

Ruiqi Chen

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EDUCATION

Bachelor of Science | Peking University 2017.9 - Present

- Major: Intelligence Science and Technology (degree expected in 2021.7)
- Overall GPA: 3.59/4.0 Last term's GPA: 3.70/4.0
- English skills: GRE Verbal 168/170 (98%), Quantitative 170/170 (96%), AW 4/6 (57%); TOEFL 106/120

RESEARCH EXPERIENCE

IDG/McGovern Institute for Brain Research | Tsinghua University 2019.7 - Present

- Advisor: Prof. [Hong. Bo](#) (PI)
- Project (Leader): EEG Functional Connectivity Microstates ([Link](#)) 2019.9 – Present
 - 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 long-time EEG signal from 5 subjects while they were 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 general linear model, multidimensional scaling, 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. [Luo. Huan](#) (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 analyzed the results with Fieldtrip
 - Learned the rationale of cluster-level permutation test and applied it to ERP analysis, result being consistent with ([Albouy et al., 2017](#)); helped fix a [bug](#) in Fieldtrip during the process
 - Working on the time-frequency analysis currently ([Codes](#))
 - 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 based on an EEG visual working memory experiment
 - Reconstructed the tuning curve for the orientation of two Gabor stimuli
 - Practiced MATLAB programming and multivariate pattern analysis (MVPA) through self-learning

PROGRAMMING PROJECTS

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

- Trained a ResNet-20 model from scratch on CIFAR-10 dataset and achieved high accuracy
- Practiced DNN implementation with Keras and TensorFlow (self-taught within one week)

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

- Visualized the National Natural Science Foundation of China (NSFC) funding allocation and revealed the hidden disparity among different academic institutions and regions in China
- Practiced front-end programming (HTML/CSS/JavaScript/SVG/D3.js, self-taught within one week)
- 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](#))

RELEVANT COURSES

Neuropsychology (96/100)

- Anatomy, function and diseases of the cortex and the thalamus

The Brain and Cognitive Science (92/100)

- Sensation and perception, language, problem solving and deduction, etc.

Probability Theory and Statistics (90/100)

- Bayes theorem, central limit theorem, parameter estimation, hypothesis testing, ANOVA, regression, etc.

Experimental Psychology (90/100)

- Experiment design, psychophysical methods, memory, social cognition, etc.

Computational Neuroscience (89/100)

- Hodgkin-Huxley equations, E-I balanced network, continuous attractor network, etc.

Computational Perception and Scene Analysis (86/100)

- Physiological, psychological and computational models for vision and audition

Signals and Systems (84/100)

- Continuous and discrete Fourier Transform, Laplace and z Transform, filtering, etc.

Introduction to Pattern Recognition (83/100)

- Bayes decision theory, SVM, logistic regression, artificial neural network, decision tree, clustering, PCA, etc.

SKILLS

- **Programming:** C/C++, Python (NumPy, TensorFlow, OpenCV), MATLAB (EEGLAB, Fieldtrip, Psychtoolbox), HTML, CSS, JavaScript, SVG, R & SPSS (expected this semester)
- **Electrophysiology:** EEG recording, ERP & time frequency analysis, multivariate pattern analysis, dynamic general linear model, cluster analysis, phase coupling analysis