Paul Michael Bays

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Education & Employment

1995 – 2000	Downing College, University of Cambridge Natural Sciences (Experimental Psychology) BA Hons
2001 – 2002	Research Fellow & Lab Manager, UCL Institute of Neurology
2003 – 2006	PhD in Neurological Studies, University of London Wellcome Prize Studentship, supervised by Prof. Daniel Wolpert
2006 – 2010	Senior Research Fellow, UCL Institute of Cognitive Neuroscience
2010 – 2015	Wellcome-Beit Prize & Research Career Development Fellow UCL Institute of Neurology
2013 – 2014	Visiting Scholar, Institute of Cognitive and Brain Sciences University of California, Berkeley
2015 –	Wellcome Trust Senior Research Fellow in Basic Biomedical Science Department of Psychology, University of Cambridge

Grants & Awards

Jan 2003	Wellcome Trust Prize Studentship (3 years) *"Modularity of multiple task learning in sensorimotor control"*	£70,352 (US $112,000)
Apr 2008	Guarantors of Brain Travel Grant *Cognitive Neuroscience Society Annual Meeting 2008*	£800 (US $1,275)
Mar 2009	Guarantors of Brain Travel Grant *Cognitive Neuroscience Society Annual Meeting 2009*	£800 (US $1,275)
Jan 2010	Rank Prize Funds Committee Prize *Best contributed paper at Rank Prize Fund Symposium*	£500 (US $800)
Sep 2010	Guarantors of Brain Travel Grant *Society for Neuroscience, Annual Conference 2010*	£800 (US $1,275)
Oct 2010	Wellcome Trust Career Development Fellowship (5 years) *"Prioritization of sensory resources for action in the healthy and lesioned brain"*	£705,745 (US $1.1m)
Oct 2010	Wellcome-Beit Prize Fellowship *Prize awarded for outstanding Wellcome Trust Fellowship applications*	£25,000 (US $40,000)
Oct 2015	Wellcome Trust Senior Research Fellowship (5 years) *"Noise in neural codes: consequences for memory, exploration and decision-making"*	£1,390,747 (US $2.2m)

Academic Supervision

2008	Albert Hoang	Research Assistant
2009	Rebecca Sternschein	Research Assistant
2010	Emma Wu (Dowd)	MSc Project
2010 – 2012	Muy-Cheng Peich	MSc Project
2010 – 2012	Louise Marshall	Research Assistant
2011 – 2014	Loic Matthey	PhD Student (secondary supervision)
2012	Maike Heider	MSc Project
2013 – 2015	Leonie Oostwoud-Wijdenes	Post-Doctoral Research Associate
2015 –	Sebastian Schneegans	Post-Doctoral Research Associate
2015 – 2016	Ben Dowding	Research Technician / Programmer
2016 –	David Aagten-Murphy	Post-Doctoral Research Associate
2016 – 2017	Ivan Tomić	Visiting PhD student
2017 – 2018	Will Harrison	Post-Doctoral Research Associate
2017 –	Robert Taylor	Post-Doctoral Research Associate
2017	Svea Schröder	Visiting PhD student
2018	Lisa Kröll	MSc Project

Undergraduate projects (2009 – 2018): Raquel Catalao, Natalie Wee, Gemma Cheng, Janna Golden, Akshay Jagadeesh, Charlotte Diss, Faiyaz Islam, Muhammad Zachry, Leo Penrose, Srishti Agarwal, Anthony Yew-Kheen Tang, Katherine Irwin.

Teaching

2010 – 2013 Guest Lecturer, University College London MSc in Clinical Neuroscience (1L)
2016 – Sutton Trust Summer School, University of Cambridge (1L)
2016 – Affiliated Lecturer, University of Cambridge, Dept of Psychology
Psychological & Behavioural Sciences Part I, *Neuroscience of Decision Making* (3L)
Natural Sciences Part II, *Working Memory* (2L)
+ Supervisions (small-group teaching, ~10/yr)

