Miriam C Klein-Flügge, PhD

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Curriculum Vitae

Education/Work history

10/2019 – current	**College Tutor** Corpus Christi College, Oxford
03/2019 – current	**Postdoctoral Research Fellow** Department of Experimental Psychology, Oxford University Laboratory of Prof Matthew Rushworth
09/2014 – 02/2019	**Sir Henry Wellcome Postdoctoral Fellow** Department of Experimental Psychology, Oxford University Supervisor: Prof Matthew Rushworth Title: Contribution of subcortico-frontal interactions to complex real-life decision making
2015 – 2018	**Wolfson College (Oxford), Junior Research Fellow**
09/2015 – 04/2016	Maternity leave
2013 – 2014	**Post-doctoral Research Fellow** Wellcome Trust Centre for Neuroimaging, UCL, London MEG study on information processing during perceptual choice Supervisor: Tim Behrens
2008 - 2013	**4 Year Wellcome Trust PhD in Neuroscience, UCL, London** Interface between human decision making and action execution Supervisors: Sven Bestmann and Karl Friston Short projects with David Attwell, Tim Behrens, and Ray Dolan
06/2012-01/2013	Maternity leave
2007 - 2008	**MSc in Neuroscience, University of Oxford** Distinction; Sherrington Prize for Neuroscience Short projects with Heidi Johansen-Berg, Jan Scholz (FMRIB Centre) and Matthew Rushworth, Rogier Mars (Experimental Psychology)
2003-2006	**BSc Mathematics, Computer Science and Cognitive Science** University of Osnabrück, Germany, First Class Honours Academic Award of the University of Osnabrück
2005-2006	**Study abroad: Mathematics and Psychology** McGill University, Montreal, Canada (GPA: 4.0 out of 4.0)

Peer Review

Nature Neuroscience, Neuron, Nat Comms, Nat Hum Beh, eLife, Current Biology, Plos Biology, Plos Comp Biol, Comms Biology, Journal of Neuroscience, Biological Psychiatry, Scientific Reports, Cerebral Cortex, Journal of Cognitive Neuroscience, NeuroImage, Cortex, Plos One, Quarterly Journal of Experimental Psychology, Journal of Physiology, Frontiers in Decision Neuroscience, Frontiers in Decision Neuroscience, Cogn Aff Behav Neuroscience, Cognition

Internships

2007	Mc Govern Institute of Brain Research, MIT, Boston FMRI study on temporal discounting Nancy Kanwisher and Johannes Haushofer

2005	Centre for Neuroscience and Learning, Ulm, Germany Behavioural study on number acquisition in children

Grants, Fellowships and Awards

2021	**Wellcome Trust Sir Henry Dale Fellowship (2022-2027: £900,000)**
2020	Awarded title of University Research Lecturer
2019	**Seed grant Wellcome Centre for Integrative Neuroimaging (2019-2020, ~15,000)**
2017	**Co-applicant on MRC programme grant (2017-2022; ~3,192,556)** Distributed anatomical circuits for decision making, inference, and learning (PI: Rushworth, co-applicants: M Klein-Flügge, N Kolling, J Sallet) MR/P024955/1
2015	Invitation to the 65th Lindau Nobel Laureate Meeting **Wolfson College Junior Research Fellowship**
2014	Guarantors of Brain travel award for SfN 2014
2013	**Sir Henry Wellcome Postdoctoral Fellowship: £250,000**
2011	FENS travel grant for SfN 2011 Guarantors of Brain travel award for HBM 2011 HBM abstract award for HBM 2011
2010	UCL Graduate School Student Conference Fund for SfN 2010 Guarantors of Brain travel award for HBM 2010 HBM abstract award for HBM 2010
2008-2012	**Wellcome Trust 4-year PhD Studentship (~£150,000)**
2008	Sherrington Prize in Neuroscience for MSc projects
2007-2008	Graduate studentship from German Academic Exchange Service (DAAD) for Msc in Neuroscience
2006	Academic Award of University of Osnabrück for BSc thesis
2005-2007	German National Scholarship for BSc degree (Cusanuswerk)
2003	Studentship from German Academic Exchange Service (DAAD) for Study Abroad at McGill University, Montreal

