Ares Fisher

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SUMMARY

Neuroscientist with expertise in machine learning and AI. I excel at creative thinking and finding cross-pollination between disciplines. I thrive in a fast-paced, collaborative environment, and particularly enjoy taking on different responsibilities. I learn quickly, and find excitement contagious.

RESEARCH EXPERIENCE

University of Washington — *Postdoctoral Researcher*

Neural Systems Lab, Paul G. Allen School, Seattle, WA — Nov 2020 - Dec 2023

- Designed and created "Recursive Neural Programs" - a novel generative neural network architecture that recursively and compositionally weaves sensory-motor sequences into concepts and objects - to address the need for compositionality in deep networks
- Collaborated with experimental neuroscientists to design and analyze large-scale neuronal recording (Neuropixel) experiments

Numenta — *Visiting Scientist*

Redwood City, CA — Feb 2020 - July 2020

- Researched lifelong learning in deep neural networks by exploiting sparse connections and activity and models of dendritic computation
- Learned how to use Git and unit testing to contribute to collaborative code bases

FMI — *Research Assistant*

Keller Group, Basel, Switzerland — May 2018 - April 2019

- Analyzed large-scale chronic neuronal imaging and behavioral data recorded from mice learning a 2-alternative forced choice (2AFC) task (using the Python data science stack)
- Discovered that neuronal immediate early genes (IEGs) predict - rather than follow - task-relevant plasticity in mouse hippocampal CA1 throughout learning the task

Friedrich Miescher Institute (FMI) — *Doctoral student*

Keller Group, Basel, Switzerland — Sept 2013 - April 2017

- Designed, carried out and analyzed chronic neuronal imaging and behavioral experiments, manipulating the expectations of mice traversing a virtual corridor
- Discovered populations of neurons in layer 2/3 of mouse primary visual cortex learn to predict upcoming stimuli based on spatial location, and large populations that respond with a strong "error signal" when an expected stimulus is omitted
- Designed and wrote the VR environment and data cleaning and analysis code

Swiss Federal Institute of Technology, Lausanne (EPFL) — *Master's student*

Moore Group, Lausanne, Switzerland — Sept 2012 - April 2013

- Performed molecular biology and histology assays in yeast and rodent models of familial Parkinson's Disease
- Showed that dominant-negative mutations in the familial Parkinson's gene *vps35* lead to cell death and neurodegeneration

LAB SKILLS

Two-photon microscopy, designing and implementing behavioral and virtual reality experiments with animal models, electrophysiology, kinematic, behavioral and neural data analysis

QUANTITATIVE SKILLS

Programming: Python, Pytorch, Julia, Matlab

Deep learning

Generative models

Bayesian inference

Computer vision

Data science

Signal processing

Nonlinear + Network dynamics

Biological modeling

Git

AWS

OTHER LANGUAGES

Bilingual in English and Greek; fluent in German; working competence in French

AWARDS AND TALKS

Invited Talk, Diverse Intelligences Summit, St. Andrews, Scotland, 2023

Invited Talk: "Top-down interactions in the neocortex: structure, function, plasticity and models", COSYNE workshop 2023

Invited Talk: "What can computer vision learn from visual neuroscience?", CVPR Workshop 2022

Swartz Foundation Postdoctoral Fellow (April 2023 -June 2023)

eScience Data Science Postdoctoral Fellow (April 2022-)

PhD Fellowship, Boehringer Ingelheim Fonds (2014-2016)

PUBLICATIONS

Fisher & Rao, Recursive Neural Programs: Variational Learning of Image Grammars and Part-Whole Hierarchies, PNAS Nexus, 2023

Rao, Jiang & Fisher, Predictive Coding in Corticothalamic Networks, The Cerebral Cortex and Thalamus, Oxford University Press, 2023

Mahringer et al., Expression of c-Fos and Arc in hippocampal CA1 marks neurons that exhibit learning-related activity changes, In preparation

Fiser et al., Experience-dependent spatial expectations in mouse visual cortex, Nature Neuroscience, 2016

Tsika et al., Parkinson's disease-linked mutations in VPS35 induce dopaminergic neurodegeneration, Human Molecular Genetics, 2014

Daniel et al., α-Synuclein-induced dopaminergic neurodegeneration in a rat model of Parkinson's disease occurs independent of ATP13A2 (PARK9), Neurobiology of Disease, 2015

EDUCATION

FMI | University of Basel, Basel, CH — ***PhD, Neuroscience***

Sept 2013 - Apr 2017

EPFL, Lausanne, CH — ***MSc, Biomedical Engineering***

Aug 2011 - May 2013

Johns Hopkins University, Baltimore, MD — ***BA, Neuroscience***

Aug 2007 - May 2011

OTHER INTERESTS

In my spare time I enjoy cycling, reading and writing fiction, meditating, volunteering at the local food bank, hobby-level physics, amateur astronomy, pottery, and experimenting with cooking. Raspberries, kindness, sunshine and warm breezes make me the happiest.

MSc Scholarship, Greek State Scholarships Foundation (2011-2012)

Best Poster Award, Swiss Society for Neuroscience annual meeting (2017)