

BIOGRAPHICAL SKETCH

NAME Breakspear, Michael	POSITION TITLE Professor
eRA COMMONS USER NAME MICHAEL_BREAKSPEAR	

INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Sydney	Ph.D.	2003	Psychological Medicine
University of Sydney	MB BS	1994	Medicine/Surgery
University of Sydney	BSc(Hons 1)	1992	Physiology
University of Sydney	BA (Hons 1)	1990	Mathematics/Philosophy
Royal Australian and New Zealand College of Psychiatrists	FRANZCP	2010	Clinical Psychiatry

A. Personal Statement.

I am a psychiatrist with a PhD in computational neuroscience. I undertook postdoctoral studies in the School of Physics at the University and The Black Dog Institute, before joining the academic staff in the School of Psychiatry at UNSW. Since 2009, I have been the inaugural Chair of the Division of Mental Health Research at the Queensland Institute of Medical Research. This is an exciting initiative that will seek to improve our understanding, diagnosis and management of the major mental illnesses. My expertise lies in both computational and experimental neurosciences and have made contributions to “system’s neuroscience” that sees the brain as a complex, dynamical network. I hope this framework will underpin a novel generation of diagnostic brain imaging tests in clinical psychiatry.

I am the chief named investigator of a large collaborative grant awarded by the Australian Research Council in 2007 for AU\$3.3 million. This grant, called "Thinking Systems - Autonomous Control of the Hand" brings together 11 experimental and computational neuroscientists, computer scientists, biomedical engineers and clinicians from Australia's top Universities and Medical Institutes. Insights and collaborations gained through this project are complimentary to those proposed in the present grant, although the focus in the Thinking Systems grant is more specific to motor control of the hand.

My background and expertise and very well suited to the network-based approach advocated in our BrainNRG proposal. In addition, my background in both clinical practise and basic science will assist us to translate our basic sciences advances into clinically meaningful outcomes.

B. Positions and Honors.

Positions and Employment

Clinical:

1998-2003 Registrar in Psychiatry, South East Sydney Area Health Service
 2003-2004 Senior Registrar in Psychiatry, St Vincent’s Hospital, Sydney
 2006-2008 Advanced Trainee in Psychiatry, The Black Dog Institute, Sydney

Academic:

2002-2005 Guest Lecturer, NSW Institute of Psychiatry
 Supervisor - Talented students programme, School of Physics
 Guest Lecturer - Doctorate Programme, University of Sydney

2005-2006 Senior Research Fellow & Conjoint Lecturer – School of Psychiatry, UNSW
 2007-present Associate Professor, School of Psychiatry, University of NSW, & The Black Dog Institute, AUSTRALIA.
 2008-present Chair, Division of Mental Health Research, Queensland Institute for Medical Research, AUSTRALIA.
 2010-present Professor, Griffith Medical Research College, AUSTRALIA.

Other Experience and Professional Memberships

2007- present Member, Society for Neuroscience
 2008- present Associate Editor, NeuroImage
 2010- present Associate Editor, PLoS ONE
 2010- present Fellow, Royal Australian and New Zealand College of Psychiatrists (FRANZCP)

Honors

1990 First Place, National Undergraduate Essay in Neuroscience (Australian Society for Neuroscience)
 1992 International Student Exchange Scholarship (UCSC) (\$5000)
 1993 Tapping Bequest for Medical Elective Term (\$5000)
 2000 University of Sydney, Faculty of Medicine Travel Grant (\$5000) Australian Post-Graduate Research Award (\$17 267 p.a. for 3 years)
 2001 Australian Institute of Physics Award for Postgraduate Excellence
 2002 NSW Institute of Psychiatry Research Fellowship (\$32 000)
 University of Sydney SESQUI Post-Doctoral Fellowship (\$23 647)
 Eli-Lily Scholars Award for Best Presentation by an Early Career Researcher, Australasian Schizophrenia Congress
 Organon Award for Best Early Career Researcher in Australasian Psychiatry (Australasian Society for Psychiatric Research)
 2003 Pfizer Neuroscience Research Grant (\$44 000)
 Neuropsychiatry Interest Group Travel Bursary (\$1000)
 RANZCP Award for Best Paper by a Psychiatry Trainee
 2004 American Psychiatric Association "Young Minds in Psychiatry" International Award recipient (\$60 000)
 2005 Chief Investigator, James McDonnell Foundation Collaborative Gift (Total for group, US\$4million; Subtotal for MB, AU\$614,000 over 3 years)
 Young Investigator Research Award, RANZCP (\$6,000)
 2007 Organon Young Psychiatrist Award, RANZCP (\$6,000)
 2008 Chief Investigator, National Health and Medical Research Council Project Grant, "Orientation-specific modulation in human visual cortex"
 2010 Health Research Fellowship, Queensland Office of Health and Medical Research (2010-2015)

C. Selected peer-reviewed publications (in chronological order).

1. Breakspear, M. (2002) Nonlinear phase desynchronization in human electroencephalographic data. *Human Brain Mapping*, **15**: 175-198.
2. Breakspear, M., Terry, J. (2002) Topographic organisation of nonlinear interdependence in multichannel human EEG. *Neuroimage*, **16**: 822-825.
3. Breakspear, M., Terry, J., Friston, K., Williams, L., Brown, K., Brennan, J., Gordon, E. (2003) A disturbance of nonlinear interdependence in scalp EEG of subjects with first episode schizophrenia. *NeuroImage*, **20**: 466-478.

