

# Monica A. Gates

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## Education

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**University of California, Berkeley**, PhD student in Neuroscience, *2016-present*

Advisor: Prof. Tom Griffiths (Psychology, Cognitive Science)

**University of Cambridge**, Master of Philosophy in Biological Science (Psychology), *2015-2016*

Advisor: Dr. Zoe Kourtzi (Experimental Psych.), one-year research (not taught) program

**Wellesley College**, Bachelor of Arts in Neuroscience *2011-2015*

Magna cum laude (GPA: 3.82/4.00), departmental honors, Phi Beta Kappa, Sigma Xi

Advisor: Prof. Bevil Conway (Neuroscience)

## Research Experience

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**PhD Student, Prof. Tom Griffiths (Psychology, Cognitive Science)**

*Fall 2016-Present*, UC Berkeley

- Conducting a collaborative memory experiment to analyze social information transmission. Collecting and analyzing web data from Amazon Mechanical Turk.

**Rotation Student, Prof. Anca Dragan (Electrical Engineering and Computer Sciences)**

*Spring 2017-Present*, UC Berkeley

- Developing and conducting an experiment on robot value-alignment with multiple humans.

**Rotation Student, Prof. Anne Collins (Psychology, Neuroscience)**

*Fall 2016*, UC Berkeley

- Developed a hierarchical parameter fitting model for reinforcement learning behavioral data.

**Research Masters Student, Prof. Zoe Kourtzi (Experimental Psychology)**

*Fall 2015-Fall 2016*, University of Cambridge

- Researched mechanisms of statistical learning through feedback, temporal jitter, and structure interventions. Ran approximately 75 participants on a 6-day learning study. Analyzed data and Bayesian modeling output in MATLAB. Thesis title: Impact of Task Structure on Strategies in Statistical Learning.

**Undergraduate Research Assistant, Prof. Bevil Conway (Neuroscience)**

*Fall 2012-Summer 2015*, Harvard Medical School / M.I.T. and Wellesley College

- Researched neural basis of color vision in humans and macaques using psychophysics, electrophysiology, and fMRI.

- Conducted an undergraduate thesis aimed at replicating the Bezold-Brücke effect (hue shifts in response to luminance changes) psychophysically in humans to match observed single-neuron data in macaques.
- Characterized electrophysiology data from V4 color-selective cells, using MATLAB to analyze spike train latencies and color tuning. Latter included in undergraduate thesis.
- Developed a lab processing stream for, and created, functional and anatomical region-of-interest labels in two macaques; these efforts were part of a collaborative project with Dr. Zeynep Saygin to establish connectivity patterns in macaques and humans using diffusion tensor imaging.
- Conducted macaque fMRI analyses using FreeSurfer to determine color representation throughout the visual field. Also developed introductory-level fMRI and MRI analysis guides to enable new students to become immediately productive.
- Trained macaques in behavioral tasks and analyzed psychophysics data using MATLAB.

### **Undergraduate Research Assistant, Prof. Ellen Hildreth (Computer Science)**

*Spring 2015, Wellesley College*

- Independent study aimed at determining optimum representative colors within defined color categories using Bayesian modeling techniques (Abbott et al., 2012), as well as defining these categories through clustering algorithms (Regier et al., 2007). Replicated parts of the listed papers and extended these models into different color spaces.
- Abbott, J.T., Regier, T., and Griffiths, T.L. (2012). Predicting focal colors with a rational model of representativeness. *In Proceedings of the 34th Annual Conference of the Cognitive Science Society*. (Vol. 1).
- Regier, T., Kay, P., and Khetarpal, N. (2007). Color naming reflects optimal partitions of color space. *Proceedings of the National Academy of Sciences*, 104(4), 1436-1441.

### **Publications**

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J.F. Fisac, **M.A. Gates**, J.B. Hamrick, C. Liu, D. Hadfield-Menell, M. Palaniappan, D. Malik, S.S. Sastry, T.L. Griffiths, and A.D. Dragan (2017). Pragmatic-Pedagogic Value Alignment. *International Symposium on Robotics Research*. Under review.

**Gates, M.A.**, Suchow, J.W., and Griffiths, T.L. (2017). Empirical tests of large-scale collaborative recall. *Proceedings of the 39th Annual Conference of the Cognitive Science Society*. Selected for oral presentation.

Gagin, G., Bohon, K.S., Butensky, A., **Gates, M.A.**, Hu, J.Y., Lafer-Sousa, R., Pulumo, R.L., Qu, J., Stoughton, C.M., Swanbeck, S.N. and Conway, B.R. (2014). Color-detection thresholds in rhesus macaque monkeys and humans. *Journal of vision*, 14(8), 12.

*Along with Galina Gagin, prepared Figure 10C in:* Conway, B.R. (2014). Color signals through dorsal and ventral visual pathways. *Visual neuroscience*, 31(02), 197-209.

