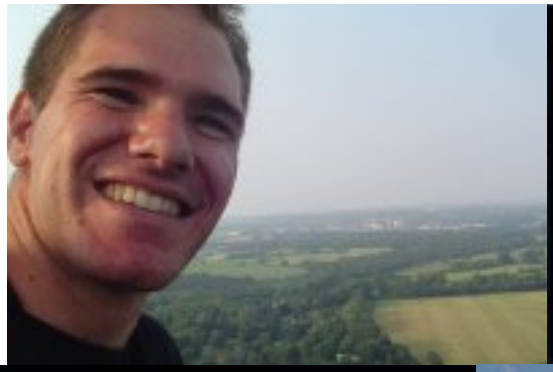
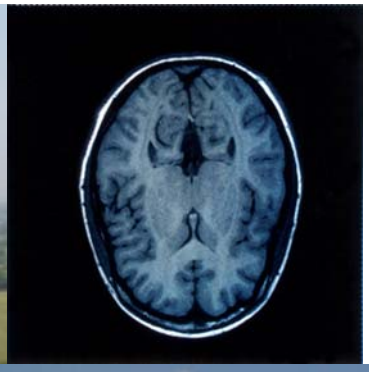
Jonathan Roiser.....exploring brain function

"For me, the Scholars' program was unique in providing the opportunity to work in two first class laboratories, learning both different techniques to investigate brain function, and complementary approaches to understand the root causes of mental illness. As a result of the program, I was able to secure a post-doctoral position in a leading center in neuroscience research in London, which has subsequently led to a faculty position in just two years. This is without doubt due to the high-quality training and teaching I received during the NIH-Cambridge Scholars' program."

Jon Roiser, a Brit and the first Advanced Scholar in the NIH-Oxford-Cambridge program, began his scientific life as a molecular biologist at Cambridge University. However, he soon became fascinated by understanding the causes of mental illness after taking a minor option in psychology. He started a PhD in the Department of Psychiatry at Cambridge to investigate the neurobiological basis of depression, in particular, understanding the roles of chemicals such as dopamine and serotonin. To his surprise, this led to a renewed interest in understanding genetics, since several psychiatric disorders appear to have strong genetic components. Elucidating the genetic basis of psychiatric disorders, particularly using neuroimaging methods, is now a major focus of his work. After learning about the NIH-Cambridge partnership from his Mentor, he entered the program as an "Advanced Scholar" after the first two years of graduate school as a Medical Research Council student.

The aim of Jon's research is to understand the neurobiological mechanisms underlying psychiatric diseases, particularly depression and schizophrenia. He also has focused on neurological changes that accompany chronic drug abuse. His work utilizes experimental techniques drawn from cognitive psychology, functional neuroimaging, psychopharmacology

and genetics, both in patient groups and healthy volunteers. His project was a collaborative investigation between Dr. Barbara Sahakian of Cambridge and Dr. Wayne Drevets of the National Institute of Mental Health at NIH to investigate how modulation of the serotonin pathway influenced affective disorders, specifically depression.

Barbara J Sahakian Ph.D. is Professor of Clinical Neuropsychology at the Department of Psychiatry, University of Cambridge School of Clinical Medicine and Addenbrooke's Hospital, Cambridge.

Wayne C. Drevets, M.D. is a Senior Investigator and the Chief of the Section on Neuroimaging in Mood and Anxiety Disorders at the National Institute of Mental Health (NIMH), NIH.

In work carried out at the MRI center at Cambridge and the fMRI center in NIMH, NIH, Jon has examined how the processing of affective stimuli is modulated by serotonin (5-HT) using neurophysiological measures to characterize the effect of changes in 5-HT on neural responses to emotional stimuli. He used functional magnetic resonance imaging to investigate the effect of acute tryptophan depletion, which reduces central 5-HT synthesis on neural responses to emotionally valenced verbal stimuli. His data suggested that 5-HT may play an important role in mediating automatic negative attentional biases in major depression, as well as resilience against negative distracting stimuli in never-depressed individuals. His work as a student led to a number of important papers:
(go to http://www.ncbi.nlm.nih.gov/sites/entrez and search Roiser JP).

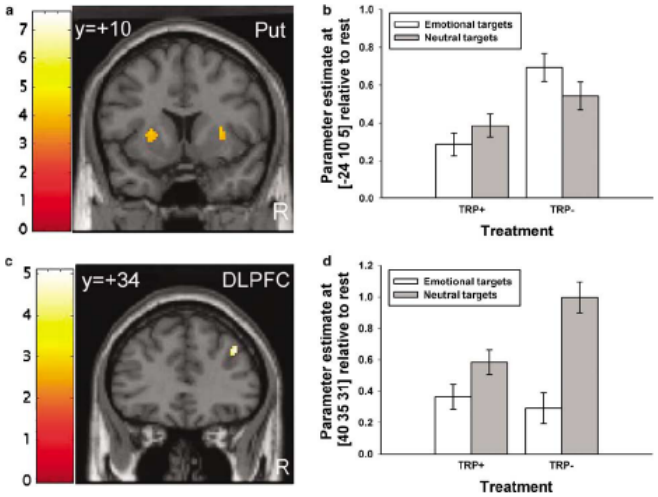


Figure 1 Effect of tryptophan depletion on neural responses to emotional relative to neutral target words. (a) Greater response to emotional relative to neutral target words following tryptophan depletion in the left putamen ([$x = -24$, $y = 10$, $z = 5$], peak Z-score = 3.46) and right insula/putamen ([$x = 30$, $y = 8$, $z = 5$], peak Z-score = 3.66). (c) Greater response to neutral relative to emotional target words following tryptophan depletion in the right dorsolateral prefrontal cortex ([$x = 40$, $y = 35$, $z = 31$], peak Z-score = 3.86). Effects in (a) and (c) were significant at $p < 0.001$, minimum cluster size 20 voxels. Color bars indicate t-values and images are thresholded at $p < 0.001$. (b and d) Plots of parameter estimates relative to rest for emotional and neutral target words under tryptophan and sham depletion conditions for peak voxels in the left putamen (b) and right dorsolateral prefrontal cortex (d). Error bars represent 1 SED between emotional and neutral targets.

Jon completed his Ph.D. in four years and undertook a postdoctoral fellowship in psychiatry at University College London. Within two years he was appointed a group leader and currently runs his own laboratory at UCL. Currently a major focus of his work is investigating changes in reward processing and attention in schizophrenia using functional magnetic resonance imaging (fMRI) and magnetoencephalography (MEG). A related, but parallel, research direction is the investigation of how genetic variants associated with psychiatric disease affect behavior and neurobiological function in healthy volunteers.

His laboratory webpage is http://www.icn.ucl.ac.uk/research-groups/Cognitive-Neuropsychiatry/index.php.

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