Sean Cavanagh, MBBS PhD

I am a clinical academic psychiatrist specialising in computational psychiatry and translational neuroscience. My research aims to identify mechanistic and computational predictors of treatment response in obsessive–compulsive and related disorders. I combine behavioural modelling and clinical phenotyping to develop clinically actionable tools for early detection and personalised intervention. My doctoral work at UCL characterised neural computations underlying working memory and decision-making using single-neuron electrophysiology, pharmacological manipulations, and computational modelling.

Current Research Programme

- Developing behavioural paradigms to characterise mechanisms of CBT response in paediatric OCD.
- Applying reinforcement learning and decision models to predict treatment response and relapse.
- Functional neurosurgery research investigating cognitive effects of deep brain stimulation (DBS) and anterior cingulotomy.

Work

2024 – Present

Academic Clinical Fellow in Psychiatry: King's College London & South London and Maudsley NHS Foundation Trust

Research (Computational Psychiatry):
- Developing behavioural paradigms to characterise mechanisms of CBT response in paediatric OCD
- Applying reinforcement learning models to predict treatment response and relapse

Clinical Posts:
- National and Specialist CAMHS OCD and BDD Service
- Acute adult and older adult inpatient psychiatry

2022 – 2024

Academic Foundation Doctor, St George's University Hospital
Research post using computational psychiatry approaches in a functional neurosurgery patient population. Clinical posts included perinatal psychiatry, dermatology (with experience of psychodermatology), emergency medicine, general internal medicine, and trauma and orthopaedics.

Education

2015 - 2022 **MBPhD Programme, University College London**

Clinical Examination Results: First year (92%); Second year (81%); Final year (85%).

2015 - 2019 **PhD in Neuroscience, University College London Queen Square Institute of Neurology**

"Neural computations for working memory and decision making" supervised by Dr Steve Kennerley, Dr Simon Farmer and Dr Laurence Hunt.

2012 - 2015 **BSc (Hons) Medical Sciences with Neuroscience, University College London - 1st Class**

Dissertation: "Differential modulation of the excitability of inputs to corticospinal neurones during action preparation for choice reaction time" supervised by Professor John Rothwell.

Selected Awards and Media Coverage

2025: Contributor to Patient Resource on Body Dysmorphic Disorder (Nip in the Bud)
2023: Merit Award for Leadership, London Foundation School (Health Education England)
2022: Betuel Prize (first prize for written examinations in MBBS finals)
2020: Foulkes Foundation Fellowship.
2020: Media coverage of Cavanagh et al. 2020 (eLife) – including Naked Scientists Podcast
2019: Media coverage of Cavanagh et al. 2019 (PNAS) in Medical Xpress
2019: Jon Driver Prize (yearly award to outstanding young neuroscientist from UCL).

2017: Art of Neuroscience Competition Winner. Media coverage in Scientific American and Atlas Obscura
2016: Brain travel award to attend Society for Neuroscience meeting, USA
2015: PhD studentship funding from Middlesex Hospital Medical School General Charitable Trust (£77,076)

Clinical Innovation and Quality Improvement

- Automated pre-assessment report generation for National OCD/BDD service using Python (2026).
- Optimised St George's Hospital Emergency Department Cauda Equina pathway (2024).

Teaching and Academic Leadership

- Supervisor: MSc, MRes and BSc students (UCL & KCL), academic foundation doctor (SGUL).
- Research protocol marker, MSc Clinical Neuropsychiatry (KCL).
- Organiser, KCL IoPPN Journal Club.
- Peer reviewer: Science Advances, eLife, Quarterly Journal of Experimental Psychology.

Selected Presentations

2025: Maudsley Mental Health of Older Adult Academic Meeting – case presentation.
2025: Maudsley Hospital Journal Club - Non-invasive temporal interference electrical stimulation of the human hippocampus.
2024: Delusional infestation. St George's Hospital Dermatology Department.
2019: Jon Driver prize talk: The role of neuronal timescales in cognition. UCL Neuroscience Symposium (Video).
2019: Swartz program in theoretical neuroscience seminar. Yale University, USA.
2018: Circuit mechanisms of working memory and decision-making. Oxford Centre for Human Brain Activity, University of Oxford.
2018: Reconciling persistent and dynamic hypotheses of working memory coding in prefrontal cortex. Society for Neuroscience Meeting, San Diego, USA.
2018: Circuit mechanisms of working memory and decision-making. Max Planck UCL Centre for Computational Psychiatry and Ageing.

Publications

Gelfer, Y., **Cavanagh, S. E**., Bridgens, A., Ashby, E., Bouchard, M., Leo, D. G. & Eastwood, D. M. (2024) Relapse, with poorer clinical and quality of life outcomes, affects 37% of idiopathic clubfoot patients: the Core outcome Clubfoot (CoCo) study - An International Multicentre Observational Study. Bone & Joint.

Hussain, S. A., Russell, A., **Cavanagh, S. E**., Bridgens, A. & Gelfer, Y. (2023) "A 'Hub and Spoke' Shared Care initiative for CTEV Ponseti service." Bone & Joint Open, 4(11), pp. 865-872.

***Cavanagh, S.E**., Hunt, L.T. & Kennerley, S.W. (2020) A Diversity of Intrinsic Timescales Underlie Neural Computations. *Front Neural Circuits*, **14**, 615626.

***Cavanagh, S.E**., Lam, N.H., Murray, J.D., Hunt, L.T. & Kennerley, S.W. (2020) A circuit mechanism for decision-making biases and NMDA receptor hypofunction. Elife, 9.

***Cavanagh, S. E**., Malalasekera, W. M. N., Miranda, B., Hunt, L. T., & Kennerley, S. W. (2019). Visual fixation patterns during economic choice reflect covert valuation processes that emerge with learning. *Proceedings of the National Academy of Sciences*, 201906662.

***Cavanagh, S. E**., Towers, J. P., Wallis, J. D., Hunt, L. T., & Kennerley, S. W. (2018). Reconciling persistent and dynamic hypotheses of working memory coding in prefrontal cortex. *Nature Communications*, *9*(1).

Hannah, R., **Cavanagh, S. E**., Tremblay, S., Simeoni, S., & Rothwell, J. C. (2018). Selective suppression of local interneuron circuits in human motor cortex contributes to movement preparation. *Journal of Neuroscience*, *38*(5), 1264–1276.

Hannah, R., Sommer, M., **Cavanagh, S.,** Jerjian, S., & Rothwell, J. C. (2017). Motor outcomes of repetitive transcranial magnetic stimulation are dependent on the specific interneuron circuit targeted. In *Biosystems and Biorobotics* (Vol. 15, pp. 3–7).

***Cavanagh, S. E**., Wallis, J. D., Kennerley, S. W., & Hunt, L. T. (2016). Autocorrelation structure at rest predicts value correlates of single neurons during reward-guided choice. *ELife*.

Cavanagh, S., Malalasekera, N., & Kennerley, S. (2015). In the blink of an eye: Value and novelty drive saccades. *Annals of Medicine and Surgery*, *4*(3), 319–320.