

ERIC MARIS

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EDUCATION

Katholieke Universiteit Leuven (KULeuven), Belgium

PhD

1992

Dissertation: "Psychometric models for psychological processes and structures."

Katholieke Universiteit Leuven (KULeuven), Belgium

M.A. in Psychology

1986

SCIENTIFIC PROFILE

I obtained my PhD in Quantitative Psychology in 1992 and was active in this field until about 2004. I then switched to Cognitive Neuroscience. Initially, I used my quantitative skills as an entry ticket to neuroscience. I am best known for my contributions to the statistical analysis of electrophysiological data, a research line in which I am no longer active. In 2010, I started the research group *Neurophysiology of Active Perception*. The objective of our research program is to formulate and validate explanations of cognitive phenomena in terms of their underlying neurophysiological mechanisms. Our focus is on active perception, that is, perceptual phenomena that reflect the role of the perceiving organism (expectation, attention, prediction), as opposed to the physical properties of the stimulus. In our experiments, we measure neurophysiological activity using a variety of techniques: MEG, ECoG and EEG in humans, and ECoG in rats. Most of our experiments target the somatosensory system. Our research program also has a methodological component: the characterization of interactions in spatially distributed neural activity.

AWARDS

Best Teacher Award of the Faculty of Social Sciences, Radboud University, Nijmegen

2012

Top Reviewer of The Journal of Neuroscience Methods

2009

Psychometric Society Dissertation Award (PhD thesis competition)

1993

Laureate of the "Reisbeurzenwedstrijd" (Master thesis competition)

1987

PHD THESES SUPERVISED

Gunter Maris (University of Nijmegen). *Statistical Contributions to Psychological Modeling*.

December 2001

Tom Verguts (University of Leuven). *Process Models of Rule Induction Tasks*.

March 2001

Heike Martensen (University of Nijmegen). *The Role of Sublexical Phonology in Adult Reading*.

January 2001

Francis Tuerlinckx (University of Leuven). *Some Extensions and Applications of Item Response Theory Models and Diffusion Models*.

December 2000

Javier Revuelta (University of Madrid). *A Psychometric Model for Multiple Choice Items*.

May 2000

INVITED LECTURES (NEUROSCIENCE ONLY)

Top-down control in perception implemented by networks of oscillatory brain activity

[Institute for Biomagnetism and Biosignalanalysis University of Münster](#)

May 2013

Invited by Dr. Christian Dobel

Neurophysiology of active perception; investigations in the rat somatosensory system

[Translational Neuroscience Unit, University Medical Center Nijmegen](#)

January 2013

Invited by Dr. Judith Homberg

Neuronal Information Processing by Structured Phase Diversity

[Artificial Intelligence Department, University of Groningen](#)

November 2011

Invited by Dr. Marieke van Vugt

Phase-amplitude Coupling in Human ECoG is Spatially Distributed and Phase Diverse

[Workshop Functional Connectivity, Radboud University Nijmegen](#)

June 2011

Invited by Dr. Ole Jensen

Neuronal Information Processing by Structured Phase Diversity

[Cognitive Neuroscience Department, Swammerdam Institute for Life Sciences, University of Amsterdam](#)

November 2010

Invited by Dr. Francesco Battaglia

Neuronal Information Processing by Structured Phase Diversity
Functional Imaging Laboratory (FIL), University College London (UCL)
 Invited by Dr. Vladimir Litvak

September 2010

Phase-amplitude Coupling in Human ECoG is Spatially Distributed and Phase Diverse
Computational Memory Lab, University of Pennsylvania, Philadelphia
 Invited by Dr. Michael Kahana

October 2008

TEACHING EXPERIENCE

Current courses

- Introduction to Brain and Behaviour (BA Psychology),
- Neurophysiology of Cognition and Behaviour (BA Psychology, BA Biology)
- Introduction to Electrophysiology (BA Artificial Intelligence)
- Neuroimaging 2 - Electrophysiology (MA Cognitive Neuroscience)
- Attention and Performance (MA Cognitive Neuroscience)
- Advanced Mathematics (MA Cognitive Neuroscience)
- Learning and Memory (MA Cognitive Neuroscience)

