Harrison Ritz

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Academic Appointments

2026 – Present **Queen's University** — *Centre for Neuroscience Studies*
Connected Minds Postdoctoral Fellow
Advisor: Dr. Gunnar Blohm

2026 – Present **Baycrest Hospital** — *Rotman Research Institute*
Visiting Postdoctoral Fellow
Local Collaborators: Drs. Björn Herrmann & Douglas Cheyne

2022 – 2026 **Princeton University** — *Princeton Neuroscience Institute*
C.V. Starr Postdoctoral Fellow
Advisors: Drs. Jonathan D. Cohen & Nathaniel D. Daw

Education

2016 – 2022 **Brown University** — *Dept. of Cognitive, Linguistic & Psychological Sciences*
Ph.D. in Psychology
Advisors: Drs. Amitai Shenhav & Michael J. Frank

2014 – 2016 **University of Western Ontario** — *Brain and Mind Institute*
M.Sc. in Psychology (Cognitive and Behavioural Neuroscience Specialization)
Advisor: Dr. Ingrid Johnsrude

2010 – 2014 **Queen's University** — *Dept. of Psychology*
B.Sc. in Psychology (Honours, Distinction)
Honours Thesis Advisor: Dr. Ingrid Johnsrude

Awards and Fellowships

2026 – 2028 *Connected Minds Fellowship*, Queen's University ($209 000 CAD)
2022 – 2026 *C.V. Starr Postdoctoral Fellowship*, Princeton University ($670 000 CAD)
2019 – 2020 *Carney Graduate Award in Brain Science*, Brown University ($75 000 CAD)
2019 *Cognitive Science Society Travel Award ($700 CAD)*
2018 – 2019 *Eimas Graduate Research Award*, Brown University ($1400 CAD)
2014 *Certificate of Academic Excellence,* Canadian Psychological Association (Honours Thesis Award)
2011 *Summer Work Experience Program*, Queen's University ($2500 CAD)
2010 – 2014 *Dean's Honour List*, Queen's University
2010 – 2014 *Foresters Competitive Scholarship* (*$8000 CAD*)
2010 *Queen's University Excellence Scholarship* (*$2000 CAD*)

Peer-Reviewed Publications [* shared authorship; # trainee]

Ritz, H., Jha, A., Daw, N.D., & Cohen, J.D. (2026). Inter-trial convergence of neural task states supports cognitive flexibility. *Current Biology, 36*(17), 4245-4257.

Bridgeford, E., Campbell, I.D., Chen, Z., Lin, Z., **Ritz, H.**, Vandekerckhove, J., & Poldrack, R.A. (2026). Twelve quick tips for AI-assisted coding in science. *PLOS Computational Biology,* 22(7), e1014428.

Huang, B., **Ritz, H.**, & Jiang, J. (2026). Adaptive behavior is guided by integrated representations of controlled and non-controlled information. *eLife,* 14:RP108673.

Ritz, H., Frömer, R., & Shenhav, A. (2026). Phantom controllers: Misspecified models create the false appearance of adaptive control during value-based choice. *Communications Psychology, 4*(1), 11.

Ritz, H., & Shenhav, A. (2024b). Orthogonal neural encoding of targets and distractors supports multivariate cognitive control. *Nature Human Behaviour*, *8*, 945–961.
Dataset: www.doi.org/10.18112/OPENNEURO.DS004909.V1.1.0

Ritz, H., & Shenhav, A. (2024a). Humans reconfigure target and distractor processing to address distinct task demands. *Psychological Review, 131(2),* 349–372.
Dataset: www.doi.org/10.6084/m9.figshare.16755418.v1

Rier, L., Michelmann, S., **Ritz, H.**, Shah, V., Hill, R.M., Osborne, J., Doyle, C., Holmes, N., Bowtell, R., Brookes, M.J., Norman, K.A., Hasson, U., Cohen, J.D., & Boto, E. (2023). Test-retest reliability of the human connectome: An OPM-MEG study. *Imaging Neuroscience, 1*, 1–20.
Dataset: www.doi.org/10.5281/zenodo.7525341

Ritz, H., Wild, C.J., & Johnsrude, I.S. (2022). Parametric cognitive load reveals hidden costs in the neural processing of perfectly intelligible degraded speech. *Journal of Neuroscience, 42(23)*, 4619–4628.