### **Awards**

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Data on the Mind Summer Workshop, UC Berkeley, *June 2017*

Center for Brains, Minds, and Machines (CBMM) Summer Course, Marine Biological Laboratory

at Woods Hole, MA, *Aug. 2017*

**NSF Graduate Research Fellowship Honorable Mention, 2017**

BAIR First-Year Travel Stipend, Berkeley Artificial Intelligence Research Lab, *2016*

**Goldwater Scholarship Honorable Mention**, Barry Goldwater Scholarship and Excellence in Education Foundation, *2014*

**Beckman Scholar**, Arnold and Mabel Beckman Foundation, *2014-2015*

Travel Grant to Cosyne (Computational and Systems Neuroscience meeting), NSF- and Brain Corporation-funded, *Mar. 2015*

Horton-Hallowell Graduate Research Fellowship, Wellesley College, *2015*

Russell Prize in Neuroscience Senior Prize (awarded to graduate with most promise in academic research), Wellesley College, *2015*

Center for Brains, Minds, and Machines (CBMM) Summer Undergraduate Research Program, M.I.T., *Summer 2014*

Summer Undergraduate Research Program, Wellesley College, *Summer 2013, Summer 2012*

Wellesley Sophomore Early Research Program Award, Wellesley College, *2013*

## Theses

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**Gates, M.A.** (2016). Impact of Task Structure on Strategies in Statistical Learning. Master of Philosophy Thesis, University of Cambridge.

*Advisor:* Prof. Zoe Kourtzi. *Committee members:* Dr. Lucy G. Cheke, Dr. Caroline Di Bernardi Luft

**Gates, M.A.** (2015). Neural Correlates of the Bezold-Brücke Perceptual Color Shift. Senior Undergraduate Thesis, Wellesley College.

*Advisor:* Prof. Bevil R. Conway and Prof. Ellen C. Hildreth. *Committee members:* Prof. Bevil R. Conway, Prof. Ellen C. Hildreth, Prof. Michael C. Wiest, Prof. Margaret M. Keane

## Posters and Presentations

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*\* indicates equal contributions*

### Posters

**Gates, M.A.** and Conway, B.R. (2015). Responses to Color and Luminance in Macaque Monkeys and Humans. Presented as a poster at Beckman Scholars Annual Research Symposium in Irvine, CA.

**Gates, M.A.** and Conway, B.R. (2015). Responses to Color and Luminance in Macaque Monkeys and Humans. Presented as a poster at Northeast Under/Graduate Organization for Neuroscience (NEURON) Conference in Hamden, CT.

**Gates, M.A.**, Gagin, G., Bohon, K.S. and Conway, B.R. (2014). Responses of Macaque PIT Neurons to Color and Luminance. Presented as a poster at M.I.T. CBMM/BCS Summer Poster Session in

Cambridge, MA.

**Gates, M.A.** and Conway, B.R. (2014). Quantification of Macaque Glob Cell Single-Unit Responses. Presented as a poster at Wellesley College Summer Research Poster Session in Wellesley, MA.

**Gates, M.A.\***, Galina, G.\* , Hu, J.Y.\* , Conway, B.R. (2013). Cellular and Behavioral Investigations of Color in Macaques. Presented as a poster at the Faculty for Undergraduate Neuroscience Social at the Society for Neuroscience Conference in San Diego, CA.

**Gates, M.A.** and Conway, B.R. (2013). Single-Unit Responses to Color in Macaque V4 Cells. Presented as a poster at Wellesley College Summer Research Poster Session in Wellesley, MA.

Hu, J.Y.\* , **Gates, M.A.\*** , and Conway, B.R. (2013). Latencies of V4T Cells in Response to Variations in Hue, Saturation, and Luminance. Listed on the poster presented at National Collegiate Research Conference at Harvard University in Cambridge, MA.

### Oral Presentations

**Gates, M.A.**, Suchow, J.W., and Griffiths, T.L. (2016). Large-scale empirical comparison to models of social memory. Invited Speaker. Presented as a talk at the DARPA UC Berkeley NGS2 Visit in Berkeley, CA.

**Gates, M.A.**, Suchow, J.W., and Griffiths, T.L. (2016). Models of Social Cognition. Invited Speaker. Presented as a talk at the Dallinger Kick-Off Event at UC Berkeley in Berkeley, CA.

Grahmann, P.\* , Li, A.\* , **Gates, M.A.\*** and Conway, B.R. (2015). Conway Lab Presentation. Presented as a split talk for the Wellesley College Summer Research Program at Wellesley College in Wellesley, MA.

Chuang, G.\* , **Gates, M.A.\*** , Cho, E.\* , Lee, E.\* , and Conway, B.R. (2014). Conway Lab Presentation. Presented as a split talk for the Wellesley College Summer Research Program in Wellesley, MA.

