

Academic Appointments

- 2026 – Present **Queen’s University** (*Centre for Neuroscience*)
Connected Minds Fellow
Advisor: Dr. Gunnar Blohm
- 2026 – Present **Baycrest Hospital** (*Rotman Research Institute*)
Visting Postdoctoral Fellow
Collaborators: Drs. Björn Herrmann & Douglas Cheyne
- 2022 – 2026 **Princeton University** (*Princeton Neuroscience Institute*)
C.V. Starr 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 Behavioral Neuroscience Specialization)
Advisor: Dr. Ingrid Johnsrude
- 2010 – 2014 **Queen’s University** (*Dept. of Psychology*)
B.Sc. in Psychology (Honors, Distinction)
Honors Thesis Advisor: Dr. Ingrid Johnsrude

Awards and Fellowships

- 2026 – 2028 *Connected Minds Fellowship, Queen’s University (Salary & Research Funds)*
- 2022 – 2026 *C.V. Starr Postdoctoral Fellowship, Princeton University (Salary & Research Funds)*
- 2019 – 2020 *Carney Graduate Award in Brain Science, Brown University (Salary & Research Funds)*
- 2019 *Cognitive Science Society Travel Award*
- 2018 – 2019 *Eimas Graduate Research Award, Brown University (Research Funds)*
- 2014 *Certificate of Academic Excellence, Canadian Psychological Association (Thesis Award)*
- 2011 *Summer Work Experience Program, Queen’s University*
- 2010 – 2014 *Dean’s Honor List, Queen’s University*
- 2010 – 2014 *Foresters Competitive Scholarship*
- 2010 *Queen’s University Excellence Scholarship*

Preprint Manuscripts [* shared authorship; # trainee]

Bridgeford, E., Campbell, I.D., Chen, Z., Lin, Z., **Ritz, H.**, Vandekerckhove, J., Poldrack, R.A. [alphabetical], Ten Simple Rules for AI-Assisted Coding in Science. preprint: doi.org/10.48550/arXiv.2510.22254.

Ritz, H., Jha, A., Daw, N.D., & Cohen, J.D. Convergent neural dynamical systems for task control in artificial networks and human brains. preprint: doi.org/10.1101/2024.09.29.615736.

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

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.

Huang, B., **Ritz, H.**, & Jiang, J. (2025). Adaptive behavior is guided by integrated representations of controlled and non-controlled information. *eLife*.

Ritz, H., & Shenhav, A. (2024). Orthogonal neural encoding of targets and distractors supports multivariate cognitive control. *Nature Human Behaviour*, 8, 945–961.

Ritz, H., & Shenhav, A. (2024). Humans reconfigure target and distractor processing to address distinct task demands. *Psychological Review*, 131(2), 349–372.

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.

Ritz, H., Wild, C.J., & Johnsrude, I.J. (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*, 1–23.

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]

Gedah, V., Arbelaz, J., **Ritz, H.**, Daw, N., Cohen, J.D., Pillow J. (2024). Inferring System and Optimal Control Parameters of Closed-Loop Systems from Partial Observations. *IEEE Decision and Control*. [8 pg., **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**].

Chaired Conference Symposia and Workshops

June 2026 (Upcoming) *Using task-optimized artificial neural networks to understand brain and behaviour*
Symposium Chair, CSBBCS. North York, Canada.

Nov. 2022 *Cortical Basis of Cognitive Control Across Species*
Nanosymposium Chair, Society for Neuroscience. San Diego, USA.

Invited Talks

- Apr. 2026 (Upcoming) *Inzicht & Hutcherson labs*, University of Toronto Scarborough.
- Dec. 2025 *Safavi Lab*, Technische Universität Dresden.
- Nov. 2025 *Sensorimotor SuperLab*, Western University.
- 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	<i>Cole Lab</i> , Rutgers University.
Nov. 2023	<i>Dept. of Psychology</i> , University of British Columbia.
Apr. 2023	<i>Egner Lab</i> , Duke University.
Oct. 2022	<i>Rotman Research Institute</i> , Baycrest Hospital.
Sept. 2022	<i>Summerfield Lab</i> , University of Oxford.
June 2022	<i>BLRB Group</i> , University of Chicago.
Feb. 2022	<i>Woolgar Lab</i> , University of Cambridge.
Feb. 2022	<i>Egner Lab</i> , Duke University.
Nov. 2021	<i>Otto Lab</i> , McGill University.
Oct. 2021	<i>Ghent Effort Group</i> , Ghent University.
July 2021	<i>Mars Lab</i> , University of Oxford.
June 2021	<i>CoCoA Lab (Dr. Taraz Lee)</i> , University of Michigan.
May 2021	<i>Verguts Lab</i> , Ghent University.
Apr. 2021	<i>Sensorimotor SuperLab</i> , Western University.
Feb. 2021	<i>Summerfield Lab</i> , University of Oxford.
Nov. 2020	<i>Jazayeri Lab</i> , Massachusetts Institute of Technology.
Oct. 2020	<i>Schultz Lab</i> , Max Planck Institute for Biological Cybernetics.
Sept. 2020	<i>Kool Lab</i> , University of Washington in St. Louis.
Aug. 2020	<i>Collins Lab</i> , University of California Berkeley.
May 2020	<i>McGuire Lab</i> , Boston University.
Apr. 2020	<i>Hayden Lab</i> , University of Minnesota.
Mar. 2020	<i>Donner Lab</i> , Hamburg University.
Feb. 2020	<i>ConCat Series</i> , New York University.
May 2018	<i>CBC Series</i> , Universitat Pompeu Fabra.

