

Li Kevin Wenliang

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Google Scholar

Education

Gatsby Unit, University College London, PhD candidate in machine learning and theoretical neuroscience **2015 – 2020**

- ♦ Supervised by **Maneesh Sahani** (primary) and **Peter Dayan** (secondary)
- ♦ **Thesis: nonparametric enrichment in computational and biological representation of distributions**
 - Human perception as inference: theory on how the brain may encode uncertainty in the environment
 - State-space models: inference and learning of nonlinear exponential family models
 - Representation learning: probabilistic computation in neural networks by supervised learning
 - Amortised learning: maximum likelihood learning of latent variable models without inference
- ♦ **Other research:** Perceptual learning, optimal transport GAN

University of Cambridge, Trinity College Information and Computer Engineering **2010 – 2014**

- ♦ B.A. (1st Hon.) and M.Eng. (Distinction), scholarship £18,510 p.a. for four years
- ♦ College Senior Scholar, product design competition prize winner
- ♦ Ranked within top 10 of the year for 1st, 2nd and 4th years (3rd year at MIT)
- ♦ Master thesis: inference and learning on a nonlinear state-space model for neural spiking data, with **Máté Lengyel**

Massachusetts Institute of Technology **2012 – 2013**

- ♦ GPA: 4.9/5.0, Cambridge-MIT Exchange in Electrical Engineering and Computer Science.
- ♦ Course projects: Shadow removal (image processing), modelling information propagation (network science)
- ♦ Research: an automated pipeline for a new peptide synthesis method at the Chemistry department.

Teaching experiences

Neurochat Academy summer school, TA **Jul 2020**

- ♦ Teaching computational tools for analysing neural recordings, advice on career and projects

Machine Learning Summer School (UCL), TA **July 2019**

- ♦ Led variational inference tutorial, helped students in all tutorials, organised by **Marc Deisenroth** and **Arthur Gretton**

UCL TAs: probabilistic and unsupervised learning, approximate inference, theoretical neuroscience **Sept 2016 – Jun 2017**

- ♦ Marked homework, led tutorials, responded to questions and managed annotated reference list

Research and career experiences

Neurochat, Chinese Association for Psychological & Brain Science, invited talk **Apr 2020**

Neurocomputation and AI in Neuroscience, invited talk, Dynamics in vision and touch,(cancelled) **Mar 2020**

DeepMind PhD workshop, UCL, invited talk **Feb 2020**

Brains, Minds and Machines Summer School, MIT/Harvard **Aug 2016**

Project: human perception of object stability, with **Josh Tenenbaum**

Illume Research **Dec 2016 – Sept 2019**

Mentor, teaching machine learning to under 18s, 2/3 students received reward from state/country competitions

Tsinghua University **Dec 2014 – Mar 2015**

Research Intern, 3D object representation on point-cloud data, grasp planning, with **Funchun Sun**

Microsoft Research Cambridge **Jul – Oct 2014**

Research Intern, road network recognition by marked point process, with **Sadia Ahmed** and **Sebastian Nowozin**

Other internship experiences

- ♦ Microsoft R&D Shanghai, program manager internship **2013**
- ♦ Swiftkey, research in natural language processing for non-whitespace languages, with **Caroline Gasperin** **2011**

Programming: Python (TensorFlow, PyTorch, Caffe), Julia, MatLab, C/C++, Ruby, HTML/CSS, JavaScript

Publications (Li Kevin Wenliang)

Referred journal papers:

Li Wenliang, Aaron Seitz, *Deep neural network for modelling visual perceptual learning*, Journal of Neuroscience, 18

- ♦ Proposed using deep neural network to model behavioural and neural data, designed and conducted experiments, approached Aaron Seitz for collaboration, wrote paper

Referred conference proceedings:

Li K. Wenliang, Theodore Moskovitz, Heishiro Kanagawa, Maneesh Sahani, *Amortised learning by wake-sleep*, ICML, 20

- ♦ Proposed direct ML gradient approximation with kernel ridge regression and automatic differentiation, designed experiments, conducted all but matrix factorisation experiments, managed collaboration, wrote paper

Li K. Wenliang, Maneesh Sahani, *Plausible model for online recognition and postdiction in dynamic environment*, NeurIPS, 19

- ♦ Proposed filtering algorithm and temporal features for encoding memory, designed flash-lag effect and occluded tracing experiments, conducted all experiments, wrote paper

Li K. Wenliang*, Dougal Sutherland*, Heiko Strathmann, **Arthur Gretton**, *Learning deep kernels for exponential family densities*, ICML, 19

- ♦ Developed meta-learning algorithm for training deep network kernels, design and conducted experiments, discussed normalisability of kernel exponential family distributions and issues of score matching, wrote paper

Chunfang Liu, Wenliang Li, **Funchun Sun, Jianwei Zhang**, *Grasp planning by human experience on objects with complex geometry*, IROS, 15

- ♦ Proposed a framework to classify objects and identify of graspable part, conducted vision experiments, wrote paper

Referred workshop abstracts:

Li K. Wenliang, Eszter Vértés, Maneesh Sahani, *Accurate and adaptive recognition in dynamic environment*, COSYNE, 19

- ♦ Proposed biological inference and learning algorithms, designed and conducted experiments, wrote abstract, scored within top 6%

Li K. Wenliang, Maneesh Sahani, *Neural network represents uncertainty by nonlinear moments*, COSYNE, 18

- ♦ Hypothesised that activations of RNN trained to perform inference represent uncertainty with distributed distributional code, designed and conducted experiments, wrote abstract