

Dr. rer. nat.

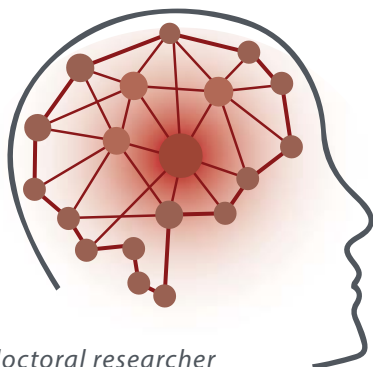
**JULIAN Q. KOSCIESSA**



Thomas van Aquinostraat 4, Nijmegen

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ORCID: 0000-0002-4553-2794



*I am a postdoctoral researcher working at the intersection of cognitive, computational and systems neurosciences. My work aims to improve the characterization of neural dynamics, and clarify the functional role of neural rhythms and noise in flexible cognition. My experimental research combines neuroscientific techniques, and extends available methods via scientific software development.*



behavior



EEG



fMRI



stimulation



models

## RESEARCH EXPERIENCE

**Postdoctoral Research Fellow** 2022 – PRESENT

Donders Institute for Brain,  
Cognition and Behaviour  
Nijmegen, Netherlands

**Pre-/postdoctoral Research Fellow** 2016 – 2022

IMPRS Comp2Psych  
Max Planck UCL Centre for  
Computational Psychiatry  
and Aging Research  
Berlin, Germany

2010 – 2016

**Research Assistant/Intern**

Berlin, Germany  
London, UK  
Singapore, Singapore

## EDUCATION

**Humboldt Universität zu Berlin** 2016 – 2020

Psychology  
Dr. rer. nat. (summa cum laude)

**Humboldt Universität zu Berlin** 2014 – 2016

Mind & Brain – Track Brain  
M.Sc. Master of Science

**Freie Universität Berlin** 2011 – 2014

Psychology  
B.Sc. Bachelor of Science

## COMP. SKILLS

**MATLAB**  
**R**  
**UNIX**



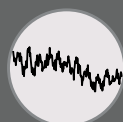
**Python**  
**Git**  
**DataLad**



## KEY PUBLICATIONS



**Kosciessa, J. Q.**, Lindenberger, U., & Garrett, D. D. (2021)  
Thalamocortical excitability adjustments guide human perception under uncertainty  
*Nature Communications*



**Kosciessa, J. Q.**, Kloosterman, N. A., & Garrett, D. D. (2020)  
Standard multiscale entropy reflects neural dynamics at mismatched temporal scales:  
What's signal irregularity got to do with it?  
*PLoS Computational Biology*



**Kosciessa, J. Q.**, Grandy, T. H., Garrett, D. D., & Werkle-Bergner, M. (2020)  
Single-trial characterization of neural rhythms: Potential and challenges.  
*NeuroImage*

## RESEARCH EXPERIENCE

- 09/2022 – PRESENT**    **Postdoctoral Researcher / Radboud Excellence Fellow**  
Donders Institute for Brain, Cognition and Behaviour  
Radboud University, Nijmegen, The Netherlands  
Independent Research Fellow / PI: Dr. Lennart Verhagen
- 07/2020 – 07/2022**    **Postdoctoral Researcher**  
Max Planck Institute for Human Development, Berlin, Germany
- 10/2016 – 03/2020**    **Predoctoral Research Fellow**  
*IMPRS COMP2PSYCH*: International Max Planck Research School on  
Computational Methods in Psychiatry and Ageing Research  
Max Planck UCL Centre for Computational Psychiatry and Aging Research  
Max Planck Institute for Human Development, Berlin, Germany  
Supervisors: Prof. Dr. Ulman Lindenberger, Dr. Douglas D. Garrett
- 10/2015 – 03/2016**    **Research Intern**  
UCL Institute of Cognitive Neuroscience  
PIs: Prof. Emrah Düzel & Prof. Ray Dolan  
PI: Dr. Dorothea Hämmerer
- 03/2015 – 07/2015**    **Research Intern**  
Max Planck Institute for Human Development, Berlin, Germany  
Center for Adaptive Rationality (ARC)  
PI: Dr. Wouter van den Bos
- 09/2012 – 09/2013**    **Research Assistant**  
**07/2014 – 09/2015**    Max Planck Institute for Human Development, Berlin, Germany  
**04/2016 – 09/2016**    Cognitive and neuronal dynamics of memory across the lifespan  
PIs: Dr. Markus Werkle-Bergner & Dr. Yee Lee Shing
- 01/2014 – 05/2014**    **Research Intern**  
Cognitive Neuroscience Laboratory, Duke-NUS, Singapore  
PI: Prof. Michael Chee  
Supervisor: Dr. Irma Kurniawan