4. Breakspear, M., Stam, K.J. (2005) Dynamics of a neural system with a multiscale architecture. *Phil. Trans. R. Soc. B*, **360**: 1051-1074.
5. Breakspear, M., Williams, L., Stam, K. (2004) Topographic analysis of phase dynamics in neural systems reveals formation and dissolution of ‘dynamic cell assemblies’. *Journal of Computational Neuroscience*, **16**: 49-68.
6. Breakspear, M., Brammer, M., Dass, P., Bullmore, E., Williams, L.M. (2004) Spatio-temporal wavelet resampling for functional neuroimaging data. *Human Brain Mapping*, **23**: 1-25.
7. Breakspear, M. (2004) “Dynamic connectivity”: Theoretical and empirical considerations. *Neuroinformatics*, **2**: 205-226.
8. Breakspear, M., Roberts, J.A., Terry, J.R., Rodrigues, S., Robinson, P.A. (2006) A unifying explanation of seizures via the bifurcation analysis of a dynamical brain model. *Cerebral Cortex*, **16**: 1296 – 1313.
9. Breakspear, M., Bullmore, E., Aquino, K., Dass, P., Williams, L.M. (2006) The multiscale properties of evoked cortical activity. *NeuroImage*, **30**: 1230 – 1242.
10. Honey, C., Kotter, R., Breakspear, M., Sporns, O. (2007) Network structure of cerebral cortex shapes functional connectivity on multiple time scales. *Proc. Nat. Acad. Sci.* **104**: 10240-10245.
11. Rubinov, M., Knock, S.A., Stam, C.J., Micheloyannis, S., Harris, A.W.F, Williams, L.M., Breakspear, M. (2008) Small world properties of nonlinear brain activity in schizophrenia. *Human Brain Mapping*. **30**: 403-416.
12. Freyer, F., Aquino, K., Robinson, P.A., Ritter, P., Breakspear, M. (2009) Non-Gaussian statistics in temporal fluctuations of spontaneous cortical activity. *Journal of Neuroscience* **29**: 8512-8524.
13. Schira, M.M., Tyler, C.W. , Breakspear, M., Spehar, B., (2009) The foveal confluence in human visual cortex. *Journal of Neuroscience* **29**: 950-9058.
14. Schira MM, Tyler CW, Spehar B, Breakspear M (2010). Modeling magnification and anisotropy in the primate foveal confluence. *PLoS Computational Biology* **6**: e1000651.
15. Breakspear, M., Heitmann, S., Daffertshofer, A. (2010) Generative models of cortical oscillations: Neurobiological implications of the Kuramoto model. *Frontiers in Human Neuroscience*.(accepted).

D. Research Support

Ongoing Research Support

Thinking Systems Initiative, Breakspear (PI) 2006-2010

Australian Research Council and National Health and Medical Research Council

“Optimizing autonomous system control with brain-like hierarchical control systems”

The goal of this multidisciplinary project is to investigate the hierarchical nature of real neuronal systems, and use this data to underpin the next generation of robotic control systems.

Role: Named Principle Investigator

James McDonnell Collaborative Gift, Breakspear (PI) 2006-2010

Awarded by the James S. McDonnell Foundation (USA)

Brain Network Recovery Group

The goal of this research is to understand the essential mechanisms of recovery from a neurological or psychiatric illness through advanced neuroscience research

Role: Principle Investigator

Australian Research Council Discovery Grant, Breakspear (PI) 2006-2009

Awarded by the Australian Research Council

"Nonlinear dynamics in cardiac physiology"

We aim to characterize the properties of pathological rhythms in the heart and the brain.

Role: Principle Investigator

National Health and Medical Research Council Project Grant, Breakspear (PI) 2009-2011

Awarded by the National Health and Medical Research Council

"Orientation-specific modulation in human visual cortex"

This projects seeks to understand the neural substrates for normal human vision, particularly basic shape and form processing, through a combination of neuroimaging and data modelling research.

Role: Principle Investigator

Australian Prudential Givewell Award, Breakspear (PI)

Awarded by Prudential Philanthropic

"Facial Imaging System"

This grant provides seed funding to install and initiate a facial imaging system for use in major depression

Role: Principle Investigator

National Health and Medical Research Council Program Grant, Breakspear (CI) 2009-2013

"Identifying determinants of both the origins and the progression of depressive and bipolar (mood) disorders"

Awarded by the National Health and Medical Research Council

This project aims to understand the aetiology, treatment responsiveness and outcome of the bipolar and major depressive disorders.

Role: Co-Investigator

Completed Research Support

Australian Rotary Health Research Fund, Breakspear (CI), 2006-2007

Awarded by the Rotary Foundation, Australia

"Functional MRI investigation of the neural processes underlying Mild Cognitive Impairment"

The project investigated changes in working memory-related brain activity through a functional neuroimaging experiment

Role: Co-investigator