

Max Planck Institute for Human Development
Max Planck Research Group NeuroCode
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Lennart Wittkuhn

Doctoral Researcher

Last update: June 2021
(click to open hyperlinks)

Professional Appointments

Current position

- 2017–present **Pre-doctoral research fellow**, Max Planck Institute for Human Development.
Max Planck Research Group NeuroCode (PI: Dr. Nicolas Schuck)
Dissertation project: The main goal of my dissertation is to investigate the role of hippocampal replay in planing and decision-making in humans using fMRI

Previous positions

- 2013–2017 **Research assistant**, Technische Universität Dresden, Germany.
Chair of Lifespan Developmental Neuroscience (PI: Prof. Shu-Chen Li)
Main tasks: I carried out various behavioral, EEG, TMS and tDCS studies with different age groups, analyzed data using MATLAB, R and SPSS and recruited study participants
- Spring 2017 **Research intern**, Concordia University Montreal, Canada.
Department of Psychology (PI: Prof. Ben Eppinger)
Main tasks: I programmed a task using MATLAB (with PsychToolbox) to investigate adaptive decision-making and analyzed the behavioral data using MATLAB and R
- Summer 2016 **Clinical intern**, Charité University Hospital Berlin, Germany.
Department of Clinical Neuropsychology (Head: Dr. Ute Kopp)
Main tasks: I carried out neuropsychological examinations (e.g., memory and executive functions) in neurological patients (e.g. Parkinson's disease, dementia) and wrote the reports
- Spring 2015 **Research intern**, University College London, United Kingdom.
Affective Brain Lab (PI: Tali Sharot, Ph.D.; supervised by Dr. Neil Garrett)
Main tasks: I programmed two tasks using MATLAB (with Cogent 2000) to investigate risky decisions, collected and analyzed behavioral and skin conductance response data

Education

Postgraduate education

- 2017–present **PhD candidate in Cognitive Neuroscience**, Max Planck Institute for Human Development, Berlin | Freie Universität Berlin.
Preliminary thesis title: "Investigating the role of hippocampal replay in decision-making in humans using fMRI" (expected completion: Winter 2021)
Advisors: Dr. Nicolas Schuck (MPIB), Prof. Hauke Heekeren (FU Berlin)

2017–present **Pre-doctoral research fellow**, International Max Planck Research School (IMPRS) on Computational Methods in Psychiatry and Ageing Research (COMP2PSYCH).
Max Planck UCL Center for Computational Psychiatry and Ageing Research, Berlin, Germany

2015–2017 **M.Sc. in Cognitive-Affective Neuroscience**, Technische Universität Dresden.
Thesis: “Inferring changes in latent states in dynamic environments”
Grade: 1.2 (very good; roughly equivalent to A- / GPA of 3.7)
Advisors: Prof. Ben Eppinger, Prof. Hauke Heekeren, M.Sc. Rasmus Bruckner

Undergraduate education

2012–2015 **B.Sc. in Psychology**, Technische Universität Dresden.
Thesis: “Effects of age and prefrontal rTMS on learning to predict future reward”
Grade: 1.3 (very good; roughly equivalent to A- / GPA of 3.7)
Advisors: Prof. Ben Eppinger, Prof. Shu-Chen Li

Specialized training and educational courses

02/2020 **Workshop “A Reproducible Data Analysis Workflow”**,
Max Planck Institute for Human Development, Berlin, Germany.
Full-day workshop on reproducible data analyses with R Markdown, Git, Make, and Docker

11/2019 **Symposium “Doing Good - Scientific Practice under Review”**,
Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany.
2-days symposium on good scientific practices and open science

08/2019 **Summer school on Methods in Neuroscience at Dartmouth (MIND)**,
Dartmouth College, Hanover, New Hampshire, USA.
10-days computational neuroscience summer school on “cognitive maps”

06/2019 **OHBM Hackathon**, Rome, Italy.
3-days neuroinformatics hackathon before the OHBM Annual Meeting 2019

Publications

Preprints

2021 **Wittkuhn, L.**, Chien, S., Hall-McMaster, S., & Schuck, N. W. (2021) Replay in minds and machines. *PsyArXiv*. doi: 110.31234/osf.io/df7ga

