Emilija Perković

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Appointments

2023–2026 **Dorothy Gilford Early Career Endowed Professor in Mathematical Statistics**, *UW Statistics*.

2020– **Assistant Professor**, *Department of Statistics, University of Washington*, USA.

2018–2020 **Acting Assistant Professor**, *Department of Statistics, University of Washington*, USA.

Affiliations

2023–present **eScience Institute at UW**, *Data Science Affiliate*.

2023–present **Center for Statistics and the Social Sciences (CSSS) at UW**, *Affiliate Faculty*.

Education

2014–2018 **Ph.D. in Statistics**, *ETH Zürich*, Switzerland.
Thesis: Graphical characterizations of adjustment sets. Advisor: Marloes H. Maathuis.

2012–2014 **M.Sc. in Statistics**, *ETH Zürich*, Switzerland.
Thesis: The FCI+ algorithm. Advisor: Markus Kalisch.

2008–2012 **B.Sc. in Mathematics**, *University of Belgrade*, Serbia.
Major in Statistics.

Bibliography

Works In Progress

Sara LaPlante and Emilija Perković (2024+). "**Identifying Conditional Causal Effects in MPDAGs.**".

Preprints

Aparajithan Venkateswaran and Emilija Perković (2024+). "**Towards Complete Causal Explanation with Expert Knowledge**", Submitted arxiv:2407.07338.

Published Papers

Sara LaPlante and Emilija Perković (2024). "**Conditional Adjustment in a Markov Equivalence Class.**" *Proceedings of 27th International Conference on Artificial Intelligence and Statistics (AISTATS 2024)*.

F. Richard Guo, Emilija Perković and Andrea Rotnitzky (2022). "**Variable elimination, graph reduction, and efficient g-formula**", *Biometrika*.

F. Richard Guo, Emilija Perković (2022). "**Efficient Least Squares for Estimating Total Effects under Linearity and Causal Sufficiency**", *Journal of Machine Learning Research*.

Leonard Henckel, Emilija Perković and Marloes H. Maathuis (2022). "**Graphical Criteria for Efficient Total Effect Estimation via Adjustment in Causal Linear Models**", *Journal of Royal Statistical Society. Series B*.

F. Richard Guo, Emilija Perković (2021). "**Minimal enumeration of all possible total effects in a Markov equivalence class**", *Proceedings of the 24th International Conference on Artificial Intelligence and Statistics (AISTATS 2021)*.

Emilija Perković (2020). "**Identifying causal effects in maximally oriented partially directed acyclic graphs**", *Proceedings of the Thirty-Sixth Conference on Uncertainty in Artificial Intelligence (UAI 2020)*.

Emilija Perković, Johannes Textor, Markus Kalisch and Marloes H. Maathuis (2018). "**Complete Graphical Characterization and Construction of Adjustment Sets in Markov Equivalence Classes of Ancestral Graphs**". *Journal of Machine Learning Research*.

Emilija Perković, Markus Kalisch and Marloes H. Maathuis (2017). "**Interpreting and Using CPDAGs with Background Knowledge**". *Proceedings of the Thirty-Third Conference on Uncertainty in Artificial Intelligence (UAI 2017)*. Selected for a plenary talk (30 out of 87 accepted papers).

Emilija Perković, Johannes Textor, Markus Kalisch and Marloes H. Maathuis (2015). "**A Complete Generalized Adjustment Criterion**". *Proceedings of the Thirty-First Conference on Uncertainty in Artificial Intelligence (UAI 2015)*.

Software

2022- **reduceDAG**, `https://github.com/richardkwo/reduceDAG`.
The results of Guo, Perković and Rotnitzky (2022) have been implemented in this R package by F. Richard Guo.

2020- **eff2**, `https://cran.r-project.org/web/packages/eff2/index.html`.
The results of Perković (2020) and Guo and Perković (2021) have been implemented in this R package by F. Richard Guo.

Since 2014 **pcalg**, Contributor, `https://cran.r-project.org/web/packages/pcalg/index.html`.
Pcalg is considered to be one of the main R packages for causal inference. Since 2014, `pcalg` has been downloaded more than 67 500 times. My contributions to this package include functionality related to covariate adjustment (`gac`, `adjustment`), causal discovery (`fciplus`), addition of background knowledge (`addBgKnowledge`), estimation of the range of possible causal effects (`ida`, `jointIda`), and more (`isValidGraph`, `pcalg2dagitty`).

