Povilas Karvelis, PhD

The Centre for Addiction and Mental Health,
250 College St, Toronto, ON, M5T 1R8,
Canada

E-mail: povilas.karvelis@camh.ca
Website: povilaskarvelis.github.io

Research Interests

I work at the intersection of computational neuroscience, psychometrics, and biostatistics, with a focus on predictive modeling in mental health. I develop new methods and tools to address systemic problems in research practices, particularly around measurement reliability, biomarker development, and model evaluation. My goal is to improve the efficiency and real-world impact of scientific research.

Employment History

2020-present   **Postdoctoral Research Fellow**
Krembil Centre for Neuroinformatics (KCNI), The Centre for Addiction and Mental Health (CAMH), affiliated with University of Toronto, Canada
Mentor: Dr. Andreea Diaconescu

Education

2016-2020   **PhD in Machine Learning, Computational Neuroscience, Computational Biology**
University of Edinburgh, UK
Thesis title: Perceptual Bayesian Inference in Autism and Schizophrenia
Supervisor: Prof. Peggy Seriès

2015-2016   **MSc with Distinction in Computational Cognitive Science**
University of Edinburgh, UK
Dissertation title: Probabilistic Inference in Schizotypy and Autistic Traits
Supervisor: Prof. Peggy Seriès

2011-2015   **MSci First-Class Honours in Physics and Astrophysics**
University of Birmingham, UK
Dissertation title: Asteroseismology with Kepler: Constraining mass-loss rate of RGB stars in open clusters NGC6791 and NGC681
Supervisor: Prof. Andrea Miglio

2013-2014   **Exchange year - 3rd year BSc Physics courses**
University of Melbourne, Australia

Additional Training & Courses

2023/11	Deep learning specialization, an online course by DeepLearning.ai, Coursera
2018/10	Structural Parametric Mapping for fMRI/VBM, University College London, UK
2018/07	Computational Psychiatry course, University College London, UK
2016/09	Computational Psychiatry course, University & ETH Zurich, Switzerland
2016-2019	Training for Teaching Support Providers in the School of Informatics, University of Edinburgh, UK

Fellowships, Scholarships, & Awards

2022-2024	**Postdoctoral Fellowship**, Canadian Institute of Health Research (CIHR), Canada 90,000 CAD
2016-2020	**Doctoral Scholarship**, Engineering and Physical Sciences Research Council (EPSRC), UK 50,500 GBP
2018	**Travel Award**, European Behavioural Pharmacology Society (EBPS), Cambridge, UK 1,000 USD
2016	**Best Poster Award**, The Scottish Mental Health Research Network (SMHRN) Annual Scientific Meeting, Edinburgh, UK 100 GBP
2011	**Physics Entry Achievement Scholarship**, University of Birmingham, UK 1,000 GBP

Publications

1. **Karvelis, P.**, Seitz, A. R., Lawrie, S. M., & Seriès, P. (2018). Autistic traits, but not schizotypy, predict increased weighting of sensory information in Bayesian visual integration. eLife, 7, e34115

2. Cohen Hoffing, R. A.*, **Karvelis, P.***, Rupprechter, S., Seriès, P., & Seitz, A. (2018). The Influence of Feedback on Task-Switching Performance: A Drift Diffusion Modeling Account. Frontiers in integrative neuroscience, 12, 1.

3. Valton, V.*, **Karvelis, P.***, Richards, K. L., Seitz, A. R., Lawrie, S. M., & Seriès, P. (2019). Acquisition of visual priors and induced hallucinations in chronic schizophrenia. Brain, awz171

4. Richards, K. L.*, **Karvelis, P.***, Lawrie, S. M., & Seriès, P. (2020). Visual statistical learning and integration of perceptual priors are intact in attention deficit hyperactivity disorder. PloS one, 15(12), e0243100.

5. **Karvelis, P**., & Diaconescu, A. O. (2022). A Computational Model of Hopelessness and Active-Escape Bias in Suicidality. Computational Psychiatry, 6(1)

6. Hauke, D. J., Roth, V., **Karvelis, P**., Adams, R. A., Moritz, S., Borgwardt, S., Diaconescu, A. O., & Andreou, C. (2022). Increased Belief Instability in Psychotic Disorders Predicts Treatment Response to Metacognitive Training. Schizophrenia Bulletin.

7. **Karvelis, P.***, Charlton, C. E.*, Allohverdi, S. G., Bedford, P., Hauke, D. J., & Diaconescu, A. O. (2022). Computational Approaches to Treatment Response Prediction in Major Depression Using Brain Activity and Behavioral Data: A Systematic Review. Network Neuroscience, 1-52.

8. Charlton, C. E., **Karvelis, P.**, McIntyre, R. S., & Diaconescu, A. O. (2023). Suicide prevention and ketamine: insights from computational modeling. Frontiers in psychiatry, 14.

9. **Karvelis, P.**, Paulus, M. P., & Diaconescu, A. O. (2023). Individual differences in computational psychiatry: a review of current challenges. Neuroscience & Biobehavioral Reviews, 105137.

