

# Ruyi Pan

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## Research Interests

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High-dimensional statistical inference; multivariate and multi-view data analysis; dependence modeling; statistical methods for biomedical and neuroimaging applications.

## Education

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| <b>University of Toronto</b><br>PhD Candidate in Statistical Sciences<br>GPA: 4.00/4.00<br>Supervisors: Jun Young Park, Nancy Reid, and Aristotle N. Voineskos | Sept. 2022 – June 2027<br>(Expected) |
| <b>University of Toronto</b><br>MSc in Statistics                                                                                                              | Sept. 2020 – June 2021               |
| <b>University of Waterloo</b><br>Bachelor of Computer Science, Honours; Minor in Statistics                                                                    | Jan. 2018 – Aug. 2020                |

## Working Papers and Research in Progress

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- [1] **Pan, R.**, He, Y., & Park, J. Y. (2026). Boosting multi-view association testing via devariation. [arXiv:2603.26981](https://arxiv.org/abs/2603.26981). [*Invited resubmission, JASA – Theory and Methods*].
- [2] **Pan, R.**, Nieto-Barajas, L. E., & Craiu, R. V. Multivariate temporal dependence via mixtures of rotated copulas. [arXiv:2403.12789](https://arxiv.org/abs/2403.12789). [*Revision under Canadian Journal of Statistics*].
- [3] Chaposhloo, M., Oliver, L. D., Power, J. D., Byambadorj, J., Yu, J.-C., **Pan, R.**, Bingham, K. S., Agarwal, M., Hahn, M., Foussias, G., Mulsant, B. H., Flint, A. J., Voineskos, A. N., Hawco, C., & Neufeld, N. H. Precision functional mapping in individuals with schizophrenia spectrum disorders and psychotic depression: feasibility and connectome fingerprinting. [*Manuscript in preparation*].
- [4] Bai, R., Ng, WAY., **Pan, R.**, Park, JY. A score-based test for heritability of intermodal coupling in neuroimaging. *In progress*.
- [5] **Pan, R.**, Oliver, L.D., et al. Brain connectivity foundation model: a knowledge-grounded AI system for human connectome discovery. *In progress*.

## Publications

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- [1] Chen, Y., Rajji, T. K., Zhukovsky, P., Abdulrasul, H., Fischer, C. E., Flint, A. J., Herrmann, N., Ho, N. C. W., Lanctot, K., Lee, A., Ma, C., Mah, L., Mansour, S., **Pan, R.**, Park, J. Y., Pollock, B. G., Mulsant, B. H., & Voineskos, A. N. (2026). Impact of cognitive remediation combined with transcranial direct current stimulation on gray matter macrostructure and microstructure in older adults at risk for Alzheimer’s dementia. *Biological Psychiatry: Global Open Science*. DOI: [10.1016/j.bpsgos.2026.100834](https://doi.org/10.1016/j.bpsgos.2026.100834).
- [2] **Pan, R.**, Weinstein, S. M., Tu, D., Hu, F., Tanriverdi, B., Zhang, R., Vandekar, S. N., Baller, E. B., Gur, R. C., Gur, R. E., Alexander-Bloch, A. F., Satterthwaite, T. D., & Park, J. Y. (2025). Mapping individual differences in intermodal coupling in neurodevelopment. *Imaging Neuroscience*. 3: IMAG.a.156. DOI: [10.1162/IMAG.a.156](https://doi.org/10.1162/IMAG.a.156).
- [3] Perreault, S., Tang, Y., **Pan, R.**, & Reid, N. (2025). Inference for overparametrized hierarchical Archimedean copulas. *Journal of Multivariate Analysis*. 210: 105483. DOI: [10.1016/j.jmva.2025.105483](https://doi.org/10.1016/j.jmva.2025.105483).
- [4] **Pan, R.**, Nieto-Barajas, L. E., & Craiu, R. V. (2025). Bayesian nonparametric mixtures of Archimedean copulas. *Journal of Agricultural, Biological and Environmental Statistics*. DOI: [10.1007/s13253-025-00703-8](https://doi.org/10.1007/s13253-025-00703-8).

- [5] Rashidi, A. G., Oliver, L. D., Moxon-Emre, I., Hawco, C., Dickie, E. W., **Pan, R.**, Secara, M. T., Yu, J.-C., Szatmari, P., Desarkar, P., Foussias, G., Buchanan, R. W., Malhotra, A. K., Lai, M.-C., Voineskos, A. N., & Ameis, S. H. (2026). Comparative analysis of social cognitive and neurocognitive performance across autism and schizophrenia spectrum disorders. *Schizophrenia Bulletin*. 52(1): sbaf005. DOI: [10.1093/schbul/sbaf005](https://doi.org/10.1093/schbul/sbaf005).
- [6] **Pan, R.**, Dickie, E. W., Hawco, C., Reid, N., Voineskos, A. N., & Park, J. Y. (2024). Spatial-extent inference for testing variance components in reliability and heritability studies. *Imaging Neuroscience*. 2: 1–15. DOI: [10.1162/imag\\_a.00058](https://doi.org/10.1162/imag_a.00058).
- [7] **Pan, R.**, Diaz-Martinez, J., Gronsbell, J., & Touma, Z. (2022). Screening for cognitive impairment with the Automated Neuropsychological Assessment Metrics in patients with systemic lupus erythematosus. *Journal of Rheumatology*. 49(7): 840–841.

