

Curriculum Vitae

Gergő Orbán

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Personal Information

Date of birth	29.05.1977
Place of birth	Budapest, Hungary
Citizenship	Hungary
Academic status	PhD, Eötvös University, 2006

Research Experience

2012 – present	“Lendület” young investigator, MTA Wigner Research Centre for Physics, Budapest, Hungary
2010 – 2012	Marie Curie Intra-European Fellow: Computational and Biological Learning Lab, Department of Engineering University of Cambridge, Cambridge, UK
2009	Visiting scholar: Computational and Biological Learning Lab, Department of Engineering, University of Cambridge, Cambridge, UK
2009 – 2010	Research Scientist: Department of Biophysics, MTA Research Institute for Particle and Nuclear Physics, Budapest, Hungary
2006 – 2008	Postdoctoral Fellow: Department of Psychology, Volen Center for Complex Systems, Brandeis University, Waltham, MA
2004 – 2006	Resident Fellow: Collegium Budapest, Institute for Advanced Study, Budapest, Hungary
2002, 2003	Research Assistant: Center for Complex Systems Studies, Kalamazoo College, Kalamazoo, MI, USA
2000 – 2004	Junior Research Fellow: Computational Neuroscience Group, MTA Research Institute for Particle and Nuclear Physics, Budapest, Hungary
1999	Visiting Student: Neural Information Processing Group, Technical University, Berlin, Germany
1998 – 2000	Undergraduate Researcher: Computational Neuroscience Group, MTA Research Institute for Particle and Nuclear Physics, Budapest, Hungary

Education

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| 2000 – 2006 | Ph.D., Program of Biophysics, Statistical Physics and Quantum Mechanics, Eötvös University, Budapest, Hungary |
| 1999 – 2001 | M.Ed. in physics, Faculty of Sciences, Eötvös University, Budapest, Hungary |
| 1998 – 2000 | M.Sc. in physics, Program of Atomic and Molecular Physics Faculty of Sciences, Eötvös University, Budapest, Hungary Thesis: Fast and Slow Oscillations in a Network of Hippocampal Interneurons (in Hungarian) |
| 1995 – 1998 | B.Sc. in physics
Faculty of Sciences, Eötvös University, Budapest, Hungary |

Other training

Okinawa Computational Neuroscience Course (Okinawa Institute for Science and Technology) on “Bayesian Brain: Probabilistic Approaches to Neural Coding and Learning”, Okinawa, Japan, 2004

Graduate School of the Bolyai College (Eötvös University) on “Chaos and Irreversibility”, Budapest, Hungary, 1997

Awards and scholarships

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| 1998 | 3rd Prize, Undergraduate Research Association, physics, Eötvös University. “Gamma and theta frequency oscillations in a network of hippocampal interneurons” (in Hungarian) |
| 2004 | Full scholarship for the Okinawa Computational Neuroscience Course; Okinawa (Japan) |
| 2006 | Swartz Postdoctoral Scholarship, Brandeis University |
| 2009 | National Eötvös Scholarship |
| 2010 | EU FP7 Marie Curie Intra-European Fellowship |
| 2012 | Lendület fellowship of the Hungarian Academy of Sciences |
| 2014 | National Brain Research Program Award (NAP-B), jointly with Attila Gulyás, András Telcs, Balázs Ujfalussy |

Teaching

- 2009 Designing experiments in psychology with MATLAB,
University of Szeged, Psychology MA Course
- 2009 MSc project supervision, Balazs Ujfalussy,
Eötvös University
- 2010 Bayesian methods in data analysis and in modelling,
University of Szeged, Psychology PhD Course
- 2010 Perception,
Moholy-Nagy University of Art and Design, PhD Course
- 2011 Lab demonstration, Introduction to neuroscience (3G3),
Department of Engineering, University of Cambridge
- 2011 Course supervision, Introduction to neuroscience (3G3),
Department of Engineering, University of Cambridge
- 2012 Lab demonstration, Introduction to neuroscience (3G3),
Department of Engineering, University of Cambridge
- 2012 Course lectures, Mathematical physiology (3G2),
Department of Engineering, University of Cambridge
- 2012 3rd year project supervision, Department of Physiology,
Development and Neuroscience, University of Cambridge
- 2013— Statistical models in neuroscience,
MSc course, Eötvös University
- 2013— Computational neuroscience,
MSc course, Eötvös University
- 2015, Statistics and the brain, Budapest Semester in Cognitive Science,
2016 Semmelweis University