Rmus, M.[#], **Ritz, H.**, Hunter, L.E., Bornstein, A.M., & Shenhav, A. (2022). Humans can navigate complex graph structures acquired during latent learning. *Cognition*, *225*, 105103.

Ritz, H., Leng, X., & Shenhav, A. (2022). Cognitive control as a multivariate optimization problem. *Journal of Cognitive Neuroscience*, 34(4), 569–591.

Leng, X., Yee, D., **Ritz, H.**, & Shenhav, A. (2021). Dissociable influences of reward and punishment on adaptive cognitive control. *PLoS Computational Biology*, *17*(12), e1009737.

Ritz, H., Frömer, R., & Shenhav, A. (2020). Bridging motor and cognitive control: It's about time! (Spotlight). *Trends in Cognitive Sciences*, *24*(1), 6–8.

Nassar, M.R., McGuire, J.T., **Ritz, H.**, & Kable, J. (2019). Dissociable forms of uncertainty-driven representational change across the human brain. *Journal of Neuroscience*, 39(9), 1688–1698.

Ritz, H., Nassar, M.R., Frank, M.J., & Shenhav, A. (2018). A control theoretic model of adaptive behavior in dynamic environments. *Journal of Cognitive Neuroscience, 30(10),* 1405–1421.

Peer-Reviewed Conference Proceedings [* shared authorship; # trainee]

Ritz, H. (2026). Bayesian calibration for conference reviews. *Cognitive Computational Neuroscience*. [2 pg., Poster Spotlight (top 10%)].

Liu, X.[#], Nystrom, L., Mark, P., DePinto, N., Wolf, W.A., Daw, N., Kastner, S., Cohen, J.D.*, & **Ritz, H.*** (2026). Orthogonal task representation enables flexible task switching in human OPM-MEG and neural networks. *Cognitive Computational Neuroscience*. [2 pg., Poster Spotlight, Contributed Talk].

Geadah, V., Arbelaiz, J., **Ritz, H.**, Daw, N.D., Cohen, J.D., & Pillow, J.W. (2024). Inferring system and optimal control parameters of closed-loop systems from partial observations. *2024 IEEE 63rd Conference on Decision and Control (CDC)*, 8006–8013. [8 pg., Contributed Talk].

Ritz, H., Jha, A., Pillow, J., Daw, N., & Cohen, J.D. (2024). Dynamic neural control of task representations in humans and neural networks. *Cognitive Computational Neuroscience*. [2 pg., Poster].

Ritz, H., Jha, A., Pillow, J., & Cohen, J.D. (2023). Task preparation is reflected in neural state space dynamics. *Cognitive Computational Neuroscience*. [2 pg., Poster].

Ritz, H., Wolf, W., & Cohen, J.D. (2023). Continuous and discrete transitions during task-switching. *Cognitive Science Society*. [4 pg., Poster].

Ritz, H. & Shenhav, A. (2022). Orthogonal neural encoding of targets and distractors supports cognitive control. *Cognitive Computational Neuroscience*. [2 pg., Poster].

Ritz, H., DeGutis, J., Frank, M.J., Esterman, M., & Shenhav, A. (2020). An evidence accumulation model of motivational and developmental influences over sustained attention. *Cognitive Science Society.* [4 pg., Poster].

Leng, X., **Ritz, H.**, Yee, D., & Shenhav, A. (2020). Dissociable influences of reward and punishment on adaptive cognitive control. *Cognitive Science Society.* [4 pg., Poster].

