

Heather R. McGregor

POSTDOCTORAL FELLOW | NEUROMOTOR BEHAVIOR LABORATORY

October 29, 2021

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Education

Postdoctoral Fellowship

THE UNIVERSITY OF FLORIDA

Advisor: Dr. Rachael Seidler

Gainesville, FL

2018–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

* indicates mentored trainee, † indicates co-first authorship

18. Tays GD, Hupfeld KE, **McGregor HR**, Salazar AP, De Dios YE, Beltran NE, Reuter-Lorenz PA, Kofman IS, Wood SJ, Bloomberg JJ, Mulavara AP, Seidler RD (2021). The effects of long duration spaceflight on cognition and sensorimotor control. *Frontiers in Neural Circuits*, In press
17. Hupfeld KE* , **McGregor HR**, Koppelmans V, Beltran NE, Kofman IS, De Dios YE, Riascos R, Reuter-Lorenz PA, Wood SJ, Bloomberg JJ, Mulavara AP, Seidler RD (2021). Brain and behavioral evidence for reweighting of vestibular inputs with long-duration spaceflight. *Cerebral Cortex*, In press
16. Palidis D, **McGregor HR**, Vo A, MacDonald P, Gribble PL (2021). Null effects of levodopa on reward- and error-based motor adaptation, savings, and anterograde interference. *Journal of Neurophysiology*, 126: 47–67
15. **McGregor HR**, Lee JK, Mulder E, Beltran NE, Kofman IS, De Dios YE, Bloomberg JJ, Mulavara AP, Smith SM, Zwart SR, Seidler RD (2021). Ophthalmic changes in a spaceflight analog are associated with brain functional reorganization. *Human Brain Mapping*, 42(13): 4281–4297
14. Hupfeld KE, **McGregor HR**, Reuter-Lorenz PA, Seidler RD (2021). Microgravity effects on the human brain and behavior: Dysfunction and adaptive plasticity. *Neuroscience & Biobehavioral*

13. Roberts DR, Collins HR, Lee JK, Taylor JA, Turner M, Zaharchuk G, Wintermark M, Antonucci M, Mulder E, Asemani D, **McGregor HR**, Seidler RD (2021). Altered cerebral perfusion in response to chronic mild hypercapnia and head-down tilt Bed rest as an analog for Spaceflight. *Neuroradiology*, 1–11
12. **McGregor HR**, Lee JK, Mulder E, Beltran NE, Kofman IS, De Dios YE, Bloomberg JJ, Mulavara AP, Seidler RD (2021). Brain connectivity and behavioral changes in a spaceflight analog with elevated CO₂. *NeuroImage*, 117450
11. Goldenkoff ER, **McGregor HR**, Mergos J, Gholizadeh P, Bridenstine J, Brown MJN, Vesia M (2021). Reversal of visual feedback modulates somatosensory plasticity. *Neuroscience*, 452: 335–344
10. Hupfeld KE, **McGregor HR**, Lee JK, Beltran E, Koffman 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**, Hupfeld KE, Pasternak O, Bloomberg JJ, Wood SJ, Mulavara AP, Hague TN, Seidler RD (Under Revision). No Evidence of intracranial fluid shifts in an astronaut following an aborted launch. *ID: 774805*
2. **McGregor HR**, Hupfeld KE, Pasternak O, Beltran NE, De Dios YE, Bloomberg JJ, Wood SJ, Mulavara AP, Reuter-Lorenz PA, Seidler RD (Submitted). Individual Differences in Spaceflight Experience and their Impact on Human Brain Structure.
3. Hupfeld KE[†], Richmond SB[†], **McGregor HR**, Schwartz DL, Lutherd M, Beltran NE, Kofman IS, De Dios YE, Riascos RF, Reuter-Lorenz PA, Wood SJ, Bloomberg JJ, Mulavara AP, Silbert L, Seidler RD, Piantino, J (Under Revision). MRI-Visible perivascular space (PVS) changes with long-duration spaceflight. *ID: 432f5afa-8d5b-4041-adfd-0a2c299d138c*
4. **McGregor HR**, Hupfeld KE, Pasternak O, Beltran NE, De Dios YE, Bloomberg JJ, Wood SJ, Mulavara AP, Reuter-Lorenz PA, Seidler RD (Full draft available). Spaceflight-induced brain changes do not differ based on astronaut age, sex, or SANS status.
5. Tays GD, **McGregor HR**, Lee JK, Mulder E, Beltran NE, Kofman IS, De Dios YE, Bloomberg JJ, Mulavara AP, Wood SJ, Seidler RD (Full draft available). 30 minutes of daily artificial gravity does not mitigate cognitive and sensorimotor changes in a spaceflight analog environment: An AGBRESA study.
6. Hupfeld KE, Geraghty JM, Hass CJ, Pasternak O, **McGregor HR**, Seidler RD (Full draft available). Differential relationships between brain structure and dual task walking in young and older adults.