## EDUCATION

- 10/2016 – 10/2020**    **Humboldt Universität zu Berlin**  
Psychology. Dr. rer. nat. (summa cum laude)
- 10/2014 – 09/2016**    **Humboldt Universität zu Berlin**  
Mind & Brain – Track Brain. M.Sc. Master of Science (GPA: 1.0)
- 09/2015 – 04/2016**    **University College London**  
Two Erasmus exchange terms. Institute of Neurology
- 07/2013 – 05/2014**    **National University of Singapore (NUS)**  
Two exchange semesters. Faculty of Arts and Social Sciences
- 10/2011 – 09/2014**    **Freie Universität Berlin**  
Psychology. B.Sc. Bachelor of Science (GPA: 1.1)

## TEACHING & TALKS (SELECTED)

- » 2025: Invited Symposium Talk: *Neuromodulatory Influences On Aging Cognition: Novel Measurement And Intervention Approaches In Health And Disease*. ICON2025. Porto, Portugal
- » 2025: Invited Lecture. *Managing uncertainty in perceptual and cognitive control*. Ghent University, Belgium.
- » 2024: Invited Lecture. *Evolving models of flexible neuro-cognitive control*. Radboud University.
- » 2024: Talk: *Neuroscientific data management using DataLad*. distribits conference. Düsseldorf. Germany
- » 2023: Invited Keynote Talk: *Signs, signals, and noise in human brain dynamics*. CuttingEEG conference. Frankfurt. Germany
- » 2023: Workshop: *Managing your data with DataLad*. CuttingEEG. Frankfurt. Germany
- » 2023: Lecture: *Simulations for transcranial ultrasound stimulation*. NeuroTechEU course Donders Centre for Cognitive Neuroimaging. Radboud University. The Netherlands
- » 2023: Seminar: Higher order cognition and emotion. Teacher. Radboudumc
- » 2023: Seminar: Psychology Research Project 3. Teacher. Radboud University
- » 2022: Workshops: *Reusable data management with DataLad*. Cognitive Psychology. University of Munster. Germany
- » 2022: Invited Research Talks: *Dynamic neural regimes for flexible decisions under uncertainty*.
  - Translational Decision-Making Seminar. University of Minnesota/Université de Montréal. U.S.A./Canada
  - Biopsychology. University of Munster. Germany
  - Donders Institute for Brain, Cognition and Behaviour. The Netherlands
- » 2022: Invited Symposium Talk: *Influences of arousal and cortical excitability on adaptive perceptual decision making*. ICON 2020. Helsinki, Finland
- » 2021: Research Talk: *The role of neural dynamics in flexible perception under uncertainty*. Computational Neuroscience Symposium. Osnabrück, Germany
- » 2021: Invited Research Talks: *Thalamocortical excitability adjustments guide human perception under uncertainty*. Shine Lab, University of Sydney, Australia / Halassa Lab, Massachusetts Institute of Technology (MIT), U.S.A.
- » 2020: Invited Colloquium Talk: *Measurement and relevance of rhythmic and aperiodic human brain dynamics*. Technical University. Berlin, Germany
- » 2020: Invited Workshop: *Multi-scale entropy as a tool to characterize neural signal irregularity*. EEG Meeting. Max Planck Institute for Human Development. Berlin, Germany
- » 2018: Invited Seminar: *Methods for the analysis of rhythmic and arrhythmic brain activity*. International Max Planck Research School on the Life Course. Berlin, Germany

