MA Qi

(+86) 180-9065-4381 maqi316101@gmail.com mqqq333

Background

Zhejiang University Cognomics Lab | Research Assistant | PI: Kong, X. Z. Jul 2025–Present

Conducting interdisciplinary research at the intersection of cognitive neuroscience and artificial intelligence, with a focus on brain hemispheric lateralization.

Zhejiang University | Bachelor of Science in Psychology | Hangzhou, Zhejiang Sep 2021–Jul 2025

Completed systematic training in psychology and statistical methods, with further coursework in programming, data analysis, and machine learning.

Research Experience

Cross-Hemisphere Reconstruction-Derived Neuroanatomical Specificity and Handedness

Oct 2024–Present
Cognomics Lab
PI: Kong, X. Z.

- **Research Overview:** Used handedness as a behavioral lateralization phenotype to test whether cross-hemisphere reconstruction residuals capture handedness-related structural information beyond conventional gray matter volume asymmetry indices.
- **Research Highlights:**
  - **Cross-hemisphere reconstruction:** Used a deep generative network (DGN) to reconstruct one hemisphere from the other. Expressed residuals between original and reconstructed images as absolute neuroanatomical specificity (ANS) and relative neuroanatomical specificity (RNS).
  - **Global specificity and validation:** Moved beyond homologous-region comparisons by using reconstruction residuals to capture whole-hemisphere structural relationships. Evaluated anatomical plausibility, individual specificity, test–retest reliability, and hemisphere-identity classification.
  - **Handedness analysis:** Compared ANS and RNS with a conventional gray matter volume asymmetry baseline in the balanced AOMIC Hand190 cohort. Mean RNS AUC was 0.624, significantly higher than the baseline value of 0.539 ($p = 0.018$).
- **Manuscript Draft:** Led preparation of the English manuscript draft, *Reconstruction-derived hemispheric specificity captures distributed structural information related to handedness*.

Operator-Corrector-Based Validation of Cross-Hemisphere Residual Measures Apr 2026–Present

Cognomics Lab
PI: Kong, X. Z.

- **Research Overview:** Inspired by the operator-learning approach of physics-informed neural operators (PINO), introduced an operator-corrector (OC) into the cross-hemisphere DGN framework. The correction separates residuals explained by a correction field from retained ANS-OC/RNS-OC, reducing non-specific effects and examining their biological significance.
- **Research Highlights:**
  - **Multilevel biological validation:** Tests DGN+OC-derived ANS-OC/RNS-OC across age, sex, HCP behavioral measures, and disease–control comparisons. The measures significantly outperform the DGN baseline for several cognitive and task phenotypes.
  - **Structural-specificity mechanisms:** Uses ANS-OC and RNS-OC to examine links with specific brain regions and potential mechanisms.
  - **OC mechanism:** Varies OC correction strength to test linear and quadratic responses of ANS-OC/RNS-OC to age, sex, behavioral measures, and disease phenotypes.

N-back Working-Memory Load Prediction | DecodeWM

Jun 2023–Sep 2023
Neuromatch Academy
Computational Neuroscience track

- **Research Overview:** Investigated how memory-load types affect working-memory (WM) brain activity. Used task-fMRI data from the Human Connectome Project (HCP) and built logistic-regression and random-forest models to predict WM memory-load types.

- **Research Highlights:**
  - **Working-memory load classification:** Used machine-learning methods and task-fMRI data to examine how memory-load types affect activity in WM-related brain regions.
  - **Model performance:** Built classification models from ROI (region of interest) activity. Logistic regression and random forest each reached 88% accuracy for 0-back versus 2-back classification.
  - **Key brain regions:** Feature-importance analysis identified the default mode network (DMN), frontoparietal network (FPN), cingulo-opercular network (CON), and dorsal attention network (DAN) as key N-back networks.

Project Experience

HemiSpec: Hemispheric Specificity Toolkit | HemiSpec May 2026–Present

- **Project Overview:** Packaged an existing cross-hemisphere DGN and ANS/RNS framework into installable software. Researchers can generate bilateral measures from standardized gray matter maps, conduct ROI and validation analyses, and integrate the measures into their own neuroimaging studies.
- **Technical Highlights:**
  - **Workflow integration:** Integrated FSL gray matter preprocessing, bidirectional DGN reconstruction, ANS/RNS calculation, ROI export, and hemisphere classification validation in one workflow.
  - **Reusable interfaces:** Built Python API, CLI, and GUI interfaces for batch generation of measure maps, ROI tables, and optional validation outputs.

Cortical & Subcortical Visualization Codex Skills | Cortex & Subcortex May 2026–Present

- **Project Overview:** Packaged cortical and subcortical ROI-table visualization into Codex Skills. An AI agent enables natural-language interaction, which avoids repeated tutorial lookups and ad hoc scripts.
- **Technical Highlights:**
  - **AI-agent interaction:** Used natural language to assist atlas selection, figure generation, and result presentation, turning separate tool steps into reusable workflows.
  - **Cortical workflow:** Uses the ggseg/ggseg3d visualization ecosystem and supports multiple cortical atlases.
  - **Subcortical workflow:** Uses Annie Bryant's *subcortex_visualization* for 2D maps of subcortical structures, the thalamus, cerebellum, and brainstem.

Building a Language Model from Scratch | LoreWormGu Dec 2024–Mar 2025

- **Project Overview:** Built a language model with tens of millions of parameters from scratch, covering pretraining, supervised fine-tuning (SFT), and R1 distillation fine-tuning for question answering and chain-of-thought-style reasoning.
- **Technical Highlights:**
  - **Model architecture:** Implemented a LLaMA3-like model with RMSNorm, grouped attention, SwiGLU, and RoPE positional encoding.
  - **Tokenizer design:** Built a BBPE-based tokenizer for Chinese text, balancing vocabulary compression and decoding efficiency.
  - **Pretraining and optimization:** Pretrained on the Jiangshu large-language-model dataset with custom token-level loss, forward passes, gradient accumulation, and mixed-precision training.
  - **Supervised fine-tuning:** Adapted open-source SFT datasets for instruction tuning to improve instruction understanding, instruction following, and task execution.
  - **R1 distillation fine-tuning:** Applied DeepSeek-R1 distillation through further supervised fine-tuning to strengthen deliberate reasoning and distill reasoning patterns via response-only (black-box) training.

Skills

- C, Python, machine learning and deep learning, probability and statistics, structural neuroimaging processing and visualization.

Languages

- TOEFL iBT: 5/6 (100/120).