

# Corson N. Areshenkoff

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## Education

Queens University	KINGSTON, ONTARIO, CANADA
<b>PhD in Psychology (adv. Jason Gallivan)</b>	2017 –
Thesis: Taking the ‘motor’ out of motor learning: Cognitive brain networks and explicit processes in sensorimotor learning and control.	
University of Victoria	VICTORIA, BRITISH COLUMBIA, CANADA
<b>MSc in Psychology (adv. Daniel N. Bub, Michael E.J. Masson)</b>	2015 – 2016
Thesis: Task-dependent motor representations evoked by spatial words	
<b>BSc in Mathematics</b>	2012 – 2015

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## Preprints

**Areshenkoff, C.N.**, de Brouwer, A. J., Gale, D. J., Nashed, J. Y., and Gallivan, J. (2022a). Separate and shared low-dimensional neural architectures for error-based and reinforcement motor learning. *bioRxiv*

## Publications

- Brien, D. C., Riek, H. C., Yep, R., Huang, J., Coe, B., **Areshenkoff, C.N.**, Grimes, D., Jog, M., Lang, A., Marras, C., et al. (2023). Classification and staging of parkinson’s disease using video-based eye tracking. *Parkinsonism & Related Disorders*, page 105316
- Gale, D. J., **Areshenkoff, C.N.**, Standage, D. I., Nashed, J. Y., Markello, R. D., Flanagan, J. R., Smallwood, J., and Gallivan, J. P. (2022). Distinct patterns of cortical manifold expansion and contraction underlie human sensorimotor adaptation. *Proceedings of the National Academy of Sciences*, 119(52):e2209960119
- Areshenkoff, C.N.**, Gale, D. J., Standage, D., Nashed, J. Y., Flanagan, J. R., and Gallivan, J. P. (2022b). Neural excursions from manifold structure explain patterns of learning during human sensorimotor adaptation. *Elife*, 11:e74591
- de Brouwer, A. J., **Areshenkoff, C.N.**, Rashid, M. R., Flanagan, J. R., Poppenk, J., and Gallivan, J. P. (2021). Human variation in error-based and reinforcement motor learning is associated with entorhinal volume. *Cerebral Cortex*
- Areshenkoff, C.N.**, Nashed, J. Y., Hutchison, R. M., Hutchison, M., Levy, R., Cook, D. J., Menon, R. S., Everling, S., and Gallivan, J. P. (2021b). Muting, not fragmentation, of functional brain networks under general anesthesia. *Neuroimage*
- Gale, D. J., **Areshenkoff, C.N.**, Honda, C., Johnsrude, I. S., Flanagan, J. R., and Gallivan, J. P. (2021). Motor planning modulates neural activity patterns in early human auditory cortex. *Cerebral Cortex*
- Standage, D., **Areshenkoff, C.N.**, Nashed, J. Y., Hutchison, R. M., Hutchison, M., Heinke, D., Menon, R. S., Everling, S., and Gallivan, J. P. (2020). Dynamic reconfiguration, fragmentation and integration of whole-brain modular structure across depths of unconsciousness. *Cerebral Cortex*
- Karr, J. E., **Areshenkoff, C.N.**, Rast, P., Hofer, S. M., Iverson, G. L., and Garcia-Barrera, M. A. (2018). The unity and diversity of executive functions: A systematic review and re-analysis of latent variable studies. *Psychological bulletin*, 144(11):1147
- Trafimow, D., Amrhein, V., **Areshenkoff, C.N.**, Barrera-Causil, C. J., Beh, E. J., Bilgiç, Y. K., Bono, R., Bradley, M. T., Briggs, W. M., Cepeda-Freyre, H. A., et al. (2018). Manipulating the alpha level cannot cure significance testing. *Frontiers in Psychology*, 9:699
- Areshenkoff, C.N.**, Bub, D. N., and Masson, M. E. (2017). Task-dependent motor representations evoked by spatial words: Implications for embodied accounts of word meaning. *Journal of Memory and Language*, 92:158–169
- Smart, C. M., Karr, J. E., **Areshenkoff, C.N.**, Rabin, L. A., Hudon, C., Gates, N., Ali, J. I., Arenaza-Urquijo, E. M., Buckley, R. F., Chetelat, G., et al. (2017). Non-pharmacologic interventions for older adults with subjective cognitive decline: systematic review, meta-analysis, and preliminary recommendations. *Neuropsychology review*, 27(3):245–257