Journal Publications

Forthcoming (under review/on pre-print servers)

Klein-Flügge MC, Jensen DEA, Verhagen L, Smith S, Rushworth, MFS, Relating markers of mental well-being to specific amygdala connections in humans, *BioRxiv 2020, in revision at Nat Hum Beh*

Accepted/in press

Sel AS, Verhagen L, Angerer K, David R, **Klein-Flügge MC**, and Rushworth MFS. Entraining Corticocortical Plasticity Changes Oscillatory Activity in Action Control and Inhibition. *BioRxiv, 2020, accepted at PNAS*

Peer-reviewed

Takagi Y, Hunt L, Woolrich MW, Behrens TEJ†, **Klein-Flügge MC**† (2021) Adapting non-invasive human recordings along multiple task-axes shows unfolding of spontaneous and over-trained choice [†joint senior authors] *ELife 10 (11 May **2021**): e60988.*

Bongioanni A, Folloni D, Verhagen L, Sallet J, **Klein-Flügge MC**†, Rushworth MFS† (2021) Activation and disruption of a neural mechanism for novel choice in monkeys, *Nature,* 6 January 2021, 1–5, https://doi.org/10.1038/s41586-020-03115-5 [†joint senior authors]

Harrison, OK, Guell X†, **Klein-Flügge MC**†, Barry RL† (2021) Structural and functional connectivity beyond the cortex, *Neuroimage 240: 118379 (invited review)* († equal contribution)

Wittmann, MK, Trudel N, Trier H, **Klein-Flügge MC**, Sel A, Verhagen L, and Rushworth MFS (2021) Causal Manipulation of Self-Other-Mergence in Dorsomedial Prefrontal Cortex, *Neuron 109, no.14: 2353-2361.e11*

Müller T, **Klein-Flügge MC**, Manohar S, Husain M, Apps MAJ (2021) Neural and computational mechanisms of momentary fatigue and persistence in effort-based choice, *Nature Communications 12, no.1:4593*

Jensen DEA, Leoni V, **Klein-Flügge MC**, Ebmeier KP, Suri S (2021), The effect of diet markers on the ageing brain: A systematic review, *Ageing Research Reviews 70 (1 September 2021): 101360*

Lockwood PL*, **Klein-Flügge MC*,** Abdurahman A, Crockett MJ (2020) Model-Free Decision Making Is Prioritized When Learning to Avoid Harming Others, *PNAS* 117, no 44:27719–30 https://doi.org/10.1073/pnas.2010890117 [*shared first authors]

Wittmann MK, Fouragnan E, Folloni D, **Klein-Flügge MC**, Chau B, Khamassi M, Rushworth, MFS (2020) Global reward state affects learning, the raphe nucleus, and anterior insula in monkeys, *Nature Communications* 11, 3771

Trudel N, Scholl J, **Klein-Flügge MC**, Fouragnan E, Tankelevitch L, Wittmann MK, Rushworth MFS (2020) Polarity of subjective uncertainty in ventromedial prefrontal cortex changes with behavioural adaptation *Nat Hum Beh*
Chau BKH, Law C, Lopez-Persem A, Kolling N, **Klein-Flügge MC**, Rushworth MFS (2020) Consistent replication of multiple distractor effects in multiple data sets, *eLife,* 9: e53850

Lockwood PL, **Klein-Flügge MC** (2020) Computational modelling of social cognition and behaviour – a reinforcement learning primer *Social Cognitive and Affective Neuroscience*, https://doi.org/10.1093/scan/nsaa040

Klein-Flügge MC, Wittmann, MK, Shpektor A, Jensen DEA, Rushworth MFS (2019) Multiple associative structures created by reinforcement and incidental statistical learning mechanisms, *Nature Communications*, 10,1:1–15.