Research Funding

FUNDED APPLICATIONS

2021–23	TRISH Postdoctoral Fellowship Translational Research Institute for Space Health & NASA	\$ 150,000
2020–21	NASA Human Research Program Augmentation Grant National Aeronautics and Space Administration (NASA)	\$ 30,000
2019–21	NSERC Postdoctoral Fellowship (top committee-ranked application) Natural Sciences & Engineering Research Council of Canada (NSERC)	\$ 90,000
2014–17	NSERC Canada Graduate Scholarship - Doctoral Level Natural Sciences & Engineering Research Council of Canada (NSERC)	\$ 105,000
2017–18	Australian Endeavour Research Fellowship Government of Australia	\$ 23,500

2017–18	NSERC Michael Smith Foreign Study Supplement Natural Sciences & Engineering Research Council of Canada (NSERC)	\$ 6,000
2017	Edmond & Lily Safra Center for Brain Sciences Retreat Travel Grant The Hebrew University of Jerusalem	\$ 3,000
2014–15	Ontario Graduate Scholarship (<i>declined</i>) Province of Ontario	\$ 15,000
2012–13	Ontario Graduate Scholarship Province of Ontario	\$ 15,000
2011–12	NSERC Canada Graduate Scholarship - Master's Level Natural Sciences & Engineering Research Council of Canada	\$ 17,500
2011–12	Ontario Graduate Scholarship (<i>declined</i>) Province of Ontario	\$ 15,000

Awards & Distinctions

2021	Postdoctoral Publication Award College of Human Health & Performance, University of Florida	\$ 300
2019	Nominated for Canada's Distinguished Dissertation Award Canadian Association for Graduate Students	
2018	Nominated for the Governor General's Gold Medal The University of Western Ontario	
2018	Nominated for the Collip Medal The University of Western Ontario	
2013	OHBM Trainee Abstract Award Organization for Human Brain Mapping	\$ 700

Invited Talks

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

TALKS

7. Hupfeld KE, **McGregor HR**, Koppelmans V, Beltran NE, Kofman IS, De Dios YE, Riascos R, Reuter-Lorenz PA, Wood SJ, Bloomberg JJ, Mulavara AJ, Seidler RD (2021). Brain and behavioral evidence for reweighting of vestibular inputs with long-duration spaceflight. *Society for the Neural Control of Movement*, Online.
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. Salazar AP, Hupfeld KE, Lee JK, **McGregor HR**, Gadd NE, Kofman IS, De Dios YE, Mulder E, Bloomberg JJ, Mulavara AP, Seidler RD (2020). Neural spatial working memory changes during a spaceflight analog with elevated carbon dioxide. *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

30. Tays GD, Hupfeld KE, **McGregor HR**, Salazar AP, De Dios YE, Beltran NE, Reuter-Lorenz PA, Wood SJ, Bloomberg JJ, Mulavara AP, Seidler RD (2021). Sensorimotor and cognitive changes as a result of long duration spaceflight. *Society for the Neural Control of Movement*, Online.
29. **McGregor HR**, Beltran NE, De Dios YE, Kofman IS, Wood SJ, Bloomberg JJ, Reuter-Lorenz PA, Seidler RD (2021). Functional brain changes associated with balance impairments following spaceflight. *NASA Human Research Program Investigators' Workshop*, Online.
28. Tays GD, **McGregor HR**, Lee JK, Beltran NE, Mulder E, De Dios YE, Wood SJ, Bloomberg JJ, Seidler RD (2021). Does daily artificial gravity counteract head down tilt bed rest-induced brain and behavioral changes?. *NASA Human Research Program Investigators' Workshop*, Online.

