

Joshua Henk Balsters

Curriculum Vitae

Trinity College Institute of Neuroscience
Lloyd Building
Trinity College Dublin
Dublin 2, IRELAND

Phone: +353 1 896 1504
Email: balsterj@tcd.ie
or Email: jhbalsters@gmail.com
<http://www.pc.rhul.ac.uk/staff/j.balsters>

Throughout my PhD (Royal Holloway University of London, 2009) my research focused on three main areas: **(i) Prefrontal-cerebellar information processing, (ii) Comparative neuroanatomy, and (iii) Aspects of fMRI methods.** Outside of my doctoral research, I have also provided technical expertise in fMRI methodology in investigations of Theory of Mind, reward processes in the basal ganglia, and preparatory activity in the premotor system. These collaborations have given me some experience in using other methods such as TMS, simultaneous EEG-fMRI, and new statistical methods to investigate connectivity in fMRI data (e.g. coherence analyses and granger causality).

I am currently a postdoctoral research fellow at Trinity College Institute of Neuroscience working on 'Translational research accelerating the development of novel therapies for Alzheimer's disease'. Specifically my role is to establish simultaneous EEG-fMRI at two sites (TCIN and St James' Hospital) with the goal of investigating the differential effects of aging, dementia (MCI), and Alzheimer's medications on cognitive decline.

Research Experience

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|--------------|---|
| 2008-Present | Postdoctoral Research Fellow

'Translational research accelerating the development of novel therapies for Alzheimer's disease'
Institution: Trinity College Dublin (employed by GSK)
Advisors: Prof Ian Roberston, Dr Arun Bokde, Dr Paul Dockree |
| 2005-2009 | PhD Cognitive Neuroscience

Thesis: 'Cerebellar Contributions to Cognition: Anatomy and Function'.
Institution: Royal Holloway, University of London
Supervisor: Dr Narendra Ramnani.
Advisor: Professor Andy Smith

Examiners: Professor John Stein and Professor Patrick Haggard |
| 2002-2005 | BSc (Hons) Psychology

Grade: Upper Second Class Honours
Institution: Royal Holloway, University of London |

Research Skills

- **Experimental setup and computing skills**
 - Fluent with Windows, Mac, Linux Operating systems
 - Building and fixing broken PCs (including soldering components)
 - Familiarity with networking issues (VPNs, remote access computing)
 - Familiarity with CED 1401 setup
 - Programming experience using MATLAB, HTML, Java
 - Programming in an experimental context
 - Presentation (Neurobehavioural Systems Inc., USA),
 - Spike2 (Cambridge Electronic Design, UK)
 - SPM hacks/batch codes
- **Data acquisition**
 - Siemens MRI console operation
 - Optimizing data quality
 - Pre-scanning parameter optimization
 - Advanced pre-processing e.g. unwarping using field maps

- **Data analysis**
 - Analysis of behavioural psychophysics using SPSS
 - Structural MRI
 - Structural masking using Caret, FSL, MRICro, MRICroN and SUIT toolbox
 - Functional MRI
 - Experience using SPM, FSL, and mrVista (Stanford tools package)
 - Experience with advanced analysis techniques
 - Cortical flat-mapping
 - Flexible modeling of fMRI data using a fourier basis set,
 - Parametric modulation of fMRI data
- **Neuroanatomy**
 - Familiarity with gross morphology, cytoarchitecture, and connectional anatomy in both human and nonhuman primates

Additional Techniques – Techniques used whilst working on projects outside of my thesis.

