

Toby Wise BSc MSc PhD

Department of Neuroimaging, Institute of Psychiatry, Psychology and Neuroscience, King's College London
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EDUCATION

- 2013-2017** **PhD Neuroimaging** *Institute of Psychiatry, Psychology & Neuroscience, King's College London*
Thesis Title: Structural and Neurochemical Alterations in Unipolar and Bipolar Major Depression
Supervisors: Prof Anthony Cleare & Dr Danilo Arnone
- 2012-2013** **MSc Cognitive Neuroscience (Distinction)** *University of Sussex*
Dissertation title: The role of embodied simulation in context-based facial emotion recognition: a transcranial magnetic stimulation study
Dissertation supervisor: Prof Jamie Ward
- 2009-2012** **BSc Psychology (First Class Honours)** *University of Sussex*

EMPLOYMENT

- 2021-present** **Professor Anthony Mellows Fellow and Medallist** *Department of Neuroimaging, Institute of Psychiatry, Psychology and Neuroscience, King's College London*
- 2019-2021** **Postdoctoral researcher** *Division of the Humanities and Social Sciences, California Institute of Technology*
- 2017-2021** **Sir Henry Wellcome Postdoctoral Fellow** *Max Planck UCL Centre for Computational Psychiatry and Ageing Research, University College London*
- 2015-2017** **Graduate Teaching Assistant** *Institute of Psychiatry, Psychology & Neuroscience, King's College London*

RESEARCH INTERESTS

My research focuses on the neurocomputational mechanisms underlying aversive learning and avoidance behaviour, and how these processes are involved in symptoms of anxiety and depression. I use neuroimaging and computational modelling of behaviour to understand how humans learn about punishment and make decisions that allow danger to be avoided, and how this process can go awry in psychopathology.

* indicates shared authorship

Peer-reviewed publications

1. Zbozinek, T. D., **Wise, T.**, Perez, O. D., Qi, S., Fanselow, M. S., & Mobbs, D. (2021). Pavlovian occasion setting in human fear and appetitive conditioning: Effects of trait anxiety and trait depression. *Behaviour Research and Therapy*
2. **Wise, T.***, Zbozinek, T. D*, Charpentier, C. J., Michelini, G., & Hagan, C. *In press*. Computationally-defined markers of uncertainty aversion predict trajectories of perceived threat and anxiety during a global pandemic. *Emotion*
3. Silston, B.* , **Wise, T.*** , Qi, S., Sui, X, Dayan, P., Mobbs, D. Neural encoding of socially adjusted value during competitive and hazardous foraging. (2021). *Nature Communications*.
4. **Wise, T.***, Liu, Y.* , Chowdhury, F., Dolan, R.J. Model-based aversive learning in humans is supported by preferential task state reactivation. (2021). *Science Advances*
5. Mobbs, D.* , **Wise, T.*** , Suthana, N., Guzmán, N., Kriegeskorte, N., Leibo, J.Z. (2021). Promises and Challenges of Human Computational Ethology. *Neuron*.
6. Perkins, A.M., Patrick, F., **Wise, T.**, Meyer, N., Mazibuko N., Oates, A.E., van der Bijl, A.H.M., Danjou, P., O'Connor, S.M., Doolin, E., Wooldridge, C., Rathjen, D., Macare, C., Williams, S.C.R., Young, A.H. (2021). Cholinergic Modulation of Disorder-Relevant Human Defensive Behaviour in Generalised Anxiety Disorder. (2021). *Translational Psychiatry*.
7. Serra-Blasco, M., Radua, J., Soriano-Mas, C., Gómez-Benlloch, A., Porta-Casteràs, D., Carulla-Roig, M., ... **Wise, T.** ... & Cardoner, N. (2021). Structural brain correlates in major depression, anxiety disorders and post-traumatic stress disorder: A voxel-based morphometry meta-analysis. *Neuroscience & Biobehavioral Reviews*
8. **Wise, T.** & Dolan, R.J. Associations between aversive learning processes and transdiagnostic psychiatric symptoms in a general population sample. (2020). *Nature Communications*
9. **Wise, T.**, Zbozinek, T., Michelini, G., Hagan, C.C., Mobbs, D. (2020). Changes in risk perception and protective behavior during the first week of the COVID-19 pandemic in the United States. *Royal Society Open Science*.
10. Perkins, A.M., Patrick, F., **Wise, T.**, Meyer, N., Mazibuko N., Oates, A.E., van der Bijl, A.H.M., Danjou, P., O'Connor, S.M., Doolin, E., Wooldridge, C., Rathjen, D., Macare, C., Williams, S.C.R., Young, A.H. Cholinergic Modulation of Disorder-Relevant Human Defensive Behaviour in Generalised Anxiety Disorder. *Translational Psychiatry*. In press
11. Valton, V., **Wise, T.**, Robinson, O.J. Recommendations for Bayesian hierarchical model specifications for case-control studies in mental health. *Machine Learning for Health (ML4H) at NeurIPS 2020*.
12. **Wise T.***, Patrick, F.* , Meyer M., Mazibuko, M., Oates A.E., van der Bijl, A.H.M, Danjou, P., O'Connor S.M., Doolin E., Wooldridge C., Rathjan, D., Macare, M., Williams, S.C.R., Perkins, A.M. & Young, A.H. (2020). Cholinergic Modulation of Disorder-Relevant Neural Circuits in Generalised Anxiety Disorder. *Biological Psychiatry*
13. Herane-Vives, A., Arnone, D., de Angel, V., Papadopoulos, A., **Wise, T.**, Alameda, L., Chua, K.-C., Young, A.H., Cleare, A.J., (2020). Cortisol levels in unmedicated patients with unipolar and bipolar major depression using hair and saliva specimens. *International Journal of Bipolar Disorders*
14. Herane-Vives, A., Young, A.H., Wise, T., Aguirre, J., de Angel, V., Arnone, D., Papadopoulos, A., Cleare, A.J., (2020). Comparison of short-term (saliva) and long-term