Fouragnan EF, Chau BKH, Folloni D, Kolling N, Verhagen L, **Klein-Flügge MC**, Tankelevitch L, Papageorgiou GK, Aubry J, Sallet J, Rushworth MFS (2019) The macaque anterior cingulate cortex translates counterfactual choice value into actual behavioral change *Nature Neuroscience* 22,5: 797–808 (and bioRxiv 2018)

Verhagen L, Gallea C, Folloni D, Constans C, Jensen D, Ahnine H, Roumazeilles L, Santin M, Ahmed B, Lehericy S, **Klein-Flügge MC**, Krug K, Mars RB, Rushworth MFS, Pouget P, Aubry J, Sallet J (2019) Offline impact of transcranial focused ultrasound on cortical activation in primates. *eLife* 8: e40541 (and bioRxiv 2018)

Lockwood PL, Wittmann M, Apps MAJ, **Klein-Flügge MC**, Crockett MJ, Humphreys GW, Rushworth MFS (2018) Associative learning of self and other ownership, *Nature Communications* 9: 4747

Scholl J, **Klein-Flügge MC** (2018) Understanding psychiatric disease by capturing ecologically relevant features of learning and decision-making, *Beh Brain Res* 355:56-75

Klein-Flügge MC, Kennerley SW, Friston K, Bestmann S (2016) Neural signatures of value comparison in human cingulate cortex during decisions requiring an effort-reward trade-off. *J. Neurosci.* 36(39):10002-10015

Haemmerer D*, Bonaiuto J*, **Klein-Flügge MC***, Bikson M, Bestmann S (2016)**,** Selective alteration of human value decisions with medial frontal tDCS is predicted by changes in attractor dynamics [* These authors contributed equally to the work] *Scientific Reports 6,* Article number: 25160

Klein-Flügge MC, Kennerley SW, Saraiva AC, Penny WD, Bestmann S (2015) Behavioral Modeling of Human Choices Reveals Dissociable Effects of Physical Effort and Temporal Delay on Reward Devaluation, *PLoS Comput Biol*.11(3):e1004116

Klein-Flügge MC, Nobbs D, Pitcher JB, Bestmann S (2013) Variability of human cortico-spinal excitability tracks the state of action preparation, *J. Neurosci.* 33(13), 5564 –5572

Klein-Flügge MC*, Barron H*, Brodersen KH, Dolan RJ, Behrens TEJ (2013) Segregated encoding of reward-identity and stimulus-reward associations in human orbitofrontal cortex, *J. Neurosci.* 33(7), 3202–3211 [* These authors contributed equally to the work]

Nicolle A, **Klein-Flügge MC**, Hunt LT, Vlaev I, Dolan RJ, Behrens TEJ (2012) An agent independent axis for executed and modeled choice in medial prefrontal cortex, *Neuron* 75(6), 1114-21

Hall CN, **Klein-Flügge MC**, Howarth C, Attwell D (2012) Oxidative phosphorylation, not glycolysis, powers pre- and postsynaptic mechanisms underlying brain information processing, *J. Neurosci.* 32(26), 8940-51

Klein-Flügge MC, Bestmann S (2012) Time-dependent changes in human cortico-spinal excitability reveal value-based competition for action during decision processing, *J. Neurosci.* 32(24), 8373-82.

Klein-Flügge MC, Hunt LT, Bach DR, Dolan RJ, Behrens TEJ (2011) Dissociable Reward and Timing Signals in Human Midbrain and Ventral Striatum. *Neuron* 72(4), 654-664

Neubert F, **Klein MC** (2010). What is Driving Inhibition-Related Activity in the Frontal Lobe? *J. Neurosci. 30*(14), 4830–4832

Scholz J, **Klein MC,** BehrensTE, Johansen-Berg H (2009). Training induces changes in white-matter architecture, *Nature Neuroscience*, *12*(11), 1370-1371

*** identified by Thomson Reuters as featured article: one of the most-cited papers from the last 2 years

Mars RB, **Klein MC**, Neubert F, Olivier E, Buch ER, Boorman ED, Rushworth MFS (2009). Short-Latency Influence of Medial Frontal Cortex on Primary Motor Cortex during Action Selection under Conflict. *J. Neurosci.*, *29*(21), 6926-6931.

