

# Heather R. McGregor

POSTDOCTORAL FELLOW, NEUROMOTOR BEHAVIOR LABORATORY

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## Education

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### Postdoctoral Fellowship

THE UNIVERSITY OF FLORIDA  
Advisor: Dr. Rachael Seidler

Gainesville, FL  
Present

### Ph.D. in Neuroscience

THE UNIVERSITY OF WESTERN ONTARIO  
Advisor: Dr. Paul Gribble

London, ON  
2018

### Visiting Doctoral Research Fellowship

THE UNIVERSITY OF QUEENSLAND  
Advisor: Dr. Timothy Carroll

Brisbane, QLD  
2018

### Honours B.Sc. in Psychology, Neuroscience & Behaviour

MCMASTER UNIVERSITY  
Advisor: Dr. Ramesh Balasubramaniam

Hamilton, ON  
2011

## Publications

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\* Mentored trainees

13. Hupfeld KE, **McGregor HR**, Reuter-Lorenz PA, Seidler RD (Accepted). Microgravity effects on the human brain and behavior: Dysfunction and adaptive plasticity. *Under Revision at Neuroscience & Biobehavioral Reviews*
12. **McGregor HR**, Lee JK, Mulder E, Beltran NE, Kofman IS, De Dios YE, Bloomberg JJ, Mulavara AP, Seidler RD (2020). Brain connectivity and behavioral changes in a spaceflight analog with elevated CO<sub>2</sub>. *NeuroImage* 225: 117450
11. Goldenkoff ER, **McGregor HR**, Mergos J, Gholizadeh P, Bridenstine J, Brown MJN, Vesia M (2020). Reversal of visual feedback modulates somatosensory plasticity. *Neuroscience*
10. Hupfeld KE, **McGregor HR**, Lee JK, Beltran NE, Kofman IS, De Dios YE, Reuter-Lorenz PA, Riascos R, Pasternak O, Wood SJ, Bloomberg JJ, Mulavara AP, Seidler RD (2020). The impact of six and twelve months in space on human brain structure and intracranial fluid shifts. *Cerebral Cortex Communications*, 1(1): 1–15
9. Cashaback JGA, Lao C, Palidis DJ, Coltman SK, **McGregor HR**, Gribble PL (2019). The gradient of the reinforcement landscape influences sensorimotor learning. *PLoS Computational Biology*, 15(3): e1006839.

8. **McGregor HR**, Cashaback JGA, Gribble PL (2018). Somatosensory perceptual training enhances motor learning by observing. *Journal of Neurophysiology*, 120(6): 3017–3025.
7. **McGregor HR**, Vesia M, \*Rinchon C, Chen R, Gribble PL (2018). Changes in corticospinal excitability associated with motor learning by observing. *Experimental Brain Research*, 236(10): 2829–2838.
6. **McGregor HR**, Gribble PL (2015). Functional connectivity between somatosensory and motor brain areas predicts individual differences in motor learning by observing. *Journal of Neurophysiology*, 118(2): 1235–1243.
5. Cashaback JGA, **McGregor HR**, Mohatarem A, Gribble PL (2017). Dissociating error-based and reinforcement-based loss functions during sensorimotor learning. *PLoS Computational Biology*, 13(7): e1005623.
4. Cashaback JGA, **McGregor HR**, Pun H, Buckingham G, Gribble PL (2017). Does the sensorimotor system minimize prediction error or select the most likely prediction during object lifting. *Journal of Neurophysiology*, 117(1): 260–274.
3. **McGregor HR**, Cashaback JGA, Gribble PL (2016). Functional plasticity in somatosensory cortex supports motor learning by observing. *Current Biology*, 26(7): 921–927.
2. **McGregor HR**, Gribble PL (2015). Changes in visual and sensory-motor resting-state functional connectivity support motor learning by observing. *Journal of Neurophysiology*, 114(1): 677–688.
1. Cashaback JGA, **McGregor HR**, Gribble PL (2015). The human motor system alters its reaching movement plan for task-irrelevant, positional forces. *Journal of Neurophysiology*, 113(7): 2137–2149.

