

EDUCATION

Peking University (PKU)	09/2020-07/2026
Academy for Advanced Interdisciplinary Studies	
Ph.D. candidate (Weiming Scholar) in Integrative Life Sciences, supervised by Prof. Fang Fang	
Peking University (PKU)	09/2016-07/2020
School of Psychological and Cognitive Sciences	
B.S. (Honored Graduate) in Psychology, supervised by Prof. Fang Fang	
University of California, Los Angeles (UCLA)	07/2019-09/2019
Cross-disciplinary Scholars in Science and Technology Program, supervised by Prof. Ladan Shams	

RESEARCH HIGHLIGHTS

- ◆ **Keywords:** vision, perceptual learning, plasticity, cognition enhancement, consolidation, attention
- ◆ Anodal tDCS over visual cortex enhances offline consolidation of visual perceptual learning — revealing a rare causal leverage over unconscious learning processes. ([tDCS](#), [psychophysics](#))
- ◆ Photic modulation of offline visual learning via frequency-tuned stimulation linked to LTP-like plasticity. ([fMRI](#), [sMRI \(VBM\)](#), [MRS](#), [EEG](#), [computational modeling \(RSNN\)](#))
- ◆ The right superior parietal lobule as a causal hub translating objective load into subjective effort in visual tracking. ([fMRI \(FIR, DCM, multilevel mediation\)](#), [HD-tDCS](#), [electrical field simulation](#), [pupillometry](#))
- ◆ Transcranial alpha entrainment as a powerful frequency-specific approach to sculpt the time course of visual learning. ([tACS](#), [MEG](#), [electrical field simulation](#))

RESEARCH INTEREST

How deceptively simple interventions like visual stimulation modulate neural circuit function and structure; leveraging a broad repertoire of neuroimaging, electrophysiological, stimulation, behavioral, and computational tools to uncover underlying mechanisms and inform brain–computer interfaces and the targeted design of stimuli to enhance cognition.

SKILLS

- ◆ Experimental Techniques:
 - Neuroimaging: **fMRI**, **sMRI**, **MRS**;
 - Electrophysiology: **EEG**, **MEG**;
 - Brain stimulation and modeling: **tES**, **HD-tES**, [electrical field simulation](#);
 - Computational modeling**;
 - Psychophysics and Pupillometry;
- ◆ Coding: **MATLAB**, **Python**, **R**, **C/C++**, **Bash**.
- ◆ Software: **SPM**, **Freesurfer**, BrainNetViewer, SPSS, SimNIBS, etc.
- ◆ Computational Approaches: **MVPA**, **RSA**, **DCM**, **PPI**, **Neural Network Modeling**.
- ◆ Additional: English (TOEFL 118), French (b1), Scientific illustration and figure design: proficient in digital drawing, created illustrations and schematic figures for multiple published articles.

PUBLICATIONS

- Yang, X.-Y.**, Zhao, C., Zuo, Z., Li, A., Luo, H.*, He, Q.* & Fang, F*. Frequency-dependent photic modulation of wakeful consolidation in visual learning. *Nature Communications*. (Accepted).
- Yang, X.-Y.**, He, Q. & Fang, F*. Transcranial direct current stimulation over the visual cortex facilitates awake consolidation of visual perceptual learning. *Brain Stimulation* 15, 380-382 (2022).
- Liu, C.* **Yang, X.-Y.** & Xu, X. Brain state model: A novel method to represent the rhythmicity of object-specific selective attention from magnetoencephalography data. *Neurocomputing* 634, 129920 (2025).
- He, Q., **Yang, X.-Y.**, Gong, B., Bi, K. & Fang, F*. Boosting visual perceptual learning by transcranial alternating current stimulation over the visual cortex at alpha frequency. *Brain Stimulation* 15, 546-553 (2022).
- He, Q., **Yang, X.-Y.**, Zhao, D. & Fang, F*. Enhancement of visual perception by combining transcranial electrical stimulation and visual perceptual training. *Medical Review* 2, 271-284, (2022).

In preparation:

- Bi, K.#, **Yang, X.-Y.**#, Liu, C., Chen L., Fang, F.* Causal role of the right superior parietal lobule in mental effort and visual attention performance.
- He, Q. #, **Yang, X.-Y.**#, Zhu, X. #, Fang, F.* The effect of tDCS on wakeful consolidation is mediated by the sleep-wake cycle.
- Bi, K.#, **Yang, X.-Y.**#, Chen, L., Fang, F.* A comprehensive investigation on HD-tES' effect on visual search in static scenes and underlying mechanisms.

(# Equal contribution)

CONFERENCE

- ◆ Annual Meeting of the Society for Neuroscience (**SfN 2025**). “Causal contribution of the right superior parietal lobule to mental effort in shaping multiple object tracking performance.”
- ◆ Annual Meeting of the Vision Science Society (**VSS 2025**). “Hebbian plasticity in a recurrent network model explains enhanced wakeful consolidation via repetitive sensory stimulation.”
- ◆ Annual Meeting of the Organization of Human Brain Mapping (**OHBM 2024**). “10-Hz Flicker Boosts Early Consolidation of Visual Perceptual Learning via Augmented Glx/GABA Ratio.”
- ◆ Annual Meeting of the Vision Science Society (**VSS 2024**). “LTP-like activity induced by post-training rhythmic flicker consolidates visual perceptual learning.”
- ◆ Annual Meeting of the Vision Science Society (**VSS 2021**). “The role of anodal transcranial direct current stimulation (tDCS) in the consolidation of visual perceptual learning is mediated by the wake/sleep cycle.”

ACADEMIC SERVICES

◆ Peer Review

Co-Reviewer (with Prof. Fang Fang): Nature Human Behaviour, Nature Communications, Current Biology, Cerebral Cortex, Eneuro, Medical Review

◆ Teaching Experience

Teaching Assistant: [General Psychology] [Sensation and Perception] [Frontiers in Psychological Science]
Peking University, 2021-2025

HONORS

Merit Student, PKU	2024
China Industrial Bank Scholarship	2024
Merit Student, PKU	2023
The Presidential Scholarship, Peking University (considered the highest honor awarded by PKU to Ph.D. students)	2023
Grad Student Presentation Award of the Annual Conference of the Psychological Committee of China	2022
Weiming Scholar	2020
Honored Graduate, PKU	2020

Departmental Scholarship, School of Psychological and Cognitive Sciences, PKU	2020
Merit Student, PKU	2019
University Scholarship, PKU	2019
Education Abroad Program Scholarship, PKU	2019
Scientific Research Excellence Award, PKU	2018
May 4th Scholarship, PKU	2018