www.djstrouse.com

# DJ Strouse

## Education

**PhD, Physics** — **Princeton University** — **2012 – 2018**
- *Research*: information-theoretic regularization in supervised, unsupervised, and reinforcement learning
- *Advisors*: David J Schwab, William Bialek

**MPhil, Information Engineering** — **University of Cambridge** — **2011 – 2012**
- *Research*: neural network models for dendritic integration of synaptic inputs
- *Advisor*: Máté Lengyel

**BA, Physics and BS, Math** — **University of Southern California** — **2006 – 2011**
- *Research*: quantum algorithms, quantum information theory, the role of dendritic computation in recognition memory
- *Advisors*: Bartlett Mel, Paolo Zanardi, Andrew Childs

## Work Experience

**Intern** — **Google DeepMind** — **June 2017 – October 2017**
- *Research*: using variational information bottleneck to promote transfer in multi-task reinforcement learning
- *Advisor*: Matt Botvinick

**Machine Learning Intern** — **Spotify** — **June 2016 – June 2017**
- *Research*: probabilistic models of musical taste with applications in recommendations, fraud detection, and ad targeting; Bayesian hypothesis testing for ad campaigns; information-theoretic clustering models for user segmentation
- *Advisor*: Zack Nichols

**Data Science Intern** — **Zynga** — **June 2015 – August 2015**
- *Research*: supervised learning on imbalanced datasets, using resampling and cost-sensitive methods
- *Advisor*: Caio Soares

## Awards

- Hertz Fellowship (2012-2018)
- Department of Energy Computational Sciences Graduate Fellowship (CSGF) (2012-2016)
- Churchill Scholarship (2011-2012)

## Publications

- Natasha Jaques, Edward Hughes, Angeliki Lazaridou, Caglar Gulcehre, Pedro Ortega, **DJ Strouse**, Joel Z. Leibo, & Nando de Freitas. Intrinsic Social Motivation via Causal Influence in Multi-Agent RL. *International Conference on Machine Learning (ICML), 2019.*
- Anirudh Goyal, Riashat Islam, **DJ Strouse**, Zafarali Ahmed, Maxime Chevalier-Boisvert, Doina Precup, Matthew Botvinick, Hugo Larochelle, Sergey Levine, & Yoshua Bengio. Transfer and Exploration via the Information Bottleneck. *International Conference on Learning Representations (ICLR), 2019.*
- Xundong Wu, Gabriel C. Mel, **DJ Strouse**, & Bartlett W. Mel. How dendrites affect online recognition memory. *PLoS Computational Biology, 2019.*
- **DJ Strouse** & David Schwab. The information bottleneck and geometric clustering. *Neural Computation (NECO)*, 2019.
- **DJ Strouse**, Max Kleiman-Weiner, Josh Tenenbaum, Matt Botvinick, & David Schwab. Learning to share and hide intentions using information regularization. *Neural Information Processing Systems (NIPS)*, 2018.
- **DJ Strouse** & David Schwab. The deterministic information bottleneck. *Neural Computation (NECO)*, 2017.
- **DJ Strouse** & David Schwab. The deterministic information bottleneck. *Uncertainty in Artificial Intelligence (UAI)*, 2016.
- Andrew Childs & **DJ Strouse**. Levinson's theorem for graphs. *Journal of Mathematical Physics (JMP)*, 2011.

## Presentations

### Talks

- An information theoretic approach to geometric clustering.*American Physical Society (APS)*. Mar 2017.
- The deterministic information bottleneck. *American Physical Society (APS)*. Mar 2016.
- The deterministic information bottleneck. *Physics-Informed Machine Learning (PIML)*. Jan 2016.
- The information bottleneck method. *Microsoft Research Cambridge (UK)*. Apr 2012.
- Open science is more than open publishing - meet CoLab. *Open Science Summit*. Jul 2010.
- A Levinson's theorem for scattering on graphs. *Institute for Quantum Computing (IQC)*. Jun 2010.

### Posters

- **DJ Strouse** & David Schwab. The deterministic information bottleneck: optimizing memory for prediction. *Society for Neuroscience (SfN)*. Nov 2014.
- **DJ Strouse**, Balazs Ujfalussy, & Máté Lengyel. Dendritic subunits: the crucial role of input statistics and a lack of two-layer behavior. *Computational and Systems Neuroscience (Cosyne)*. Feb 2013.
- **DJ Strouse**, Jakob Macke, Roman Shusterman, Dima Rinberg, & Elad Schneidman. Behaviorally-locked structure in a sensory neural code. *Sensory Coding & Natural Environment (SCNE)*. Sept 2012.
- **DJ Strouse** & Máté Lengyel. Hierarchical generalized linear models of dendritic integration and somatic membrane potential. *Computational and Systems Neuroscience (Cosyne)*. Feb 2012.
- Xundong Wu, **DJ Strouse**, & Bartlett Mel. Optimizing online learning capacity in a biologically-inspired memory structure. *Computational and Systems Neuroscience (Cosyne)*. Feb 2012.
- Xundong Wu, **DJ Strouse**, & Bartlett Mel. Optimizing online learning capacity in a biologically-inspired neural network. *Society for Neuroscience (SfN). San Diego, CA*. Jun 2011.

## Skills and Languages

- *Programming languages*: Python, TensorFlow, R
- *Technical skills*: reinforcement learning, information theory, deep learning, machine learning

## Professional Service

- Co-Organizer, Hertz Foundation East Coast Fellows Retreat, Oct 2015 and Oct 2017
- Co-Organizer, Cosyne workshop on *Dendritic computation in neural circuits*, Mar 2013
- Co-Founder, CoLab - an online set of tools to enable open & massively collaborative science, Dec 2009 – Apr 2012

## Other Education

- Computational and Cognitive Neuroscience Summer School (CCNSS). Beijing, China. Aug 2013.
- Advanced Course in Computational Neuroscience (ACCN). Bedlewo, Poland. Aug 2012.
- Methods in Computational Neuroscience (MCN). Woods Hole, MA. Aug 2011.