Ritz, H. & Shenhav, A. (2019). Parametric control of distractor-oriented attention. *Cognitive Science Society.* [4 pg., Talk].

Ritz, H., Nassar, M.R., Frank, M.J., & Shenhav, A. (2019). Decisions about reward and effort for the learning and control of dynamical systems. *Reinforcement Learning and Decision Making.* [4 pg., Poster].

Ritz, H., Nassar, M.R., Frank, M.J., & Shenhav, A. (2017). Behavioral evidence for PID-like feedback control. *Reinforcement Learning and Decision Making.* [4 pg., Poster Spotlight Talk].

Organization of Conferences, Symposia, and Workshops

Aug. 2026 – Present	Extended Abstracts Committee Chair, Steering Committee, AI Policy Working Group. Cognitive Computational Neuroscience
Aug. 2026	*Putting Dynamics First: State-Space Modelling for Human Neuroscience (keynote & tutorial co-chair).* Cognitive Computational Neuroscience. New York City, USA. Keynote: www.youtube.com/watch?v=LR1RigGJoXE&t=4566 Tutorial: www.youtube.com/watch?v=RfIaoViz1Og
June 2026	*Using Task-Optimized ANNs to Understand Brain & Behaviour* (symposium chair) Canadian Society for Brain, Behaviour, and Cognitive Science. Toronto, CA.
Nov. 2022	*Cortical Basis of Cognitive Control Across Species* (nanosymposium chair) Society for Neuroscience. San Diego, USA.

Invited Talks

Nov. 2026	*NeuroIDEA Lab (Dr. Moriah Sokolowski)*, Toronto Metropolitan University.
Oct. 2026	*Krembil Centre for Neuroinformatics Rounds*, Centre for Addiction and Mental Health.
Apr. 2026	*Inzlicht & Hutcherson Labs*, University of Toronto Scarborough.
Dec. 2025	*Safavi Lab,* Technische Universität Dresden.
Nov. 2025	*Sensorimotor SuperLab*, Western University. Recording

June 2025	*Dept. of Psychology*, Vrije Universiteit Amsterdam.
May 2025	*Duncker Lab*, Columbia University.
Nov. 2024	*Cognitive Control Seminar*, University of Iowa.
Nov. 2024	*CRAM Seminar*, McGill University.
Apr. 2024	*Cog Neuro Seminar*, Yale University.
Dec. 2023	*ConCat Series*, New York University.
Nov. 2023	*Cole Lab*, Rutgers University.
Nov. 2023	*Dept. of Psychology*, University of British Columbia.
Apr. 2023	*Egner Lab*, Duke University.
Oct. 2022	*Rotman Research Institute,* Baycrest Hospital.
Sept. 2022	*Summerfield Lab*, University of Oxford.
June 2022	*BLRB Group*, University of Chicago.
Feb. 2022	*Woolgar Lab*, University of Cambridge.
Feb. 2022	*Egner Lab*, Duke University.
Nov. 2021	*Otto Lab*, McGill University.
Oct. 2021	*Ghent Effort Group*, Ghent University.
July 2021	*Mars Lab*, University of Oxford.
June 2021	*CoCoA Lab (Dr. Taraz Lee)*, University of Michigan.
May 2021	*Verguts Lab*, Ghent University.
Apr. 2021	*Sensorimotor SuperLab*, Western University.
Feb. 2021	*Summerfield Lab*, University of Oxford.
Nov. 2020	*Jazayeri Lab*, Massachusetts Institute of Technology.
Oct. 2020	*Schulz Lab*, Max Planck Institute for Biological Cybernetics.
Sept. 2020	*Kool Lab*, Washington University in St. Louis.
Aug. 2020	*Collins Lab*, University of California, Berkeley.
May 2020	*McGuire Lab*, Boston University.
Apr. 2020	*Hayden Lab*, University of Minnesota.
Mar. 2020	*Donner Lab*, University of Hamburg.
Feb. 2020	*ConCat Series*, New York University.
May 2018	*CBC Series*, Universitat Pompeu Fabra.