**Gates, M.A.\*** , Hu, J.Y.\* , Qu, J.\* , Yeagle, E.\* , and Conway, B.R. (2013). Conway Lab Presentation. Presented as a split talk for the Wellesley College Summer Research Program in Wellesley, MA.

## Broader Impacts

online resources, public engagement, mentoring, teaching

## Online Resources

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### **Science Outreach Website Developer**, *Summer 2016-Present*

Science outreach website aimed at undergraduates in science, especially female undergraduates and undergraduates in computational cognitive science: <http://womenincocosci.com>

### **Student Blogger**, Admission Office of Wellesley College, *Fall 2011-Spring 2015*

Blogged weekly to inform potential students about college life, particularly as a female scientist. Represented Wellesley Class of 2015.

- Continue to blog weekly about graduate life, *Spring 2015-Present*

## Public Engagement

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### Interactive science activities

#### **Volunteer Scientist in Elementary Schools**, Bay Area Scientists in Schools (BASIS), *2017-present*

With a group of four other female scientists, developed and volunteer monthly to teach a science lesson on the brain and senses to first-graders in Berkeley.

- Copy editor for the Berkeley Science Review, April 2017 edition, UC Berkeley, *Apr. 2017*
- Science Café (Cambridge Festival of Science) and volunteering at hands-on interactive activities (Cambridge Festival of Science), University of Cambridge, *Mar. 2016*
- Volunteer at the Cambridge Hands-On Summer Roadshow (two-day event), UK, *July 2016*

### Research talks aimed at public audiences

**Gates, M.A.**, Perez-Pozuelo, I. and Kourtzi, Z. (2016). Predicting what's next—how we learn patterns from a probabilistic world. Presented as a talk at CambRAIN Neuroscience Society meeting at the University of Cambridge in Cambridge, UK.

**Gates, M.A.**, Perez-Pozuelo, I. and Kourtzi, Z. (2016). Predicting what's next—how we learn patterns from a messy (probabilistic) world. Presented as a talk at Graduate Research Day 2016 at Lucy Cavendish College, University of Cambridge in Cambridge, UK.

**Gates, M.A.**, Perez-Pozuelo, I. and Kourtzi, Z. (2016). Predicting what's next—how we learn patterns from a messy (probabilistic) world. Presented as a talk at the International and Ethnic Minorities Student Mini-Conference at Lucy Cavendish College, University of Cambridge in Cambridge, UK.

**Gates, M.A.** and Conway, B.R. (2015). Neural Responses to Color and Luminance. Presented as a talk at Lucy brainSTEMMs event at Lucy Cavendish College, University of Cambridge in Cambridge, UK.

**Gates, M.A.** and Conway, B.R. (2015). Neural Responses to Color and Luminance. Presented as a talk at Ruhlman Conference at Wellesley College in Wellesley, MA.

**Gates, M.A.\***, Hu, J.Y.\*, and Conway, B.R. (2013). Latency in V4/PIT Vision Cells. Presented as a talk at Ruhlman Conference at Wellesley College in Wellesley, MA. *\*indicates equal contributions*

### Career event talks

- Multiple 3-minute talks describing job (scientist) with 13-14 year-olds, *Mar. 2016*
- 15-minute talks leading an activity and describing job (scientist) with 14-15 year-olds, *Apr. 2016*
- Career day activities with 11-12 year-olds, *Apr. 2016, twice in May 2016, June 2016*
- Locations: Bassingbourn, Cambourne, and Chesterton Village Colleges (England)

### Mentoring

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#### **Adaptive Brain Lab, 2015-2016**

Harry Potts (undergraduate), Zena Ahmed (undergraduate)

#### **Conway Lab, 2012-2016**

Erica Wu (high school), Anran Li (undergraduate), Patricia Grahmann (undergraduate), Jessica Keleman (undergraduate), Isabelle Rosenthal (undergraduate), Eileen Cho (undergraduate), Evelyn Lee (undergraduate), Galen Chuang (undergraduate), Hannah Schmidt (undergraduate), Youngju Choi (high school)

### Teaching

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#### **Math Tutor for the Prison University Project**, San Quentin State Prison, *Summer 2017*

Tutored a student in elementary algebra. The Prison University Project offers a liberal arts education, included college and college-preparatory classes, to people incarcerated at San Quentin.

#### **Course Module Developer**, Center for Brains, Minds, and Machines at M.I.T., *Summer 2015*

Developed a course module on fMRI that will be used for a new undergraduate course on the interdisciplinary study of intelligence at CBMM partner schools. Worked with Professor Ellen Hildreth (Computer Science, Wellesley College).

#### **Neuroscience Tutor**, Wellesley College, *Fall 2014*

#### **Computer Science (MATLAB) Tutor and T.A.**, Wellesley College, *Spring 2014*