Kyle **Dunovan**

COMPUTATIONAL COGNITIVE NEUROSCIENTIST

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About me

I am currently a Postdoctoral fellow in the **CoAx Lab** at Carnegie Mellon University (PI: Dr. Timothy Verstynen). My research focuses on synthesizing **cognitive algorithms** with biologically detailed **neural networks** to capture a more complete understanding of intelligent behavior. Seeing the benefits of the interdisciplinary approach, my recent efforts have turned towards embedding neural and cognitive dynamics in artificial agents to explore solutions to creating **safer and more flexible AI**. Moving forward, I am seeking positions (in academia or industry) where I can bring my knowledge and expertise to bear on interesting and important questions while continuing to learn and grow as a researcher and scientist.

Background

Postdoctoral Researcher — *Pittsburgh, PA*

CARNEGIE MELLON UNIVERSITY — *2016 - PRESENT*

PhD in Cognitive Neuroscience — *Pittsburgh, PA*

UNIV OF PITTSBURGH • CENTER FOR THE NEURAL BASIS OF COGNITION — *2011 - 2016*

BS in Neuroscience — *Omaha, NE*

UNIV OF NEBRASKA AT OMAHA — *2009 - 2011*

Languages

Python

EXPERT PROFICIENCY (8 YRS)

- Proficient in all major scientific and machine learning packages (SciPy, Numpy, Scikit-Learn, Pandas, etc.)
- Experience with runtime optimization packages such as Cython and Numba
- Working knowledge of the full Jupyter ecosystem (Notebook, Lab, Hub, Binder, etc)
- Use Travis CI and Github for maintaining, supporting, and contributing to open source projects
- Experience with packaging & distributing custom Python projects on PyPI and Conda

Secondary Languages

(NOVICE TO INTERMEDIATE PROFICIENCY)

- **MATLAB** (4yrs), **C** (1yr), **BASH** (8yrs), **Latex** (3yrs), **LESS/CSS** (5yrs)

Projects

bgNetwork (Github)

SPIKING NEURAL NETWORK OF CORTICO-BASAL GANGLIA-THALAMIC (CBGT) PATHWAYS

AZAD (Github)

GAME-PLAYING ANNS THAT USE A STUMBLER-STRATEGIST ARCHITECTURE

Race Against Drift-Diffusion Model (Github)

PYTHON PACKAGE FOR FITTING COGNITIVE MODELS OF INHIBITORY CONTROL

Jupyter-Themes (Github)

PYTHON PACKAGE FOR CUSTOMIZING JUPYTER NOTEBOOK THEMES

Bayesian cognitive modeling tutorial series — *Remote Contractor*

GEORGIA INSTITUTE OF TECHNOLOGY — *Aug 2018 - Present*

- Developed and led a series of instructional tutorials to help guide novice statisticians and programmers through the basic theoretical foundations and applications of cognitive decision models (e.g., drift-diffusion model)
- Provided introduction to hierarchical Bayesian graphical modeling

Posters

2014

Custom Jupyter interface for Safari *Remote Contractor*

2015 Presenter⋆ & Co-Author *June 2017 - July 2018*

- Worked with Andrew Odewahn (O'Reilly CTO) to develop a custom Jupyter Notebook theme for the Safari platform

2016

2017

2018

Publications

Cognitive Computational Neuroscience (CCN) *Philadelphia, PA*

Presenter⋆ & Co-Author *2018*

- Dopaminergic changes in striatal pathway competition modify specific decision parameters⋆
- Combining heuristics with counterfactual play in reinforcement learning
- Value-conflict and volatility influence distinct decision-making processes

Computational & Systems Neuroscience (COSYNE) *Denver, CO*

Presenter⋆ & Co-Author *2018*

- Dopaminergic changes in striatal pathway competition modify specific decision parameters⋆
- Interpretable model-based strategies arising from hierarchical neural networks

Society for Neuroscience (SfN) *LA · CA · DC*

Presenter⋆ *2014-2016*

- A biologically-constrained hybridization of reinforcement learning and accumulator models for adaptive decision-making⋆
- The difference between stopping and deciding not to go: behavioral, imaging and modeling evidence⋆
- Prior expectations bias hemodynamic activity before and during perceptual decisions: DDM and fMRI⋆
- Transient prior probabilities affect choice bias during temporally extended perceptual decision-making⋆

Teaching

Neural and Cognitive Models of Adaptive Decision Making *Carnegie Mellon*

Co-Instructor *Fall 2018*

- Course code and resources on **Github**

Multimodal Neuroimaging Training Program (MNTP) *CNBC*

Teaching Assistant *Summer 2012-2015*

- Diffusion Spectrum Imaging (DSI) module (2014-2015)
- Functional Magnetic Resonance Imaging (fMRI) module (2012-2013)

Cognitive Psychology Lab *Univ of Pittsburgh*

Instructor *Spring 2014*

Biopsychology *Univ of Pittsburgh*

Teaching Assistant *Fall 2013*

Sensation & Perception *Univ of Pittsburgh*

Teaching Assistant *Fall 2013*

Intro to Psychology *Univ of Pittsburgh*

Teaching Assistant *Spring 2012*

Research Methods *Univ of Pittsburgh*

Teaching Assistant *Fall 2011*

Mentoring

Matthew Clapp *Univ of South Carolina*

Bioengineering *2017 - PRESENT*

- Advised student while working on this **co-authored paper**
- Co-sponsored student's **uPNC** fellowship **(poster)**

Alp Muyesser *Carnegie Mellon*

Mathematics *2016 - 2018*

- Served as primary advisor on the student's first-authored **pre-print**
- Co-sponsored student's **uPNC** fellowship and research project **(poster)**

Jaqueline Hon *Carnegie Mellon*

Neuroscience *2017*

- Advised student on several data collection and analysis projects

Jeremy Huang *Carnegie Mellon*

Computer Science *2016*

- Advised student on a model-fitting optimization project **(Github Repo)**

Brian Krainer *Carnegie Mellon*

Cognitive & Computer Science *2014-2016*

- Co-sponsored student's **uPNC** fellowship and research project
- Advised student on several data analysis and modeling projects

Honors

CNBC McClelland Award *Pitt & CMU*

Outstanding Paper *2016*

- Recognizes one **CNBC** student per year for an outstanding publication
- See **here** for description of paper and invited talk

Graduate Student Representative *Univ of Pittsburgh*

Psychology Dept. *2012*

Multimodal Neuroimaging Training Program *Univ of Pittsburgh*

Intensive fMRI training program *2011*