Other experience

- 2002 Local organizer of the 7th Tamagawa Dynamic Brain Forum held at Visegrád
(Hungary)

Publications

- 2016 G. Orbán, P. Berkes, J. Fiser, M. Lengyel. Neural variability and sampling-based probabilistic representations in the visual cortex. *Neuron*, in press
- 2016 D.G. Nagy, G. Orbán. Episodic memory as a prerequisite for online updates of model structure. *Proceedings of the 38th Annual Conference of the Cognitive Science Society*, 2699-2704.
- 2013 N. Housley, F. Huszár, M. Ghassemi, G. Orbán, D.M. Wolpert, M. Lengyel. Cognitive tomography reveals complex task-independent mental representations. *Current Biology*, 10.1016/j.cub.2013.09.012.
- 2011 G. Orbán, D.M. Wolpert. Representations of uncertainty in sensorimotor control. *Current Opinion in Neurobiology*, 21:629–635.
- 2011 P. Berkes, G. Orbán, J. Fiser, M. Lengyel. Spontaneous cortical activity reveals hallmarks of an optimal internal model of the environment. *Science*, 331: 83–87.
- 2010 J. Fiser, P. Berkes, G. Orbán, M. Lengyel. Statistically optimal perception and learning: from behavior to neural representations. *Trends in Cognitive Sciences*, 14: 119–30.
- 2008 G. Orbán, J. Fiser, R.N. Aslin, M. Lengyel. Bayesian learning of visual chunks by human observers. *Proceedings of the National Academy of Sciences*, 105: 2745–50.
- 2007 B. Ujfalussy, T. Kiss, G. Orbán, P. Érdi, W.E. Hoffmann, M. Hajós. Pharmacological and computational analysis of alpha-subunit preferential GABA(A) positive allosteric modulators on the rat septo-hippocampal activity. *Neuropharmacology*, 52:733–43.
- 2006 G. Orbán, T. Kiss, P. Érdi. Intrinsic and synaptic mechanisms determining the timing of neuron population activity during hippocampal theta oscillation *Journal of Neurophysiology*, 96:2889–904.
- 2006 T. Kiss, G. Orbán, P. Érdi. Modeling hippocampal theta oscillation: applications in neuropharmacology and robot navigation. *International Journal of Intelligent Systems*, 21:903–917.
- 2005 Zs. Huhn, G. Orbán, P. Érdi, M. Lengyel, Theta oscillation-coupled dendritic spiking integrates inputs on a long time scale. *Hippocampus*, 15: 950–62.
- 2005 Zs. Huhn, M. Lengyel, G. Orbán, P. Érdi. Dendritic spiking accounts for rate and phase coding in a biophysical model of a hippocampal place cell. *Neurocomputing*, 65-66: 331-341.
- 2004 M. Hajós, W.E. Hoffmann, G. Orbán, T. Kiss, P. Érdi, Modulation of septo-hippocampal Theta activity by GABA receptors: an experimental and computational approach. *Neuroscience*, 126: 599-610.
- 2001 G. Orbán, T. Kiss, M. Lengyel, P. Érdi, Gamma-related theta-frequency resonance in CA3 interneurons. *Biological Cybernetics*, 84: 123-132.

- 2001 T. Kiss, G. Orbán, M. Lengyel, P. Érdi, Intrahippocampal gamma and theta rhythm generation in a network model of inhibitory interneurons. *Neurocomputing*, 38-40: 713-719.