Conference Presentations [# trainee; excluding proceedings listed above]

Ritz, H., Jha, A., Daw, N.D., & Cohen, J.D. Inter-trial convergence of neural task states supports cognitive flexibility.

- *Canadian Society for Brain, Behaviour, and Cognitive Science* (2026). Toronto, CA. [Symposium Talk]
- *Society for Neuroscience* (2025). San Diego, USA. [Nanosymposium Talk]
- *Canadian Association for Neuroscience* (2025). Toronto, CA. [Poster]
- *Canadian Society for Brain, Behaviour, and Cognitive Science* (2024). Edmonton, CA. [Talk]
- *Cognitive Neuroscience Society* (2024). Toronto, CA. [Poster]
- *The New VISTAs in Vision Research* (2023). Toronto, CA. [Poster]
- *Motivational and Cognitive Control* (2023). Lyon, FR. [Poster]

Geadah, V., Arbelaiz, J., **Ritz, H.**, Daw, N., Cohen, J.D., & Pillow, J. Inferring System and Optimal Control Parameters of Closed-Loop Systems from Partial Observations.

- *Computational and Systems Neuroscience* (2025). Montreal, CA. [Workshop Talk by V.G.]

- *IEEE Conference on Decision and Control* (2024). Milan, IT. [Contributed Talk by V.G.]

Pulido, J.[#], **Ritz, H.**, Wolf, W., Cohen, J.D. Investigating the Dynamics of Task Switching.
- *Society for Neuroscience (2023).* Washington, USA. [Poster by J.P.]
- *Princeton Neuroscience Institute Poster Day* (2023). Princeton, USA. [Poster by J.P.]
- *Leadership Alliance National Symposium* (2023). Hartford, USA. [Talk by J.P.]

Ritz, H. & Shenhav, A. Orthogonal neural encoding of targets and distractors supports cognitive control.
- *Motivational and Cognitive Control* (2023). Lyon, FR. [Talk]
- *Canadian Society for Brain, Behaviour, and Cognitive Science (2023)*. Guelph, CA. [Talk]
- *Society for Neuroscience* (2022). San Diego, USA. [Nanosymposium Talk]
- *Workshop on Mental Effort* (2022). Providence, USA. [Poster]

Ritz, H., Frömer, R. & Shenhav, A. Disentangling stimulus-driven and controlled processes during value-based decision making.
- *Society for Neuroscience* (2021). Online. [Poster]
- *Society for Neuroeconomics* (2021). Online. [Poster]

Vartany, S., Allawala, A., **Ritz, H.**, Adkinson, J., Mathura, R., Bijanki, K., Shenhav, A., Goodman, W., Pouratian, N., Sheth, S., & Borton, D. Deep Brain Stimulation in Treatment-Resistant Depression Modulates Oscillations Above 1/f Spectral Noise in Cognitive Control Networks.
- Neuromatch Conference 4.0 (2021). Online. [Talk by S.V.]

Ritz, H., Hayden, B., Shenhav, A., & Yoo, S.B. Optimal control of approach-avoidance dynamics.
- *Neuromatch Conference 3.0* (2020). Online. [Talk]

Ritz, H., Nassar, M.R., Frank, M.J., & Shenhav, A. Optimal decision-making in metric space.
- *Society for Neuroeconomics* (2020). Online. [Poster Spotlight]

Ritz, H., & Shenhav, A. Humans reconfigure target and distractor processing to address distinct task demands.
- *Workshop on Mental Effort* (2021). Online. [Poster]
- *Motivational and Cognitive Control* (2019). Berlin, DE. [Poster]
- *Control Processes* (2019). Providence, USA. [Poster]
- *Cognitive Neuroscience Society* (2018). Boston, USA. [Poster]

Rmus, M.[#], **Ritz, H.**, Hunter, L., Bornstein, A., & Shenhav, A. Humans can navigate complex graph structures acquired during latent learning.
- *Reinforcement Learning and Decision Making* (2019). Montreal, CA. [Workshop Talk]
- *Society for Neuroeconomics* (2018). Philadelphia, USA. [Talk by M.R.]

