

Ruiqi Chen

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EDUCATION

Bachelor of Science | School of EECS | Peking University 2017.9 - Present

- Major: Intelligence Science and Technology (degree expected in 2021.7)
- Overall GPA: 3.59/4.0 Psychology & Neuroscience GPA: 3.78/4.0
- English skills: GRE Verbal 168 (98%), Quantitative 170 (96%), AW 4 (57%); TOEFL 106 (Speaking 24)

RESEARCH EXPERIENCE

Institute of Neurology | University College London (Remote) 2020.7 - Present

- **Advisor:** Prof. [Sven Bestmann](#)
- **Project (Independent): Simulation & Detection of Cortical Traveling Waves ([Link](#))**
 - Simulated an EEG dataset with spherical traveling wave and close-to-real voltage distribution and power spectrum; now working on the simulation of intracranial signals with planar waves
 - Demonstrated that the PCA method in [\(Alexander et. al., 2019\)](#) could not reliably estimate the spatial frequency and source of the traveling wave through experimental and theoretical analysis
 - Revealed that the clustering method in [\(Alexander et. al., 2016\)](#) might suffer from pattern misclassification and “blurring” during averaging, and consequently imprecise estimation of the spatiotemporal structure
 - Proved that directly clustering the data samples provided satisfactory results and common phase removal might increase the sensitivity of the clustering algorithm
 - Now implementing more methods from the literature and evaluating their performance under noise

IDG/McGovern Institute for Brain Research | Tsinghua University 2019.7 – 2020.2

- **Advisor:** Prof. [Bo Hong](#) (PI)
- **Project (Leader): EEG Functional Connectivity Microstates ([Link](#))** 2019.9 – 2020.2
 - Discovered the hierarchical, self-similar structure of EEG functional connectivity microstates by analyzing the results with different sliding window length and different number of clusters
 - Illustrated the consistency between functional-connectivity-based and voltage-distribution-based EEG microstates by their similarity in spatial topology and temporal dynamics
 - Established the link between the proportion/stability/connectivity profile of a specific microstate and activity of the Default Mode Network (DMN) under different task conditions
 - Explored the interaction between alpha oscillation and microstate dynamics
- **Pilot Study on EEG Microstates ([Link](#))** 2019.8
 - Recorded EEG signal from subjects resting/listening to a story/listening to music, with eyes open or closed
 - Conducted k-means clustering based on voltage distribution or functional connectivity pattern
 - Analyzed results with mathematic tools including dynamic Generalized Linear Model (dynamic GLM), Multidimensional Scaling (MDS), unsupervised learning, and silhouette evaluation ([Codes](#))
- **EEG Oddball Experiment ([Link](#))** 2019.7
 - Designed and performed an EEG oddball experiment with Psychtoolbox
 - Conducted Event-related Potential (ERP) analysis with EEGLAB
 - Successfully replicated the MMN/P300 effect

IDG/McGovern Institute for Brain Research | Peking University

2019.3 - Present

- **Advisor:** Prof. [Huan Luo](#) (PI)
- **Project (Independent): Sequential Working Memory** ([Link](#)) 2019.4 – Present
 - Designed an EEG experiment to explore the neural mechanism underlying the manipulation of contents in auditory working memory and collected data from 16 subjects ([Codes](#))
 - Pre-processed the data with EEGLAB and performed ERP & time-frequency analysis with Fieldtrip ([Codes](#)); results being consistent with [\(Albouy et al., 2017\)](#)
 - Decoded the memory content with an LSTM network and found that the neural representation is relatively consistent during the delay period
 - Wrote an intensive review about the temporal organization in working memory, and another for the computational models and functions of neural oscillation in attention and working memory ([Link](#))
- **Working Memory Decoding Analysis** ([Link](#)) 2019.3
 - Implemented an Inverted Encoding Model (IEM) based on an EEG visual working memory experiment
 - Reconstructed the tuning curve for the orientation of two Gabor stimuli

PROGRAMMING PROJECTS

Word Embedding Strategies & RNN Decoders for Sentiment Classification ([Link](#)) 2020.4

- Compared the performance of three word embedding strategies (Skip-gram, CBOW & Task-oriented) and three decoding networks (LSTM, GRU, simple RNN) on the IMDB dataset after controlling the number of parameters
- Found that LSTM generalized best while simple RNN was highly unstable; Task-oriented encoding is optimal

Training a Deep Convolutional Neural Network on CIFAR-10 ([Link](#)) 2019.12

- Implemented a ResNet-20 model with Keras and TensorFlow and practiced parameter tuning

Visualization of NSFC Funding 2018 ([Link](#)) 2019.10

- Revealed the disparity in funding received among different academic institutions and regions in China vividly
- Acquired visualization skill to facilitate high-dimensional big data analysis

ACTIVITIES

Summer Program for Neural and Cognitive Science | Tsinghua University

2019.8

- Learnt about the principles, methodology and frontiers of neuroscience ([Details](#))

SELECTED COURSES

- **Cognitive Neuroscience:** Neuropsychology (96/100), The Brain and Cognitive Science (92/100), Experimental Psychology (90/100), Physiological Psychology (90/100)
- **Computational Modeling:** Computational Modeling for Psychology and Neuroscience (92/100), Computational Neuroscience (89/100), Computational Perception and Scene Analysis (86/100)
- **Mathematics:** Psychological Statistics II (90/100), Probability Theory and Statistics (90/100), Introduction to Stochastic Processes (84/100), Signals and Systems (84/100), Introduction to Pattern Recognition (83/100)

SKILLS

- **Programming:** (Proficient) MATLAB (EEGLAB, Fieldtrip, Psychtoolbox), Python (TensorFlow, OpenCV); (Intermediate) C/C++, HTML, CSS, JavaScript (d3), SVG; (Basic) R, SPSS
- **Signal Analysis:** EEG recording & preprocessing, ERP & time frequency analysis, MVPA, dynamic GLM, clustering & classification, connectivity, microstates, traveling wave
- **Modeling:** Bayesian modeling & MCMC, Inverted Encoding Model, Convolutional & Recurrent Neural Network