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Jonathan P Williams

PROFESSIONAL POSITIONS

Visiting Fellow , Centre for Adv. Study, Norwegian Academy of Science and Letters	2022 - 2023
Assistant Professor (tenure-track) , Department of Statistics, NC State University	2019 -
Research Collaborator , Mayo Clinic, Rochester, MN	2017 - 2020
Biostatistics Intern , Mayo Clinic, Rochester, MN	Summer 2016
Statistical Consultant , Caster Concepts, Inc, Albion, MI	2011 - 2014
Associate Editor , <i>Journal of the American Statistical Association: Reviews</i>	2023 -
Associate Editor , <i>The American Statistician: Reviews</i>	2023 -

EDUCATION

University of North Carolina, Chapel Hill, NC Department of Statistics and Operations Research PhD Statistics Advisors: Dr. Jan Hannig (UNC) and Dr. Curtis Storlie (Mayo Clinic)	2014 - 2019
New York University, New York, NY Courant Institute of Mathematical Sciences MS Mathematics Advisor: Dr. Ying Lu	2012 - 2014

PEER-REVIEWED PAPERS

[†] Graduate student working under my supervision
* Undergraduate student working under my supervision

Manuscripts appearing in journals with **statistical focus**

25. N Dey[†], R Martin, and **J P Williams** (202x). Anytime-valid generalized universal inference on risk minimizers. *In review*.
24. A Hjort[†], G H Hermansen, J Pensar, **J P Williams** (202x). Uncertainty quantification in automated valuation models with locally weighted conformal prediction. *In review*.
23. **J P Williams** (202x). Model-free generalized fiducial inference. *R&R at Journal of Machine Learning Research*.
22. A Murph[†], C B Storlie, P M Wilson, **J P Williams**, and J Hannig (202x). Bayes Watch: Bayesian Change-point Detection for Process Monitoring with Fault Detection. *In review*.
21. N Dey[†] and **J P Williams** (202x). Valid inference for machine learning model parameters. *In review*.
20. N Dey[†], M Singer[†], **J P Williams**, and S Sengupta (202x). Word Embeddings as Statistical Estimators. *R&R at Sankhya B*.
19. J Hickey[†], **J P Williams**, and E C Hector (202x). Transfer Learning with Uncertainty Quantification: Random Effect Calibration of Source to Target (RECaST). *R&R at Journal of Machine Learning Research*.

18. E B Kendall[†], **J P Williams**, G H Hermansen, F Bois, and V H Thanh (202x). Beyond time-homogeneity for continuous-time multistate Markov models. *R&R at Journal of Computational and Graphical Statistics*.
17. A Murph[†], J Hannig, and **J P Williams** (202x). Generalized fiducial inference on differentiable manifolds. *In review*.
16. **J P Williams**, G H Hermansen, H Strand, G Clayton, and H M Nygård (202x). Bayesian hidden Markov models for latent variable labeling assignments in conflict research: application to the role ceasefires play in conflict dynamics. *To appear in Annals of Applied Statistics*.
15. A Murph[†], J Hannig, and **J P Williams** (2024). Introduction to generalized fiducial inference. *Handbook of Bayesian, Fiducial, and Frequentist Inference (1st ed.)*. Chapman and Hall/CRC.
14. M A Abba[†], **J P Williams**, and B J Reich (2023). A penalized complexity prior for deep Bayesian transfer learning with application to materials informatics. *Annals of Applied Statistics* 17 (4) pp.3241–3256.
13. N Dey[†], J Ding[†], J Ferrell*, C Kapper*, M Lovig*, E Planchon*, and **J P Williams** (2023). Conformal prediction for text infilling and part-of-speech prediction. *New England Journal of Statistics in Data Science* 1 pp.69–83.
12. S Koner[†] and **J P Williams** (2023). The EAS approach to variable selection for multivariate response data in high-dimensional settings. *Electronic Journal of Statistics* 17 (2) pp.1947–1995.
11. **J P Williams**, Y Xie, and J Hannig (2023). The EAS approach for graphical selection consistency in vector autoregression models. *Canadian Journal of Statistics* 51 (2) pp.674–703.
10. **J P Williams**, D M Ommen, and J Hannig (2023). Generalized fiducial factor: an alternative to the Bayes factor for forensic identification of source problems. *Annals of Applied Statistics* 17 (1) pp.378–402.
9. **J P Williams** (2021). Discussion of “A Gibbs sampler for a class of random convex polytopes”. *Journal of the American Statistical Association* 116 (535) pp.1198–1200.
8. **J P Williams**, C B Storlie, T M Therneau, C R Jack Jr, and J Hannig (2020). A Bayesian approach to multi-state hidden Markov models: application to dementia progression. *Journal of the American Statistical Association* 115 (529) pp.16–31.
7. **J P Williams** and J Hannig (2019). Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Annals of Statistics* 47 (3) pp.1723–1753.
6. I Carmichael and **J P Williams** (2018). An exposition of the false confidence theorem. *Stat* 7 (1) pp.e201.
5. **J P Williams** and Y Lu (2015). Covariance Selection in the Linear Mixed Effect Model, *Journal of Machine Learning Research: Workshop and Conference Proceedings* 44 pp.277–291. (NIPS conference session)