#### **SUBMITTED OR UNDER REVIEW**

1. **McGregor HR**, Lee JK, Mulder NE, Beltran NE, Kofman IS, De Dios YE, Bloomberg JJ, Mulavara AP, Seidler RD (Submitted). Ophthalmic changes in a spaceflight analog are associated with brain functional reorganization.
2. Roberts DR, Collins HR, Lee JK, Taylor JA, Turner M, Zaharchuk G, Wintermark M, Antonucci M, Mulder E, Asemani D, **McGregor HR**, Seidler RD (Submitted). Altered cerebral perfusion in response to chronic mild hypercapnia and head-down tilt bed rest as an analog for spaceflight.
3. Palidis DJ, **McGregor HR**, Vo A, MacDonald PA, Gribble PL (Submitted). The role of dopamine in reward-based motor adaptation, savings, and interference.

## Research Funding

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### FUNDED APPLICATIONS

2020–21	<b>NASA Human Research Program Augmentation Grant</b> National Aeronautics and Space Administration (NASA)	\$ 30,000
2019–21	<b>NSERC Postdoctoral Fellowship (<i>top committee-ranked application</i>)</b> Natural Sciences & Engineering Research Council of Canada (NSERC)	\$ 90,000
2017–18	<b>Australian Endeavour Research Fellowship</b> Government of Australia	\$ 23,500
2017	<b>Edmond &amp; Lily Safra Center for Brain Sciences Retreat Travel Grant</b> The Hebrew University of Jerusalem	\$ 3,000

### SUBMITTED APPLICATIONS

2021–23	<b>Banting Postdoctoral Fellowship</b> Natural Sciences & Engineering Research Council of Canada (NSERC)	\$ 140,000
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### UNFUNDED APPLICATIONS

2020–22	<b>TRISH Postdoctoral Fellowship</b> Translational Research Institute for Space Health (TRISH), Score: 87%	\$ 120,000
2019–21	<b>Banting Postdoctoral Fellowship</b> Natural Sciences & Engineering Research Council of Canada (NSERC)	\$ 140,000

## Awards & Distinctions

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2018	<b>Nominated for Canada's Distinguished Dissertation Award</b> Canadian Association for Graduate Students	
2018	<b>Nominated for the Governor General's Gold Medal</b> The University of Western Ontario	
2014–17	<b>NSERC Canada Graduate Scholarship - Doctoral Level</b> Natural Sciences & Engineering Research Council of Canada	\$ 105,000
2016	<b>NSERC Michael Smith Foreign Study Supplement</b> Natural Sciences & Engineering Research Council of Canada	\$ 6,000
2014–15	<b>Ontario Graduate Scholarship (<i>declined</i>)</b> Province of Ontario	\$ 15,000
2013	<b>OHBM Trainee Abstract Award</b> Organization for Human Brain Mapping	\$ 700
2012–13	<b>Ontario Graduate Scholarship</b> Province of Ontario	\$ 15,000
2011–12	<b>NSERC Canada Graduate Scholarship - Master's Level</b> Natural Sciences & Engineering Research Council of Canada	\$ 17,500
2011–12	<b>Ontario Graduate Scholarship (<i>declined</i>)</b> Province of Ontario	\$ 15,000

## Book Chapters

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1. **McGregor HR**, Gribble PL (2016). Observational Motor Learning. In SS Obhi & ES Cross (eds.). *Shared Representations: Sensorimotor Foundations of Social Life (Social Neuroscience Series)*. Cambridge University Press, 525-540

## Invited Talks

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5. A Role for the somatosensory system in observational motor learning. University of Michigan, **Ann Arbor, USA**, 2018.
4. Role of the somatosensory system in motor learning by observing. Progress in Motor Control Meeting, **Miami, USA**, 2017.
3. Role of the somatosensory system in motor learning by observing. York University, **Toronto, Canada**, 2017.
2. Functional plasticity in somatosensory cortex supports motor learning by Observing. The Hebrew University of Jerusalem, **Kibbutz Ein-Gedi, Israel**, 2017.
1. The somatosensory system supports motor learning by observing. The University of Western Ontario, **London, Canada**, 2015.