## FUNDING & AWARDS

- » 2022: Radboud Excellence Fellowship (200.000 EUR)
- » 2022: Otto Hahn Medal of the Max Planck Society (7.500 EUR)
- » 2022: DAAD Conference Travel Grant: International Conference of Cognitive Neuroscience
- » 2021: DGPA Brain Products Young Scientist Award 2021
- » 2021: DAAD Conference Travel Grant to OHBM Meeting 2021
- » 2021: Merit Abstract Award OHBM Meeting 2021
- » 2018: IBRO Poster Award Interpreting BOLD 2018
- » 2018: DAAD Conference Travel Grant to Interpreting BOLD 2018 (Oxford, UK)
- » 2015/2016: DAAD Erasmus Stipend (University College London, UK)
- » 2014: DAAD PROMOS Stipend (National University Singapore, Singapore)

## STUDENT SUPERVISION

- » 2024/25: MSc Joana Pedroso de Faria (*co-supervision with Dr. Carys Evans*)  
M. Sc. student in Cognitive Neuroscience, Radboud University, The Netherlands  
*fMRI signatures of perceptual and cognitive control*
- » 2024/25: MSc Sebastian Reichstein (*co-supervision with Dr. Carys Evans*)  
M. Sc. student in Cognitive Neuroscience, Radboud University, The Netherlands  
*Transcranial deep brain ultrasound effects on resting-state dynamics*
- » 2023/24: MSc Martin Wimmers  
M. Sc. student in Cognitive Neuroscience, Radboud University, The Netherlands  
*Towards effective thalamic deep brain ultrasound stimulation*
- » 2023: MSc Jesse Lam  
M. Sc. student in Cognitive Neuroscience, Radboud University, The Netherlands  
*Offline transcranial ultrasonic stimulation effects on resting-state fMRI*  
*co-supervision with Dr. Lennart Verhagen*
- » 2023: BSc Lieke Hendrix  
B. Sc. student in Faculty of Science, Radboud University, The Netherlands  
*Effects of arousal and valence on pupil size*
- » 2023: BSc Sara Mulders  
B. Sc. student in Psychology, Radboud University, The Netherlands  
*How does expressed valence affect the perception of arousal in faces?*
- » 2023: BSc Siem van der Sluijs  
B. Sc. student in Psychology, Radboud University, The Netherlands  
*Positivity and Negativity Biases of facial emotion processing*
- » 2021/22: MSc Claire Pleche  
M.Sc. Student in Cognitive Neuroscience, Ecole Normale Supérieure de Paris, France  
*Probing the role of neural variability in flexible decision-making under uncertainty*  
*co-supervision with Dr. Douglas D. Garrett*
- » 2021: Mentor at Neuromatch Academy

## PROFESSIONAL ACTIVITIES

- » Ad-hoc peer reviewer:  
*PNAS, TICS, PLoS Biology, Neurolmage (10x), Journal of Neuroscience, Journal of Neurophysiology, International Journal of Psychophysiology, Brain Topography, European Journal of Neuroscience, Mindfulness, PLoS One (2x)*
- » Associate Member of the Deutsche Gesellschaft für Psychologie (DGPs)
- » Member of the Organization for Human Brain Mapping (OHBM)
- » Member of the International Neuroinformatics Coordinating Facility (INCF)
- » Member of the International Transcranial Ultrasonic Stimulation Safety and Standards (ITRUSST)
- » Co-organizer of monthly "Donders Nexus" meeting series. Radboud University.
- » PostDoc representative at the Donders Centre for Cognition (2022-2024)
- » Member of Donders Institute PostDoc Council (2022-2024)
- » Member of Communications committee CCN 2025



# PUBLICATION LIST



## Journal Publications (\*corresponding author)

1. Mooraj, Z., Salami, A., Campbell, K. L., Dahl, M. J., **Kosciessa, J. Q.**, Nassar, M. R., Werkle-Bergner, M., Craik, F. I. M., Lindenberger, U., Mayr, U., Rajah, M. N., Raz, N., Nyberg, L., & Garrett, D. D. (2025). Toward a functional future for the cognitive neuroscience of human aging. *Neuron*, 113(1), 154-183.