10. Hauke, D. J., Wobmann, M., Andreou, C., Mackintosh, A. J., de Bock, R., **Karvelis, P.**, ... & Diaconescu, A. O. (2024). Altered perception of environmental volatility during social learning in emerging psychosis. Computational Psychiatry, 8(1), 1.

11. **Karvelis, P.**, Hauke, D.J., Wobmann, M., Andreou, C., Mackintosh, A., de Bock, R., Borgwardt, S. and Diaconescu, A., (2024). Test-retest reliability of behavioral and computational measures of advice taking under volatility. PLOS ONE.

12. Diaconescu, A. O., **Karvelis, P.**, & Hauke, D. J. (2024). Rethinking interpersonal judgments: dopamine antagonists impact attributional dynamics. Trends in Cognitive Sciences.

13. **Karvelis, P.**, & Diaconescu, A. O. (2025). Clarifying the reliability paradox: poor measurement reliability attenuates group differences. Frontiers in Psychology, 16, 1592658.

14. **Karvelis, P.**, & Diaconescu, A. O. (2025). E2P Simulator: An Interactive Tool for Estimating Real-World Predictive Utility of Research Findings. Journal of Open Source Software, 10(114), 8334.

Patents

Karvelis, P. & Diaconescu, A. Apparatus and method for assessing active-escape bias in mammals. Canada & United States of America. Patent Application Numbers: CA3236532A1 & US18/655,054. https://patents.google.com/patent/WO2023077229A1

Open-source projects

2025   **E2P Simulator** – an interactive web-based tool for translating effect sizes into predictive utility metrics: https://www.e2p-simulator.com
https://github.com/povilaskarvelis/e2p-simulator

2023   **DataViz** – Matlab data visualization toolbox.
https://github.com/povilaskarvelis/DataViz
Selected as the Pick of the Week by Matlab Central:
https://blogs.mathworks.com/pick/2024/01/27/statistical-visualization-functions-and-open-in-matlab-online.

Presentations & Workshops

Oral conference presentations

2025   **Introducing E2P Simulator: an open-source tool for estimating predictive utility of research findings.** Organization for Human Brain Mapping (OHBM) Hackathon, Brisbane, Australia

2020   **Perceptual inference with continuous variables, continuous time and complex priors.** Canadian Computational Neuroscience Spotlight (CCNS), Toronto, Canada

2018   **Is Perceptual Bayesian Inference Impaired in Autism and Schizophrenia?** European Behavioural Pharmacology Society (EBPS) workshop, Cambridge, UK

Poster presentations

2025   **Developing a Battery of Reliable Computational Assays for Studying Psychopathologies.** Organization for Human Brain Mapping (OHBM), Brisbane, Australia

2025   **Why Small Effects Fail: An Interactive Tool for Understanding Predictive Utility.** Organization for Human Brain Mapping (OHBM), Brisbane, Australia

2025   **Developing a Battery of Reliable Computational Assays for Studying Psychopathologies.** Society of Biological Psychiatry (SOBP), Toronto, Ontario, Canada

2025   **Why Small Effects Fail: An Interactive Tool for Understanding Predictive Utility.** Society of Biological Psychiatry (SOBP), Toronto, Ontario, Canada

2024   **Clarifying the reliability paradox: poor test-retest reliability attenuates group differences.** Organization for Human Brain Mapping (OHBM), Seoul, South Korea

2024   **Clarifying the reliability paradox: poor test-retest reliability attenuates group differences.** Society of Biological Psychiatry (SOBP), Austin, Texas, USA

2023   **The challenges of measuring individual differences in computational psychiatry.** Organization for Human Brain Mapping (OHBM), Montreal, Quebec, Canada

2023   **Test-retest reliability of behavioral and computational measures of advice taking.** Organization for Human Brain Mapping (OHBM), Montreal, Quebec, Canada

2023   **The challenges of measuring individual differences in computational psychiatry.** Computational Psychiatry Conference, Dublin, Ireland

2023   **The challenges of measuring individual differences in computational psychiatry.** Society of Biological Psychiatry (SOBP), San Diego, California, USA

2022   **A Computational Model of Hopelessness and Active-escape Bias in Suicidality.** Computational Psychiatry Course (CPC++), New York City, New York, USA

2016   **Probabilistic Inference in Schizotypy and Autistic Traits**. The Scottish Mental Health Research Network (SMHRN) Annual Scientific Meeting, Edinburgh, UK

Invited scholarly talks

2025/05   **Introducing E2P Simulator: an open-source tool for estimating predictive utility of research findings.** Computational Neuroscience Research Laboratory, Simon Fraser University, Surrey, Canada

2021/10   **A neurocomputational model of hopelessness and active-escape bias in suicidality.** Alliance of Suicide Prevention and Intervention Researchers and Educators at the University of Toronto (ASPIRE), Toronto, Canada

2021/02   **Suicidality: hopelessness and active-escape bias.** BRAIN-TO workshop, Toronto, Canada

2021/06   **Perceptual Bayesian inference in autism and schizophrenia.** Theoretical & Computational Neuroscience Group, Basel, Switzerland

2020/12   **Suicidality: hopelessness and active-escape bias.** Computational Psychiatry Lab, Institute for Adaptive and Neural Computation, University of Edinburgh, UK

2018/03   **Bayesian inference in schizophrenia and autism**. Brain Game Center for Mental Fitness and Well-Being, University of California, Riverside (UCR), California, USA

Educational talks/workshops

2022/03   **DCM for fMRI.** Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada

2021/10   **Schizophrenia: computational frameworks and models.** Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada

2021   **Computational and physiological mechanisms of suicide**. Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada

2021/07   **Tutorial: Dynamic causal modeling for fMRI.** Krembil Centre for Neuroinformatics (KCNI) Summer School, Toronto, Canada.

