# Moritz Boos

*Data Scientist*

## Search statement

I am a Data Scientist and researcher at the intersection of Machine Learning and Neuroscience with deep domain expertise in Statistical Modeling, Deep Learning, and Neuroimaging. I am looking for a data-driven position in industry, either remotely or in the London area, starting in Fall 2020.

## Technical skills

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| Programming | Python, R, MATLAB, 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 siginificance testing |
| Software | NumPy, SciPy, Pandas, Scikit-Learn, Pytorch, Keras, Stan |

## Experience

### Work

11/2016– **Research Associate**, Applied Neurocognitive Psychology Lab, Carl-von-Ossietzky University, Oldenburg.

- 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.
- 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.
- Designed and developed a tool for voxel-wise encoding models with continuous stimuli using Python and Docker.

6/2019–1/2020 **Staff Associate**, Neural Acoustic Processing Lab, Columbia University, New York.

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

2/2015–11/2015 **Contractual Work**, Georg-August University, Göttingen, Statistical analysis of questionnaire data using R.

11/2013-12/2015 **Contractual Work**, Medical School Hanover, Hanover, Statistical analysis of EEG data using Python.

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## Education

2016– **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 BIDS app A Docker container for running voxel-wise encoding models on large neuroimaging datasets

## Attended Hackathons

2/2016 and 3/2017 **Brainhack**, *Paris*, Collaborative development of open source software for neuroscience.

5/2018 **Brainhack**, *Magdeburg*, Collaborative development of open source software for neuroscience.

2/2019 **Brainhack**, *Warsaw*, Collaborative development of open source software for neuroscience.

11/2019 **Brainhack**, *New York City*, Collaborative development of open source software for neuroscience.

## Selected Publications

Moritz Boos et al. "Probabilistic inference: Task dependency and individual differences of probability weighting revealed by hierarchical Bayesian modelling". In: *Frontiers in Psychology* 7 (2016), p. 755.

Moritz Boos et al. "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.

Caroline Seer et al. "Prior probabilities modulate cortical surprise responses: A study of event-related potentials". In: *Brain and cognition* 106 (2016), pp. 78–89.