

Jan-Matthis Lückmann

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Education

2014 – Present PhD candidate, supervised by Prof. Dr. Jakob Macke
University of Tübingen

2012 – 2014 MSc in Neuroscience, Thesis grade: 1.0
Charité Berlin, Université Bordeaux, VU Amsterdam

2009 – 2012 BSc Neuroscience and Cognitive Psychology, GPA: 1.2
Jacobs University Bremen

2008 A-levels in Mathematics, Physics, Biology, GPA: 1.3
Gymnasium Papenburg

Research Experience

PhD Research, Fall 2014–Present

Supervision: Prof. Dr. Macke, Machine Learning in Science, University of Tübingen

Machine learning algorithms for scientific discovery:

- Bayesian inference for simulation models: New algorithms for simulation-based inference [2,3], applications to challenging problems in Neuroscience [4,11], software for practitioners [5], and, most recently, a unified benchmark for simulation-based inference [1].
- Additional projects: Neural and behavioral data analysis. Statistical models of dependence between dynamics of neural activity and perceptual decision-making [7,12]. Segmentation and tracking in video data, as well as generative time series modelling.

Internship, Summer 2018

Supervision: Dr. Karaletsos, Uber AI Labs, San Francisco, CA

Active learning of surrogate models with probabilistic programming

Master Thesis, Spring–Summer 2014

Supervision: Prof. Dr. Kiebel, Modelling of Dynamic Perception and Action, BCCN Berlin

Bayesian modelling of experimental data from a dynamic perceptual decision-making task [8]

Internship, Spring–Summer 2013

Supervision: Prof. Dr. Linkenkaer-Hansen, Oscillations group, VU Amsterdam

Implications of critical-state dynamics for stimulus processing in a neuro-computational model [6]

Bachelor Thesis, Fall 2011–Summer 2012

Supervision: Prof. Dr. Kappas, Jacobs University Bremen

Analysis of EMG recordings from a self-designed study on judgement anticipation

Internship, Summer 2010

Supervision: Prof. Dr. Di Giovanni, Hertie Institut Tübingen

Role of p53 in neuroregeneration by histochemistry, stereology, statistical analysis [10]

Scholarships & Grants

2019	Travel grant by Simons Foundation
2017	Travel grant by NIPS foundation
2017	Travel grant by COSYNE New Attendees Travel Grant Program
2017	Travel grant by HHMI
2016	Grant by Boehringer Ingelheim Fonds for CAJAL course
2014–15	Scholarship by the Max Planck Society
2013–14	Scholarship by the German National Academic Foundation
2012–14	Scholarship by Erasmus Mundus programme for Neuroscience
2010–12	Scholarship by the Foundation of German Business
2009–12	Scholarship by Jacobs University Bremen

Invited Talks

2021/06	Inria-CEA Parietal, Virtual
2021/03	SIAM Computational Science and Engineering Conference Symposium, Virtual
2019/06	Blue Brain Project, Geneva
2019/03	Flatiron Institute, New York City
2017/10	Janelia Research Campus, Ashburn

Workshops & Courses

2019	Likelihood-Free Inference Workshop at Flatiron Institute, New York City
2017	Junior Scientist Workshop on Machine Learning and Computer Vision, Ashburn
2016	CAJAL Course in Computational Neuroscience, Lisbon
2016	Deep Learning Summer School, CIFAR, Montréal
2015	Mining and Modeling of Neuroscience Data, CRCNS summer course, Berkeley
2015	Open Access Ambassadors Conference, Max Planck early stage researchers, Munich
2015	Information Processing in Neural Systems, INCF short course, Osnabrück
2014	Paradigm Shift in Cognitive Science, Schweizerische Studienstiftung, Magliaso

Teaching

2019–20	Fundamentals of Computer Science, Technical University of Munich
2019–20	Module for Large Scale Data Analysis and Modeling, Technical University of Munich
2018	Short course on Image Segmentation, Machine Intelligence Exchange, Berlin
2017	Tutorial on Convolutional Neural Networks for Object Segmentation, Janelia
2017	Tutor at G-Node Short Course on Neural Data Analysis, Munich
2013	Teaching Assistant Human Neurophysiology, Prof. Linkenkaer-Hansen, VU Amsterdam
2012	Teaching Assistant Sensation and Perception, Prof. Diederich, Jacobs University
2011	Teaching Assistant Learning and Memory, Dr. Yan, Jacobs University
2009–10	Social service, Co-teaching and mathematics tutoring, German School of Helsinki

Programming

Python (PyTorch/Pyro, Jax, Tensorflow, Theano), R, MATLAB, JavaScript, HTML/CSS, \LaTeX
github.com/jan-matthis

Professional Activities

Reviewing for NeurIPS, ICML, ICLR, AISTATS, AABI, COSYNE, and CCN. Among *Best Reviewers* for NeurIPS 2019 and *Top Reviewers* for ICML 2020.