## Conference Presentations

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### TALKS

6. **McGregor HR**, De Dios YE, Gadd NE, Kofman IS, Bloomberg JJ, Seidler RD (2020). Effects of continuous and intermittent artificial gravity on intracranial free water distribution during head down-tilt bed rest. *NASA Human Research Program Investigators' Workshop*, Galveston, USA.
5. **McGregor HR**, Gribble PL (2018). Somatosensory functional plasticity supports observational motor learning. *Canadian Society for Brain, Behaviour and Cognitive Science Meeting*, St. John's, Canada.
4. **McGregor HR**, Cashaback JGA, Gribble PL (2017). The somatosensory system supports motor learning by observing. *Australasian Neuroscience Society sensorimotor satellite meeting*, Sydney, Australia.
3. Cashaback JGA, Lao C, Palidis DJ, Coltman SK, **McGregor HR**, Gribble PL (2017). The reinforcement landscape influences sensorimotor learning. *Journal of Exercise, Movement, & Sport*, St. John's, Canada.
2. Kistemaker D, Cashaback JGA, **McGregor HR**, Gribble PL (2015). The cost of moving optimally: Muscle activation selection. *International Society of Biomechanics*, Edinburgh, Scotland.
1. **McGregor HR**, Gribble PL (2013). Exploring the neural basis of observational motor learning using resting-state fMRI. *Organization for Human Brain Mapping*, Seattle, USA.

## POSTER PRESENTATIONS

28. **McGregor HR**, Reuter EM, Gribble PL, Carroll TJ (2019). Greater neural responses to others' errors is associated with motor learning by observing. *Society for Neuroscience*, Chicago, IL.
27. **McGregor HR**, Lee JK, Gadd NE, Kofman IS, De Dios YE, Bloomberg JJ, Mulavara AP, Seidler RD (2019). Resting-state functional connectivity changes and ophthalmic changes associated with a spaceflight analog environment. *Society for Neuroscience*, Chicago, IL.
26. **McGregor HR**, Lee JK, Gadd NE, Kofman IS, De Dios YE, Bloomberg JJ, Mulavara AP, Seidler RD (2019). Changes in resting-state functional connectivity and behavior associated with a spaceflight analogue environment. *Society for the Neural Control of Movement*, Toyoma, Japan.
25. **McGregor HR**, Cashaback JGA, Gribble PL. (2017). The somatosensory system supports observational motor learning. *Progress in Motor Control meeting*, Miami, FL.
24. **McGregor HR**, Cashaback JGA, Gribble PL (2017). Functional plasticity in somatosensory cortex supports motor learning by observing. *Human Brain Mapping*, Vancouver, BC.
23. **McGregor HR**, Cashaback JGA, Gribble PL (2017). Somatosensory perceptual training enhances motor learning by observing. *Society for the Neural Control of Movement*, Dublin, Ireland.
22. Cashaback JGA, Lao C, **McGregor HR**, Palidis DJ, Coltman SK, Gribble PL (2017). Reinforcement gradient ascent during sensorimotor learning. *Society for the Neural Control of Movement*, Dublin, Ireland.
21. Lao C, Cashaback JGA, **McGregor HR**, Palidis D, Coltman SK, Gribble PL (2017). Ascending the reinforcement gradient during sensorimotor learning. *Southern Ontario Neuroscience Association*, St. Catherine's, ON.
20. **McGregor HR**, \*Rinchon VC, Gribble PL, Chen R, Vesia M (2016). Changes in corticospinal excitability associated with motor learning by observing. *Society for Neuroscience*, San Diego, CA.
19. **McGregor HR**, Cashaback JGA, Gribble PL (2016). Functional plasticity in somatosensory cortex supports motor learning by observing. *Society for the Neural Control of Movement*, Montego Bay, Jamaica.
18. Cashaback JGA, Mohatarem A, **McGregor HR**, Gribble PL (2016). Dissociating error-based and reinforcement-based learning. *Neural Control of Movement*, Montego Bay, Jamaica.
17. **McGregor HR**, Cashaback JGA, Gribble PL (2016). Functional plasticity in primary somatosensory cortex supports motor learning by observing. *Canadian Association for Neuroscience*, Toronto, ON.
16. Cashaback JGA, Mohatarem A, **McGregor HR**, Gribble PL (2016). Changing the form of feedback (error-based verse reinforcement-based) leads to dissociable motor adaptation. *Canadian Association for Neuroscience*, Toronto, ON.
15. Diep C, Cashaback JGA, **McGregor HR**, Gribble PL (2016). The relationship between upper limb inertia and decision making at movement initiation. *Southern Ontario Neuroscience Association*, Waterloo, ON.
14. Diep C, Cashaback JGA, **McGregor HR**, Gribble PL (2016). The influence of biomechanics during movement initiation on decision-making. *Western Student Research Conference*, London, ON.