Ritz, H., DeGutis, J., Frank, M.J., Esterman, M., & Shenhav, A. Modeling motivational influences on sustained attention.
- *Winter Conference on Brain Research* (2019). Snowmass, USA. [Poster]
- *Society for Neuroeconomics* (2018). Philadelphia, USA. [Poster]

Ritz, H., Dean Wolf, C., Frömer, R., & Shenhav, A. Quantifying the demands of value-based decision-making with short-term memory interference.
- *Cognitive Neuroscience Society* (2019). San Francisco, USA. [Poster]

Ritz, H., Nassar, M.R., Frank, M.J., & Shenhav, A. Behavioral evidence for PID-like feedback control.
- *Society for Neuroscience* (2017). Washington, USA. [Nanosymposium Talk]
- *New England Research in Decision-Making* (2017). Providence, USA. [Talk]
- *Brown Mind Brain Research Day* (2017). Providence, USA. [Poster]

Ritz, H., Wild, C., & Johnsrude, I.S. The effects of concurrent cognitive load on the processing of clear and degraded speech.
- *Organization for Human Brain Mapping* (2016). Geneva, CH. [Poster]

Ritz, H., Arbuckle, S., Wild, C., & Johnsrude, I.S. Enhanced recognition memory for acoustically degraded sentences.
- *Association for Research in Otolaryngology* (2016). San Diego, USA. [Talk by I.J.]
- *Brain and Mind Institute Symposium* (2015). London, CA. [Poster]

Ritz, H. & Johnsrude, I.S. Attention enhances phase-locking in the frequency following response.
- *Canadian Society for Brain, Behaviour, and Cognitive Science* (2014). Toronto, CA. [Poster]
- *McMaster University NeuroXchange Conference* (2014). Hamilton, CA. [Poster]

Research Summer Schools

Summer 2019	*Kavli Summer Institute in Cognitive Neuroscience*, Santa Barbara, USA.
Summer 2017	*Methods in Neuroscience at Dartmouth*, Hanover, USA.

Teaching Experience

Spring 2026	*PGSA Symposium Poster Judge*, University of Toronto
Summer 2025	*PNI Summer Internship Guest Lecturer,* Princeton University - lunch talk on scientific poster design and conference presentation
Spring 2025	*From Molecules to Systems to Behavior,* Princeton University, Guest Lecturer - lab section on collecting and analyzing OPM-MEG data
Spring 2025	*Junior Thesis Moderator*, Princeton University
Summer 2024	*ReMatch+ Summer Internship Mentor,* Princeton University
Summer 2023	*PNI Summer Internship Mentor*, Leadership Alliance & Princeton University
Summer 2021	*FYRE summer program*, Leadership Alliance & Brown University, Guest Lecturer - lab section on fitting reinforcement learning models to behaviour
Spring 2019	*fMRI: Theory and Practice*, Brown University, TA - assisted students with coding, collecting, and analyzing fMRI experiments
Spring 2018	*Cognitive Neuropsychology*, Brown University, TA
Fall 2017	*Social Psychology*, Brown University, TA
2015 – 2016	*Statistics using Computers (full year)*, Western University, TA - two lab sections per week on using SPSS for statistical analysis
2014 – 2015	*Sensation and Perception (full year)*, Western University, TA
2012 – 2013	*Introduction to Psychology (full year)*, Queen's University, TA

Mentorship

2026 – Present	Vishakha Desai, honours thesis: *Investigating MEG connectivity during motor planning and execution using state-space models*
2025 – Present	Xiaoyi Liu, PhD Student
2024	Haley Champion, undergraduate RA (ReMatch+ mentorship program)
2024	Jenna Mullin, summer intern (OURSIP mentorship program)
2022 – 2026	William Wolf, staff RA
2023	Joemari Pulido, summer intern (PNI Summer Internship Program)

