Kambiz Tavabi, PhD

Research Scientistt · Neuroscience Expert

Seattle, WA.

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Summary

Research Science Engineer with 13+ years of postgraduate experience in biomedical and health data science projects. Expert in behavioral neuroscience, data science, and data engineering. My research focuses on how the human brain learns to acquire and process language. I am proficient in data engineering and analyzing various biomedical imaging technologies (MRI, MEG, EEG). As a trained cognitive psychologist, I work at the intersection of neuroscience and data science to develop diagnostic tools for language impairments in psychiatric disorders like autism. I am a meticulous and passionate worker who seeks translational data science roles in public health, social policy, or healthcare sectors.

Education

University of Münster

Münster, Germany

Doctor of Philosophy in Neuroscience

Sep 2004 - Jun 2007

- Received a scholarship (Bat/2a) from the German Education Ministry to attend the Medical Faculty to study auditory neuroscience with Prof. Christo Pantev.
- Completed dissertation after delivering two first-authored articles and graduated magna cum laude (GPA 3.4 of 4.0) as one of the first student alums from the nascent program in interdisciplinary neuroscience.
- **Courses:** Digital Signal Processing, Electrophysiology, Neuroscience, Psycholinguistics, Neuropsychology

University of Oregon

Eugene, OR

Master of Science in Cognitive Psychology

Sep 2002 - June 2004

- Accepted into the terminal Master's Program in Psychology with a specialization in cognition with Prof. Helen Neville in the Brain Development Lab.
- Delivered a research proposal to use biomedical imaging technologies to explore developmental neural plasticity in the human brain.
- **Courses:** Magnetic Resonance Imaging, Philosophy of Mind, Statistics for Data Analysis, Neurobiology of Attention & Arousal, Cognitive Psychology, Social & Personality Psychology, Developmental Psychology, Neuroplasticity, Principles of Psychology, Modern Investigation Methods in Human Neuroscience, Evolution of Mind

University of California Los Angeles

Los Angeles, CA

Bachelor of Science in Physiological Science

Sep 1995 - June 2000

- Graduated from the premed training curriculum with two-yearGraduated from the premed training curriculum with 2+ years volunteering as a student research assistant in the Department of Psychiatry & Biobehavioral Sciences.
- **Courses:** Neurobiology of Learning & Memory, Biological Basis of Psychiatric Disorders, Genetics, Vertebrate Physiology, Chemistry, Organic Chemistry, Biology, Physics, Calculus, Linear Algebra, Logic

Work Experience

University of Washington

Seattle, WA

Research Science Engineer

Nov 2011 - Dec 2022

- Developed data collection, exploratory data analysis (EDA), and visualization workflows in MATLAB and Python for human health sensor-array data (HIPPA), resulting in several publications on data for 100+ participants in peer-reviewed journal articles: (i, ii, iii).
- Implemented Python software applications for small data mining or 'fishing,' automation & collaboration, and statistical analysis (A/B testing, analysis of variance, linear modeling). MNEFUN is a small-scale wrapper application used to deploy data science solutions for individual human neurophysiological data (MEG, EEG) at the Institute for Learning & Brain Sciences.
- Collaborated in developing the MNE-bids codebase featured in a Journal of Open Source Software publication and is actively maintained by a vibrant open-source developer community. MNE-bids software is designed for faster coding implementation, more robust analysis, and code sharing between co-workers and collaborations.
- Promoted to staff scientist (RSE-IV) after developing a series of biomedical imaging data science projects to study language learning in infants and spoken word recognition in individuals with autism spectrum disorders. The resulting projects generated $1.5M in funding for the Institute for Learning & Brain Sciences.
- Guided and trained junior colleagues and students with technical expertise for planning data acquisition and analysis strategies to develop Python scripts for data quality control (QC), wrangling (ETL, dimensionality reduction), and analysis (DSP, statistical modeling), resulting in publications in journals Brain and Language and Neuroscience Methods.
- **Technical Skills:** Experimentation, Digital Signal Processing (DSP), A/B testing, Analysis of Variance (ANOVA), general linear model, Case Control, Longitudinal Data, Exploratory Data Analysis (EDA), Principal Component Analysis (PCA), Dimensionality Reduction, Feature Engineering, Data visualization (R, Tidyverse), Data Mining, Extraction Transformation & Loading (ETL), Data Modeling, Machine Learning, LOGIT, Random Forest, MATLAB, Python, Pandas SQL, Xarray, Scikit-learn, Pandas SQL, Linux, MacOS, Bash Scripting, Git.
- **Soft Skills:** Teamwork, Leadership, Time Management, Communication, Presentation skills, Grant Writing, Project Management, and Paradigm Development.

The Children's Hospital of Philadelphia *Philadelphia, PA*

Post-Doc Fellow *Nov 2008 - Oct 2011*

- Designed a medical imaging exam to study language impairments in a Federally funded case-control project with 100+ school-aged children with autism. For outstanding translational research, I was awarded $35K in college loan repayment by the National Institute of Health. Results from the design were published in NeuroReport articles (i, ii).
- Enhanced the reliability of preoperative brain mapping exams for surgical epilepsy treatment in pediatric patients.
- Overhauled the statistical analysis of large-array sensor data with advanced non-parametric analysis of variance routines to improve the reliability of hypothesis testing resulting in a highly-cited publication in Biological Psychiatry.
- Planned and instructed a seminar in applied research statistics to facilitate research projects for first-year medical school residents.
- **Technical Skills:** Case-Control, Mixed Linear Modeling, Analysis of Variance (ANOVA) MATLAB, Time-Frequency Analysis.
- **Soft Skills:** Course Planning, Presentation Skills, Scientific writing.

