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Post-Doctoral Research Associate

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Key words

- Brain oscillations
- MEG / EEG / LFPs / EMG
- Functional connectivity
- Human motor control
- Parkinson's disease
- Cross-frequency coupling
- Dynamic causal modelling
- Computational neuroscience
- Cognitive neuroscience
- Graph theory

Experience

Post-doctoral

Research Associate 01/05/2016 - 31/01/2019

Charité-University Medicine Berlin, Berlin, Germany
'Cross-frequency coupling in movement disorders'
Collaborator: Prof. A. Kühn

Honorary Research Affiliate 01/04/2016 - ...

Wellcome Trust Centre for Neuroimaging, University College London, UK

Research Associate 01/06/2013 - 31/03/2016

Wellcome Trust Centre for Neuroimaging, University College London, UK
'Deep brain stimulation in Parkinson's disease'
Collaborators: Dr. V. Litvak, Prof. K.J. Friston

Research Officer 16/01/2013 - 31/03/2013

Queensland Institute of Medical Research, Brisbane, Australia
'EEG correlates of emotions'
Collaborator: Prof. M.J. Breakspear

During PhD

International working visit 01/03/2010 - 30/06/2010

Wellcome Trust Centre for Neuroimaging, University College London, UK
Group Prof. K.J. Friston

PhD student 01/06/2008 - 31/08/2012

Faculty of Human Movement Science, VU University Amsterdam, NL
'Neural synchronization within and between regions of the motor system'
Supervisors: Prof. A. Daffertshofer, Prof. P.J. Beek

Before PhD

Teaching and Research Assistant 01/09/2005 - 30/06/2006

Research Assistant 01/02/2008 - 31/05/2008

Faculty of Human Movement Science, VU University Amsterdam, NL

International working visit 01/02/2007 - 14/07/2007

Master's Research internship at the School of Psychology, University of Birmingham, UK
Supervisor: Dr. P. Praamstra

Education

Doctoral degree	Human Movement Sciences VU University Amsterdam, The Netherlands	2008-2012 cum laude (top 5%)
Master's degree	Human Movement Sciences VU University Amsterdam, The Netherlands	2006-2007 cum laude (top 5%)
Bachelor's degree	Human Movement Sciences VU University Amsterdam, The Netherlands	2003-2006 cum laude (top 5%)

PhD thesis

Neural synchronization within and between regions of the motor system
Defended on 26/11/2012

Publications

Total = 16
First Author = 9

H-index = 10
(Google Scholar)

International peer-reviewed journals

Espenhahn SE, de Berker AO, **van Wijk BCM**, Rossiter HE, Ward NS. Movement-related beta oscillations show high intra-individual reliability (2017). *Neuroimage* 147:175-185.

van Wijk BCM, Beudel M, Jha A, Oswal A, Foltynie T, Hariz MI, Limousin P, Zrinzo L, Aziz TZ, Green AL, Brown P, Litvak V (2016). Subthalamic nucleus phase-amplitude coupling correlates with motor impairment in Parkinson's disease. *Clinical Neurophysiology* 127:2010-2019.

Friston KJ, Litvak V, Oswal A, Razi A, Stephan KE, **van Wijk BCM**, Ziegler G, Zeidman P (2015). Bayesian model reduction and empirical Bayes for group (DCM) studies. *Neuroimage* 128:413-431.

van Wijk BCM, Jha A, Penny W, Litvak V (2015). Parametric estimation of cross-frequency coupling. *Journal of Neuroscience methods*: 243:94-102. *This paper describes a new statistical method to estimate significant cross-frequency coupling from electrophysiological recordings.*

Friston KJ, Bastos AM, Oswal A, **van Wijk B**, Richter C, Litvak V (2014). Granger causality revisited. *Neuroimage* 101:796-808.

van Wijk BCM, FitzGerald THB (2014). Thalamo-cortical cross-frequency coupling detected with MEG. *Frontiers in Human Neuroscience* 8:187.

Boersma M, de Bie HMA, Oostrom KJ, van Dijk BW, Hillebrand A, **van Wijk BCM**, Delemarre-van de Waal HA, Stam CJ (2013). Resting-state oscillatory activity in children born small for gestational age: an MEG study. *Frontiers in Human Neuroscience* 7:600.

van Wijk BCM, Litvak V, Friston KJ, Daffertshofer A (2013). Nonlinear coupling between occipital and motor cortex during motor imagery: a dynamic causal modeling study. *Neuroimage* 71:104-113. *In this paper we apply DCM for time-frequency responses as a phenomenological generative model.*

van Wijk BCM, Beek PJ, Daffertshofer A (2012). Neural synchrony within the motor system: what have we learned so far? *Frontiers in Human Neuroscience* 6:252.

van Wijk BCM, Willemsse RB, Vandertop WP, Daffertshofer A (2012). Slowing of M1 oscillations in brain tumor patients in resting state and during movement. *Clinical Neurophysiology* 123:2212-2219.

van Wijk BCM, Beek PJ, Daffertshofer A (2012). Differential modulations of ipsilateral and contralateral beta (de)synchronization during unimanual force production. *European Journal of Neuroscience* 36:2088-2097.