Professional Service

2013	Examination of MPhil/PhD upgrade: Nish Malalasekera, University College London
2016 –	Research Ethics Committee, University of Cambridge, Dept of Psychology
2016 –	Wellbeing, Equality & Diversity Committee, University of Cambridge, Dept of Psychology
2016 –	Coordinating Supervisor, Selwyn College, University of Cambridge
2017	Guest Reviewing Editor, eLife
2017	Scientific Committee, European Conference on Visual Perception (ECVP) 2017
2017	Examination of 1st year PhD reports: Saana Korkki, Si Mon Kwon, University of Cambridge
2017	PhD Examination: Elisa Zamboni, University of Nottingham
2017 –	Chair of Computing Management Group, University of Cambridge, Dept of Psychology
2017	PhD Examination: Muhammet Ikbal Sahan, University of Ghent, Belgium
2018	PhD Examination: Mohsen Sadeghi, University of Cambridge, Dept of Engineering

Peer Review: Grants

Agence Nationale de la Recherche, France
The Brain Tumour Charity, UK
Fund for Scientific Research, Belgium
Israel Science Foundation
National Science Foundation (NSF), USA
New York University, USA
Swiss National Science Foundation
Wellcome Trust, UK

Peer Review: Journal Articles

Attention, Perception & Psychophysics
Behavior Research Methods
Brain
Cerebral Cortex
Cognition
Cogn., Affect. & Behav. Neuroscience
Cognitive Neuropsychology
Cognitive Psychology
Cortex
Current Biology
Current Directions in Psychological Science
eLife
Experimental Brain Research
IEEE Transactions on Sys., Man and Cybern.
Journal of Cognitive Neuroscience
Journal of Computational Neuroscience
Journal of Experimental Psychology: General
Journal of Experimental Psychology: H. P. P.
Journal of Experimental Psychology: L. M. C.
Journal of Gerontology: Psychological Sciences
Journal of Memory & Language
Journal of Neurophysiology
Journal of Neuroscience
Journal of Vision
Memory & Cognition
Nature Communications
Nature Human Behaviour
Neuroimage
Neuropsychologia
Neuroreport
Perception
PLOS Computational Biology
PLOS ONE
PNAS
Psychological Research
Psychological Review
Psychological Science
Psychology & Aging
Psychonomic Bulletin & Review
Quarterly Journal of Experimental Psychology
Science
Scientific Reports
Trends in Cognitive Sciences (TICS)
Vision Research
Visual Cognition

Publications

1. Shergill SS, **Bays PM**, Frith CD & Wolpert DM* (2003)
   Two eyes for an eye: The neuroscience of force escalation
   Science 301: 187

2. Caithness G, Osu R, **Bays P**, Chase H, Klassen J, Kawato M, Wolpert DM & Flanagan JR* (2004)
   Failure to consolidate the consolidation theory of learning for sensorimotor adaptation tasks
   Journal of Neuroscience 24(40): 8662–8671

3. **Bays PM***, Wolpert DM & Flanagan JR (2005)
   Perception of the consequences of self-action is temporally tuned and event-driven
   Current Biology 15: 1125–1128

4. **Bays PM***, Flanagan JR & Wolpert DM (2005)
   Interference between velocity- and position-dependent force-fields indicates that tasks depending on different kinematic parameters compete for motor working memory
   Experimental Brain Research 163: 400–405

5. Shergill SS*, Samson G, **Bays PM**, Frith CD & Wolpert DM (2005)
Evidence for sensory prediction deficits in schizophrenia
American Journal of Psychiatry 162: 2384–2386

6. **Bays PM***, Flanagan JR & Wolpert DM (2006)
Attenuation of self-generated tactile sensations is predictive not postdictive
PLOS Biology 4(2): e28

7. **Bays PM*** & Wolpert DM (2006)
Actions and consequences in bimanual interaction are represented in different coordinate systems
Journal of Neuroscience 26(26): 7121–7126

8. **Bays PM*** & Wolpert DM (2007)
Computational principles of sensorimotor control that minimise uncertainty and variability
Journal of Physiology 578(2): 387–396

9. Voss M*, **Bays PM**, Rothwell JC & Wolpert DM (2007)
An improvement in perception of self-generated tactile stimuli following theta-burst stimulation of primary motor cortex
Neuropsychologia 45(12): 2712–2717

10. Tcheang L*, **Bays PM**, Ingram JN & Wolpert DM (2007)
Simultaneous bimanual dynamics are learned without interference
Experimental Brain Research 183(1): 17–25

11. **Bays PM** & Wolpert DM (2007)
Predictive attenuation in the perception of touch
Attention & Performance XXII: Sensorimotor Foundations of Higher Cognition
Oxford University Press (Eds: P. Haggard, Y. Rosetti, M. Kawato)

