Katharina Duecker

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Research Experience

Doctoral Researcher Jun 2019 - present
Centre for Human Brain Health, UK
The role of oscillations in neuronal computation

- Pioneered implementation of biological dynamics in neural networks
- Prototype in NumPy, extension to deeper networks (PyTorch/Scipy)
- Parameter optimization using Optuna
- Partnered with interdisciplinary collaborators (Marco Idiart/Marcel van Gerven)
- Won Leading women in NeuroAI abstract award at Montreal AI& Neuroscience meeting 2021
- side project: oscillatory dynamics in memory replay (with Zeb Kurth-Nelson)

Neuronal oscillations in visual perception, publications [1], [3]

- Directed two MEG studies, using invisible photic stimulation
- Headed research design, implementation, data collection (N=80): MEG recordings, eye tracking, behavior, MRI
- Developed analysis pipeline, incl. frequency and wavelet analysis, statistics (Python, MATLAB, R), bash scripts for high-performance computing

Student Researcher 2017 - 2018
Carl-von-Ossietzky University of Oldenburg, Germany
Electric field modelling of transcranial brain stimulation: Conceptualized MEG - tACS study & acquired data (N=20) · MEG pre-processing and source localization · publication[4]

Research Intern 2017
Charité, Berlin, Germany
Neural correlates of pathological gambling: participant recruitment (clinical population) · phone counseling · fMRI pre-processing in SPM (MATLAB) · statistical analyses in R · publication [2]

Education

PhD Neuroscience 2019 – present
Centre For Human Brain Health, School of Psychology, University of Birmingham, UK
advisors: Ole Jensen, Kimron L. Shapiro

MSc Neurocognitive Psychology 2016 – 2019
Carl-von-Ossietzky University of Oldenburg, Germany. Grade: 1.2 thesis: 1.0[1]
advisors: Ole Jensen, Christoph S. Herrmann, Florian Kasten

BSc Psychology 2013 – 2016
Bielefeld University, Germany. Grade: 1.9; thesis: 1.0
advisor: Gernot Horstmann

Extracurricular Education

Computational Neuroscience: Vision Jul 2022
Summer School at Cold Spring Harbor Laboratory, Long Island, NY, USA

Neuromatch Academy: Deep Learning Jul 2021

Neuromatch Academy: Computational Neuroscience Jul 2020

Linear Algebra for Neuroscientists Aug 2019
Summer School at Radboud University, Nijmegen, The Netherlands

Machine Learning I: Unsupervised Learning 2018/2019
M.Sc. Physics course at the University of Oldenburg, Germany

Tools for Teaching Quantitative Thinking Mar 2017
Erasmus+ Seminar at the University of Graz, Austria

[1] Grading: 1.0 - 1.7: very good, 1.7 - 2.7: good, 2.7 - 3.7: pass, >4: fail

Awards

2023
Travel Grant, Elsevier/Vision Research, VSS conference 500 USD

2022
Travel Grant, Boehringer Ingelheim Fonds 3,150 EUR/ 3,307.5 USD

2022
Howard Hughes Medical Award, Cold Spring Harbor Laboratory course waiver 1,500 USD

2022
Kavli Summer Institute in Cognitive Neuroscience, summer school fellowship

2022
PhD paper of the year (2nd place), Centre for Human Brain Health

2021
Leading Women in Neuro-AI abstract award, Montreal AI & Neuroscience meeting 400 CAD/ 324 USD

Publications

[1] K. Duecker, T. P. Gutteling, C. S. Herrmann, and O. Jensen, "No evidence for entrainment: Endogenous gamma oscillations and rhythmic flicker responses coexist in visual cortex," *Journal of Neuroscience*, 2021. DOI: 10.1523/JNEUROSCI.3134-20.2021.

[2] A. Genauck, C. Matthis, M. Andrejevic, *et al.*, "Neural correlates of cue-induced changes in decision-making distinguish subjects with gambling disorder from healthy controls," *Addiction Biology*, 2021. DOI: 10.1111/adb.12951.

[3] A. Zhigalov, K. Duecker, and O. Jensen, "The visual cortex produces gamma band echo in response to broadband visual flicker," *PLoS Computational Biology*, 2021. DOI: 10.1371/journal.pcbi.1009046.

[4] F. H. Kasten, K. Duecker, M. C. Maack, A. Meiser, and C. S. Herrmann, "Integrating electric field modeling and neuroimaging to explain inter-individual variability of tacs effects," *Nature Communications*, 2019. DOI: 10.1038/s41467-019-13417-6.

Conference Proceedings

[5] K. Duecker, K. L. Shapiro, S. Hanslmayr, J. Wolfe, Y. Pan, and O. Jensen, "Alpha oscillations in early visual cortex support visual search through inhibition of neuronal excitability to target and distractor features," Vision Science Society conference, St. Pete Beach, Florida, USA, May 2023.

[6] K. Duecker, K. L. Shapiro, S. Hanslmayr, J. Wolfe, Y. Pan, and O. Jensen, "Alpha oscillations support modulation of neuronal excitability to target and distractor features in guided search," The 22nd International Conference on Biomagnetism (poster), Aug. 2022.

[7] K. Duecker, K. L. Shapiro, S. Hanslmayr, J. Wolfe, Y. Pan, and O. Jensen, "Guided search is associated with modulated neuronal excitability to target and distractor features in early visual regions," International Conference of Cognitive Neuroscience (poster), May 2022.

[8] K. Duecker, M. Idiart, and O. Jensen, "Space-to-time-conversion: Oscillations in an artificial neural network generate a temporal code representing simultaneous visual inputs," Montreal AI & Neuroscience (conference abstract), Nov. 2021.

[9] K. Duecker, T. P. Gutteling, C. S. Herrmann, and O. Jensen, "No evidence for entrainment: Endogenous gamma oscillations and rhythmic flicker responses coexist in visual cortex," Neuromatch Conference 3 (virtual poster), Nov. 2020.

[10] K. Duecker, T. P. Gutteling, C. S. Herrmann, and O. Jensen, "Does rapid frequency tagging entrain neuronal gamma oscillations?," British Association for Cognitive Neuroscience (poster), Sep. 2019.

Invited talks

Prof Jonathan Winawer, New York University Jun 2023

Helmholtz Lecture Series, Utrecht University Feb 2023

Prof. Stefan van der Stigchel, Utrecht University Nov 2022

Prof Gareth Barnes, University College London Oct 2022

Dr Saskia Haegens, Columbia University Oct 2022

Neuoxillations talk series, University of Oxford Sep 2021

Psyched@UoB early career researcher talk, University of Birmingham Jun 2021

Teaching/Mentoring (selected)

Jiahui An, M.Sc. Cognitive Neuroscience and Robotics 2022
Mentor for MSc thesis

Current Research & Practice: Magnetoencephalography practical 2021,2022
School of Psychology, University of Birmingham

Application of Electrophysiological Approaches 2020,2021,2022
School of Psychology, University of Birmingham

MATLAB programming 2020,2021
School of Psychology, University of Birmingham

Fundamental competencies in Psychology 2018
Department of Computer Science, University of Oldenburg

Multivariate Statistics 2017
Department of Psychology, University of Oldenburg

Journal Reviewer

Journal of Neuroscience; Psychophysiology; European Journal of Neuroscience; Cerebral Cortex; PLOS One; Brain & Behavior; Attention, Perception, & Psychophysics; Neuron (with supervisor)