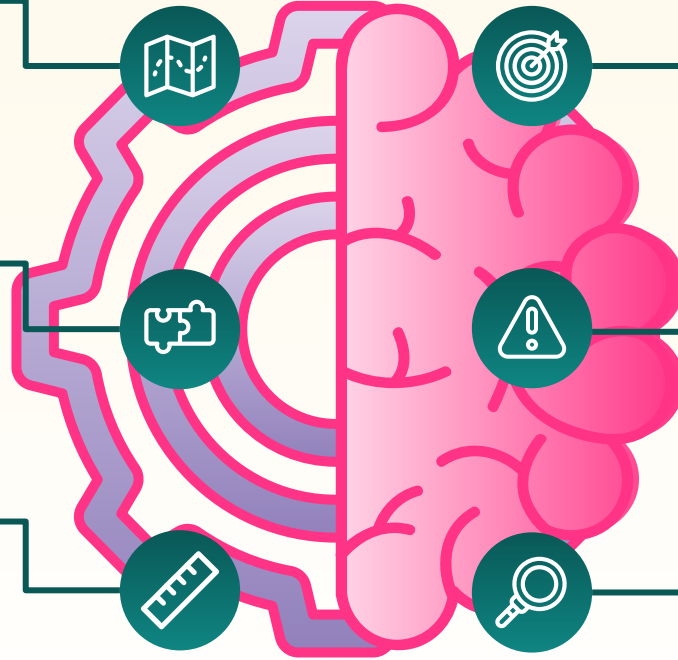
How does it work? (cf. Neurocritic, 2016)

Limitations?

What does and doesn't it measure?

Interpretation?

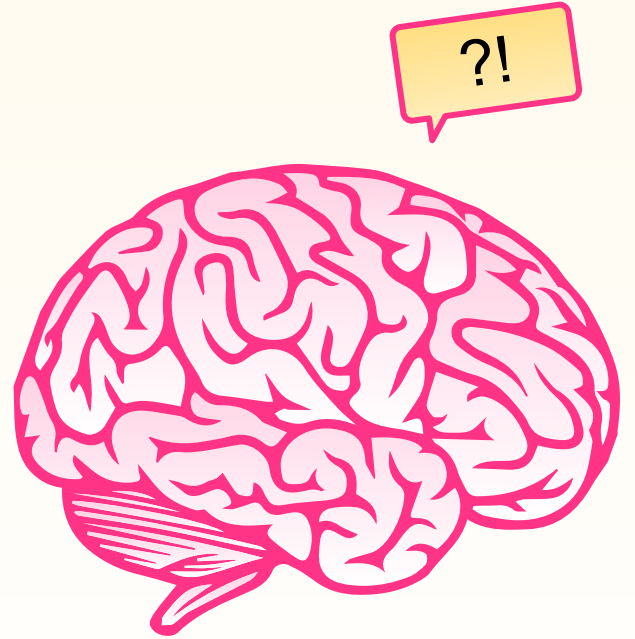
What does it mean? (cf. van der Vinne et al., 2017)



3. Is

The Research

Reliable?



How Things Go Wrong..

Statistics is hard! (cf. Ioannidis, 2005)

4

Trouble

Ignorance

3

Far too common!
(cf. Fanelli, 2009)

2

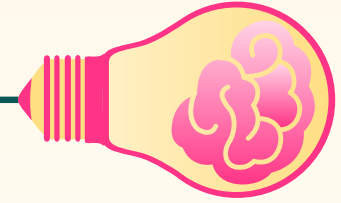
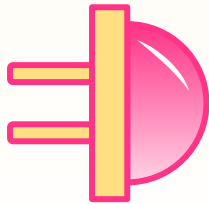
Misconduct

Incentives

1

Small samples!! (cf. Button et al., 2013)

Expectations of
"publish or perish"





64%

Foundational psychology studies that don't replicate (Open Science Collaboration, 2015)



And Neurodoping?..



Questionable tech

We need to establish that tDCS actually works first!



Small sample sizes

The scourge of so much neuroscientific research!



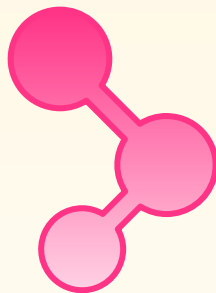
Sloppy concepts

How are we measuring performance enhancement?



Wishful thinking

Correlation \neq causation. One study \neq compelling evidence.



Conclusion

Beware the risks of overzealous techno-utopian interpretations of neuroscience! It is an important and powerful field, but even in principle, we are *a long way* from establishing that any technological form of supposed neurodoping amounts to anything more than wishful thinking!

img from
https://www.reddit.com/r/tDCS/comments/tmeno/burns_from_use_and_disc_electrodes/



Thanks!

Any questions?

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