- Karr, J. E., **Areshenkoff, C.N.**, Duggan, E. C., and Garcia-Barrera, M. A. (2014b). Blast-related mild traumatic brain injury: a bayesian random-effects meta-analysis on the cognitive outcomes of concussion among military personnel. *Neuropsychology review*, 24(4):428–444
- Karr, J. E., **Areshenkoff, C.N.**, and Garcia-Barrera, M. A. (2014c). The neuropsychological outcomes of concussion: A systematic review of meta-analyses on the cognitive sequelae of mild traumatic brain injury. *Neuropsychology*, 28(3):321
- Karr, J. E., **Areshenkoff, C.N.**, Rast, P., and Garcia-Barrera, M. A. (2014d). An empirical comparison of the therapeutic benefits of physical exercise and cognitive training on the executive functions of older adults: A meta-analysis of controlled trials. *Neuropsychology*, 28(6):829
- Karr, J. E., Garcia-Barrera, M. A., and **Areshenkoff, C.N.** (2014a). Executive functions and intraindividual variability following concussion. *Journal of clinical and experimental neuropsychology*, 36(1):15–31

## Conference Presentations

- Areshenkoff, C.N.**, Gale, D. J., Nashed, J. Y., Standage, D., Flanagan, J. R., and Gallivan, J. P. (2021a). Neural excursions from low-dimensional manifold structure in cognitive and sensorimotor brain networks explains intersubject variation in human motor learning. Paper presented at the annual meeting for the Society for the Neural Control of Movement
- Areshenkoff, C.N.**, Nashed, J. Y., Hutchison, R. M., Hutchison, M., Menon, R. S., Everling, S., and Gallivan, J. P. (2020). Predicting depth of sedation from latent structure in whole-brain cortical networks. Paper presented at the annual meeting for the Organization for Human Brain Mapping
- Areshenkoff, C.N.**, de Brouwer, A., Nashed, J. Y., Gale, D., and Gallivan, J. P. (2019). Network-level interactions during sensorimotor adaptation learning and generalization. Poster presented at the annual meeting for the Society for Neuroscience, San Diego, CA
- Areshenkoff, C.N.**, Nashed, J. Y., Standage, D., and Gallivan, J. P. (2018). Functional coupling between the basal ganglia and cerebellum during visuomotor adaptation learning. Poster presented at the annual meeting for the Society for Neuroscience, San Diego, CA
- Standage, D., Nashed, J. Y., **Areshenkoff, C.N.**, Flanagan, R. J., and Gallivan, J. P. (2018). Whole-brain modular structure of spontaneous neural activity at rest predicts future sensori-motor learning. Poster presented at the annual meeting for the Society for Neuroscience, San Diego, CA
- Areshenkoff, C.N.**, Bub, D. N., and Masson, M. E. (2016). Parallel encoding of alternative action possibilities alters the execution of a cued action. Poster presented at the 31st meeting of the Society for the Neuroscience of Decision Making. Montreal, QC
- Areshenkoff, C.N.** and Bub, D. N. (2016). The temporal dynamics of motor affordances. Poster presented at the 31st meeting of the Society for the Neuroscience of Decision Making. Montreal, QC
- Mulligan, B. P., **Areshenkoff, C.N.**, and Smart, C. M. (2015). Eeg entropy predicts intensively measured cognitive performance in healthy older adults. In *Psychophysiology*, volume 52, pages S25–S25. WILEY-BLACKWELL 111 RIVER ST, HOBOKEN 07030-5774, NJ USA
- Areshenkoff, C.N.**, Bub, D. N., and Masson, M. E. (2015). Embodied representation of word meaning. In *Canadian Journal of Experimental Psychology-Revue Canadienne de Psychologie Experimentale*, volume 69, pages 343–343. Canadian Psychological Assoc. 141 Laurier Ave West, STE 702, Ottawa, Ontario
- Areshenkoff, C.N.**, Karr, J. E., and Garcia-Barrera, M. (2013b). Performance patterns of card selection in the iowa gambling task: Preliminary evidence of high sensitivity to losses following mtbi [abstract]. In *Journal of the International Neuropsychological Society*, volume 19, page 75
- Areshenkoff, C.N.**, Karr, J. E., Crevier-Quintin, E., and Garcia-Barrera, M. (2013a). The benefits of physical and cognitive training programs of executive functions among older adults: A meta-analytical comparison. Poster presented at the 41st annual meeting of the International Neuropsychological Society. Waikaloa, Hawaii
- Karr, J. E., **Areshenkoff, C.N.**, Evans, J., Jewett, David Nguyen, K., Tutt, G., and Garcia-Barrera, M. (2012). Physical exercise versus cognitive training on executive functioning: It's a tie! a meta-analysis of controlled trials during healthy aging. Lecture presented at the annual meeting of the Canadian Association of Gerontology. Vancouver, BC
- Grindstaff, T. R., Karr, J. E., **Areshenkoff, C.N.**, Saville, K., Alexander, J., and Alexander, R. (2012). Frontal and parietal differences in p300 amplitude and latency during a self-evaluation task. Poster presented at the 24th annual convention of the Association for Psychological Science. Chicago, Illinois