Daffertshofer A, **van Wijk BCM** (2011). On the influence of amplitude on the connectivity between phases. *Frontiers in Neuroinformatics* 5(6).

van Wijk BCM, Stam CJ, Daffertshofer A (2010). Comparing brain networks of different size and connectivity density using graph theory. *PLoS ONE* 5:e13701. ***This paper reveals important methodological caveats of popular graph theory analysis. These are relevant for a wide***

range of structural and functional brain connectivity studies. To date the paper has received >300 citations (Google Scholar).

Antiqueira L, Rodrigues FA, **van Wijk BCM**, Costa L da F, Daffertshofer A (2010). Estimating complex cortical networks via surface recordings – a critical note. *Neuroimage* 53:439-449.

Boonstra TW, **van Wijk BCM**, Praamstra P, Daffertshofer A (2009). Corticomuscular and bilateral EMG coherence reflect distinct aspects of neural synchronization. *Neuroscience Letters* 29:17-21.

van Wijk BCM, Daffertshofer A, Roach N, Praamstra P (2009). A role of beta oscillatory synchrony in biasing response competition? *Cerebral Cortex* 19:1294-1302.

Research grants and prizes

- MEG UK 2015 - Best presentation award
- Data analysis competition Biomag 2014 – third prize
- Data analysis competition Biomag 2010 – first prize (500 EURO)
- Guarantors of Brain Travel Grant 2016 (800 GBP)
- **NWO Toptalent 2008**
The Netherlands Organisation for Scientific Research
Personal grant for financing the salary of a 4-year PhD project. **180.000 EURO**
Competitive national grant scheme with several selection rounds aiming at excellent Master students from all scientific disciplines for financing their own PhD at a university in The Netherlands.
- *Hersenstichting Nederland* (Dutch Organization for Brain Research)
Grant for students to support an international research internship related to brain research. 2007 (500 EURO)

Invited talks

- Seminar at Institute of Psychiatry, King's College London, UK. *Interacting brain rhythms in health and disease*. 29/01/2016
- Lab meeting Centre for Neuropsychopharmacology group, Imperial College London, UK. *Interacting brain rhythms in health and disease*. 19/01/2016
- Seminar at the Movement Disorders Unit, Charité Universitätsmedizin Berlin, Germany. *Cross-frequency coupling as a marker for motor impairment in Parkinson's disease*. 03/12/2015
- Workshop on synchrony and connectivity, King's College London, UK. *Parametric estimation of cross-frequency coupling*. 16/09/2015
- Brain meeting lecture at Wellcome Trust Centre for Neuroimaging, University College London, UK. *Interacting brain rhythms in health and disease*. 03/07/2015
- Lecture at British Neuroscience Association meeting 2015, Edinburgh, UK. *Dynamic causal modeling for MEG and EEG*. 13/04/2015
- Seminar at Sir Peter Mansfield Magnetic Resonance Centre, University of Nottingham. *Cross-frequency coupling within the motor system of Parkinson's disease patients*. 06/11/2014
- Lab meeting experimental Neurology group, University of Oxford, UK. *Unraveling synchronization patterns within and across frequency bands*. 30/04/2014
- Seminar at Centre for Complexity Sciences, University of Bristol, UK. *Synchronization in the brain: from neural populations to functional networks*. 25/03/2014
- Lab meeting SyMoN group, School of Psychology, University of Birmingham, UK. *Synchronization within and between different frequency bands in Parkinson's disease*. 06/03/2014
- Workshop on functional connectivity, Donders Institute, Nijmegen, NL. *Characterizing*

complex brain networks using graph theory: benefits and pitfalls. 17/06/2011

- Lecture at annual SPM course on M/EEG, Institute of Neurology, University College London, UK. *Dynamic causal modeling*
10/05/2011; 15/05/2012; 14/05/2013; 13/05/2014; 12/05/2015; 17/05/2016;
09/05/2017

Organization

Co-organizer of the SPM course for MEG/EEG in May 2014, May 2015, and May 2016, London. The course consists of two days lectures and demonstrations, and a one day hands-on computer seminar. Organization involves constructing the course program and inviting local and external speakers.