Conference Presentations [# trainee; excluding proceedings listed above]

Ritz, H., Jha, A., Pillow, J., & Cohen J.D. Convergent neural dynamical systems for task control in artificial networks and human brains.

- *Society for Neuroscience* (Nov 2025). San Diego, USA. [**Nanosymposium Talk**]
- *Canadian Association of Neuroscience* (2025). Toronto, CA. [Poster]
- *Canadian Society for Brain, Behavior, 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., Arbelaz, J., **Ritz, H.**, Daw, N., Cohen, J.D., Pillow J. Inferring System and Optimal Control Parameters of Closed-Loop Systems from Partial Observations.

- *Cosyne* (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, Behavior, and Cognitive Science (2023)*. Guelph, CA. [Talk]
- *Society for Neuroscience (2023)*. Washington, 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 V.S.]

Ritz, H., Hayden, B., Shenhav, A., Yoo, S.B., Optimal control of approach-avoidance dynamics.

- *Neuromatch 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.J. 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.J. Enhanced recognition memory for acoustically degraded sentences.

- *Association for Research in Otolaryngology* (2015). San Diego, USA. [Talk by I.J.]
- *Brain and Mind Institute Symposium* (2015). London, CA. [Poster]

Ritz, H. & Johnsrude, I.J. Attention enhances phase-locking in the frequency following response.

- *Canadian Society of Brain, Behaviour, and Cognitive Science.* (2014). Toronto, CA. [Poster]
- *McMaster University NeuroXchange Conference* (2014). Hamilton, CA. [Poster]

Research Courses

Summer 2019 *Kavli Summer Institute in Cognitive Neuroscience*, Santa Barbara, USA.

Summer 2017 *Methods in Neuroscience at Dartmouth*, Hanover, USA.

Teaching Roles

Spring 2025 *From Molecules to Systems to Behavior*, Princeton University, Guest lecturer

- Ran a lab section on OPM-MEG preprocessing and analysis

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

- Ran a full-day session on fitting reinforcement learning models to behaviour

Spring 2019 *fMRI: Theory and Practice*, Brown University, TA

- Guided students through 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

- Ran 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

- Combined with a seminar on educational psychology

Mentorship

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

Service Positions

2022 - 2026	<i>PNI Climate and Inclusion Committee, Princeton University</i>
2024 - 2025	<i>PNI Colloquium Committee, Princeton University</i>
2020 – 2021	<i>Departmental Colloquium Committee, Brown University</i>
2018 – 2019	<i>Cognition Seminar Series Organiser, Brown University</i>
2017 – 2018	<i>Psychology Graduate Student Representative, Brown University</i>
2017 – 2022	<i>Optimism Walk Participant, American Parkinson Disease Association</i>
2017 – 2020	<i>Brown Brain Week Participant, Brown University</i>
2015 – 2016	<i>Psychology Graduate Student Representative, Western University</i>
2015 – 2016	<i>Psychology Colloquium Committee, Western University</i>
2013 – 2014	<i>Psychology Undergraduate Student Council, Queen’s University</i>

Scientific Communication

Nov 2024	Bielski, Z. (2024, November 20). <i>Instead of fighting back against our many distractions, these experts say we’re better off accepting them.</i> The Globe and Mail. www.theglobeandmail.com/canada/article-digital-distraction-focus-experts/ - Interviewed on QR Calgary 770AM
March 2024	Schrafft, G. (2024, March 8). <i>Lack of focus doesn’t equal lack of intelligence — it’s proof of an intricate brain.</i> News from Brown. www.brown.edu/news/2024-03-08/focus - Picked up by 32 news outlets (Altmetric) - Interview on KCBS Radio in San Francisco

Open-Source Software

2025	<i>mne-opm</i> (OPM-MEG preprocessing pipeline) DOI: doi.org/10.5281/zenodo.17328631
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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: doi.org/10.5281/ZENODO.14511206
Julia Registry UUID: 8767b432-2e83-436f-aa62-e8e2db78ab85

Overview of Technical Skills

Programming Python, Julia, MATLAB, R; Git; high-performance computing (SLURM, Bash)

Experiment Creation PsychoPy, Psychophysics toolbox, jsPsych

Data Analysis SPM, fMRIPrep, FSL; MNE; PyTorch; brms

Certifications fMRI operator (Brown University), OPM-MEG operator (Princeton University)

Pre-Graduate Research Experience

2013 – 2014 Queen’s University. Advisor: Dr. Ingrid Johnsrude

2011 – 2012 Queen’s University. Advisor: Dr. Monica Castelhana

Summer 2010 Juravinski Cancer Centre. Advisor: Dr. Jehonathan Pinthus

Ad Hoc Reviewer

eLife; Nature Human Behaviour; Nature Communications; Trends in Cognitive Science; 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: Cognitive Science; Frontiers; Cognitive Science (conference); Reinforcement Learning and Decision Making (conference); Cognitive Computational Neuroscience (conference); IEEE Decision and Control (conference).