# Povilas Karvelis, PhD

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## 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. I enjoy improving the efficiency and real-world impact of scientific research while simultaneously exploring fundamental questions about the mind, intelligence, and knowledge.

## Employment History

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

## Education

| | |
|---|---|
| 2016-2020 | **PhD in Machine Learning, Computational Neuroscience, Computational Biology**<br>University of Edinburgh, UK<br>Thesis title: Perceptual Bayesian Inference in Autism and Schizophrenia<br>Supervisor: Prof. Peggy Seriès |
| 2015-2016 | **MSc with Distinction in Computational Cognitive Science**<br>University of Edinburgh, UK<br>Dissertation title: Probabilistic Inference in Schizotypy and Autistic Traits<br>Supervisor: Prof. Peggy Seriès |
| 2011-2015 | **MSci First-Class Honours in Physics and Astrophysics**<br>University of Birmingham, UK<br>Dissertation title: Asteroseismology with Kepler: Constraining mass-loss rate of RGB stars in open clusters NGC6791 and NGC681<br>Supervisor: Prof. Andrea Miglio |
| 2013-2014 | **Exchange year - 3rd year BSc Physics courses**<br>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 <br> 90,000 CAD |
|---|---|
| 2016-2020 | **Doctoral Scholarship**, Engineering and Physical Sciences Research Council (EPSRC), UK <br> 50,500 GBP |
| 2018 | **Travel Award**, European Behavioural Pharmacology Society (EBPS), Cambridge, UK <br> 1,000 USD |
| 2016 | **Best Poster Award**, The Scottish Mental Health Research Network (SMHRN) Annual Scientific Meeting, Edinburgh, UK <br> 100 GBP |
| 2011 | **Physics Entry Achievement Scholarship**, University of Birmingham, UK <br> 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 open-source web tool for estimating real-world predictive utility of research findings: 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