Refereed conference proceedings

- 2006 G. Orbán, J. Fiser, R.N. Aslin, M. Lengyel. Learning Objects by Learning Models: Finding Independent Causes and Preferring Simplicity. *Proceedings of the 28th Annual Conference of the Cognitive Science Society*. pp 645-650, Sheridan Publishing.
- 2006 G. Orbán, J. Fiser, R.N. Aslin, M. Lengyel. Bayesian model learning in human visual perception. *Advances in Neural Information Processing Systems 18*, Eds Y. Weiss, B. Schölkopf, and J. Platt. pp. 1043-1050. MIT Press, Cambridge, MA.

Book Chapters

- 2007 E. Szathmáry, Z. Szatmáry, P. Ittész, G. Orbán, I. Zachár, F. Huszár, A. Fedor, M. Varga, Sz. Számadó. In silico evolutionary developmental neurobiology and the origin of natural language. In: Lyon, C. and Nehaniv, C. L. and Cangelosi, A. (Eds) *Emergence of Communication and Language*. Springer-Verlag. London pp. 151 – 187.

Unrefereed publications

- 2016 Bányai M., Koman Z., Orbán G. Response statistics dissect the contributions of different sources of variability to population activity in V1. arXiv:1605.08909
- 2013 Fiser J., Lengyel M., Savin C., Orbán G., Berkes P. How (not) to assess the importance of correlations for the matching of spontaneous and evoked activity. arXiv preprint arXiv:1301.6554.
- 2009 Berkes P., Orbán G., Lengyel M., Fiser J. Matching spontaneous and evoked activity in V1: a hallmark of probabilistic inference. *Computational and Systems Neuroscience*.
- 2007 Orbán G., Fiser J., Lengyel M. V1 activity as optimal Bayesian inference. *Computational and Systems Neuroscience*.
- 2007 Fiser J., Orbán G., Aslin R.N., Lengyel M. Ideal Bayesian learning in human scene perception. *Computational and Systems Neuroscience*.
- 2007 Fiser J., Orbán G., Aslin R., Lengyel M. Beyond pair-wise statistics in visual scene perception. *Journal of Vision*, 7(9):799, 799a.
- 2007 B. Ujfalussy, T. Kiss, G. Orbán, P. Érdi, W.E. Hoffmann, M Hajós. Pharmacological and computational analysis of alpha-subunit preferential GABA(A) positive allosteric modulators on the rat septo-hippocampal activity. *Neuropharmacology*, 52:733–43.
- 2006 Orbán G., Aslin R.N., Fiser J., Lengyel M. Bayesian model learning in human visual perception. *Computational and Systems Neuroscience*.
- 2006 Fiser J., Aslin R.N., Orbán G., Lengyel M.. Bayesian model-learning and the emergence of visual features and rules. *Perception* , 35:115–116.
- 2005 Orbán G., Aslin R.N., Fiser J., Lengyel M.. Bayesian model selection in human visual perception. *Computational Cognitive Neuroscience*.
- 2005 Orbán G., Aslin R.N., Fiser J., Lengyel M.. Bayesian model selection in human visual perception. Program No. 640.5. 2005 Abstract Viewer/Itinerary Planner. Washington, DC: *Society for Neuroscience*, 2005. Online.
- 2005 Ujfalussy B., Orbán G., Kiss T., Hoffmann W. E., Érdi P., Hajós M. Anxiolytics and Septo-hippocampal Oscillation: Pharmacological and Computational Analysis of Action of GABA-A alpha-1 and alpha-2 Receptor Allosteric Modulators. *Clinical Neuroscience*, 58(1)
- 2003 Hajós M., Hoffmann W.E., Orbán G., Kiss T., Érdi P., Modulation of septo-hippocampal Theta activity by GABAA receptors: an experimental and computational approach. Program No. 679.11. *Society for Neuroscience*, 2003. Online
- 2000 Kiss T., Orbán G., Lengyel M., Érdi P., Hippocampal rhythm generation: gamma related theta frequency resonance. *Cybernetics and Systems Research 2000* (ed. Trapp R): (1) 330-335.