Research Grants

2022–2025 **NSF**, PI ($150'000), Title: Leveraging Background Knowledge for Identification and Estimation of Causal Effects in the Presence of Latent Variables..

Awards and Honors

2023–2026 **Dorothy Gilford Early Career Endowed Professor in Mathematical Statistics**.

2017 **Best Poster Award**, *Semantic Statistics (SEMSTAT), Statistical Network Science Workshop*, Eidhoven, Netherlands, On *Characterizing and Constructing Adjustment Sets*..

Teaching

Spring 2024 **STAT 435, Introduction to Statistical Machine Learning**, *undergraduate course, 40 students, 4 credits*.

Fall 2023 **STAT 512, Statistical Inference**, *graduate course, 60 students, 4 credits*.

AY 2023/2024 **STAT 590, Statistics Seminar**, *graduate course, 1 credit*.

Spring 2023 **STAT 435, Introduction to Statistical Machine Learning**, *undergraduate course, 40 students, 4 credits*.

Winter 2023 **STAT/CSE 416, Introduction to Machine Learning**, *undergraduate course, 160 students, 4 credits*.

AY 2022/2023 **STAT 590, Statistics Seminar**, *graduate course, 1 credit*.

Spring 2022 **STAT 591, Special Topics in Statistics - Causal Inference: Identification and Estimation**, *graduate course, 25 students, 3 credits*.

Fall 2021	**STAT/CSE 416, Introduction to Machine Learning**, *undergraduate course, 100 students, 4 credits.*
Fall 2021	**STAT 502, Design And Analysis Of Experiments**, *graduate course, 50 students, 4 credits.*
Spring 2021	**DATA 598, Special Topics Course on Causal Inference**, *graduate course, 12 students, 2 credits.*
Spring 2021	**STAT 435, Introduction to Statistical Machine Learning**, *undergraduate course, 40 students, 4 credits.*
Winter 2021	**STAT 423 and STAT 504, Applied Regression**, *combined undergraduate and graduate course, 70 students, 4 credits.*
Summer 2020	**STAT 220, Statistical Reasoning**, *undergraduate course, 180 students, 5 credits.*
Spring 2020	**STAT 220, Statistical Reasoning**, *undergraduate course, 180 students, 5 credits.*
Winter 2020	**STAT 423 and STAT 504, Applied Regression**, *combined undergraduate and graduate course, 69 students, 4 credits.*
Fall 2019	**STAT 502, Design And Analysis Of Experiments**, *graduate course, 30 students, 4 credits.*
Spring 2019	**STAT 220, Principles of Statistical Reasoning**, *undergraduate course, 180 students, 5 credits.*
Winter 2019	**STAT 504, Applied Regression**, *graduate course, 65 students, 4 credits.*
Fall 2018	**STAT 502, Design And Analysis Of Experiments**, *graduate course, 30 students, 4 credits.*

Academic Service

Advising and Ph.D. Committees

2022–	Ph.D. Co-Advisor of **Apara Venkat**, with Tyler McCormick, Department of Statistics, University of Washington.
2022–	Ph.D. Advisor of **Sara LaPlante**, Department of Statistics, University of Washington.
2019-2023	Ph.D. Committee Member for **Anne Wagner**, advisor: **Marina Meila**, Department of Statistics, University of Washington.
2020-2022	Ph.D. Committee Member and Reader for **Wenyu Chen**, advisors: **Ali Shojaie and Mathias Drton**, Department of Statistics, University of Washington.
2020-2021	Ph.D. Committee Member and Reader for **Richard F. Guo**, advisor: **Thomas Richardson**, Department of Statistics, University of Washington.
2020	Mentor for the Honor's Thesis of **Emily Rose Flanagan**.
2017	Master Thesis Co-Advisor of **Leonard Henckel** on **Graphical Criteria for Efficient Total Effect Estimation via Adjustment in Causal Linear Models**, with Marloes H. Maathuis.

Scientific Events and Organizations

2020,2021, 2024	**Senior Program Committee Member** for Uncertainty in Artificial Intelligence (UAI), 2020, 2021, and 2024.
July 2021–present	**Online Causal Inference Seminar**, *Hosted by the Department of Statistics at Stanford University.*, Co-organizer and Moderator.
	Weekly zoom seminars for an audience of several hundred participants. Recordings posted online.
2022	**Workshop co-Chair** (with Ilya Shpitser) for the Conference on Uncertainty in Artificial Intelligence (UAI) 2022.
2022	**Area Chair** for the First Conference on Causal Learning and Reasoning (CClear) 2022.
July 2021	**Advances in Causal Inference Workshop**, *Uncertainty in Artificial Intelligence (UAI) 2021*, Main Organizer and Chair of the 7th Causal Inference Workshop at UAI..