(hair) cortisol levels in out-patients with melancholic and non-melancholic major depression. *BJPsych Open*

15. **Wise, T.**, Michely, J., Dayan, P., Dolan, R.J. (2019). A computational account of threat-related attentional bias. *PLOS Computational Biology*
16. Marwood, L., **Wise, T.**, Perkins, A. M., & Cleare, A. J. (2018). Meta-analyses of the neural mechanisms and predictors of response to psychotherapy in depression and anxiety. *Neuroscience & Biobehavioral Reviews*.
17. **Wise, T.**, Marwood, L., Perkins, A. M., Herane-Vives, A., Williams, S. C. R., Young, A. H., ... & Arnone, D. (2018). A morphometric signature of depressive symptoms in unmedicated patients with mood disorders. *Acta Psychiatrica Scandinavica*
18. **Wise, T.**, Taylor, M. J., Herane-Vives, A., Gammazza, A. M., Cappello, F., Lythgoe, D. J., ... & Arnone, D. (2018). Glutamatergic hypofunction in medication-free major depression: Secondary effects of affective diagnosis and relationship to peripheral glutaminase. *Journal of affective disorders*
19. Arnone, D.* , **Wise, T.***, Walker, C., Cowen, P. J., Howes, O., & Selvaraj, S. (2018). The effects of serotonin modulation on medial prefrontal connectivity strength and stability: A pharmacological fMRI study with citalopram. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*
20. Herane-Vives, A., de Angel, V., Papadopoulos, A., **Wise, T.**, Chua, K. C., Strawbridge, R., ... & Cleare, A. J. (2018). Short-term and long-term measures of cortisol in saliva and hair in atypical and non-atypical depression. *Acta Psychiatrica Scandinavica*
21. Herane-Vives, A., Fischer, S., de Angel, V., **Wise, T.**, Cheung, E., Chua, K. C., ... & Cleare, A. J. (2018). Elevated fingernail cortisol levels in major depressive episodes. *Psychoneuroendocrinology*
22. **Wise, T.***, Marwood, L.* , Perkins, A.M., Herane, A., Joules, R., Lythgoe, D., Luh, W., Williams, S.C.R., Young, A.H., Cleare, A.J., Arnone, D. (2017) Instability of Default Mode Dynamic Functional Connectivity in Major Depression: A Two-Sample Confirmation Study. *Translational Psychiatry*.
23. **Wise, T.**, Radua, J., Via, E., Cardoner, N., Abe, O., Adams, T. M., ... & Arnone, D. (2017). Common and distinct patterns of grey-matter volume alteration in major depression and bipolar disorder: evidence from voxel-based meta-analysis. *Molecular Psychiatry*
24. **Wise, T.**, Arnone, D, Marwood, L, Zahn, R, Lythe, KE, Young, AH (2016). Recruiting for research studies using online public advertisements: examples from research in affective disorders. *Neuropsychiatric Disease and Treatment*
25. **Wise, T.**, Radua, J, Nortje, G, Cleare, A J, Young, A H, & Arnone, D (2016) Voxel-Based Meta-Analytical Evidence of Structural Disconnectivity in Major Depression and Bipolar Disorder. *Biological Psychiatry*
26. Herane-Vives, AH, De Angel, V, Papadopoulos, A, Strawbridge, R, **Wise, T.**, Young, AH, Arnone, D and Cleare, AJ (2015). The relationship between cortisol, stress and psychiatric illness: New insights using hair analysis. *Journal of Psychiatric Research*
27. **Wise, T.**, Cleare, AJ, Herane, A, Young, AH, & Arnone, D (2014). Diagnostic and therapeutic utility of neuroimaging in depression: an overview. *Neuropsychiatric Disease and Treatment*