13. **McGregor HR**, Gribble PL (2015). Resting-state functional connectivity predicts observational motor learning. *Organization for Human Brain Mapping meeting*, Honolulu, HI.
12. Cashaback JGA, Mohatarem A, **McGregor HR**, Gribble PL (2015). Bayesian integration of skewed distributions during sensorimotor learning. *Society for Neuroscience*, Chicago, IL.
11. **McGregor HR**, Cashaback JGA, Gribble PL (2015). Neuroplasticity in primary somatosensory cortex supports motor learning by observing. *Society for Neuroscience*, Chicago, IL.
10. **McGregor HR**, Cashaback JGA, Gribble PL (2015). The somatosensory system supports motor learning by observing. *The Brain and Mind Symposium*, London, ON.
9. Pun H, Cashaback JGA, **McGregor HR**, Gribble PL (2015). Motor prediction and object lifting. *Southern Ontario Neuroscience Association*, Hamilton, ON.
8. **McGregor HR**, Gribble PL (2015). Resting-state functional connectivity predicts observational motor learning. *Society for the Neural Control of Movement*, Charleston, SC.
7. Kistemaker D, Cashaback JGA, **McGregor HR**, Gribble PL (2015). On what basis does the brain select muscle activation patterns. *Society for the Neural Control of Movement*, Charleston, SC.
6. Cashaback JGA, **McGregor HR**, Gribble PL (2014). The human motor system adapts reaching movements for both task-relevant and task-irrelevant forces. *Society for Neuroscience*, Washington, USA.
5. **McGregor HR**, Gribble PL (2013). Brain networks underlying observational motor learning. *Society for Neuroscience*, San Diego, CA.
4. **McGregor HR**, Gribble PL. (2013). Brain networks underlying motor learning by observing assessed using resting-state fMRI. *Progress in Motor Control meeting*, Montreal, QC.
3. **McGregor HR**, Gribble PL (2013). Exploring the Neural Basis of Observational Motor Learning using Resting-state fMRI. *Organization for Human Brain Mapping*, Seattle, WA.
2. **McGregor HR**, Gribble PL (2013). Motor learning by observing: A resting-state fMRI study. *Society for the Neural Control of Movement*, San Juan, Puerto Rico.
1. **McGregor HR**, Gribble PL (2012). Mapping functional changes in resting-state sensorimotor networks following active and observational learning using fMRI. *Society for Neuroscience*, New Orleans, LA.

## Professional Training

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### **Electroencephalography (EEG) Workshop**

THE UNIVERSITY OF WESTERN ONTARIO

*London, ON*

2016

### **Representational Similarity Analysis (RSA) Workshop**

MRC COGNITION AND BRAIN SCIENCES UNIT, UNIVERSITY OF CAMBRIDGE

*Cambridge, UK*

2015

### **Analysis of Functional NeuroImages (AFNI) Bootcamp**

NATIONAL INSTITUTES OF HEALTH

*Bethesda, MD*

2013

## **FMRIB Software Library (FSL) Course**

UNIVERSITY OF BRISTOL

*Bristol, UK*

2012

## **Summer School in Computational Sensorimotor Neuroscience**

NORTHWESTERN UNIVERSITY

*Evanston, IL*

2012

## **Teaching Experience**

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### **UNDERGRADUATE LEVEL**

2013–14 **Teaching Assistant & Tutorial Instructor**, Research Methods and Statistical Analysis in Psychology, The University of Western Ontario

*PSYCH*

*2820E*

## **Professional Contributions**

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### **PROFESSIONAL SOCIETIES**

Society for Neural Control of Movement (Trainee Board Member)

Society for Neuroscience

Organization for Human Brain Mapping

Vision Sciences Society

Canadian Association for Neuroscience

Canadian Society for Brain, Behaviour & Cognitive Science

### **COMMUNITY SERVICE & OUTREACH**

2019–20 Volunteer, Girls With Nerve Camp, The University of Florida

2019 Volunteer, National Biomechanics Day, The University of Florida

2016–17 Volunteer, London Brain Bee, The University of Western Ontario

2014–16 Lead organizer, London Brain Bee, The University of Western Ontario

2013–14 Volunteer, London Brain Bee, The University of Western Ontario