

Project Title	Assessing the effect of Dopamine on mutual information of Perceptuo-Motor Coupling in humans via transcranial magnetic stimulation
Supervisor(s)	Dr Barry Seemungal Prof Simon Schultz
Project Type	Lab based
Project Description	<p>The human brain is an information processing machine. Our brain can accurately decode external and internal events, like when our finger moves, this could be from our voluntary command or passively from an external force. Transcranial magnetic stimulation (TMS) to the human motor cortex causes an involuntary hand muscle contraction which uncouples muscular contraction from volitional control. If we apply low intensity TMS then we can objectively measure muscular contraction (via Myogenic Evoked Potentials) sometimes without conscious awareness of the contraction. This setup allows us to assess the efficiency of sensory processing by measuring the mutual information between MEP responses and perceived contraction (contraction versus no contraction). Mutual information is the difference between two entropies, a “noise + signal” and a “noise” entropy, and enables an optimal measure of changes in cortical sensory processing.</p> <p>We will assess how a Dopamine agonist modulates sensory processing measured by changes in mutual information. Dopamine is an important neurotransmitter and its loss mediates several features of Parkinson’s Disease (PD). We hypothesise that dopaminergic activation enhances the mutual information of perceiving a TMS-evoked MEPs in healthy subjects. Future studies will involve PD patients.</p> <p>See here for output from a similar Masters project: https://www.jneurosci.org/content/36/36/9303</p>