12. **Bays PM*** & Husain M (2007)
Spatial remapping of the visual world across saccades
Neuroreport 18(12): 1207–1213

13. Hoang Duc A, **Bays PM** & Husain M* (2008)
Eye movements as a probe of attention
Progress in Brain Research 171: 403–411

14. **Bays PM*** & Husain M (2008)
Dynamic shifts of limited working memory resources in human vision
Science 321: 851–854

15. **Bays PM*** & Husain M (2009)
Response to comment on "Dynamic shifts of limited working memory resources in human vision"
Science 323: 877

16. **Bays PM***, Catalao RFG & Husain M (2009)
The precision of visual working memory is set by allocation of a shared resource
Journal of Vision 9(10): 7, 1–11

17. **Bays PM***, Singh-Curry V, Gorgoraptis N, Driver J & Husain M (2010)
Integration of goal- and stimulus-related visual signals revealed by damage to human parietal cortex
Journal of Neuroscience 30(17): 5968-5978

18. **Bays PM*** (2010)
Precision versus capacity of working memory in schizophrenic and healthy individuals
Archives of General Psychiatry Online: 16 July 2010

19. **Bays PM***, Wu EY & Husain M (2011)
Storage and binding of object features in visual working memory
Neuropsychologia 49: 1622–1631

20. Gorgoraptis N*, Catalao RFG, **Bays PM** & Husain M (2011)
Dynamic updating of working memory resources for visual objects
Journal of Neuroscience 31(23): 8502–8511

21. **Bays PM***, Gorgoraptis N, Wee N, Marshall L & Husain M (2011)
Temporal dynamics of encoding, storage and reallocation of visual working memory
Journal of Vision 11(10): 6, 1–5

22. Zokaei* N, Gorgoraptis N, Bahrami B, **Bays PM** & Husain M (2011)
Precision of working memory for visual motion sequences and transparent motion surfaces
Journal of Vision 11(14): 2, 1–18

23. Adam R, **Bays PM** & Husain M* (2012)
Rapid decision-making under risk
Cognitive Neuroscience 3(1): 52–61

24. Burnett Heyes S*, Adam RJ, Urner M, van der Leer L, Bahrami B, **Bays PM** & Husain M (2012)
Impulsivity and rapid decision-making for reward
Frontiers in Psychology 3: 153

25. Burnett Heyes S*, Zokaei N, van der Staaij I, **Bays PM** & Husain M (2012)
Development of visual working memory precision in childhood
Developmental Science 15(4): 528–39

26. **Bays PM*** & Husain M (2012)
Active inhibition and memory promote exploration and search of natural scenes
Journal of Vision 12(8): 8, 1–18

27. Pertzov Y*, **Bays PM**, Joseph S & Husain M (2012)
Rapid forgetting prevented by retrospective attention cues
Journal of Experimental Psychology: Human Perception & Performance 39(5): 1224–31

28. Marshall L & **Bays PM*** (2013)
Obligatory encoding of task-irrelevant features depletes working memory resources
Journal of Vision 13(2): 21, 1–13

29. Shergill SS*, White T, Joyce DW, **Bays PM**, Wolpert DM & Frith C (2013)
Modulation of somatosensory processing by action
Neuroimage 70, 356–362

30. Jacquin-Courtois S*, **Bays PM**, Salemme R, Leff AP & Husain M (2013)
Rapid compensation of visual search strategy in patients with chronic visual field defects
Cortex 49(4): 994–1000

31. Adam R, Leff A, Sinha N*, Turner C, **Bays P**, Draganski B & Husain M (2013)
Dopamine reverses reward insensitivity in apathy following globus pallidus lesions
Cortex 49(5): 1292–303

32. Peich M-C, Husain M, **Bays PM*** (2013)
Age-related decline of precision and binding in visual working memory
Psychology & Aging 28(3): 729-43

33. Shergill SS*, White TP, Joyce DW, **Bays PM**, Wolpert DM & Frith CD (2014)
Functional magnetic resonance imaging of impaired sensory prediction in schizophrenia
JAMA Psychiatry 71(1): 28-35

34. Pearson B*, Raskevicius J, **Bays PM**, Pertzov Y & Husain M (2014)
Working memory retrieval as a decision process
Journal of Vision 14(2): 2