- Basics of TMS (with the guidance of Dr. Schippling, Dr. Ramnani, and Prof. Rothwell)
- Combined EEG-fMRI (with the guidance of Dr. Saalman, Dr. Ramnani, and Prof. Wright)
- The application of coherence and granger analyses to fMRI data (with the guidance of Dr. Saalman)

Teaching Experience

- First Year Undergraduate Tutorials (2007/08)
- Supervision of Summer Research Assistant (2007)
 - Comparative Anatomy project, E. Cussans
- Third Year Undergraduate Project Tutorials (2006/07)
 - How to use Linux
 - Preprocessing in SPM– theory and practice
 - Contrasts and classical inference in SPM – theory and practice
 - Group level statistics in SPM – theory and practice

Awards – Travel grants and training bursaries

- Organization for Human Brain Mapping Travel Award (2007, 2008)
- Physiological Society Travel Grant (2006, 2007, 2008)
- Guarantors of Brain Travel Grant (2006)
- Autumn School in Cognitive Neuroscience Bursary (2005) – used to attend workshop mentioned below
- Royal Holloway/St Georges Joint Research Studentship (2005)
- Undergraduate Research Bursary in Science, Nuffield Foundation (2004)

Professional Memberships

- British Neuroscience Association
- Organization for Human Brain Mapping
- The Physiological Society
- Society for Neuroscience

Lab Visits and Workshops Attended

- SPM Course, ICN, UCL (2008)
- Matlab Training Course, Royal Holloway University of London (2008)
- Invitation to Bangor University, UK, to collaborate with Dr. J Diedrichsen (2007)
- Mathematics of Brain Imaging, FIL, UCL (2006)
- Invitation to Emory University, USA, to collaborate with Dr. J Rilling (2006)
- Invitation to Sobell Department of Motor Neuroscience and Movement Disorders, Institute of Neurology, UCL, UK, to collaborate with Dr. S Schippling, Dr. N Ramnani, and Prof. J Rothwell (2005)
- Autumn School in Cognitive Neuroscience, University of Oxford (2005)

Peer-reviewed Publications

Balsters, J.H., Henson, R.N., & Ramnani, N. Insufficiency of the informed basis set for fMRI analysis. *In Prep.*

Balsters, J.H. and Ramnani, N. Automatic Cognition: Cerebellar plasticity during the automatization of rule-based information. *In Prep.*

Pierno, A.C., Castiello, U., **Balsters, J.H.**, & Ramnani, N. Reward omissions become negative reinforcers in the human nucleus accumbens. *In Prep.*

Balsters, J.H. and Ramnani, N. Automatic Cognition: Cerebellar plasticity during the automatization of rule-based information. *Under Review.*

Balsters, J.H., Cussans, E., Diedrichsen, J., Phillips, K., Preuss, T.M., Rilling, J.K., & Ramnani, N. Evolution of the Cerebellar Cortex: Selective expansion of prefrontal-projecting lobules. *Under Review.*

Diedrichsen, J., **Balsters, J.H.**, Flavell, J., Cussans, E., & Ramnani, N. (2009). A probabilistic MR atlas of the human cerebellum. *Neuroimage*, 46(1), 39-46.

Balsters, J.H. and Ramnani, N. (2008). Symbolic representations of action in the human cerebellum. *Neuroimage*, 43(2), 388-98.

Smith, A.T., Singh, K.D. & **Balsters, J.H.** (2007). A comment on the severity of the effects of non-white noise in fMRI time-series. *Neuroimage*, 36(2), 282-8.

Conference Proceedings

(* Selected for oral presentations)

Balsters, J.H., and Ramnani, N. (2009). Cerebellar and Prefrontal Contributions to Rule Learning: Parametric Modulation of Associative Strength. Organization for Human Brain Mapping Abstracts

Diedrichsen, J., **Balsters, J.H.**, Flavell, J., Cussans, E., & Ramnani, N. (2009). A probabilistic MR atlas of the human cerebellum. Organization for Human Brain Mapping Abstracts

* Apps, M.A., **Balsters, J.H.**, & Ramnani, N. (2009). Anterior Cingulate Cortex: Monitoring the uncertain outcomes of other's decisions. Organization for Human Brain Mapping Abstracts

Saalmann, Y., **Balsters, J.H.**, Wright, M.J., & Ramnani, N. (2009). Rules, Prefrontal-Cerebellar Connectivity and Granger Causality. Organization for Human Brain Mapping Abstracts