[article](#)

A perspective on dominant methodologies in the cognitive neuroscience of human aging, identifying an overreliance of structural and resting-state measures. The perspective advocates for a more task-centric, computationally-informed, approach in the field.

2. **Kosciessa, J. Q.\***, Mayr, U., Lindenberger, U., & Garrett, D. D. (2024). Broudscale dampening of uncertainty adjustment in the aging brain. *Nature Communications*, 15(1), 10717.

[article](#)[data](#)[code](#)

Task uncertainty is tracked by an integrated neural response (EEG & fMRI-based) across 100 younger and older adults, including prefrontal-thalamic modulation. This response dampens in older age, while response maintenance is associated with higher cognitive flexibility.

3. **Kosciessa, J. Q.\***, Lindenberger, U., & Garrett, D. D. (2021). Thalamocortical excitability adjustments guide human perception under uncertainty. *Nature Communications*, 12(1), 2430.

[article](#)[data](#)[code](#)[task](#)[press release](#)

Higher-order thalamic activation increases when contextual uncertainty ambiguates which environmental features are critical for an upcoming choice, and is associated with switches from a rhythmic to an aperiodic processing mode.

4. Kloosterman, N. A., **Kosciessa, J. Q.**, Lindenberger, U., Fahrenfort, J. J., & Garrett, D.D. (2020). Boosts in brain signal variability track liberal shifts in decision bias. *Elife*, 9.

[article](#)[data](#)[code](#)

The magnitude of adaptive shifts from conservative to liberal decision biases under speed-accuracy emphasis is tracked by increasing signal variability in frontal cortex.

5. **Kosciessa, J. Q.\***, Kloosterman, N. A., & Garrett, D. D. (2020). Standard multiscale entropy reflects neural dynamics at mismatched temporal scales: What's signal irregularity got to do with it? *PLoS Computational Biology*, 16(5).

[article](#)[data](#)[code](#)[toolbox](#)

Highlights and exemplifies biases in prior research using an information theoretic metric of signal irregularity and proposes avenues to adjudicate such issues in future applications.

6. **Kosciessa, J. Q.\***, Grandy, T. H., Garrett, D. D., & Werkle-Bergner, M. (2020). Single-trial characterization of neural rhythms: Potential and challenges. *NeuroImage*, 206, 116331.