35. Ma WJ*, Husain M & **Bays PM** (2014)
Changing concepts of working memory
Nature Neuroscience 17(3): 347-356

36. **Bays PM*** (2014)
Noise in neural populations accounts for errors in working memory
Journal of Neuroscience 34(10): 3632-3645

37. Matthey L*, **Bays PM** & Dayan P (2015)
A probabilistic palimpsest model of visual short-term memory
PLOS Computational Biology 11(1): e1004003

38. Ong Y-H, Jacquin-Courtois S, Gorgoraptis N, **Bays PM**, Husain M & Leff AP* (2015)
Eye-Search: a web-based therapy that improves visual search in hemianopia
Annals of Clinical and Translational Neurology 2(1): 74-78

39. Oostwoud Wijdenes L*, Marshall L & **Bays PM** (2015)
Evidence for optimal integration of visual feature representations across saccades
Journal of Neuroscience 35(28): 10146-10153

40. **Bays PM*** (2015)
Spikes not slots: noise in neural populations limits working memory
Trends in Cognitive Sciences 19(8): 431-438

41. **Bays PM*** (2016)
Evaluating and excluding swap errors in analogue tests of working memory
Scientific Reports 6: 19203

42. Schneegans S & **Bays PM*** (2016)
No fixed item limit in visuospatial working memory
Cortex 83: 181-193

43. Oostwoud Wijdenes L*, Ivry RB & **Bays PM** (2016)
Competition between movement plans increases motor variability: evidence of a shared resource for movement planning
Journal of Neurophysiology 116(3): 1295-303

44. **Bays PM*** (2016)
A signature of neural coding at human perceptual limits
Journal of Vision 16(11): 4

45. Richter FR†, Cooper RA†, **Bays PM** & Simons JS* (2016)
Distinct neural mechanisms underlie the success, precision, and vividness of episodic memory
eLife 5: e18260

46. Cooper RA, Richter FR, **Bays PM**, Plaisted-Grant KC, Baron-Cohen S & Simons JS* (2017)
Reduced hippocampal functional connectivity during episodic memory retrieval in autism
Cerebral Cortex 27: 888-902

47. **Bays PM*** & Dowding BA (2017)
Fidelity of the representation of value in decision-making
PLOS Computational Biology 13(3): e1005405

48. Schneegans S* & **Bays PM** (2017)
Neural architecture for feature binding in visual working memory
Journal of Neuroscience 37(14): 3913-3925

49. Aagten-Murphy D* & **Bays PM** (2017)
Automatic and intentional influences on saccade landing
Journal of Neurophysiology 118: 1105-1122

50. Schneegans S* & **Bays PM** (2017)
Restoration of fMRI decodability does not imply latent working memory states
Journal of Cognitive Neuroscience 29(12): 1977-1994

51. **Bays PM*** & Taylor R (2018)
A neural model of retrospective attention in visual working memory
Cognitive Psychology 100: 43-52

53. **Bays PM*** (2018)
Reassessing the evidence for capacity limits in neural signals related to working memory
Cerebral Cortex 28(4): 1432-1438

52. Harrison WJ* & **Bays PM** (2018)
Visual working memory is independent of the cortical spacing between memoranda
Journal of Neuroscience 38(12): 3116-3123

53. Schneegans S* & **Bays PM** (2018)
Drift in neural population activity causes working memory to deteriorate over time
Journal of Neuroscience 38(21): 4859-4869

*Corresponding author †Equal contributions

Invited Talks & Seminars

Oct 2007	British Neuropsychological Society Meeting, London, UK	Invited talk
Jan 2008	Computational and Biological Learning Labs, University of Cambridge, UK	Invited talk
Feb 2008	School of Psychology, University of Nottingham, UK	Seminar
Sep 2008	Wellcome Trust Centre for Neuroimaging, London, UK	Seminar
Oct 2008	Department of Experimental Psychology, Ghent University, Belgium	Seminar
May 2009	Department of Psychology, Royal Holloway, University of London, UK	Seminar
Jun 2009	Workshop on Gaze Patterns in Dynamic Displays, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany	Invited talk
Nov 2009	Department of Psychology, University of York, UK	Seminar
Jan 2010	Rank Prize Fund Symposium: “What Determines Where and When We Look?”, Grasmere, UK	Invited talk
Feb 2010	School of Optometry and Vision Science, University of Bradford, UK	Seminar
Jun 2010	MRC Cognition and Brain Sciences Unit, Cambridge, UK	Seminar
Jun 2010	Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany	Seminar
Sep 2010	School of Psychology, Bangor University, UK	Seminar
Nov 2010	Beit Memorial and Wellcome-Beit Prize Annual Meeting, Wellcome Trust, UK	Invited talk
Oct 2010	Department of Experimental Psychology, University of Bristol, UK	Seminar
Mar 2011	Vision for Action Symposium, University College London, UK	Invited talk
Aug 2011	Working Memory Symposium, 5th International Conference on Memory, York, UK	Invited talk