2021	Kyle Chen, undergraduate RA
2019 – 2022	Christopher Bravo, undergraduate RA
2019 – 2020	Jennifer Dzul, honours thesis: *Are Distractors really that Distracting? A Closer Look into Target vs Distractor Sensitivity in Older Adults*
2019 – 2020	Natalie Knowles, undergraduate RA
2019	Savannah Doelfel, undergraduate RA
2017 – 2019	Allison Loynd, undergraduate RA
2017 – 2018	Milena Rmus, honours thesis: *Model-based decision-making is associated with structure inference ability*
2017	William McNelis, undergraduate RA
2016 – 2017	Kia Sadahiro, undergraduate RA
2015 – 2016	Jessica Uthayakumar, honours thesis: *Consequences of acoustic degradation and semantic context on recognition memory*

Service Positions

2026 – Present	*RRI Rounds Committee [colloquia]*, Rotman Research Institute
2026 – Present	*Data Science and Computing Committee*, Rotman Research Institute
2022 – 2026	*PNI Climate and Inclusion Committee*, Princeton University
2024 – 2025	*PNI Colloquium Committee*, Princeton University
2020 – 2021	*Departmental Colloquium Committee*, Brown University
2018 – 2019	*Cognition Seminar Series Organizer*, Brown University
2017 – 2018	*Psychology Graduate Student Representative*, Brown University
2017 – 2022	*Optimism Walk Participant*, American Parkinson Disease Association
2017 – 2020	*Brown Brain Week Participant*, Brown University
2015 – 2016	*Psychology Graduate Student Representative*, Western University
2015 – 2016	*Psychology Colloquium Committee*, Western University
2013 – 2014	*Psychology Undergraduate Student Council*, Queen's University

Contributions to Open-Source Software

2026	Core contributor to *StateSpaceDynamics.jl* repository: www.github.com/depasquale-lab/StateSpaceDynamics.jl
2025	*mne-opm* (OPM preprocessing pipeline) DOI: www.doi.org/10.5281/zenodo.17328631
2025	Authored pull requests for OPM compatibility in MNE (2) and MNE-BIDS-Pipeline (6)
2024	*StateSpaceAnalysis.jl* (state space analysis toolbox for neuroimaging) DOI: www.doi.org/10.5281/ZENODO.14511206 Julia Registry UUID: 8767b432-2e83-436f-aa62-e8e2db78ab85

Scientific Communication

Nov. 2024	Bielski, Z. (2024, November 20). *Instead of fighting back against our many distractions, these experts say we're better off accepting them.* The Globe and Mail. www.theglobeandmail.com/canada/article-digital-distraction-focus-experts/

- Interviewed on QR Calgary 770AM

Mar. 2024 Schrafft, G. (2024, March 8). *Lack of focus doesn't equal lack of intelligence — it's proof of an intricate brain*. News from Brown. www.brown.edu/news/2024-03-08/focus
- Picked up by 32 news outlets (Altmetric)
- Interviewed on KCBS Radio in San Francisco

Ad Hoc Reviewer

eLife; PNAS; Nature Human Behaviour; Trends in Cognitive Sciences; Nature Communications; Journal of Experimental Psychology (General, HPP); Journal of Neuroscience; Imaging Neuroscience; NeuroImage; Journal of Cognitive Neuroscience; Cognition; Computational Brain & Behavior; Cognitive, Affective, & Behavioral Neuroscience; Acta Psychologica; Wiley Interdisciplinary Reviews

Technical Skills

Programming:	Julia, MATLAB, Python, R, bash; git, SLURM
Data Analysis:	PyTorch; SPM, fMRIPrep, FSL; MNE, EEGLAB
Experimental Design:	Psychophysics toolbox, PsychoPy, jsPsych
Data Collection:	fMRI operator (Brown University), OPM-MEG operator (Princeton University)