Past courses

Better than listing the courses, I will list the topics that were covered in them. Almost without exception, these were courses on quantitative methods for psychological research; one big course at the BA level and about 10 at the MA level (sometimes only for a few years). Topics: experimental design, classical and modern test theory, univariate and multivariate analysis of variance and covariance, regression, factor analysis, cluster analysis, and models for response times.

EDITORIAL AND ADMINISTRATIVE WORK

Ad hoc reviewer for The Journal of Neuroscience, Science, Cerebral Cortex, The Journal of Cognitive Neuroscience, The Journal of Neuroscience Methods, NeuroImage, Neuroscience, The Journal of Neurophysiology, Psychophysiology,

When I was still active in Quantitative Psychology (before 2005), I served in several boards and committees, both local and national, and all centered on quantitative methods for the social sciences. I also chaired local grant committees and organized the 1997 European Meeting of the Mathematical Psychology Group.

PAPERS (NEUROSCIENCE ONLY, 2004-PRESENT)

van Ede F., Maris E. (in press). Somatosensory Demands Modulate Muscular Beta Oscillations Independent of Motor Demands. *The Journal of Neuroscience*.

van Ede F., de Lange F. P., Maris E. (in press). Anticipation increases tactile stimulus processing in the ipsilateral primary somatosensory cortex. *Cerebral Cortex*.

Maris, E., Womelsdorf, T., Desimone, R. J., Fries, P. (2013). Rhythmic neuronal synchronization in visual cortex entails spatial phase relation diversity that is modulated by stimulation and attention. *NeuroImage*, 74, 99–116.

van Ede F., Köster M., Maris E. (2012). Beyond establishing involvement: quantifying the contribution of anticipatory alpha- and beta-band suppression to perceptual improvement with attention. *Journal of Neurophysiology*, 108, 2352-2362.

van Gerven, MAJ, Maris, E., Sperling, M., Sharan, A., Litt, B., Anderson, C., Baltch, G., Jacobs, J. (2012). Decoding the memorization of individual stimuli with direct human brain recordings. *NeuroImage*, 70:223-232.

van Ede F., de Lange F. P., Maris E. (2012). Attentional Cues Affect Accuracy and Reaction Time via Different Cognitive and Neural Processes. *The Journal of Neuroscience*, 32, 10408-10412.

Maris E. (2012). Statistical testing in electrophysiological studies. *Psychophysiology*, 49, 549–565.

van der Meij, R., Kahana, M., Maris, E. (2012). Phase-amplitude coupling in human ECoG is spatially distributed and phase diverse. *Journal of Neuroscience*, 32, 111-123.

Todorovic A, van Ede F, Maris E, de Lange FP (2011). Prior expectation mediates neural adaptation to repeated sounds in the auditory cortex: an MEG study. *Journal of Neuroscience*, 31, 9118-9123.