## Awards and Honours

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| <b>Student Paper Award (Runner-Up)</b> , ASA Statistics in Imaging Section                                                                                                  | 2025 |
| <b>Travel Grant</b> , Institute for Mathematical and Statistical Innovation Workshop, University of Chicago                                                                 | 2024 |
| <b>Early Research Excellence Award</b> , Department of Statistical Sciences, University of Toronto<br><i>Awarded for junior PhD students for research excellence.</i>       | 2024 |
| <b>Faculty of Arts and Science Recognition of Excellence Award</b> , University of Toronto<br><i>Awarded for incoming PhD students who demonstrate academic excellence.</i> | 2022 |
| <b>CANSSI Doctoral Recruitment Award</b> , University of Toronto                                                                                                            | 2022 |
| <b>Andrews Academic Achievement Award</b> , University of Toronto<br><i>Awarded for outstanding academic work in the Master's program.</i>                                  | 2021 |
| <b>Douglas Lankshear Scholarship for Women in Computer Science</b> , University of Waterloo<br><i>Awarded for academic excellence in undergraduate computer science.</i>    | 2020 |

## Conference Presentations

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### Talks

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| Devariation: a robust approach to improve statistical power in high-dimensional multi-view association testing. <i>Joint Statistical Meetings (JSM)</i> | 2025 |
| Improving statistical power of multi-modal associations via de-variation. <i>Eastern North American Region (ENAR) Spring Meeting</i>                    | 2025 |
| Improving statistical power of multi-modal associations via de-variation. <i>CMStatistics</i>                                                           | 2024 |
| A fast and powerful spatial-extent inference method for reliability of task-fMRI. <i>Joint Statistical Meetings (JSM)</i>                               | 2023 |

### Posters

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| Improving statistical power of multi-modal associations test via de-variation. <i>Institute for Mathematical and Statistical Innovation (IMSI) Workshop, University of Chicago</i> | 2024 |
| Fast and powerful spatial-extent inference for testing variance components in reliability and heritability studies. <i>Eastern North American Region (ENAR) Spring Meeting</i>     | 2024 |
| Fast and powerful spatial-extent inference for testing variance components in reliability and heritability studies. <i>Statistical Methods in Imaging (SMI)</i>                    | 2023 |
| Screening for Cognitive Impairment with the Automated Neuropsychological Assessment Metrics in Patients with Systemic Lupus Erythematosus. <i>ACR Convergence</i>                  | 2021 |

## Academic Service

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| <b>Member</b> , CANSSI Ontario Student PhD and Research Network (SPARK) Program | 2025–2026 |
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| <b>Organizing Committee</b> , The Fast and Curious II: MCMC in Action, University of Toronto                                                                             | 2025       |
| <b>Session Chair</b> , University of Toronto Statistics Graduate Student Research Day                                                                                    | 2024, 2025 |
| <b>Session Chair</b> , ENAR Spring Meeting                                                                                                                               | 2024       |
| <b>Reviewer</b> , <i>Biometrics</i> ; <i>Computational Statistics &amp; Data Analysis</i> ; <i>Annals of Applied Statistics</i> (under guidance of Prof. Jun Young Park) |            |
| <b>Volunteer</b> , Statistical Sciences Graduate School Information Session, University of Toronto                                                                       | 2024       |

## Teaching Experience

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|-----------------------------------------------------------------------|-----------------------|
| <b>University of Toronto, Teaching Assistant</b>                      | 2021 – Present        |
| <b>STA437H1</b> – <i>Methods for Multivariate Data</i>                | Winter 2026           |
| <b>STA2101</b> – <i>Methods of Applied Statistics, Graduate</i>       | Fall 2024, 2025       |
| <b>STA442H1</b> – <i>Methods of Applied Statistics, Undergraduate</i> | Fall 2024, 2025       |
| <b>STA347H1</b> – <i>Probability</i>                                  | Summer 2025           |
| <b>STA238H1</b> – <i>Probability, Statistics and Data Analysis II</i> | Winter 2024, 2025     |
| <b>STA237H1</b> – <i>Probability, Statistics and Data Analysis I</i>  | Fall 2022, 2023, 2026 |
| <b>STA221H1</b> – <i>The Practice of Statistics II</i>                | Winter 2026           |
| <b>STAB57H3</b> – <i>An Introduction to Statistics</i>                | Winter 2021           |
| <b>STAB22H3</b> – <i>Statistics I</i>                                 | Winter 2021           |
| <b>CSCA08H3</b> – <i>Introduction to Computer Science I</i>           | Winter 2021           |

## Research and Professional Experience

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| <b>Centre for Addiction and Mental Health (CAMH)</b> – <i>Research Analyst</i><br>Statistical and neuroimaging analysis for interdisciplinary mental health research.            | Sept. 2022 – Present  |
| <b>Goldman Sachs</b> – <i>Quantitative Strategist Summer Associate, Multi-Asset Solutions</i><br>Quantitative methods and AI-based tools for institutional portfolio management. | June 2026 – Aug. 2026 |
| <b>University of Toronto</b> – <i>Research Assistant</i><br>Statistical analysis of electronic health records and statistical communication research.                            | Apr. 2021 – Aug. 2021 |