Qisheng (Adam) Zhu

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Summary: BA&MSc Cambridge graduate with backgrounds in mathematics, specialised in cognitive neuroscience. Experiences in computational modelling, neural networks, human behavioural experiments.

Education

University of Cambridge, Cambridge, UK *2021.10 - 2025.07*

Master of Science in Natural Sciences, Systems Biology
- Grade: Class I, ranked 2/15.
- Thesis: *The Emergence of N-gram Neurons and Feature Binding from an In Silico Visual Cortex.* Supervisor: Greg Davis. Thesis awarded the cohort's Best Research Project Prize.

Bachelor of Arts in Natural Sciences, Psychology
- Grade: Class I, ranked 6/38.
- Thesis: *Causal Basis of Biases in Visual Estimation.* Supervisor: Paul Bays. Thesis nominated by the University of Cambridge for the EPS/BSA Undergraduate Project Prize.

Research Experiences

University of Cambridge, Department of Psychology, Visual Cognition Lab *2023.12 - present*

Research Assistant. Supervisor: Dr. Greg Davis
- Original research project investigating the feature binding problem in vision.
- Independently developed biologically inspired spiking neural network models of the visual cortex. Designed in silico object recognition tasks to train the cortex. Investigated the emerged neural tuning properties and feature binding in the cortex. Created experimental benchmark tests to compare feature binding performance in human and neural networks.
- Gained experiences in building artificial neural networks, modelling biophysically realistic neurons, conducting in silico electrophysiological experiments, and analysing neuronal tuning and network dynamics using Python (PyTorch). Acquired knowledge in GPU programming (CUDA Numba) and operating high-performance computing clusters.
- Intermediate results submitted as an MSc thesis and awarded the cohort's 2025 Best Research Project Prize in Systems Biology. Abstract accepted for conference presentation.

University of Cambridge, Department of Psychology, Computational Cognition Group *2023.10 - 2024.06*

Undergraduate Researcher. Supervisor: Prof. Paul Bays
- Undergraduate research project investigating the allocational biases of neural resources in human visual working memory.
- Independently built a stochastic neural population coding model to analyse how human observers allocate neural resources across items in visual working memory. Assisted in conducting human psychophysical experiments and collecting behavioural data.
- Gained experiences in stochastic simulation and probabilistic modelling using Python (SciPy) and MATLAB. Acquired knowledge in Bayesian statistical analysis using JASP and Python (PyStan). Learned skills in scripting and conducting psychophysical experiments on MATLAB (Psychtoolbox) with eye-tracking devices.
- Project resulted in an undergraduate thesis and received the top mark. Nominated by the University of Cambridge for the 2024-2025 EPS/BSA Undergraduate Project Prize.

University of Cambridge, Department of Genetics *2025.03 - 2025.04*

Graduate Researcher. Supervisor: Dr. Karen Lipkow
- Collaborative project investigating prevention strategies for harmful algal blooms in North American waterbodies.
- Independently developed a Fourier-based LSTM ensemble model for forecasting algal bloom onsets in North American water systems. Applied to real-world forecasting tasks.
- Gained experiences in designing and building neural networks using Python (TensorFlow). Acquired skills in data mining and ML pipelining.
- Project resulted in a poster presentation and awarded the 2025 Stephen G. Oliver Group Project Prize in Systems Biology.

University College London, Institute of Behavioural Neuroscience, Solomon Lab
Undergraduate Researcher. Supervisor: Prof. Samuel Solomon   *2023.08*
- Original research project investigating the influence of environmental contexts on motion   *- 2024.04*
  perceptions in human vision.
- Independently designed and built a VR-based human psychophysical experiment from
  scratch. Additionally, developed a stochastic staircase algorithm for data collection.
- Gained experiences in building VR-based psychophysical experiments using Unity engine
  (C#) and Blender. Learned skills in operating VR head-mounted displays.

University College London, Institute of Behavioural Neuroscience, Saleem Lab
Undergraduate Researcher. Supervisor: Prof. Aman Saleem   *2023.06*
- Collaborative research project investigating the effect of voluntary locomotion on human   *- 2023.08*
  optic flow perception.
- Conducted VR-based human behavioural experiments with motion tracker. Managed bulk
  data processing and statistical analysis on behavioural recordings. Designed and performed
  Monte Carlo simulations to improve the robustness of data-collection toolkits against
  visual fatigue and attentional lapses.
- Gained experiences in conducting bulk data analysis and stochastic simulation using
  Python (SciPy) and R. Acquired knowledge in operating VR head-mounted displays and
  motion trackers.

Work Experiences

Neureality   *2022.12*
Scientific Editor   *- present*
- A member of editorial team of Neureality, a non-profit organisation aiming at broadcasting
  news and research breakthroughs in cognitive science to the general public.
- Assisted in selecting cognitive science-related articles from reputable, royalty-free journals,
  publications, and web-based blogs and translating them into Chinese for broader assess.

Publications & Conferences

Zhu, Q., & Davis, G. (2025, November). *Emergence of partial conjunctions in artificial neural networks: a tractable solution to the binding problem in vision*. Poster presentation at the Society for Neuroscience Annual Meeting (SfN 2025), San Diego, CA, United States.

Award & Scholarships

Scholar of St. Catharine's College   *2024 &*
- Awarded for exceptional academic achievements (Dean's List equivalent).   *2025*

Best Research Project Prize in Systems Biology   *2025*
- Awarded for the best research thesis in the Cambridge systems biology cohort.

Stephen G. Oliver Group Project Prize in Systems Biology   *2025*
- Awarded for the best group research project in the Cambridge systems biology cohort.

EPS/BSA Undergraduate Project Prize *(Nomination)*   *2024*
- Nominated for the best psychological undergraduate research thesis across UK universities
  and research institutes.

Programming & Skills

Python (NumPy, Pandas, SciPy, PyTorch, TensorFlow, CUDA Numba, PyStan), **R, JASP, MATLAB** (Psychtoolbox), **C#, LINUX, LaTeX, Unity Engine, Blender, High-performance Computing, VR HMDs, Eye Tracking Devices, Motion trackers**