

# Ari S. Morcos

RESEARCH SCIENTIST · DEEPMIND

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## Experience and Education

### DeepMind

RESEARCH SCIENTIST

London, UK

Sep. 2016 - PRESENT

- Using neuroscience-inspired approaches to work toward AGI.

### Harvard University

PH.D. IN NEUROSCIENCE, LAB OF CHRISTOPHER HARVEY

Cambridge, Massachusetts, USA

Jul. 2011 - April 2016

- Developed a novel evidence accumulation task for head-restrained mice in virtual reality and used calcium imaging of activity in large neuronal populations along with advanced and new computational analyses to study the neuronal population activity dynamics underlying decision-making.
- Using machine learning approaches that had not been applied to neuroscience data sets previously, we analyzed the dynamics of population activity during single trials and identified multiple major features of the population activity, including a distributed code among heterogeneous individual neurons, history signals for past events lasting seconds, and structured trial-trial variability that was predictive of past and future activity patterns.
- Together our results provide data that contradict the long-standing models of evidence accumulation and that propose a novel model of computation based on large-scale neuronal population dynamics.

### University of California, San Diego

B.S. IN PHYSIOLOGY AND NEUROSCIENCE

La Jolla, California, USA

Sept. 2008 - March 2011

### Salk Institute for Biological Studies, Lab of Fred H. Gage

RESEARCH ASSISTANT

La Jolla, California, USA

Jan. 2009 - Dec. 2010

- Researched the role of REST in adult neurogenesis.

## Publications

**Morcos AS**, Barrett DGT, Rabinowitz NC, and Botvinick M. “On the importance of single directions for generalization.” *ICLR 2018*.

**Morcos AS** and Harvey CD. “History-dependent variability in population dynamics during evidence accumulation in cortex.” *Nature Neuroscience*, 2016; 19(12):1672-1681. doi: 10.1038/nn.4403.

Kim HJ, Denli AM, Wright R, Baul TD, Clemenson GD, **Morcos AS**, Zhao C, Schafer ST, Gage FH, and Kagalwala MN. “REST Regulates Non-Cell-Autonomous Neuronal Differentiation and Maturation of Neural Progenitor Cells via Secretogranin II.” *Journal of Neuroscience*, 2015 Nov 4;35(44):14872-84. doi: 10.1523/JNEUROSCI.4286-14.2015.

**Morcos AS**. “Mechanisms and applications of adult neurogenesis.” *Saltman Quarterly*, 2009 (6):35-36. .

## Presentations

**Morcos AS** and Harvey CD. “History-dependent variability in population dynamics during evidence accumulation in cortex.” *COSYNE 2016*, Salt Lake City, UT, USA. Feb. 27, 2016.

**Morcos AS**, Kagalwala MN, Denli AM, and Gage FH. “The role of REST/NRSF in adult neurogenesis.” *Society for Neuroscience*, San Diego, CA, USA. Nov. 13, 2010.

**Morcos AS**. “Understanding the Protein-Protein Interplay of NRSF (REST) In Regulating Transcription.” *UCSD Undergraduate Research Conference*, San Diego, CA, USA. 2009.

## Awards, Honors, & Fellowships

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- 2013-2016    **Stuart and Victoria Quan Pre-Doctoral Fellowship**  
Harvard Medical School
- 2013        **Honorable Mention**  
NSF Graduate Research Fellowship
- 2009-2010   **Research Scholar**  
Amylin Pharmaceuticals
- 2009        **Summer Research Fellow**  
Howard Hughes Medical Institute
- 2009        **Scholar**  
Alliance for Affordable Services

## Teaching Experience

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- 2012        **Teaching assistant, MATLAB/Quantitative Methods Bootcamp**  
Harvard Medical School

## Relevant coursework

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### FOR DEGREE CREDIT

- 2012        **NB204, Neurophysiology of Central Circuits**  
Harvard University
- 2015        **CS281, Advanced Machine Learning**  
Harvard University

### ONLINE

- 2014        **Machine Learning**  
Stanford University via Coursera
- 2014        **Mining Massive Datasets**  
Stanford University via Coursera
- 2014        **Algorithms: Design and Analysis, Part I**  
Stanford University via Coursera
- 2015        **Databases**  
Stanford Online
- 2015        **Intro to Theoretical Computer Science**  
Udacity
- 2015        **Introduction to Big Data with Apache Spark**  
UC Berkeley via edX
- 2015        **Scaleable Machine Learning**  
UC Berkeley via edX