2021/05   **Statistical Parametric Mapping: hierarchical models, empirical Bayes, and variational Bayes.** Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada

2021/01   **Statistical Parametric Mapping: fMRI data pre-processing.** Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada

2020/02   **Is Perceptual Bayesian Inference Impaired in Autism and Schizophrenia?** Wellcome Trust 4-year PhD Translational Neuroscience programme, University of Edinburgh, UK

2019/02   **Is Perceptual Bayesian Inference Impaired in Autism and Schizophrenia?** Wellcome Trust 4-year PhD Translational Neuroscience programme, University of Edinburgh, UK

2018/02   **Bayesian inference in schizophrenia and autism**. Wellcome Trust 4-year PhD Translational Neuroscience programme, University of Edinburgh, UK

Teaching Experience

2022   Guest Lecturer for **Bayesian Models of Perception and Decision-Making**
               (PSY3100 S5), Department of Psychology, University of Toronto, Canada

2019-2020   Teaching Support roles at the School of Informatics, University of Edinburgh, UK

- Tutor for **Computational Cognitive Neuroscience** (graduate)
- Tutor for **Computational Cognitive Science** (graduate)
- Tutor & Marker for **Informatics Research Review** (graduate)
- Tutor & Marker for **Informatics Project Proposal** (graduate)
- Demonstrator & Marker for **Informatics 1 - Cognitive Science** (undergraduate)

2018-2019   Teaching Support roles at the School of Informatics, University of Edinburgh, UK

- Tutor for **Computational Cognitive Neuroscience** (graduate)
- Tutor for **Computational Cognitive Science** (graduate)
- Tutor & Marker for **Informatics Research Review** (graduate)
- Tutor & Marker for **Informatics Project Proposal** (graduate)

2017-2018   Teaching Support roles at the School of Informatics, University of Edinburgh, UK

- Tutor for **Computational Cognitive Neuroscience** (graduate)
- Tutor & Marker for **Informatics Research Review** (graduate)
- Tutor for **Informatics Project Proposal** (graduate)
- Demonstrator & Marker for **Informatics 1 - Cognitive Science** (undergraduate)

2016-2017   Teaching Support roles at the School of Informatics, University of Edinburgh, UK

- Teaching Assistant for **Computational Cognitive Science** (graduate)
- Tutor & Marker for **Informatics Research Review** (graduate)
- Tutor for **Informatics Research Proposal** (graduate)
- Demonstrator & Marker for **Informatics 1 - Cognitive Science** (undergraduate)

2015-2016   Teaching Support roles at the School of Informatics, University of Edinburgh, UK

- Demonstrator for **Informatics 1 - Cognitive Science** (undergraduate)

Service

Peer reviewer

Computational Psychiatry (since 2021)
Frontiers in Human Neuroscience (since 2022)
Depression & Anxiety (since 2023)
Frontiers in Psychiatry (since 2023)
BMC psychiatry (since 2024)
Communications Psychology (since 2024)
Social Psychiatry and Psychiatric Epidemiology (since 2024)

Clinical and Translational Neuroscience (2024)
Scientific Reports (since 2024)
npj Mental Health Research (since 2024)
Cognitive Neuropsychiatry (since 2025)

Funding reviewer

2022   Wellcome Trust Early-Career Awards Committee
2023   CIHR Doctoral Research Awards Committee

Editorial contributions

2022-2023   Guest Associate Editor, Frontiers in Psychiatry

Conference organization

2022   Chair at Canadian Computational Neuroscience Spotlight (CCNS)
2024-2025   Hybridization Chair at OHBM Open Science Special Interest Group (OSSIG)

Mentoring activities

2020-pres.   **Co-mentor**, Krembil Centre for Neuroinformatics (KCNI), The Centre for Addiction and Mental Health (CAMH), affiliated with University of Toronto, Toronto, Canada

- Pamina Laessing, PhD student
- Jason Yang, MSc student
- Daniel Wurgaft, BSc student
- Alex Coutler, BSc student

2017-2019   **Co-mentor**, School of informatics, University of Edinburgh, UK

- Nikitas Chrysaitis, MSc student
- Raffaele Piccini, MSc Student
- Gizem Aras, MSc student

Other skills

Languages: English (fluent), Lithuanian (native), Russian (basic), Spanish (basic)
Coding: Python, R, Matlab, C/C++, JavaScript, HTML, GitHub, Cursor AI

Community and volunteer activities

2016-2020 Founder and president of Breakdance Society, University of Edinburgh, UK