Manuscripts appearing in journals with **non-statistical focus**

4. N Giertych[†], A Shaban, P Haravu*, and **J P Williams** (202x). A statistical primer on classical period-finding techniques in astronomy. *In review*.
3. I Carmichael, T Keefe, N Giertych[†], and **J P Williams** (202x). yaglm: a Python package for fitting and tuning generalized linear models that supports structured, adaptive and non-convex penalties. *In progress, but manuscript available on my website*.
2. S Nghiem, **J P Williams**, C Afoakwah, Q Huynh, S K Ng, and J Byrnes (2021). Can administrative health data improve the gold standard? Evidence from a model of the progression of myocardial infarction. *International Journal of Environmental Research and Public Health* 18 (14) pp.7385.

1. E Sechi, E Shosha, **J P Williams**, S J Pittock, B G Weinshenker, B M Keegan, N L Zalewski, A S Lopez-Chiriboga, J Jitprapaikulsan, and E P Flanagan (2019). Aquaporin-4 and MOG autoantibody discovery in idiopathic transverse myelitis epidemiology. *Neurology* 93 (4) pp.e414–e420.

FUNDING

5. Statistical foundations for uncertainty quantification of machine intelligence assembled from generalized fiducial inference (2023-2024). NC State Faculty Research and Professional Development Fund, sole-PI, 7,000 USD.
4. Seed grant: Hidden Markov methodology for assessing racial stressors (2023-2024). NC State Data Science Academy, PI, 50,000 USD.
3. R56: Hidden Markov methodology for machine learning applied to identifying physiological states of shock in the intensive care unit via biomedical and unstructured text data (2021-2022). NIH R56HL155373, sole-PI, 494,527 USD.
2. REU Site: Directed Research for Undergraduates in Math and Statistics (DRUMS) (2021-2024). NSF 2051010, Faculty Associate, 488,397 USD.
1. REU Site: Directed Research for Undergraduates in Math and Statistics (DRUMS) (2021). NSA H98230-20-1-0259 and H98230-21-1-0014, Faculty Associate, 125,000 USD.

PROFESSIONAL SERVICES

• Reviewer for <i>National Science Foundation</i>	1 proposal
• Referee for <i>Journal of the American Statistical Association: Theory and Methods</i>	2 manuscripts
• Referee for <i>Sankhya A</i>	1 manuscript
• Referee for <i>Statistics in Medicine</i>	1 manuscript
• Referee for <i>Biometrics</i>	2 manuscripts
• Referee for <i>Journal of Computational and Graphical Statistics</i>	4 manuscripts
• Referee for <i>International Journal of Approximate Reasoning</i>	1 manuscript
• Referee for <i>Journal of Statistical Planning and Inference</i>	1 manuscript
• Referee for <i>Statistical Methods in Medical Research</i>	2 manuscripts
• Referee for <i>Stat</i>	6 manuscripts
• Referee for <i>The New England Journal of Statistics in Data Science</i>	1 manuscript
• Referee for <i>SCIENCE CHINA Mathematics</i>	2 manuscripts
• Referee for <i>CRC Press</i>	1 manuscript
• Referee for <i>Communications in Statistics: Theory and Methods</i>	1 manuscript
• Referee for <i>PLOS ONE</i>	1 manuscript
• Referee for <i>Statistical Modelling</i>	1 manuscript
• Referee for <i>Negotiation Journal</i>	1 manuscript
• Referee for <i>Computers</i>	1 manuscript
• Referee for <i>Mathematics</i>	1 manuscript
• Referee for <i>Stats</i>	1 manuscript