article

code

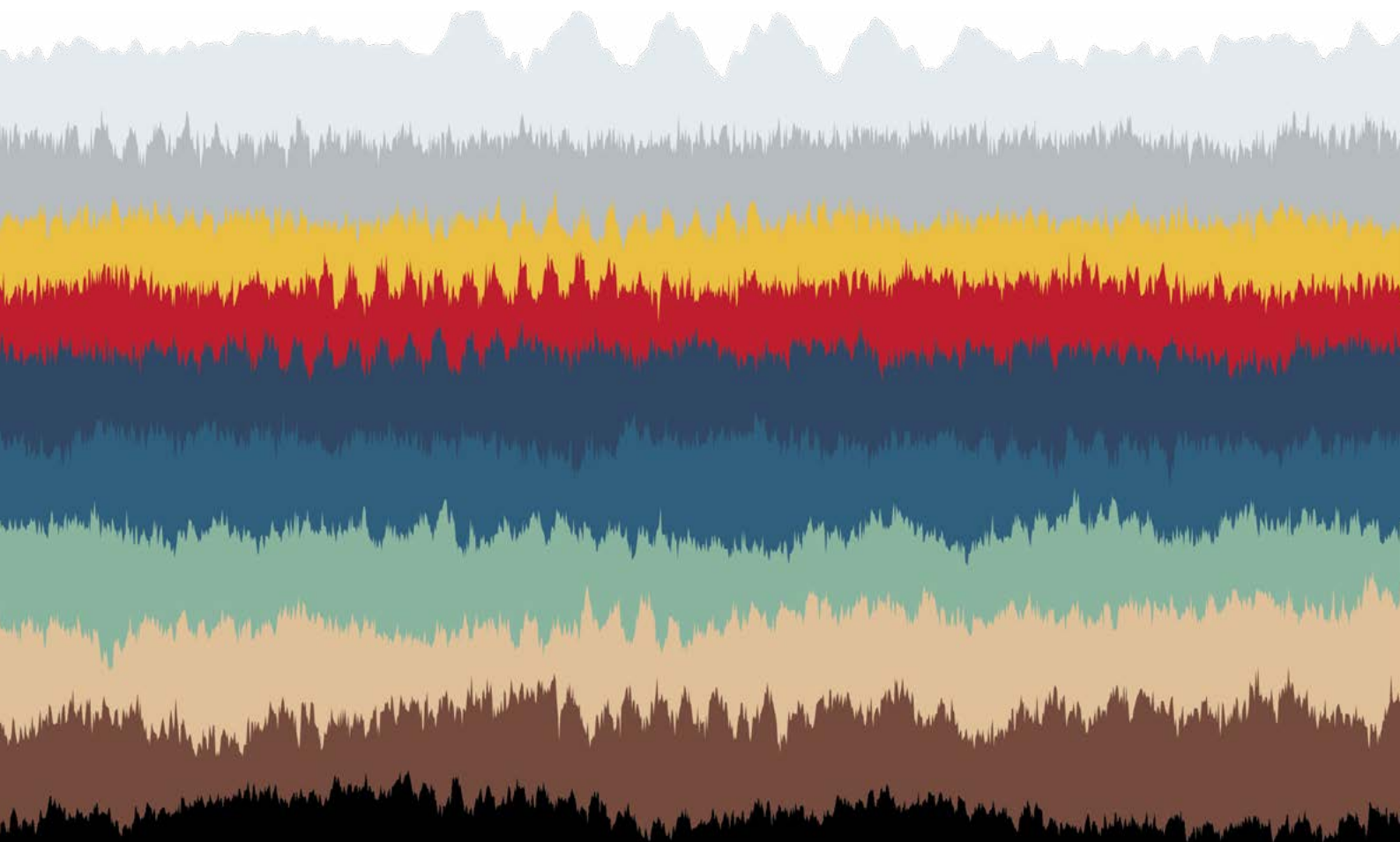
toolbox

Introduces a novel algorithm that separates neural rhythms from background activity in magnitude, space and time, and enables specific rhythm characterization when boundary conditions are met.

7. Hämmerer, D., Callaghan, M. F., Hopkins, A., **Kosciessa, J.**, Betts, M., Cardenas-Blanco, A., Kanowski, M., Weiskopf, N., Dayan, P., Dolan, R. J., & Düzel, E. (2018). Locus coeruleus integrity in old age is selectively related to memories linked with salient negative events. *Proceedings of the National Academy of Sciences of the United States of America*, 115, 2228-2233.

article

Quantitative imaging indicates structural reductions in brainstem locus coeruleus integrity with increasing adult age, and links related noradrenergic drive to the encoding of salient events.



## Monographs/Theses

- 8. Kosciessa, J. Q.** (2020, Dr. rer. nat.). Measurement and relevance of rhythmic and aperiodic human brain dynamics. *Humboldt-Universität zu Berlin*.

This dissertation highlights improvements in the ability to selectively characterize rhythmic and aperiodic fluctuations, and discusses potential generating mechanisms as well as modulatory influences to contextualize their interpretation at the latent level of human brain function.

