

## Improving Brain Stimulation Treatment for Depression

Anxious-depressive disorders are a major cause of adult disability. Several treatment options are available, but they don't work for everyone, and patients often relapse. One recently developed treatment approach is non-invasive brain stimulation. As an anti-depressant, brain stimulation is typically applied daily for weeks while patients sit at rest. The benefit is modest. How it works, and why it works for some people, but not others, are not understood.

One likely way to improve treatment effectiveness is to engage patients in a psychological task while they undergo stimulation. It is well known that patients with anxious-depression show biases in how they process information. Typically they are highly sensitive to negative information and less sensitive to positive information. By targeting stimulation at brain circuits that control these biases, and training patients to focus more on positive and less on negative information, we predict treatment efficacy will be improved.

This project will include the use of brain stimulation techniques, cognitive testing and training, the collection and analysis of brain imaging data, and the development and fitting of computational models of behavior, both in healthy volunteers and anxious/depressed patients.

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- Ironside, M., O'Shea, J., Cowan, P.J. and Harmer, C.J. (2016). Frontal cortex stimulation reduces vigilance to threat: implications for the treatment of depression and anxiety. *Biological Psychiatry*. 79(10): 823-30.
- Browning, M. et al. (2015). Anxious individuals have difficulty learning the causal statistics of aversive environments. *Nature Neuroscience*, 18(4), 590–596.
- Pulcu, E., & Browning, M. (2017). Affective bias as a rational response to the statistics of rewards and punishments. *ELife*, 6.