Apps, M.A., **Balsters, J.H.**, & Ramnani, N. (2009). Anterior Cingulate Cortex: Monitoring the uncertain outcomes of other's decisions. British Neuroscience Association

Balsters, J.H., and Ramnani, N. (2009). Cerebellar and Prefrontal Contributions to Rule Learning: Parametric Modulation of Associative Strength. British Neuroscience Association

Balsters, J.H., Cussans, E., Diedrichsen, J., Phillips, K., Preuss, T.M., Rilling, J.K., & Ramnani, N. (2009). Evolution of the Cerebellar Cortex: Selective expansion of prefrontal-projecting lobules. British Neuroscience Association

Balsters, J.H. and Ramnani, N. (2008). Cerebellum and Cognition: Plasticity during the automatization of rule-based information processing. *Organization for Human Brain Mapping Abstracts.*

Balsters, J.H., Cussans, E., Diedrichsen, J., Phillips, K., Preuss, T.M., Rilling, J.K., & Ramnani, N. (2008). Evolution of the Cerebellar Cortex: Selective expansion of prefrontal-projecting lobules. *Organization for Human Brain Mapping Abstracts*

Saalmann, Y., **Balsters, J.H.**, Wright, M.J., & Ramnani, N. (2008). Learning rule changes between the prefrontal cortex and cerebellum. *Organization for Human Brain Mapping Abstracts*

Diedrichsen, J., **Balsters, J.H.**, Cussans, E., & Ramnani, N. (2008). A probabilistic atlas of the lobular organisation of the human cerebellum. *Neural Control of Movement*

* **Balsters, J.H.**, and Ramnani, N. (2007). Symbolic information activates prefrontal-projecting areas of the cerebellum. *Organization for Human Brain Mapping Abstracts*

* **Balsters, J.H.**, and Ramnani, N. (2006). Preparatory activity in the human premotor cortex: comparing arbitrary and direct instructions. *Society for Neuroscience*

* Ramnani N., Pierno A.C., **Balsters J.H.** & Castiello, U. (2006). Monetary reward error activates the human nucleus accumbens when contingent on behaviour. *Society for Neuroscience*

* **Balsters, J.H.**, and Ramnani, N. (2006). Cerebellar Activity and Motor Preparation: Preparatory activity evoked by arbitrary instructions. *Young Physiologists Symposium*

Smith A.T., **Balsters J.H.**, & Singh, K.D. (2005). Spurious BOLD activation from low-frequency noise. *Organization for Human Brain Mapping Abstracts*: 585.

Invited Talks

Cerebellum (huh!) What is it good for? (2009). *Neurosoc seminar series, Trinity College Dublin.*

Field maps: What are they good for? (2008). *CUBIC Neuroimaging Methods Meetings, Royal Holloway University of London.*

Automatic Cognition: An event-related fMRI study. (2007). *CUBIC Neuroimaging Methods Meetings, Royal Holloway University of London.*

Abstract information processing in ‘prefrontal zones’ of the cerebellum. (2007). *CUBIC Away Day, Royal Holloway University of London.*

Activity in the human cerebellum time-locked to the execution of skilled cognitive operations. (2006). *2nd St George’s Research Day, St George’s University of London.*

The human cerebellum and cognition? Evidence from fMRI. (2006). Postgraduate Convention, *Department of Psychology, Royal Holloway University of London.*

Referees

Dr Narender Ramnani
(PhD Supervisor)

Department of Psychology
Royal Holloway University of London
Egham, Surrey TW20 0EX
UK

Tel: +44 (0) 1784 443519
Email: n.ramnani@rhul.ac.uk

Prof Andy Smith
(PhD Advisor)

Department of Psychology
Royal Holloway University of London
Egham, Surrey TW20 0EX
UK

Tel: +44 (0) 1784 434347
Email: a.t.smith@rhul.ac.uk

Dr Yuri Saalman
(Colleague)

3-C-5 Green Hall,
Princeton University,
Princeton, NJ 08540
USA

Tel: +1 609 258 8318
Email: saalman@princeton.edu