

# Moritz Boos

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## Technical skills

Programming Python, R, SQL

Machine Learning Deep Learning, linear and nonlinear regression and classification, Natural Language Processing, audio recognition, unsupervised learning, approximate variational inference, Monte Carlo sampling

Statistics Bayesian statistics, hierarchical Bayesian modeling, classical significance testing

Software NumPy, SciPy, Pandas, Scikit-Learn, Pytorch, Keras, Stan

## Experience

### Work

3/2021– **Data Scientist**, EYEO, Brighton.

3/2020– **Research Associate**, APPLIED NEUROCOGNITIVE PSYCHOLOGY LAB, CARL-VON-OSSIETZKY UNIVERSITY, Oldenburg.

- o Designed and developed a [tool](#) for voxel-wise encoding models with continuous stimuli using Python and Docker.

- o Developed a new Deep Learning model for relating auditory stimuli to neuroimaging data based on self attention in recurrent neuronal networks.

6/2019– **Staff Associate**, NEURAL ACOUSTIC PROCESSING LAB, COLUMBIA UNIVERSITY, New York.

- o Developed a new Deep Learning model for relating auditory stimuli to neuroimaging data based on self attention in recurrent neuronal networks.

11/2016– **Research Associate**, APPLIED NEUROCOGNITIVE PSYCHOLOGY LAB, CARL-VON-OSSIETZKY UNIVERSITY, Oldenburg.

- o Developed a Machine Learning model to relate Bayesian unsupervised learning to brain activity. This model employs sparse coding, principal component analysis, and linear and non-linear regression to build an interpretable model of neuronal speech processing.

- o Built a model of speech signal to noise ratio that combines unsupervised learning of audio signals with a Machine Learning model of human neuronal speech processing.

2/2015– **Contractual Work**, GEORG-AUGUST UNIVERSITY, Göttingen, Statistical analysis of questionnaire data using R.

11/2013– **Contractual Work**, MEDICAL SCHOOL HANOVER, Hanover, Statistical analysis of EEG data using Python.

## Education

- 2016–2021 **PhD student in the Applied Neurocognitive Psychology Lab**, *Carl-von-Ossietzky University*, Oldenburg.
- 2013–2017 **Masters of Science in Neurocognitive Psychology (in English)**, *Carl-von-Ossietzky University*, Oldenburg.
- 2009–2013 **Bachelor of Science in Psychology**, *Technische Universität Carolo-Wilhelmina*, Braunschweig.

#### Selected Internships

- 7/2016–10/2016 **Internship**, INRIA SACLAY, Saclay, Developed machine learning models of brain activity using Natural Language Processing.
- 5/2015–8/2015 **Internship**, OTTO-VON-GUERICKE UNIVERSITY, Magdeburg, Developed a pipeline for comparing different validation criteria for encoding models in neuroimaging.

#### Machine Learning competitions

- 2015 **How much did it rain? II**, *Predict hourly rainfall using data from polarimetric radars*, Place 72/587, Top 13%.
- 2018 **Toxic Comment classification challenge**, *Identify and classify toxic online comments*, Place 119/4551, Top 3%.

#### Open source contributions

- Nilearn A machine learning library for neuroimaging
- Datalad-OSF A Datalad extension for the Open Science Framework
- Voxel-wise encoding datasets A Docker container for running voxel-wise encoding models on large neuroimaging datasets
- BIDS app

#### Selected Publications

Moritz Boos, J. Swaroop Guntupalli, Jochem W. Rieger, and Michael Hanke. “The role of auxiliary parameters in evaluating voxel-wise encoding models for 3T and 7T BOLD fMRI data”. In: *bioRxiv* (2020). DOI: 10.1101/2020.04.07.029397. URL: <https://www.biorxiv.org/content/early/2020/04/09/2020.04.07.029397>.

Moritz Boos, Jörg Lücke, and Jochem W Rieger. “Generalizable dimensions of human cortical auditory processing of speech in natural soundscapes: A data-driven ultra high field fMRI approach”. In: *NeuroImage* (2021), p. 118106.

Moritz Boos, Caroline Seer, Florian Lange, and Bruno Kopp. “Probabilistic inference: Task dependency and individual differences of probability weighting revealed by hierarchical Bayesian modelling”. In: *Frontiers in Psychology* 7 (2016), p. 755.