

# Povilas Karvelis, PhD

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## Research Interests

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I work on the development of computational models with the aim to re-conceptualize mental disorders and their treatment. My current focus is on addressing fundamental methodological challenges in studying individual differences and validating novel psychometric instruments. In the process of that, I also aim to shift the academic research culture towards using effect sizes, predictive power, and practical impact, as primary metrics for assessing the significance of findings.

## Employment History

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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

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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 (International study)**  
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 - 3<sup>rd</sup> year BSc Physics courses**  
University of Melbourne, Australia

## Additional Training & Courses

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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

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

## Publications

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1. Diaconescu, A. O., **Karvelis, P.**, & Hauke, D. J. (2024). Rethinking interpersonal judgments: dopamine antagonists impact attributional dynamics. Trends in Cognitive Sciences.
2. 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.
3. **Karvelis, P.**, Paulus, M. P., & Diaconescu, A. O. (2023). Individual differences in computational psychiatry: a review of current challenges. Neuroscience & Biobehavioral Reviews, 105137.
4. Charlton, C. E., **Karvelis, P.**, McIntyre, R. S., & Diaconescu, A. O. (2023). Suicide prevention and ketamine: insights from computational modeling. Frontiers in psychiatry, 14.

5. **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.
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.**, & Diaconescu, A. O. (2022). A Computational Model of Hopelessness and Active-Escape Bias in Suicidality. *Computational Psychiatry*, 6(1)
8. 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.
9. 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
10. 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.
11. **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

### Preprints

12. **Karvelis, P.**, Hauke, D.J., Wobmann, M., Andreou, C., Mackintosh, A., de Bock, R., Borgwardt, S. and Diaconescu, A., (2023). Test-retest reliability of behavioral and computational measures of advice taking under volatility. *PsyArXiv*.
13. **Karvelis, P.**, & Diaconescu, A. O. (2024). Clarifying the reliability paradox: poor test-retest reliability attenuates group differences. *PsyArXiv*.

\* Co-first author

### Patents

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**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>

### Presentations & Workshops

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#### Oral conference presentations

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

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

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	<b>DCM for fMRI.</b> Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada
2021/10	<b>Schizophrenia: computational frameworks and models.</b> Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada
2021	<b>Computational and physiological mechanisms of suicide.</b> Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada
2021/07	<b>Tutorial: Dynamic causal modeling for fMRI.</b> Krembil Centre for Neuroinformatics (KCNI) Summer School, Toronto, Canada.
2021/05	<b>Statistical Parametric Mapping: hierarchical models, empirical Bayes, and variational Bayes.</b> Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada
2021/01	<b>Statistical Parametric Mapping: fMRI data pre-processing.</b> Cognitive Network Modelling (Cognemo) EduSeries, Toronto, Canada
2020/02	<b>Is Perceptual Bayesian Inference Impaired in Autism and Schizophrenia?</b> Wellcome Trust 4-year PhD Translational Neuroscience programme, University of Edinburgh, UK
2019/02	<b>Is Perceptual Bayesian Inference Impaired in Autism and Schizophrenia?</b> Wellcome Trust 4-year PhD Translational Neuroscience programme, University of Edinburgh, UK
2018/02	<b>Bayesian inference in schizophrenia and autism.</b> Wellcome Trust 4-year PhD Translational Neuroscience programme, University of Edinburgh, UK

## Teaching Experience

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2022	Guest Lecturer for <b>Bayesian Models of Perception and Decision-Making</b> (PSY3100 S5), Department of Psychology, University of Toronto, Canada
2019-2020	Teaching Support roles at the School of Informatics, University of Edinburgh, UK <ul style="list-style-type: none"><li>- Tutor for <b>Computational Cognitive Neuroscience</b> (graduate)</li><li>- Tutor for <b>Computational Cognitive Science</b> (graduate)</li><li>- Tutor &amp; Marker for <b>Informatics Research Review</b> (graduate)</li><li>- Tutor &amp; Marker for <b>Informatics Project Proposal</b> (graduate)</li><li>- Demonstrator &amp; Marker for <b>Informatics 1 - Cognitive Science</b> (undergraduate)</li></ul>
2018-2019	Teaching Support roles at the School of Informatics, University of Edinburgh, UK <ul style="list-style-type: none"><li>- Tutor for <b>Computational Cognitive Neuroscience</b> (graduate)</li><li>- Tutor for <b>Computational Cognitive Science</b> (graduate)</li><li>- Tutor &amp; Marker for <b>Informatics Research Review</b> (graduate)</li><li>- Tutor &amp; Marker for <b>Informatics Project Proposal</b> (graduate)</li></ul>
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

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### 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)

### 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

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**Languages:** English (fluent), Lithuanian (native), Russian (basic), Spanish (basic)

**Coding:** Python, R, Matlab, C/C++, JavaScript, GitHub

## Community and volunteer activities

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