Co-organizer of a one-day workshop on Fieldtrip and SPM toolboxes at MEG UK 2015, January 7, Birmingham, UK. The workshop consists of short lectures and hands-on computer sessions.

Co-organizer of the weekly 'brain meeting' seminars at the Wellcome Trust Centre for Neuroimaging for the year 2013-2014. Organization involves inviting and hosting national and international speakers working on various neuroscientific topics.

Symposium on 'Cross-frequency coupling – methodological challenges' at Biomag 2014, Halifax Canada. Organization together with Prof. Daffertshofer.

Teaching experience

Student supervision

Co-supervisor of 1 Research Master's student during her 6-month visit to the Wellcome Trust Centre for Neuroimaging, University College London. 2015

Co-supervisor of 8 Bachelor's Human Movement Sciences students during their final research project (4 projects of 4 months each). VU University Amsterdam. 2008-2012

Co-supervisor of 1 literature thesis, Bachelor's Human Movement Sciences, VU University Amsterdam. 2011

Seminars

Supervision during a one day computer seminar of the annual SPM course hosted by the Institute of Neurology, UCL. The students in this course are primarily PhD students and post docs from universities across Europe. 2010-2016

Teaching assistant for dissection classes of the Neuroanatomy course in the Bachelor's curriculum of Human Movement Sciences, VU University Amsterdam. 2009-2011

Teaching assistant for various Matlab-based computer seminars for courses in the Bachelor's curriculum of Human Movement Sciences, VU University Amsterdam: *Introduction to Matlab*, *Introduction to research methods*, *Simulation models of neuromuscular systems*. 2005-2007

Lectures

Lecture on dynamic causal modelling in the annual SPM course hosted by the Institute of Neurology, UCL. 2011-2016

Reviewer activities

Review editor for:

- Frontiers in Human Neuroscience

Ad-hoc peer reviewer for:

- The Journal of Neuroscience
- PLoS One
- Neuroimage
- Journal of Neuroscience Methods
- European Journal of Applied Physiology
- Journal of Neurophysiology
- Chaos
- Neuroscience Letters

- Schizophrenia Bulletin
- Movement Disorders

- Human Movement Science
- Clinical Neurophysiology

Skills

Matlab programming	● ● ● ● ● ● ● ● ● ●
SPM	● ● ● ● ● ● ● ● ● ○
Fieldtrip	● ● ● ● ● ● ● ○ ○ ○ ○
Signal processing	● ● ● ● ● ● ● ● ● ○
MEG acquisition	● ● ● ● ● ● ● ● ● ○
EEG acquisition	● ● ● ● ● ● ● ● ○ ○
Experimental design	● ● ● ● ● ● ● ● ● ○

Experienced with data acquisition and signal processing of: MEG (CTF system), EEG (Biosemi), EMG (surface bipolar and high-density grids), force sensors, accelerometers, and motion capturing (Optotrak). Experienced with various signal processing methods: e.g., spectral analysis, event-related potentials, coherence, phase synchronization, source localization, principal component analysis, graph theory, dynamic causal modeling, cross-frequency coupling.

I have contributed towards SPM Matlab functions for analysis of cross-frequency coupling and dynamic causal modeling.

Experienced with Windows and Linux operating systems, as well as grid computing.

Extra-curricular courses

- Linear Algebra (first year Bachelor's Mathematics, VU University Amsterdam)
- Non-linear dynamics (second year Bachelor's Mathematics, VU University Amsterdam)
- Probabilistic and Unsupervised Learning, Approximate Inference and Learning in Probabilistic Models (Gatsby Unit for Computational Neuroscience, University College London)

Other presentations

Oral presentations

- *Phase-amplitude coupling: the bad guy in movement disorders?*
Biomag 2016, Seoul, South Korea.
- *High-frequency oscillations as a new window into Parkinson's disease.*
Biomag 2016, Seoul, South Korea.
- *Estimating directional cross-frequency coupling from time-frequency spectra using dynamic causal modelling.*
Biomag 2014, Halifax, Canada.
- *Detection of cross-frequency interactions.*
Satellite symposium on Biomagnetic signal processing. Biomag 2014, Halifax, Canada.
- *Dynamic causal modelling of time-frequency modulations during motor imagery.*
MEG UK 2014, Nottingham, UK.
- *Dynamic causal modeling of time-frequency modulations.*
Brainmodes 2012, Brisbane, Australia.
- *Characterizing complex brain networks using graph theory.*
Brainmodes 2010, Copenhagen, Denmark.
- *Time-frequency analysis reveals distinct synchronization patterns within the motor system.*
7th NFSI & ICBEM 2009, Rome, Italy.