Under review & preprints

1. Wise, T., Charpentier, C. J., Dayan, P. & Mobbs, D. Modeling the mind of a predator: Interactive cognitive maps support flexible avoidance of dynamic threats. *Under review at Neuron*

2. Tashjian, S. M., **Wise, T.**, & Mobbs, D. Model-based prioritization for acquiring protection. *PsyArXiv (under review at PNAS)*
3. Qi, S., Cross, L., **Wise, T.**, Sui, X., O'Doherty, J., & Mobbs, D. The Role of the Medial Prefrontal Cortex in Spatial Margin of Safety Calculations. *bioRxiv (under review at Nature Communications)*
4. **Wise, T.**, Michelini, G., Zbozinek, T., Hagan, C. C., & Mobbs, D. Development and validation of the Avoidance of Respiratory Viral Infection Scale (ARVIS). *PsyArXiv*

AWARDS AND FUNDING

2021	Anthony Mellows medal, King's College London
2021-2023	King's prize fellowship at King's College London (£112,967)
2021	Association for Psychological Science Rising Star 2021
2020	Merkin Institute Grant to study the psychological impact of the COVID-19 pandemic (co-investigator, \$35,000)
2020	Institute of Advanced Studies at Toulouse multidisciplinary award to study the evolution of social inference (co-investigator, €1500)
2017	Trainee Professional Development Award from the Society for Neuroscience to attend the 2017 SfN annual meeting (\$2500)
2017-2021	Wellcome Trust Sir Henry Wellcome Postdoctoral Fellowship (£250,000)
2016	Award from the Guarantors of Brain to attend the 2016 Society for Neuroscience annual meeting (£800)
2016	Prize for best research proposal at the Max Planck-UCL Center for Computational Psychiatry Symposium and Advanced Course 2016
2016	British Association for Psychopharmacology training member bursary to attend the 2016 summer meeting (£200)
2016	Prize for best graduate teaching assistant on the KCL BSc Psychology degree
2015	Award from the Guarantors of Brain to attend the 2015 Society for Neuroscience annual meeting (£800)
2014	British Association for Psychopharmacology training member bursary to attend the 2014 summer meeting (£200)
2013-2017	National Institute for Health Research Biomedical Research Centre PhD Studentship (£96,000)
2013	Prize for Best Performance on the Cognitive Neuroscience MSc at the University of Sussex

INVITED TALKS

November 2020	Task state reactivation during aversive learning and avoidance. <i>Symposium at Neuromatch 2020</i>
February 2020	Uncertainty, threat, and psychopathology. <i>Goldsmiths, University of London.</i>
April 2019	The neurobiology of mood and anxiety disorders: A computational perspective. <i>Stony Brook university</i>
February 2019	Learning and planning in aversive environments. <i>Phelps Lab, New York University</i>
November 2018	A computational account of threat-related attentional bias. <i>Symposium, Society for Neuroscience Annual Meeting</i>

October 2018	The computational underpinnings of anxiety. <i>Gershman Lab, Harvard University</i>
July 2018	Computations underlying attentional bias towards threat. <i>Symposium, British Association for Psychopharmacology Conference</i>
May 2018	The search for a mechanistic understanding of anxiety disorders. <i>Departmental seminar, University of Zurich</i>
May 2018	The computational basis of threat-related attentional bias. <i>Bach Lab, University of Zurich</i>
July 2017	Neural systems underlying active avoidance behaviour in major depression. <i>Symposium, British Association for Psychopharmacology Conference</i>
May 2016	Understanding affective disorders: Insights from novel neuroimaging methods. <i>Computational psychiatry seminar, UCL</i>

SELECTED CONFERENCE PRESENTATIONS

Wise, T., Michely, J., Dayan, P., Dolan, R.J. The computational basis of threat-related attentional bias. *Poster presentation given at the Society of Biological Psychiatry 2018 annual meeting.*

Wise, T, Marwood L, Williams, SCR, Young, AH, Cleare, AJ, Perkins, AM. Neural Systems Underlying Active Avoidance Behaviour in Major Depression. *Poster presented at the Society for Neuroscience 2017 annual meeting.*

