Kristopher Torp Jensen

University of Cambridge – Computational and Biological Learning Lab ktj21@cam.ac.uk

Education

2019 - present **PhD Computational Neuroscience** *(University of Cambridge)*
Supervisor: Dr Guillaume Hennequin
- Continual learning in biological motor circuits and for AI.
- Planning and decision making in biological and artificial agents.
- Development of Bayesian latent variable models for neural population recodings.

2018 - 2019 **MPhil Computational Biology** *(University of Cambridge)*
Result: Distinction (89.1/100; 1st of 19 students)

2015 - 2018 **BA Natural Sciences** *(University of Cambridge)*
Result: First Class Honors (82.7/100; 1st of 112 students)

Research

2022 - 2022 **UC San Diego Department of Cognitive Science** (Supervisor: Dr Marcelo Mattar)
- Studying planning & decision making with behaviour, neural recordings, and deep RL.

2019 - 2022 **Harvard Center for Brain Science** (Supervisor: Professor Bence Ölveczky)
- Analysis & modelling of the stability of neural dynamics associated with motor memories.

2018 - 2019 **Janelia Research Campus** (Supervisor: Professor Vivek Jayaraman)
- Analysis & modelling of connectomic & RNAseq data from the fly head direction circuit.

2017 - 2018 **Cambridge Centre for Computational Chemistry** (Supervisor: Dr Alex Thom)
- Development of a Hartree Fock-based method for modeling electron transfer reactions.

2016 - 2017 **Aarhus University Department of Biomedicine** (Supervisor: Dr Yonglun Luo)
- Investigation of factors affecting the efficiency of CRISPR/Cas9 for genome editing.

Teaching

2021 & 2023 University of Cambridge – Teaching Assistant, 3rd year mathematical biology.
2020 & 2022 University of Cambridge – Teaching Assistant, 3rd year computational neuroscience.
2021 Neuromatch Academy – Teaching Assistant, computational neuroscience.
2018 - 2020 University of Cambridge – Teaching Assistant, 3rd year theoretical chemistry.

Fellowships

2019 - present Cambridge Gates Scholarship
2016 - 2019 Scholar of Magdalene College, Cambridge
2018 Janelia Undergraduate Scholar
2015 *British Chamber of Commerce in Denmark* Scholar

Prizes

2015 - 2018 GWHP Memorial Prize for best performance in undergraduate chemistry.
Gill, Bundy & B.C. Saunders prizes for excellence in university examinations.
BP Prizes for the best performance in practical chemistry and theoretical chemistry.
2014 & 2015 Silver medal – The International Chemistry Olympiad.

Programming

Python (PyTorch, Jax, TensorFlow), Julia (Zygote, Flux), R, Matlab.

Reviewing

Nature Neuroscience, Neuron, Nature Methods, NeurIPS workshops, Nature Communications.

Invited Talks

A recurrent network model of planning with replays

2023 DeepMind NeuroLab workshop
2023 Bristol Computational Neuroscience Unit
2023 NYU Department of Psychology
2023 University of California, Berkeley (Foster lab)
2022 Sainsbury Wellcome Centre (Behrens lab)
2022 Gatsby Computational Neuroscience Unit (Sahani lab)
2022 Oxford University (Summerfield lab)

Bayesian machine learning for topological analyses of neural data

2022 NeurIPS workshop on symmetry and geomery in neural representations
2022 Cosyne workshop on motor-driven cognition

Representational stability and continual learning in neuroscience and AI

2022 ContinualAI
2021 The Weizmann Institute of Science (Ziv lab)

Gaussian processes for neural data analysis

2021 Imperial College London (Gallego lab)
2021 MIT Brain and Cognitive Sciences tutorial
2021 Harvard University (Ölveczky lab)

Publications

2023 **Kristopher T. Jensen**, Guillaume Hennequin*, and Marcelo Mattar*.
A recurrent network model of planning explains hippocampal replay and human behavior.
bioRxiv.

2022 **Kristopher T. Jensen**, Naama Kadmon Harpaz, Steffen B. E. Wolff,
Ashesh K. Dhawale, and Bence P. Ölveczky.
Long-term stability of single neuron activity in the motor system. *Nature Neuroscience*.

2022 Marine Schimel, Ta-Chu Kao, **Kristopher T. Jensen**, and Guillaume Hennequin.
iLQR-VAE : control-based learning of input-driven dynamics with applications to neural data.
The International Conference on Learning Representations (oral).

2021 **Kristopher T. Jensen***, Ta-Chu Kao*, Jasmine T. Stone, and Guillaume Hennequin.
Scalable Bayesian GPFA with automatic relevance determination and discrete noise models.
Advances in Neural Information Processing Systems.

2021 Ta-Chu Kao*, **Kristopher T. Jensen***, Alberto Bernacchia, and Guillaume Hennequin.
Natural continual learning: success is a journey, not (just) a destination.
Advances in Neural Information Processing Systems.

2020 **Kristopher T. Jensen**, Ta-Chu Kao, Marco Tripodi, and Guillaume Hennequin.
Manifold GPLVMs for discovering non-Euclidean latent structure in neural data.
Advances in Neural Information Processing Systems.

2020 Daniel B. Turner-Evans, **Kristopher T. Jensen***, Saba Ali*, Tyler Paterson*, Arlo Sheridan*,
Robert P. Ray, Tanya Wolff, Gerald M. Rubin, Davi D. Bock, and Vivek Jayaraman.
The neuroanatomical ultrastructure and function of a biological ring attractor. *Neuron*.

2018 **Kristopher T. Jensen**, Raz L. Benson, Salvatore Cardamone, and Alex J. W. Thom.
Modeling electron transfers using quasidiabatic Hartree-Fock states.
Journal of Chemical Theory and Computation.

2017 **Kristopher T. Jensen**, Lasse Fløe, Trine S. Petersen, Jinrong Huang, Fengping Xu,
Lars Bolund, Yonglun Luo, and Lin Lin.
Chromatin accessibility and guide sequence secondary structure affect CRISPR-Cas9
gene editing efficiency. *FEBS Letters*.

Conferences

2023 **Computational and Systems Neuroscience (Cosyne)** *(poster)*.
An RNN model of planning explains hippocampal replay and human behavior.

2022 **Reinforcement learning and decision making** *(poster)*.
Learning goal-directed behavior in humans and RNNs.

2021 **Champalimaud Research Symposium** *(poster)*.
Gaussian process latent variable models for neural data analysis.

2021 **Computational and Systems Neuroscience (Cosyne)** *(poster)*.
Beyond the Euclidean brain: inferring non-Euclidean latent trajectories from spike trains.

2020 **From Neuroscience to Artificially Intelligent System** *(poster)*.
Self-supervised learning for multisensory integration in biologically inspired networks.

2020 **Bernstein Conference** *(contributed talk)*.
mGPLVM – Beyond the Euclidean brain.

2018 **Janelia Undergraduate Scholars Symposium** *(poster)*.
Angular velocity integration in *Drosophila melanogaster*.