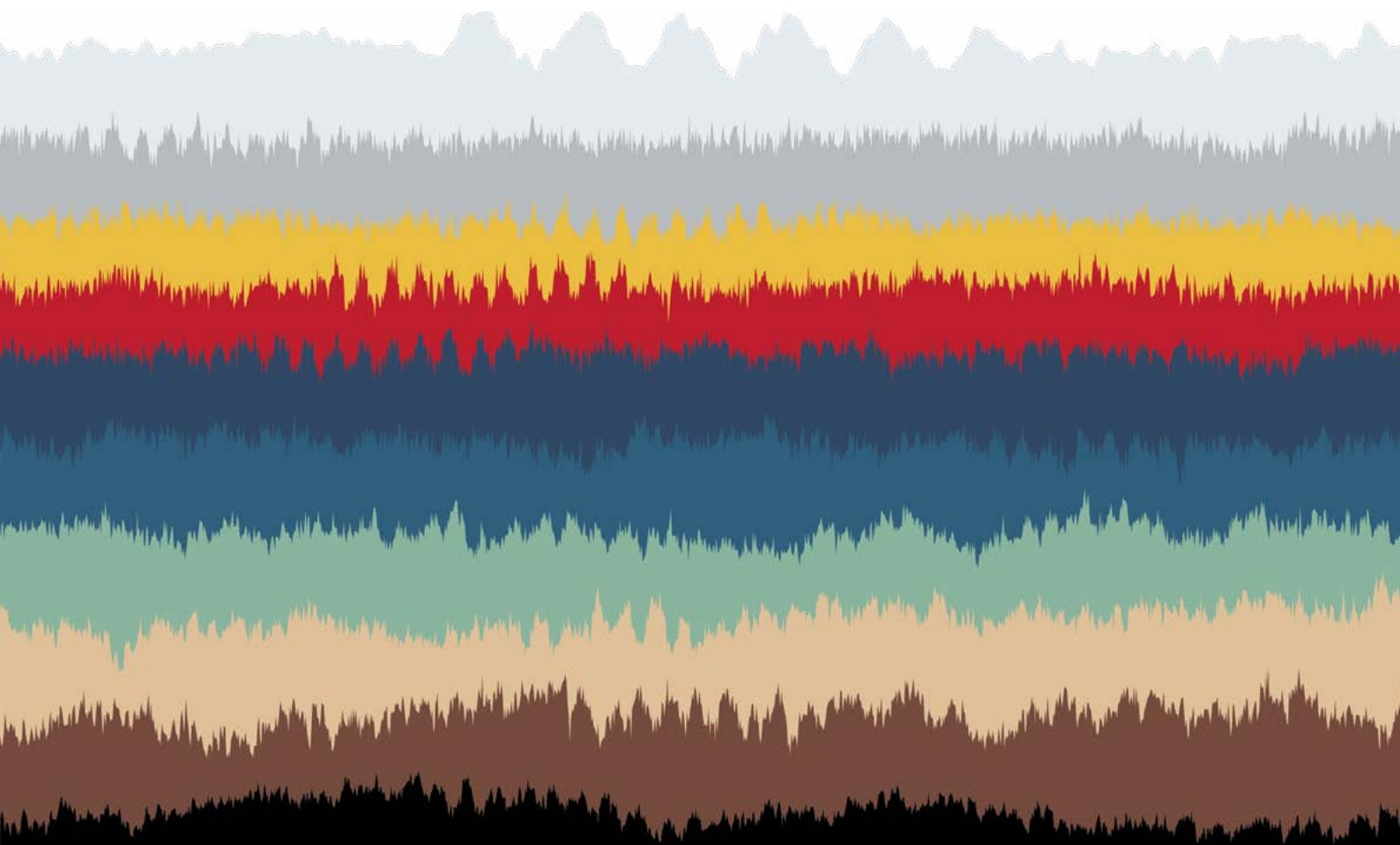
article

- 9. Kosciessa, J. Q.** (2016, M. Sc.). Effects of short-term memory load and task training on the amplitude and abundance of rhythmic neural activity. *Humboldt-Universität zu Berlin*

Neural rhythms are dominantly characterized by their power, but this measure conflates amplitude and duration. This work separates these two parameters of human alpha rhythms and investigates how they are modulated during working memory.

- 10. Kosciessa, J.** (2014, B. Sc.). The assessment of microsaccades from the rEOG. *Freie Universität Berlin*

Microsaccades are small, high-velocity eye movements. This work explores the potential to use visual EEG channels to detect microsaccades without an eye tracker, and describes adult age differences in microsaccade characteristics.