| 2021-2022 | **Reviews Associate Editor** at Journal of the American Statistical Association (JASA). |
| Fall 2019 | **Causal Inference Working Group**, *at the Department of Statistics at the University of Washington*, Faculty co-organizer along with Thomas Richardson.
Co-organized weekly seminars for an audience of 20 to 30 graduate students and faculty. |

Reviewing

Journals	*Annals of Statistics, Annals of Applied Statistics, Journal of the Royal Statistical Society, Journal of the American Statistical Association, Journal of Machine Learning Research, Journal of American Statistical Association, International Journal of Approximate Reasoning, Journal of Causal Inference, Harvard Data Science Review, American Journal of Epidemiology, Association for Computing Machinery Transactions on Intelligent Systems and Technology (ACM TIST).*
Conferences	*Conference on Causal Learning and Reasoning* (CClear), *International Conference on Machine Learning (ICML), Conference on Neural Information Processing Systems (NeurIPS), WHY-21 Workshop, Hosted by NeurIPS 2021, Conference on Uncertainty in Artificial Intelligence (UAI), Causation Workshop of the conference on Uncertainty in Artificial Intelligence (UAI)*

Talks, Posters and Research Stays

September 2024	**Symposium on Causality, Florence, Italy**, *Hosted at the Museo Galileo of History of Science*, Organized by the Department of Statistics of the University of Florence, Harvard Data Science Initiative, and the European University Institute, Invited Participant.
July 2024	**UAI 2024, Barcelona, Spain**, *Towards Complete Causal Explanation with Expert Knowledge*, Keynote Speaker at 9th Causal Inference Workshop at UAI, Joint work with Apara Venkat who will be presenting the work.
May 2024	**ACIC 2024, Seattle, USA**, *Towards Complete Causal Explanation with Expert Knowledge*, Poster Presentation at the American Causal Inference Conference (ACIC 2024), Joint work with Apara Venkat who will be presenting the work.
May 2024	**AISTATS 2024, Valencia, Spain**, *Conditional Adjustment in a Markov Equivalence Class*, Poster Presentation at AISTATS 2024, Joint work with Sara LaPlante who will be presenting the work.
April 2024	**European Causal Inference Meeting (EUROCIM) 2024**, Invited speaker and participant.
February 2024	**Bellairs Workshop on Causality at Bellairs Research Institute of McGill University in Barbados**, Invited speaker and participant.
October 2023	**UW Data Science Seminar at E-Science, UW**, Invited speaker.
May 2023	**Causality Reunion at Simons Institute at UC Berkeley**, Invited participant.
April 2023	**Statistics Seminar at the University of Florida**, Invited speaker.
February 2023	**DPMMS Seminar Series**, *at Cambridge University*. Invited speaker
January 2023	**External Seminar Series**, *at the Gatsby Computational Neuroscience Unit*. Invited speaker
January 2023	**Bellairs Workshop on Causality at Bellairs Research Institute of McGill University in Barbados**, Invited speaker and participant.
September 2022	**Pacific Causal Inference Conference**, Invited speaker.
June 2022	**First International Workshop on Interactive Causal Learning**, Invited speaker.
April 2022	**Biostatistics Seminar at UC Berkeley**, Invited talk on "Total causal effects in MPDAGs: Identification and minimal enumeration".

