

# Em Heffernan

PhD Candidate, University of Toronto

✉ [e.maeve.heffernan@gmail.com](mailto:e.maeve.heffernan@gmail.com) ☎ 705 434 8655 🌐 [emheffernan.github.io](https://emheffernan.github.io)

## 🎓 Education

### PhD Student, Computational Neuroscience

2020 – current

*University of Toronto, Toronto, Ontario*

Supervisor: Michael L. Mack

My research explores the impact that surprising information has on our existing knowledge and subsequent learning with a combination of behavioural and neuroimaging data and computational modelling

### MA, Psychology

2019 – 2020

*University of Toronto, Toronto, Ontario*

Thesis: The Impact of Learning Sequence on Performance in a Rule-Plus-Exceptions Categorization Task

Advisor: Michael L. Mack

Committee: Margaret L. Schlichting, Katherine Duncan, Li H. Shu

### BASc, Electrical Engineering

2013 – 2018

*Queen's University, Kingston, Ontario*

Capstone Project: Robotics-Based Medical Simulator

Advisor: Keyvan Hashtrudi-Zaad

## 🏆 Awards

NSERC CGS-D (35,000 CAD/year)

2021 – current

NSERC CGS-M (17,500 CAD)

2020 – 2021

CogSci 2021 Computational Modelling Award in Higher Level Cognition (1,000 USD)

2021

Queen's University Chernoff Family Scholarship (15,000 CAD/year)

2013 – 2018

Hydro One Women in Engineering Scholarship (5,000 CAD)

2016

Google Lime Connect Scholarship (5,000 USD)

2016

NSERC Undergraduate Student Research Award (4,500 CAD)

2015

AbbVie IBD Scholarship (5,000 CAD)

2014

## 🔬 Research Experience

### Outside Project Student

2020 – 2023

*Budding Minds Lab, University of Toronto*

Exploring quality control and data processing pipelines in pediatric diffusion-weighted MRI data

Advisor: Margaret L. Schlichting

### Undergraduate Researcher

2015 – 2016

*PURC Lab, Queen's University*

Independently assessed the accuracy of lesion boundary tracking in a computer-navigated lumpectomy workflow  
Advisors: Gabor Fichtinger, Evelyn L. Morin

## Industry Experience

### **Freelance Editor**

2019 – Present

*Scribbr, Remote*

Provide proofreading and editing services to students and professionals in a wide range of fields.

### **Junior Account Executive**

2018 – 2019

*Microsoft, Mississauga, Ontario*

Worked with clients in the legal vertical to find Microsoft solutions that met their business needs

### **Course Instructor**

2017

*iD Tech, Stanford, California*

Ran two-week courses on programming and electrical engineering for high school students  
Topics included C programming, basic circuit building, IoT, and Arduino

### **Co-op Student**

2016

*Hydro One, Toronto, Ontario*

Assisted in developing an expert system to model the failure of utility poles

### **Summer Student**

2014

*Mars Canada, Bolton, Ontario*

Used Excel VBA to automate the completion of product information forms

## Teaching Experience

### **TA, Sensation and Perception**

2020 – 2023

*University of Toronto, Toronto, Ontario*

### **TA, Statistics I**

2022

*University of Toronto, Toronto, Ontario*

### **TA, Introduction to Forensic Psychology**

2020

*University of Toronto, Toronto, Ontario*

### **TA, Introduction to Cognitive Psychology**

2019, 2020

*University of Toronto, Toronto, Ontario*

### **Project Manager, First-Year Engineering Design**

2016 – 2018

*Queen's University, Kingston, Ontario*

### **TA, Engineering Problem Analysis**

2017

*Queen's University, Kingston, Ontario*

## Volunteer Experience

### **Coordinator, Psychology Undergraduate Research Club**

2020 – Current

*University of Toronto, University of Toronto*

Organize and deliver workshops and professional development opportunities for psychology undergraduates interested in research

### **Regional Executive Officer**

2016 – 2017

*Robogals North America, Remote*

Oversaw operations of Robogals North America and supported chapters across Canada and the United States