Publications

PEER-REVIEWED PROCEEDINGS

- [1] **J.-M. Lueckmann**, J. Boelts, D. S. Greenberg, P. J. Gonçalves, and J. H. Macke. Benchmarking simulation-based inference. In *Proceedings of The 24th International Conference on Artificial Intelligence and Statistics (AISTATS)*. PMLR 2021 [PDF] [CODE] [WEBSITE]
- [2] **J.-M. Lueckmann**, G. Bassetto, T. Karaletsos, and J. H. Macke. Likelihood-free inference with emulator networks. In *Proceedings of The 1st Symposium on Advances in Approximate Bayesian Inference (AABI)*. PMLR 2019 [PDF]
- [3] **J.-M. Lueckmann***, P. J. Gonçalves*, G. Bassetto, K. Öcal, M. Nonnenmacher, and J. H. Macke. Flexible statistical inference for mechanistic models of neural dynamics. In *Advances in Neural Information Processing Systems (NeurIPS) 30*. Curran Associates, Inc. 2017 [PDF] [CODE]

JOURNAL ARTICLES

- [4] P. J. Gonçalves*, **J.-M. Lueckmann***, M. Deistler*, M. Nonnenmacher, K. Öcal, G. Bassetto, C. Chintaluri, W. F. Podlaski, S. A. Haddad, T. P. Vogels, D. S. Greenberg, and J. H. Macke. Training deep neural density estimators to identify mechanistic models of neural dynamics. *eLife* 2020 [DOI:10.7554/eLife.56261] [PDF] [CODE]
- [5] A. Tejero-Cantero*, J. Boelts*, M. Deistler*, **J.-M. Lueckmann***, C. Durkan*, P. J. Gonçalves*, D. S. Greenberg, and J. H. Macke. sbi: A toolkit for simulation-based inference. *Journal of Open Source Software (JOSS)* 2020 [DOI:10.21105/joss.02505] [PDF] [CODE] [WEBSITE]
- [6] A.-E. Avramiea, R. Hardstone, **J.-M. Lueckmann**, J. Bím, H. D. Mansvelder, and K. Linkenkaer-Hansen. Pre-stimulus phase and amplitude regulation of phase-locked responses are maximized in the critical state. *eLife* 2020 [DOI:10.7554/eLife.53016]
- [7] **J.-M. Lueckmann**, J. H. Macke*, and H. Nienborg*. Can serial dependencies in choices and neural activity explain choice probabilities? *Journal of Neuroscience* 2018 [DOI:10.1523/JNEUROSCI.2225-17.2018]
- [8] H. Park*, **J.-M. Lueckmann***, K. von Kriegstein, S. Bitzer, and S. J. Kiebel. Spatiotemporal dynamics of random stimuli account for trial-to-trial variability in perceptual decision making. *Scientific Reports* 2016 [DOI:10.1038/srep18832]
- [9] W. Wolf, A. Levordashka, J. R. Ruff, S. Kraaijeveld, **J.-M. Lueckmann**, and K. D. Williams. Ostracism online: A social media ostracism paradigm. *Behavior Research Methods* 2015 [DOI:10.3758/s13428-014-0475-x]
- [10] E. M. Floriddia, K. I. Rathore, A. Tedeschi, G. Quadrato, A. Wuttke, **J.-M. Lueckmann**, K. A. Kigerl, P. G. Popovich, and S. Di Giovanni. p53 regulates the neuronal intrinsic and extrinsic responses affecting the recovery of motor function following spinal cord injury. *Journal of Neuroscience* 2012 [DOI:10.1523/JNEUROSCI.1925-12.2012]

SELECTED CONFERENCE PRESENTATIONS

- [11] **J.-M. Lueckmann***, P. J. Gonçalves*, C. Chintaluri, W. F. Podlaski, G. Bassetto, T. P. Vogels, and J. H. Macke. Amortised inference for mechanistic models of neural dynamics. In *Computational and Systems Neuroscience Meeting (COSYNE), Lisbon, Portugal 2019*
- [12] **J.-M. Lueckmann**, H. Nienborg, and J. H. Macke. Can serial dependencies in choices and neural activity explain choice probabilities? In *Computational and Systems Neuroscience Meeting (COSYNE), Salt Lake City, USA 2017*

* Equal contribution