27. Salazar AP, Hupfeld KE, Lee JK, **McGregor HR**, Beltran NE, Kofman IS, De Dios YE, Mulder E, Bloomberg JJ, Seidler RD (2021). Longitudinal changes in brain activity during a spaceflight analog with elevated carbon dioxide. *NASA Human Research Program Investigators' Workshop*, Online.
26. **McGregor HR**, Reuter EM, Gribble PL, Carroll TJ (2019). Greater neural responses to others' errors are associated with motor learning by observing. *Society for Neuroscience*, Chicago, IL.
25. **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.
24. **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.
23. **McGregor HR**, Cashaback JGA, Gribble PL. (2017). The somatosensory system supports observational motor learning. *Progress in Motor Control meeting*, Miami, FL.
22. **McGregor HR**, Cashaback JGA, Gribble PL (2017). Functional plasticity in somatosensory cortex supports motor learning by observing. *Human Brain Mapping*, Vancouver, BC.
21. **McGregor HR**, Cashaback JGA, Gribble PL (2017). Somatosensory perceptual training enhances motor learning by observing. *Society for the Neural Control of Movement*, Dublin, Ireland.
20. 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.
19. 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.
18. **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.
17. **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.
16. Cashaback JGA, Mohatarem A, **McGregor HR**, Gribble PL (2016). Dissociating error-based and reinforcement-based learning. *Neural Control of Movement*, Montego Bay, Jamaica.
15. **McGregor HR**, Cashaback JGA, Gribble PL (2016). Functional plasticity in primary somatosensory cortex supports motor learning by observing. *Canadian Association for Neuroscience*, Toronto, ON.
14. Cashaback JGA, Mohatarem A, **McGregor HR**, Gribble PL (2016). Changing the form of feedback (error-based versus reinforcement-based) leads to dissociable motor adaptation. *Canadian Association for Neuroscience*, Toronto, 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.

Book Chapters

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

Skills

TOOLS & TECHNIQUES

- Resting-state fMRI
- Voxel-based Morphometry
- Diffusion-weighted MRI
- Task-based fMRI
- Event-related Potentials (ERPs)
- Somatosensory Evoked Potentials (SEPs)
- Peripheral Nerve Stimulation
- Vibrotactile Stimulation

- Transcranial Magnetic Stimulation (TMS)
- Motor Evoked Potentials (MEPs)
- Motion Capture [familiar]

PARADIGMS

- Motor Learning & Adaptation
- Inter-limb Transfer
- Kinematic Analysis
- Perceptual Training
- Proprioceptive Testing
- Cognitive Testing

NEUROIMAGING TOOLS

- FSL
- CONN
- SPM12
- Advanced Normalization Tools (ANTs)

PROGRAMMING

- MATLAB
- Unix shell scripting
- Python [familiar]
- R [familiar]

SOFTWARE

- SPSS
- Brain Vision
- Brainsight Neuronavigation
- Signal
- Motive
- LaTeX
- Microsoft Office Suite
- Adobe Creative Suite

Professional Training

Academy of Bioastronautics

TRANSLATIONAL RESEARCH INSTITUTE & BAYLOR COLLEGE OF MEDICINE

Virtual
2021

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

UNDERGRADUATE LEVEL

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

*PSYCH
2820E*

Contributions

PROFESSIONAL SOCIETIES

Society for Neural Control of Movement (Elected as Trainee Board Member in 2020)
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

2021 Judge, JSEHS STEM Poster Competition, University of Florida
2019–20 Volunteer, Girls With Nerve Camp, University of Florida
2019 Volunteer, National Biomechanics Day, University of Florida
2016–17 Volunteer, London Brain Bee, University of Western Ontario
2014–16 Lead organizer, London Brain Bee, University of Western Ontario
2013–14 Volunteer, London Brain Bee, University of Western Ontario