Planned a conference for North American chapters in Los Angeles

### **Chapter President**

2015 – 2016

*Robogals Queen's, Kingston, Ontario*

Managed an executive team and organized workshops and outreach activities in the Kingston community

### **Training Manager**

2014 – 2015

*Robogals Queen's, Kingston, Ontario*

Developed and ran lego robotics workshops for students aged 4–17

Trained volunteers to run workshops

## Presentations

### **Academic Talks**

Learning exceptions to the rule in human and model via hippocampal encoding  
*CogSci 2021, Virtual*

Learning exceptions to the rule in human and model via hippocampal encoding  
*Ebbinghaus Empire Data Blitz, Virtual*

Learning exceptions to the rule in human and model via hippocampal encoding  
*Annual Meeting of the Psychonomics Society 2021, Virtual*

Identifying the neural dynamics of category decisions with computational model-based fMRI.  
*CogSci 2020, Virtual*

### **Posters**

An In Silico Exploration of the Effect of Surprising Information on Hippocampal Representations  
*CogSci 2022, Toronto*

Hippocampus-related exception categorization varies across the menstrual cycle  
*SfN 2022, San Diego*

Investigating hippocampus sensitivity to learning sequence in a categorization task using a neural network model  
*SfN Global Connectome 2021, Virtual*

“I” before “E” except after “C”: Does learning rules before exceptions enhance visual object category learning?

*OPAM 2020, Virtual*

### **Other Presentations**

Introduction to Python Programming  
*Psychology Undergraduate Research Club 2023, University of Toronto*

Coverletter Writing Workshop  
*Psychology Undergraduate Research Club 2023, University of Toronto*

Panel Moderator, "Graduate School Interviews"  
*Psychology Undergraduate Research Club 2023, University of Toronto*

Panel Moderator, "Applying to Graduate School"  
*Psychology Undergraduate Research Club 2023, University of Toronto*

Introductory tutorial to high performance computing  
*Mack Lab Meeting 2021, Virtual*

The impact of learning sequence on performance in a rule-plus-exceptions task  
*Psychology Undergraduate Research Club 2020, Virtual*

## Peer-Reviewed Publications

- Du, B., Schwartz-Narbonne, H., Tandoc, M., Heffernan, E. M., Mack, M. L., & Siegel, J. A. (2022). The impact of emissions from an essential oil diffuser on cognitive performance. *Indoor Air*, 32(1), e12919. <https://doi.org/10.1111/ina.12919>
- Heffernan, E. M., & Mack, M. L. (2022). An In Silico Exploration of the Effect of Surprising Information on Hippocampal Representations. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 44(44). <https://escholarship.org/uc/item/18d29196>
- Perovic, M., Heffernan, E. M., Einstein, G., & Mack, M. L. (2022). Category learning across the menstrual cycle: Learning exceptions to the rule varies by hormonal milieu. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 44(44). <https://escholarship.org/uc/item/4vj7x1w8>
- Heffernan, E. M., Adema, J. D., & Mack, M. L. (2021). Identifying the neural dynamics of category decisions with computational model-based functional magnetic resonance imaging. *Psychonomic Bulletin & Review*. <https://doi.org/10.3758/s13423-021-01939-4>
- Heffernan, E. M., Schlichting, M. L., & Mack, M. L. (2021). Learning exceptions to the rule in human and model via hippocampal encoding. *Scientific Reports*, 11(1), 21429. <https://doi.org/10.1038/s41598-021-00864-9>
- Heffernan, E., Ungi, T., Vaughan, T., Pezeshki, P., Lasso, A., Gauvin, G., Rudan, J., Engel, C. J., Morin, E., & Fichtinger, G. (2016). Accuracy of lesion boundary tracking in navigated breast tumor excision. *Medical Imaging 2016: Image-Guided Procedures, Robotic Interventions, and Modeling*, 9786, 97860Y. <https://doi.org/10.1117/12.2217017>