Poster presentations

- **van Wijk BCM**, Cagnan H, Litvak V, Friston KJ. *Dynamic causal modelling of cortical-basal ganglia interactions*. International DBS Symposium KFO 247, 2016, Berlin, Germany.
- **van Wijk BCM**, Cagnan H, Litvak V, Friston KJ. *Dynamic causal modelling of cortical-basal ganglia interactions*. Bernstein Conference 2016, Berlin, Germany.
- **van Wijk BCM**, Pogosyan A, Hariz MI, Foltynie T, Limousin P, Zrinzo L, Brown P, Litvak V. *Intraoperative localization of beta band and high-frequency oscillations within the subthalamic nucleus*. 20th International Congress of Parkinson's Disease and Movement Disorders 2016, Berlin, Germany.
- **van Wijk BCM**, Beudel M, Jha A, Oswal A, Foltynie T, Limousin P, Zrinzo L, Hariz MI, Brown P, Litvak V. *Phase-amplitude coupling between beta band and high-frequency oscillations as a marker for motor impairment in Parkinson's disease*. Society for Neuroscience 2015, Chicago, USA.
- **van Wijk BCM**, Beudel M, Jha A, Oswal A, Foltynie T, Limousin P, Zrinzo L, Hariz MI, Brown P, Litvak V. *Phase-amplitude coupling between beta band and high-frequency oscillations as a marker for motor impairment in Parkinson's disease*. CuttingEEG 2015, Berlin, Germany.
- **van Wijk BCM**, Beudel M, Jha A, Oswal A, Foltynie T, Limousin P, Zrinzo L, Brown P, Litvak V. *Phase-amplitude coupling within the subthalamic nucleus correlates with severity of Parkinson's disease*. UCL Neuroscience Symposium, 19 June 2015, London, UK.
- **van Wijk BCM**, Beudel M, Jha A, Oswal A, Foltynie T, Limousin P, Zrinzo L, Brown P, Litvak V. *Phase-amplitude coupling within the subthalamic nucleus correlates with severity of Parkinson's disease*. MEG UK 2015, Birmingham, UK.
- **van Wijk BCM**, Beudel M, Jha A, Oswal A, Foltynie T, Limousin P, Zrinzo L, Brown P, Litvak V. *Phase-amplitude coupling within the subthalamic nucleus correlates with severity of Parkinson's disease*. Brainmodes 2014, London, UK.
- **van Wijk BCM**, Brown P, Friston KJ, Litvak L. *Movement-related cross-frequency coupling between M1 and STN in Parkinson's disease*. UCL Neuroscience Symposium, 13 June 2014, London, UK.
- **van Wijk BCM**, Brown P, Friston KJ, Litvak L. *Movement-related cross-frequency coupling between M1 and STN in Parkinson's disease*. HBM 2014, Hamburg, Germany.
- **van Wijk BCM**, Litvak V, Friston KJ, Daffertshofer A. *Dynamic causal modelling of time-frequency modulations during motor imagery*. MEG UK 2014, Nottingham, UK.
- **van Wijk BCM**, Litvak V, Friston KJ, Daffertshofer A. *Dynamic causal modelling of time-frequency modulations during motor imagery*. Brainmodes 2013, Amsterdam.
- **van Wijk BCM**, Stam CJ, Daffertshofer A. *Using graph theory to study anatomical and functional networks in the brain: prospects and limitations*. 7th FENS forum of European Neuroscience, 2010, Amsterdam, NL.
- **van Wijk BCM**, Beek PJ, Daffertshofer A. *Unimanual and bimanual movements are accompanied by different cortical network organization*. 7th edition of Progress in Motor Control, 2009, Marseille, France.
- **van Wijk BCM**, Daffertshofer A, Praamstra P. *Local and long-range beta synchrony in motor control*. Biomagnetism: interdisciplinary research and exploration, 2008. Sapporo, Japan: Hokkaido University Press p. 185-187.

Other international conferences

Attendance of international conferences (>1 day) without presenting own work: *Brain informatics and Health* (London 2015), *Brainmodes* (Amsterdam 2008 & Marseille 2011), *Brain Connectivity Workshop* (Maastricht 2009 & Berlin 2010), *FENS Satellite Symposium on Motor Control* (Nijmegen 2010).

Public engagement

UCL Hospitals Research Open Day, 10 July 2014. Helping out at information stall on deep brain stimulation in Parkinson's disease. Explaining ongoing research to members of the public.

Languages