## Funding and Awards

<b>National Sciences and Engineering Research Council (NSERC) PGS-D</b> \$21,000 (x3 years)	2017-2020
<b>Queens Graduate Entrance Award</b> \$5,000	2017
<b>University of Victoria Graduate Award</b> \$2,000	2016
<b>University of Victoria Graduate Award</b> \$1,000	2015

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## Teaching

<b>Queens University – Psyc 801: Design of Experiments</b> Teaching assistant. Prepared lecture materials, assignments, and labs.	2020-2021
<b>Queens University – Psyc 376: Functional Neuroimaging of the Human Brain and Mind</b> Teaching assistant.	2017-2019
<b>Queens University – Psyc 370: Brain and Behavior II</b> Teaching assistant.	2017
<b>University of Victoria – Psyc 401: Measurement of Psychological Processes</b> Guest lecture on exploratory factor analysis and principal component analysis.	2016
<b>University of Victoria – Psyc 401: Measurement of Psychological Processes</b> Teaching assistant and guest lecturer on exploratory factor analysis, validity, and generalizability theory.	2015
<b>University of Victoria – Psyc 351C: Introduction to Mind and Brain</b> Teaching assistant and guest lecturer on reinforcement learning and the basal ganglia.	2015
<b>University of Victoria – Summer statistics and programming tutorial</b> Organized and led a series of weekly tutorials on statistics and programming in MATLAB.	2013

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## Workshops and Summer Schools

<b>Vector Institute Deep Learning and Reinforcement Learning Summer School</b> Toronto, Ontario	July-August 2018
<b>Computational Sensorimotor Neuroscience (CoSMo) Summer School</b> Minneapolis St. Paul, Minnesota	August 2017
<b>Temporal Dynamics of Learning Center (TDLC) Summer School</b> San Diego, California	August 2015

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## Projects

### **spdm**

R package for the analysis of symmetric, positive-definite (SPD) matrices (i.e. covariance matrices). These data frequently arise in fMRI as measures of functional connectivity, and in DTI tractography as diffusion tensors describing the propagation of water molecules through tissue. The spdm package provides a suite of routines for performing common operations in the space of SPD matrices (e.g. averaging, interpolation) in a way that respects the natural geometry of this space. It also implements several more advanced procedures (e.g. centering via parallel transport) which are common in differential-geometric approaches to the study of covariance matrix valued data.

### **seathree**

R package implementing basic operations and arithmetic on (unit) dual quaternions, which provide a particularly elegant parametrization of displacements (translation and rotation) in three dimensions. Seathree is part of a suite of packages (in progress) enabling the preprocessing and analysis of three dimensional motion tracking data.

### **MSMVSampEn**

R package for computing multiscale, multivariate sample entropy of biological signals.

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