Wise, T, Marwood L, Perkins AM, Herane, A, Williams, SCR, Young, AH, Cleare, AJ, Arnone, D. Morphometric Correlates of Depressive and Hypomanic Symptoms in Major Depression. *Poster presented at the Society of Biological Psychiatry 2017 annual meeting.*

Wise, T & Marwood L, Perkins AM, Herane, A, Joules, R, Lythgoe, D, Luh, W, Williams, SCR, Young, AH, Cleare, AJ, Arnone, D. Major Depression is Associated with Unstable Functional Connectivity in the Default Mode Network. *Poster presented at the Society for Neuroscience 2016 annual meeting.*

Wise, T, Radua, J, Via, E, Cardoner, N, Cleare, AJ, Adams, T, Cole, JH, Pezzoli, S, Kempton, MJ, Fu, CH, Young, AH, Arnone, D. Grey Matter Changes in Major Depression and Bipolar Disorder: Evidence from Voxel-Based Meta-Analysis. *Poster presented at the Society for Neuroscience 2015 annual meeting.*

Wise, T, Radua, J, Via, E, Cardoner, N, Cleare, AJ, Adams, T, Cole, JH, Pezzoli, S, Kempton, MJ, Fu, CH, Young, AH, Arnone, D. Major Depression and Bipolar Disorder show Common and Distinct Patterns of Grey Matter Volume Reduction. *Poster presented at the British Association for Psychopharmacology 2015 annual meeting.*

Wise, T, Radua, J, Herane, A, Young, AH, Cleare, AJ, Arnone, D. Voxel-Based Meta-Analytical Comparison of White Matter Alterations in Major Depression and Bipolar Disorder. *Poster presented at the British Association for Psychopharmacology 2014 annual meeting.*

TEACHING

2022-present	Lecturer and teaching assistant. King's College London Modules taught: Computing for Brain and Cognitive Scientists
2021-present	Guest lecturer. University College London Modules taught: MSc Lecture on the neuroscience of depression
2016	Session leader. Goldsmith's College London

Modules taught: Introduction to Python course

2015-2017 **Graduate teaching assistant.** King's College London Psychology BSc
Modules taught: Psychology and the brain; Research methods; Decision making

2014 **Small group tutorial leader.** King's College London MSc courses
Modules taught: Statistics

SUPERVISION

2018-2019 *Rose Clarke, UCL Neuroscience iBSc (awarded 1st Class)*
2018-2019 *Fatima Chowdhury, UCL Brain Sciences MRes (awarded Distinction)*
2017-2018 *Helen Schmidt, UCL Clinical Neuroscience MSc (awarded Merit)*

SELECTED MEDIA COVERAGE

2020

"Don't eat inside a restaurant" – *The Atlantic*

<https://www.theatlantic.com/politics/archive/2020/11/can-you-get-coronavirus-inside-restaurant/617151/>

Featuring my work on threat perception in the COVID-19 pandemic (Wise et al., 2020, *Royal Society Open Science*)

2020

"Study: COVID-19 may be changing how you perceive personal risk" – *KX net*

<https://www.kxnet.com/news/national-news/study-covid-19-may-be-changing-how-you-perceive-personal-risk/>

Featuring my work on threat perception in the COVID-19 pandemic (Wise et al., 2020, *Royal Society Open Science*)

2020

"As pandemic progressed, people's perceived risks went up" – *Latin American Post*

<https://latinamericanpost.com/34420-as-pandemic-progressed-peoples-perceived-risks-went-up>

Featuring my work on threat perception in the COVID-19 pandemic (Wise et al., 2020, *Royal Society Open Science*)

2019

"Cougar or not?" – *National Geographic*

<https://www.nationalgeographic.com/animals/2019/11/cougar-or-not-twitter-big-cats-united-states/>

Featuring my work on attentional bias towards threat (Wise et al., 2019, *PLOS Computational Biology*)

PEER REVIEW

Ad-hoc reviewing for:

eLife

Emotion

Human Brain Mapping

Molecular Psychiatry

Biological Psychiatry

Biological Psychiatry: Cognitive Neuroscience and Neuroimaging
Neuropsychopharmacology
The Lancet Psychiatry
Bipolar Disorders
Journal of Psychiatry and Neuroscience
Translational Psychiatry
Clinical Psychological Science
British Journal of Psychiatry
Brain and Behavior
Cognitive Neuropsychiatry
European Journal of Neuroscience
Neuroimage: Clinical
PLOS One
Autism Research
SSM Population Health
Schizophrenia Bulletin

MEMBERSHIP OF PROFESSIONAL BODIES

Member of:

Society of Biological Psychiatry
British Association for Psychopharmacology

Past memberships:

International Society for Affective Disorders
Society for Psychophysiological Research
Society for Neuroscience