April 2022	**Biostatistics Seminar at the University of Washington**, Invited talk on "Efficient Least Squares For Estimating Total Effects Under Linearity And Causal Sufficiency".
February 2022	**Causal Working Group at UC Berkeley**, Richard Guo presented our work on "Variable elimination and graph reduction: towards an efficient g-formula".
February 2022	**Learning from Interventions Workshop, Simons Institute at UC Berkeley**, Invited talk on "Efficient Least Squares For Estimating Total Effects Under Linearity And Causal Sufficiency".
February 2022	**CSSS Seminar at the University of Washington**, Invited talk on "Total causal effects in MPDAGs: Identification and minimal enumeration".
February 2022	**Simons Institute: Causality Speaker Series at UC Berkeley**, Invited talk on "Total causal effects in MPDAGs: Identification and minimal enumeration".
Jan-March 2022	**Simons Institute Program on Causality at Berkeley**, Invited long-term visitor.
2021	**Minimal Enumeration of Causal Effects in MPDAGs'**, *ISI World Statistics Congress*, Invited speaker.
2021	**Minimal Enumeration of Causal Effects in MPDAGs**, *Poster Presentation at AISTATS 2021*, Joint work with Richard F. Guo.
2021	**Discussant for "Optimal adjustment sets in non-parametric graphical models" by Andrea Rotnitzky**, *Online Causal Inference Seminar*, Invited discussant.
2021	**Minimal Enumeration and Efficient Estimation of Causal Effects in MPDAGs**, *Joint colloquium of the Departments of Statistic of UW and UC Berkeley*, Invited speaker.
2021	**Causal Identification and Enumeration in a Markov Equivalence Class**, *Visit Day presentation at UW Statistics*.
2020	**Graphical Criteria for Efficient Total Effect Estimation in Causal Linear Models**, *SER Annual Meeting in Boston*, slides, Invited speaker.
2020	**Minimal Enumeration and Efficient Estimation of Causal Effects in MPDAGs**, *UW Machine Learning Retreat*, Virtual Edition, Invited Speaker.
2020	**Causal effects in MPDAGs: Identification and efficient estimation**, *Online Causal Inference Seminar*, link to video, slides discussant slides, Invited Speaker.
2020	**Efficient Least Squares for Estimating Total Causal Effects**, *(Online) Pacific Causal Inference Conference*, slides, Invited Speaker.
2020	**Learning in Machines and Brains Virtual Meeting on Causal Inference**, *CIFAR Virtual workshop*, Invited participant.
2020	**Identifying Causal Effects in MPDAGs**, *Conference on Uncertainty in Artificial Intelligence*, Virtual Edition, presentation slides, expanded slides, Talk and Poster.
2020	**Identifying Causal Effects from Observational data**, *Invited Talk at the University of Wisconsin-Madison*, Madison, Wisconsin, Talk.
2020	**Identifying Causal Effects from Observational data**, *Invited Talk at the University of Washington*, Seattle, Washington, Talk.
2019	**Identifying Causal Effects in CPDAGs and CPDAGs with Background Knowledge**, *Causal Working Group at UW Statistics*, Seattle, Washington, Talk.
2019	**Graphical Criteria for Efficient Total Effect Estimation in Causal Linear Models**, *Faculty Research Talk at the University of Washington*, Seattle, Washington, Talk.
2019	**Graphical Criteria for Efficient Total Effect Estimation in Causal Linear Models**, *Oberwolfach Workshop on "Foundations and New Horizons for Causal Inference"*, Oberwolfach, Germany, Talk.
2019	**Graphical Characterizations of Adjustment Sets**, *Statistics Seminar of the Department of Statistics at the University of Washington*, Seattle, WA, Talk.
2018	**Identifiability of Causal Effects from Observational Data**, *International Conference on Computational and Methodological Statistics (CMStatistics 2018)*, Pisa, Italy, Invited Talk.

2017 **Interpreting and Using CPDAGs with Background Knowledge**, *Conference on Uncertainty in Artificial Intelligence (UAI 2017)*, Sydney, Australia, Plenary Talk and Poster.

2017 **Interpreting and Using CPDAGs with Background Knowledge**, *Causation Workshop of the Conference on Uncertainty in Artificial Intelligence*, Sydney, Australia, Invited Talk and Poster.

2017 **Using Background Knowledge for the Estimation of Total Causal Effects**, *European Meeting of Statisticians 2017*, Helsinki, Finland, Invited Talk.

2017 **Characterizing and Constructing Adjustment Sets**, *Semantic Statistics (SemStat), Statistical Network Science Workshop*, Eindhoven, Netherlands, Best Poster Award.

2016 **Characterizing and Constructing Adjustment Sets**, *International Conference on Computational and Methodological Statistics (CMStatistics 2016)*, Seville, Spain, Invited Talk.

2016 **Graphical Characterization and Construction of Adjustment Sets in Markov Equivalence Classes of Ancestral Graphs**, *Statistical Causal Inference and Application to Genetics Workshop*, Montreal, Canada, Invited Talk and Poster.

2016 **Research Program on Causal Inference and Applications to Genetics**, *Visiting Researcher at the Centre de Recherches Mathématiques (CRM) at the University of Montreal*, Montreal, Canada, Research Stay.

2016 **A Complete Generalized Adjustment Criterion**, *United Kingdom Causal Inference Meetings 2016*, London, United Kingdom, Poster.

2015 **A Complete Generalized Adjustment Criterion**, *Conference on Uncertainty in Artificial Intelligence (UAI 2015)*, Amsterdam, Netherlands, Poster.