Nov 2011	Institute of Movement Neuroscience “Open Day”, University College London, UK	Invited talk
Nov 2011	Beit Memorial and Wellcome-Beit Prize Annual Meeting, Wellcome Trust, UK	Invited talk
Oct 2012	Institute of Cognitive and Brain Sciences, University of California, Berkeley, CA, USA	Seminar
Dec 2012	Cognitive Psychology Institute, University of Saarland, Germany	Seminar
Apr 2013	Visual Neuroscience Group, University of Nottingham, UK	Invited talk
May 2013	Symposium on “The Structure of Visual Working Memory”, Vision Sciences Society Annual Meeting, Naples, FL, USA	Invited talk
Jul 2013	Workshop on “Neural Mechanisms of Working Memory Limits”, Organization for Computational Neurosciences (CNS) Annual Meeting, Paris, France	Invited talk
Oct 2013	Vision Science, University of California, Berkeley, CA, USA	Seminar
Dec 2013	Centre for Neural Science, New York University, NY, USA	Seminar
Apr 2014	Cognitive Neuroscience Group (D’Esposito lab), Helen Wills Neuroscience Institute, University of California, Berkeley, CA, USA	Invited talk
May 2014	Centre for Mind and Brain, University of California, Davis, CA, USA	Seminar
Jul 2014	Department of Psychology, University of Cambridge, UK	Seminar
Oct 2014	Smith Kettlewell Eye Research Institute, San Francisco, CA, USA	Seminar
Jan 2015	Department of Psychology, University of California, San Diego, CA, USA	Seminar
Feb 2015	Department of Psychology, Columbia University, New York, NY, USA	Seminar
Feb 2015	Department of Cognitive Science, University of California, San Diego, CA, USA	Seminar
Apr 2015	Department of Psychology, University of Zurich, Switzerland	Seminar
Jul 2015	Conference on “Adaptive Brains and Machines”, University of Cambridge, UK	Invited talk
Oct 2015	Bernstein Sparks Workshop on Active Perceptual Memory, Berlin, Germany	Invited talk
Dec 2015	Beit Memorial and Wellcome-Beit Prize Annual Meeting, Wellcome Trust, UK	Keynote
Dec 2015	Neuro-Cognitive Psychology (Master Program) Day, Department of Psychology, University of Munich, Germany	Keynote
Jan 2016	Laboratoire Psychologie de la Perception, Université Paris Descartes, France	Seminar
Jan 2016	Computational and Biological Learning Labs, University of Cambridge, UK	Invited talk
Feb 2016	Adaptive Brain Lab, Department of Psychology, University of Cambridge, UK	Invited talk
Feb 2016	2nd International Workshop on Cognitive Neuroscience Robotics, Osaka, Japan	Invited talk
Sep 2016	Oxford Autumn School in Cognitive Neuroscience, University of Oxford, UK	Invited talk
Oct 2016	Donders Institute for Brain, Cognition & Behaviour, Nijmegen, The Netherlands	Seminar
Dec 2016	Wellcome Trust Researchers Meeting: Neuroscience & Mental Health, Berkhamsted, UK	Invited talk
Feb 2017	Visual Working Memory Symposium, New York University Abu Dhabi, United Arab Emirates	Invited talk
Aug 2017	Symposium on “Mnemonic Priorities: Dynamic Interplays Between Attention and Working Memory”, International Conference for Cognitive Neuroscience (ICON), Amsterdam, The Netherlands	Invited talk
Mar 2018	Workshop on “Circuit Dynamics in Working Memory”, Computational and Systems Neuroscience (Cosyne) Annual Meeting, Denver, CO, USA	Invited talk