- Oostenveld R., Fries P., Maris E., Schoffelen J.M. (2011). FieldTrip: Open source software for advanced analysis of MEG, EEG, and invasive electrophysiological data. *Computational Intelligence and Neuroscience*, doi:10.1155/2011/156869.
- van Ede F., de Lange F., Jensen O., Maris E. (2011) Orienting attention to an upcoming tactile event involves a spatially and temporally specific modulation of sensorimotor alpha- and beta-band oscillations. *Journal of Neuroscience*, 31, 2016-2024.
- Maris E., van Vugt M., Kahana M (2011). Spatially distributed patterns of oscillatory coupling between high-frequency amplitudes and low-frequency phases in human iEEG, *NeuroImage*, 51, 867-876.
- Sanz-Arigitia E. J., Schoonheim M. M., Damoiseaux J. S., Rombouts S., Maris E., Barkhof F., Scheltens P., and Stam C. J. (2010). Loss of 'Small-World' Networks in Alzheimer's Disease: Graph Analysis of fMRI Resting-State Functional Connectivity, *Plos One*, 5.
- Van Ede F., Jensen O., Maris E. (2010). Tactile expectation modulates pre-stimulus beta-band oscillations in human sensorimotor cortex, *NeuroImage*, 51(2), 867-876.
- Kelly S. D., Ozyurek, A., Maris E. (2010). Two Sides of the Same Coin: Speech and Gesture Mutually Interact to Enhance Comprehension, *Psychological Science*, 1-8.
- van Schie, H. T., Koelewijn, T., Jensen, O., Oostenveld, R., Maris, E., Bekkering, H. (2008). Evidence for fast, low-level motor resonance to action observation: An MEG study, *Social Neuroscience*, 3, 213-228.
- Bouwman, B. M., Suffczynski, P., Midzyanovskaya, I. S., Maris, E., van den Broek, P. L. C., van Rijn, C. M. (2007). The effects of vigabatrin on spike and wave discharges in WAG/Rij rats, *Epilepsy Research*, 76, 34-40.
- Tuladhar, A. M., ter Huurne, N., Schoffelen, J. M., Maris, E., Oostenveld, R., Jensen, O. (2007). Parieto-occipital sources account for the increase in alpha activity with working memory load, *Human Brain Mapping*, 28, 785-792.
- Maris, E., Oostenveld, R. (2007). Nonparametric statistical testing of EEG- and MEG-data, *Journal of Neuroscience Methods*, 164, 177-190.
- Maris, E., Schoffelen, J. M., Fries, P. (2007). Nonparametric statistical testing of coherence differences, *Journal of Neuroscience Methods*, 163, 161-175.
- Bouwman, B. M., Suffczynski, P., da Silva, F. H. L., Maris, E., van Rijn, C. M. (2007). GABAergic mechanisms in absence epilepsy: a computational model of absence epilepsy simulating spike and wave discharges after vigabatrin in WAG/Rij rats, *European Journal of Neuroscience*, 25, 2783-2790.
- Litvak, V., Zeller, D., Oostenveld, R., Maris, E., Cohen, A., Schramm, A., Gentner, R., Zaaroor, M., Pratt, H., Classen, J. (2007), LTP-like changes induced by paired associative stimulation of the primary somatosensory cortex in humans: source analysis and associated changes in behaviour, *European Journal of Neuroscience*, 25, 2862-2874.
- Osipova, D., Takashima, A., Oostenveld, R., Fernandez, G., Maris, E., Jensen, O. (2006). Theta and gamma oscillations predict encoding and retrieval of declarative memory, *Journal of Neuroscience*, 26, 7523-7531.
- Takashima, A., Jensen, O., Oostenveld, R., Maris, E., van de Coevering, M., Fernandez, G. (2006). Successful declarative memory formation is associated with ongoing activity during encoding in a distributed neocortical network related to working memory: A magnetoencephalography study, *Neuroscience*, 139, 291-297.
- Maris, E., Bouwman, B. M., Suffczynski, P., van Rijn, C. M. (2006). Starting and stopping mechanisms of absence epileptic seizures are revealed by hazard functions, *Journal of Neuroscience Methods*, 152, 107-115.
- Maris, E. (2004). Randomization tests for ERP topographies and whole spatiotemporal data matrices, *Psychophysiology*, 41, 142-151.
- Maris, E. (2003). A resampling method for estimating the signal subspace of spatio-temporal EEG/MEG data, *IEEE Transactions on Biomedical Engineering*, 50, 935-949.

BOOK

- Maris, E. (2006). *Methoden en Technieken van Onderzoek in de Psychologie [Research Methods in Psychology]*. Leuven/Leusden: Acco, 536 p..

MEMBERSHIPS

Society for Neuroscience