Peer-reviewed journal articles

2021 **Wittkuhn, L.**, & Schuck, N. W. (2021) Dynamics of fMRI patterns reflect sub-second activation sequences and reveal replay in human visual cortex. *Nature Communications* (12), 1795. doi: 10.1038/s41467-021-21970-2

2018 **Wittkuhn, L.**, Eppinger, B., Bartsch, L. M., Thurm, F., Korb, F. M., & Li, S.-C. (2018) Repetitive transcranial magnetic stimulation over dorsolateral prefrontal cortex modulates value-based learning during sequential decision-making. *NeuroImage* (176), 384–395. doi: 10.1016/j.neuroimage.2017.11.057

Conference proceedings

2019 **Wittkuhn, L.**, & Schuck, N. W. (2019) Detecting sub-second activation sequences with sequential fMRI pattern analysis. *2019 Conference on Cognitive Computational Neuroscience, 13–16 September 2019, Berlin, Germany*. doi: 10.32470/CCN.2019.1253-0

Conference presentations and posters

- 06/2021 **Psychologie und Gehirn (PuG) 2021**, Online conference.
Poster: "Dynamics of fMRI patterns reflect sub-second activation sequences and reveal replay in human visual cortex", Authors: Wittkuhn, L., & Schuck, N. W.
- 09/2019 **2019 Conference on Cognitive Computational Neuroscience (CCN)**,
Technical University (TU), Berlin, Germany.
Poster: "Detecting sub-second activation sequences with sequential fMRI pattern analysis", Authors: Wittkuhn, L., & Schuck, N. W.
- 06/2019 **Organization for Human Brain Mapping (OHBM) Annual Meeting 2019**, Auditorium Parco della Musica, Rome, Italy.
Poster: "Detecting fast sub-second activation sequences with sequential fMRI pattern analysis", Authors: Wittkuhn, L., & Schuck, N. W.
- 05/2019 **Royal Society Meeting: "Memory reactivation: replaying events past, present and future"**, Kavli Royal Society Centre, Newport Pagnell, UK.
Poster: "Tracking fast sequential neural events in humans using sequential fMRI pattern analysis", Authors: Wittkuhn, L., & Schuck, N. W. (presented by Schuck, N. W.)
- 09/2018 **Replay @ CUBRIC**, CUBRIC, Cardiff, United Kingdom.
Poster and talk: "Tracking fast sequential neural events in humans using fMRI", Authors: Wittkuhn, L., & Schuck, N. W.

Talks

- 06/2021 **Max Planck Digital Library**, Max Planck Society, Munich, Germany.
Talk: "Towards a workflow for open and reproducible MRI studies" (online talk) as part of the discussion series "Human Research Data in Practice", doi: 10.5281/zenodo.5012477
- 01/2021 **Lab of Matthew Nassar**, Brown University, Providence, RI, USA.
Talk: "Dynamics of fMRI patterns reflect sub-second activation sequences and reveal replay in human visual cortex" (online talk)
- 01/2021 **COMP2PSYCH Doctoral Colloquium**, Max Planck UCL Centre for Computational Psychiatry and Ageing Research, Berlin, Germany.
Talk: "Dynamics of fMRI patterns reflect sub-second activation sequences and reveal replay in human visual cortex"
- 11/2018 **Research colloquium**, Max Planck Institute Human Development, Berlin, Germany.
Talk: "Tracking fast sequential replay events in humans using fMRI"
- 09/2018 **Symposium on Computational Psychiatry and Ageing Research**, Max Planck UCL Centre for Computational Psychiatry and Ageing Research, Tegernsee, Germany.
Talk: "Tracking fast neural replay events in humans using fMRI"
- 11/2017 **COMP2PSYCH Fall Academy 2017**, Max Planck UCL Centre for Computational Psychiatry and Ageing Research, Berlin, Germany.
Talk: "Tracking fast sequential replay events in humans using fMRI"

Awards, funding and fellowships

Fellowships

2020–2021 **ReproNim/INCF Training Fellowship**, awarded by the Center for Reproducible Neuroimaging Computation and International Neuroinformatics Coordinating Facility.
Full year Train-the-Trainer fellowship program which provides fellows with conceptual and practical training in reproducible neuroimaging