Public Engagement Articles

Scholz J, **Klein MC** (2010) Lernen verbindet, Gehirn & Geist, 2010 [Learning connects: Brain&Mind –magazine; published in German]

Teaching and supervision

2020-current	MSc in Psychological Research Methods: Lecturing in Project Design (Experimental Psycholgy, Oxford)
2020-current	DPhil supervisor for Sankalp Garud (Experimental Psychology, Oxford)
2020-2021	Undergraduate Psychology at Oxford: Tutor for Psychobiology
2019	MSc project supervisor for Mollie Ward (MSc in Neurosience)
2018-current	DPhil supervisor for Daria Jensen (Psychiatry Department, Oxford)
2017-current	Undergraduate Psychology at Oxford: Block Practical in Computational Modelling
2017-current	MSc in Neuroscience at Oxford: Lecturing in the Computational & Cognitive Neuroscience modules
2017	MSc project supervisor for Anna Shpektor (MSc in Neurosience)
2015-2018	DPhil supervisor for Alessandro Bongioanni (Experimental Psychology, Oxford)
2018	Teaching on the FMRIB graduate course: Computational Modelling Module
2017	Supervision of Daria Jensen, Visiting Student
2015	Co-Supervision of Katie Fisher, MSc Cognitive Neuroscience, UCL
2011-2012	Co-Supervision of David Nobbs, MSc Cognitive Neuroscience, UCL
2010-2011	Co-Supervision of Helen Barron, MRC 4 year PhD program, UCL
2003-2006	Teaching mathematical logic for BSc students as part of a research assistant position at the Institute for Cognitive Mathematics, Osnabrück

Invited Talks

Cognitive Computational Neuroscience (CCN) Generative Adversarial Collaborations (GAC) 2020 virtual conference

Neuroeconomics Seminar, Department of Economics, University of Zurich (2020)

4th Quadrennial Meeting on Orbitofrontal Cortex Function (2019) Paris, France

Research Centre for Cognitive Neuroscience at Brunel University London (2019), London UK

Eigth International Symposium on Biology of Decision-Making (SBDM, Oxford 2019)

Beh & Cog Neuroscience seminar, Department of Experimental Psychology, Oxford (2019)

Max Planck Centre for Computational Psychiatry (2018), UCL, UK

Oxford Autumn School in Cognitive Neuroscience (2017), Oxford, UK

Royal Society Fatigue Meeting (2017), Kavli Centre, Buckinghamshire

Paris (2015) Fifth International Symposium on Biology of Decision-Making

Wellcome Trust Centre for Neuroimaging, University College London (2015) Brain meeting lecture

Copenhagen (2015), FENS workshop on Bridging Neural Mechanisms and Cognition

University of Tohoku (2015), Japan, Symposium on prefrontal cortex, learning and memory

Wellcome Trust Centre for Neuroimaging, University College London (2014) Behavioural and neural signatures of choice computation for human effort-based decision making

Department of Economics, University of Zurich (2013) The impact of physical effort on behavioural and neural computations guiding value-based choice

Joint University College London - Johns Hopkins University workshop, London: “Unresolved questions in motor control” (2012) Variability of cortico-spinal excitability tracks the preparatory state of human motor cortex.

Centre for Data Analysis and Modeling, Freiburg (2012) Causal and correlative approaches for understanding interactions between decision and action systems of the human brain

HBM annual meeting, Quebec City (2011) Intra-parietal sulcus links decisions to actions and receives value-modulated inputs from vmPFC. Presentation #2156

Einstein Fellowship Symposium on Decision Making, Berlin (2011) Learning in time and reward: Human ventral tegmental area encodes a temporal difference reward prediction error whereas ventral striatum encodes task-specific learning signals.

HBM annual meeting, Barcelona (2010) Characterization of Prediction Error Signals in the Ventral Tegmental Area under Variable Timings. Presentation #638

IT skills

Microsoft Office (Word, Excel, PowerPoint), Adobe Illustrator, Photoshop, SPSS, SPM2, SPM5, SPM8, FSL for fMRI and DTI analyses, Spike, Signal, Programming: Matlab, Java, C++