MRC Cognition and Brain Sciences Unit *Cambridge, UK*

Visiting Scientist *Aug 2007 - Aug 2008*

- Developed an experimental procedure for data acquisition in the newly established magnetoencephalography (MEG) lab in the Cognition Brain Sciences Unit.
- Facilitated the development of standard operating systems for data acquisition.
- **Technical Skills:** MATLAB, Unix Cluster computing, Quality Control, Standard Operating Procedures.
- **Soft Skills:** Teamwork, Presentation Skills.

Projects

Automaticity in the reading circuitry *Seattle, WA*

University of Washington *2015 - 2019*

- Measured magnetoencephalography in school-aged children (N = 42, 7–12 years of age) to examine word-selective brain responses under multiple experimental conditions. The results showed word-selective responses in language regions in the presence of overt distractions. Critically, this automatic word-selective response was indicative of reading skill: the strength of word-selective responses correlated with individual reading skills.
- Developed data acquisition and analysis strategies for signal extraction, dimensionality reduction (PCA), data transformations, and 3D modeling to facilitate hypothesis testing.
- Coauthored manuscript and made critical contributions to the discussion and interpretation of results in the context of language cognition.
- **Technical Skills:** Data Engineering, Python, Digital Signal Processing, Data Modeling.
- **Soft Skills:** Time management, Teamwork, Technical Writing.

Effectively combining temporal projection noise suppression methods in magnetoencephalography *Seattle, WA*

University of Washington *2018 - 2020*

- Mentored a graduate student with Python data visualization, analysis scripts, and manuscript preparation for a student project.
- Examined the efficacy of various noise sub-space projection methods for preprocessing and magnetoencephalography or electrophysiology data before 3D modeling. The findings apply to clinical populations such as epilepsy, single-trial data, or cases of sparse data.
- **Technical Skills:** Data Visualization, Python, Digital Signal Processing, Data Modeling.
- **Soft Skills:** Mentoring, Teamwork, Scientific Writing.

Mne-Bids: Organizing Electrophysiological Data into the Bids Format and Facilitating Their Analysis *Seattle, WA*

University of Washington *2018 - 2019*

- Contributed to open-source Python applications to speed up analyses, develop more reliable code, and facilitate sharing of data and code with co-workers and collaborators.
- **Technical Skills:** Python Software Development, Git, Github
- **Soft Skills:** Teamwork

Using magnetoencephalography to examine word recognition, lateralization, and future language skills in 14-month-old infants *Seattle, WA*

University of Washington *2014 - 2019*

- Developed an acquisition protocol and managed data collection for word learning in young infants (N = 27, 39–42 weeks gestational age) using magnetoencephalography (MEG) during a spoken word recognition experimental paradigm.
- Implemented digital signal processing and 3D statistical modeling to examine the relationship between brain responses and prospective measures of vocabulary growth. The findings were discussed in terms of theory on cerebral lateralization and individual differences related to attention that play an essential role in language learning.
- **Technical Skills:** Python, Digital Signal Processing, Statistical Modeling
- **Soft Skills:** Teamwork, Project Management, Data Management

Auditory Magnetic Mismatch Field Latency: A Biomarker for Language Impairment in Autism *Philadelphia, PA*

The Children's Hospital of Philadelphia *2010 - 2011*

- Leveraged nonparametric statistical analysis to examine data for children with ASD (N = 51, 6–15 years of age). Measured neuropsychological evaluation, tests of language function, and magnetoencephalography (MEG) recording during speech discrimination.
- Authored analysis of variance results for significantly slower discrimination in children with ASD and receiver operator characteristic analysis to characterize sensitivity and specificity for diagnosing language impairment based on MEG data feature engineering.
- **Technical Skills:** Mixed Linear Modeling, Analysis of Variance, SPSS, Receiver Operator Curve Analysis, Case Control
- **Soft Skills:** Scientific Writing

Skills

Data Science	Experimentation, Digital signal processing, A/B testing, Analysis of variance, General linear modeling, Case control, Longitudinal data, Exploratory data analysis, Principal component analysis, Dimensionality reduction, Feature engineering, Data visualization (Seaborn, Tidyverse), Data mining, Extraction-transformation-loading, Data wrangling, Data modeling, Machine learning, LOGIT, Random forest.
Programming	Github, Python, R (ggplot2, lme4), HUGO HTML/CSS, SQL, MATLAB.
Miscellaneous	Linux, MacOS, Windows, Shell (Bash/Zsh), LaTeX(Overleaf/R Markdown), Git.
Soft Skills	Presentation, Time management, Teamwork, Problem solving, Documentation, Scientific writing, Grant management.

Languages

English	Fluent
Farsi	Intermediate
Spanish	Intermediate
German	Beginner