COMBINING NEUROIMAGING AND NEUROMODULATION FOR COGNITIVE ENHANCEMENT

A TALK BY VINCE CLARK

UNIVERSITY OF NEW MEXICO

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15:30

AULA SEMINARI VIMM
FONDAZIONE RICERCA BIOMEDICA AVANZATA
VIA ORUS, 2
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In this talk, I will describe our attempts to develop new methods for cognitive neuroscience that combine brain stimulation with brain imaging. There are many reasons for developing these new multimodal techniques. In previous work, brain imaging has made great progress in understanding the mechanisms of normal and abnormal human brain function. However, this has been mostly observational, unable to prove causation, and has provided few real-world benefits for treating brain and mental illness. By contrast, brain stimulation offers the hope of better understanding causation and of developing new treatments for brain and mental illness, but has been plagued by failed replications. The multimodal combination of imaging and stimulation may provide many mutual benefits. Several studies using fMRI and EEG to guide tDCS electrode placement, producing large and replicable enhancements in learning and attention, using closed-loop EEG to guide tACS to improve sleep quality and memory consolidation, and using MEPs, EEG, MEG and MRS to infer the mechanisms of action of stimulation, including the effects of tDCS on hallucinations in schizophrenia and transcranial ultrasound (TUS) effects on brain function, among others. Possible future directions for these combined areas of research will be discussed.

Vince Clark obtained his PhD in Neuroscience from the University of California at San Diego and did his postdoctoral training at the National Institutes of Health. He was recruited to the University of New Mexico to help build and organize the Mind Research Network (http://www.mrn.org), eventually being promoted to Scientific Director. He is currently Professor of Psychology and Neuroscience and founding Director of the Psychology Clinical Neuroscience Center at the University of New Mexico (http://pcnc.unm.edu). He serves on the Editorial Boards of Human Brain Mapping and Brain Stimulation, and is founding Chair of the annual Brain Stimulation and Imaging Meeting (http://brainstim-meeting.org). His research focuses on combining neuroimaging with brain stimulation to study the brain basis of cognition in healthy populations, to examine how these are disrupted in clinical populations, and to increase cognitive performance and treat symptoms of brain and mental illness.

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