Travel stipends

2019 **DAAD travel stipend**, awarded by the German Academic Exchange Service.
for my conference trip to the OHBM Annual Meeting 2019 in Rome, Italy

2017 **DAAD PROMOS stipend**, awarded by the German Academic Exchange Service.
for my research visit to the Department of Psychology at Concordia University Montreal

2015 **Erasmus+ stipend**, awarded by the Saxon Erasmus+ Internship Consortium.
for my research visit to the Affective Brain Lab at University College London

Skills

Coding Python, R, MATLAB, Bash

Development Git (GitHub, GitLab), DataLad, high-performance computing (Slurm, Torque), software containers (Docker, Singularity), continuous integration (Travis, GitLab CI)

Data Analysis Nipype, NiLearn, scikit-learn, SPM12, fMRIPrep, MRIQC, Brain Imaging Data Structure (BIDS), computational modeling

Task Design PsychoPy (Python), PsychToolbox & Cogent 2000 (MATLAB)

Methods functional and structural magnetic resonance imaging, online behavioral studies (Prolific, Pavlovia), electroencephalography, skin conductance response measurement, transcranial magnetic stimulation, transcranial direct-current stimulation

Writing \LaTeX , Markdown, MS Office

Design Adobe Photoshop, Adobe Illustrator, Affinity Designer

Languages German (native), English (fluent), French (basic)

Teaching

10/2020 **Data Management Workshop with DataLad**, MPIB / FZ Jülich.
Full-day online workshop on data management using DataLad (together with Adina Wagner)

12/2019 **Introduction to git**, Max Planck Institute for Human Development.
Hands-on introductory workshop on the version-control system `git`

07/2019 **Introduction to fMRIPrep**, Lab of Christian Doeller.
Introductory tutorial how to run fMRIPrep for pre-processing fMRI data

Winter 18/19 **fMRI data analysis and pre-processing**, MPI for Human Development.
I organized and partly taught a weekly meeting on fMRI data analysis and data pre-processing

Professional memberships

2019–2020 Organization for Human Brain Mapping (OHBM)

Media coverage

- 11/2019 **“Neuroplastizität: Wie das Gehirn sich neu strukturiert”**, *Bayern 2*.
Rebroadcast of the radio podcast featuring our work on replay in humans (in German)
- 11/2018 **“Kommandozentrale Gehirn”**, *Bayerischer Rundfunk (Bayern 2)*, *radioWissen*.
Radio podcast featuring our work on replay in humans (in German)

Mentoring and supervision

Research assistants

- 2019 – 2020 **Sudeshna Bora**, *Masters’s student*, Computational Neuroscience.
- 2019 – 2020 **Lena Krippner**, *Masters’s student*, Berlin School of Mind and Brain.
- 2018 – 2020 **Anika Löwe**, *Masters’s student*, Social, Cognitive and Affective Neuroscience.

Interns

- 2019 **Leonardo Pettini**, *Masters’s student*, Berlin School of Mind and Brain.
Now: PhD candidate at the Max Planck School of Cognition, Berlin, Germany
- 2018 **Lion Schulz**, *Bachelor’s student*, Technische Universität Dresden.
Now: PhD candidate at the Department Computational Neuroscience, Max Planck Institute for Biological Cybernetics, Tübingen, Germany

Professional services and extracurricular activities

- since 01/2021 **Member of Research Data Management group**, MPI for Human Development.
I contribute to the institutionalized, cross-departmental management of research data
- since 2019 **PhD wiki admin**, MPI for Human Development.
I created and since maintain a git-based wiki for PhD students

References

Dr. Nicolas Schuck, *PhD advisor*.

Principal investigator of Max Planck Research Group NeuroCode
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Prof. Dr. Ben Eppinger, *Bachelor's and Master's advisor*.

Associate Professor at the Department of Psychology
Concordia University Montreal, Loyola Campus
Montreal, Quebec, Canada H4B1R6
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Prof. Shu-Chen Li, Ph.D., *Bachelor's advisor*.

Professor at the Chair of Lifespan Developmental Neuroscience
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shu-chen.li@tu-dresden.de

Univ.-Prof. Dr. med. Hauke Heekeren, *Master's and external PhD advisor*.

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