## Preprints / in preparation

### 11. **Kosciessa, J. Q.\*** (2022). EEGmanylibs contribution.

Preprocessing and analysis workflows for high-dimensional EEG data are highly variable. This project aims to establish the impact of analytical variability on hypothesis testing. This is a contribution to this community effort that was derived with one of my common workflows.

preprint

code + data

12. Garrett, D. D., Kloosterman, N. A., Epp, S., Chopurian, V., **Kosciessa, J. Q.**, Waschke, L., Skowron, A., Shine, J. M., Perry, A., Salami, A., Rieckmann, A., Papenberg, G., Wählin, A., Karalija, N., Andersson, M., Riklund, K., Lövdén, M., Bäckman, L., Nyberg, L., & Lindenberger, U. (2022). Dynamic regulation of neural variability during working memory reflects dopamine, functional integration, and decision-making. *bioRxiv*, 2022.2005.2005.490687. <https://doi.org/10.1101/2022.05.05.490687>

Linking BOLD variability increases with increasing memory load to dopamine capacity, network-level functional integration, and flexible decision processes, this study argues that the ability to dynamically regulate subcortical striato-thalamic dynamics according to momentary task demands may be a hallmark of a well-functioning brain.

preprint

13. Skowron, A., **Kosciessa, J. Q.**, Lorenz, R., Hertwig, R., Bos, W. van den, & Garrett, D. D. (2024). Neural variability compresses with increasing belief precision during Bayesian inference. *bioRxiv*. <https://doi.org/10.1101/2024.01.11.575180>

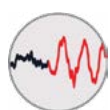
BOLD variability tracks changes in internal uncertainty levels during a latent inference task.

preprint



## Software / Tools / Data

(abridged; see <https://jkosciessa.github.io/tools> for complete and updated list)

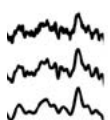


extended Better  
OSCillation Detection  
(**eBOSC**)

Toolbox to detect the occurrence of  
rhythms in (neural) time series.  
*MATLAB/Python*

DOI [10.5281/zenodo.4668502](https://doi.org/10.5281/zenodo.4668502)

DOI [10.5281/zenodo.5898813](https://doi.org/10.5281/zenodo.5898813)



modified multiscale  
entropy (**mMSE**)

Information-theoretic algorithm for  
the characterization of (neural) time  
series irregularity.

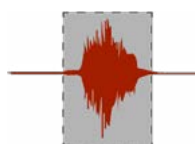
DOI [10.5281/zenodo.4672138](https://doi.org/10.5281/zenodo.4672138)



Multi-attribute  
attention task (**MAAT**)

Adaptation of the random dot motion  
paradigm, a key task in systems neu-  
roscience.

[https://git.mpib-berlin.mpg.de/  
LNDG/multi-attribute-task](https://git.mpib-berlin.mpg.de/LNDG/multi-attribute-task)



Computer-Assisted  
Response Labeler  
(**CARL**)

Graphical User Interface that accel-  
erates verbal response labelling in  
psychological experiments.

DOI [10.5281/zenodo.7505622](https://doi.org/10.5281/zenodo.7505622)

<https://github.com/jkosciessa/carl>



PREprocessing &  
Simulations for  
Transcranial Ultra-  
sound Stimulation  
(**PRESTUS**)

Toolbox to create personalized models  
of ultrasonic brain stimulation based  
on structural MRI images.

[https://github.com/jkosciessa/  
PRESTUS](https://github.com/jkosciessa/PRESTUS)

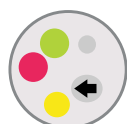


Examples of integrated code & data DataLad datasets:

[https://gin.g-node.org/juliankosciessa/eegmp\\_analysis](https://gin.g-node.org/juliankosciessa/eegmp_analysis)

<https://git.mpib-berlin.mpg.de/LNDG/stateswitchage/stsw>

<https://gin.g-node.org/StateSwitch/stsw>



see also:

<https://git.mpib-berlin.mpg.de/LNDG/stateswitch>

<https://osf.io/ug4b8/>