PRESENTATIONS

28. Multistate Markov models: Application to dementia progression. *16th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2023)*, HTW Berlin, University of Applied Sciences, Berlin, Germany, December 2023.
27. R package: HMMs for conflict research. *Uncertainty of Forecasting Fatalities in Armed Conflict Research Kitchen*, Peace Research Institute Oslo (PRIO), Oslo, Norway, December 2023.
26. Discussion of “Imprecise probability in statistics: why imprecision is needed, where it comes from, and how it’s beneficial”. *Seminar*, Department of Statistics, North Carolina State University, October 2023.
25. Organizer/discussant: topic-contributed session “Modeling techniques for astrostatistical datasets”. *Joint Statistical Meeting*, Toronto, Canada, August 2023.
24. Model-free generalized fiducial inference. *Eighth Bayesian, Fiducial, and Frequentist Conference*, University of Cincinnati, May 2023.
23. Model-free generalized fiducial inference. *Seminar Series in Statistics and Data Science*. Department of Mathematics, University of Oslo, Norway, December 2022.
22. Introduction to conformal-based uncertainty quantification and applications to automated valuation models. *CAS Workshop: Prediction with Uncertainty*, Oslo, Norway, December 2022.
21. Tutorial on conformal prediction, and a new idea. *Seminar*, Norwegian Computing Center, Oslo, Norway, December 2022.
20. Hidden Markov model applications for conflict data. *CAS Workshop: From Processes to Models*, Oslo, Norway, October 2022.
19. Conformal predictors constructed from generalized fiducial inference. *Joint Statistical Meeting*, Washington, DC, August 2022.
18. The role of Bayesian hidden Markov models in conflict research. *Pre-CAS Workshop on Stability and Change*, Oslo, Norway, May 2022.
17. Research experience at NC State University for undergraduate students. *Seminar*, Department of Mathematics, High Point University, October 2021.
16. Discussion of “A Gibbs sampler for a class of random convex polytopes”. *JASA T&M Invited Session, Joint Statistical Meeting*, Seattle, WA, August 2021.
15. Generalized fiducial factor: an alternative to a Bayes factor for forensic identification of source problems. *Joint Statistical Meeting*, Seattle, WA, August 2021.
14. A Bayesian hidden Markov model framework for monitoring and diagnosing critically ill hospital patients. *28th Nordic Conference in Mathematical Statistics*, Tromsø, Norway, June 2021.
13. Generalized fiducial factor: an alternative to a Bayes factor for forensic identification of source problems. *BFF 6.5 – Virtual Workshop on Bayesian, Fiducial, and Frequentist Statistical Inference*, virtual conference hosted on <https://researchers.one/>, February 2021.
12. The EAS approach for graphical selection consistency in vector autoregression models. *12th International Conference of the European Research Consortium for Informatics and Mathematics Working Group on Computational and Methodological Statistics (CMStatistics 2019)*, University of London, UK, December 2019.
11. The EAS approach for graphical selection consistency in vector autoregression models. *Sixth Bayesian, Fiducial, and Frequentist Conference on Model Uncertainty*, Duke University and SAMSI, May 2019.
10. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, University of Florida Gainesville, January 2019.
9. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, Iowa State University, January 2019.

8. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, University of Illinois Urbana–Champaign, December 2018.
7. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, North Carolina State University, December 2018.
6. Non-penalized variable selection via generalized fiducial inference. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, November 2018.
5. Non-penalized variable selection via generalized fiducial inference. *AISC 2018 International Conference on Advances in Interdisciplinary Statistics and Combinatorics*, UNC Greensboro, October 2018.
4. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *27th Nordic Conference in Mathematical Statistics*, Tartu, Estonia, June 2018.
3. A Bayesian approach to multi-state hidden Markov models: application to dementia progression. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, September 2017.
2. Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, February 2017.
1. A Bayesian approach to multi-state hidden Markov models: application to dementia progression. *Tea Time for Science*, Biomedical Statistics and Informatics, Health Sciences Research, Mayo Clinic, Rochester, MN, August 2016.

POSTER PRESENTATIONS

7. A Bayesian hidden Markov model framework for monitoring and diagnosing critically ill hospital patients. *Seventh Bayesian, Fiducial, and Frequentist Conference*, University of Toronto, Canada, May 2022.
6. A statistical primer on classical methods for exoplanet detection. *Statistical Challenges in Modern Astronomy VII conference*, virtual conference, June 2021.
5. Non-penalized variable selection via generalized fiducial inference. *Recycled Poster Session of the North Carolina Chapter of the American Statistical Association*, SAS Campus, NC, September 2019.
4. Non-penalized variable selection via generalized fiducial inference. *Fifth Bayesian, Fiducial, and Frequentist Conference*, University of Michigan Ann Arbor, May 2018.
3. Generalized fiducial inference for high dimensional problems. *Invited Poster Session, Joint Statistical Meeting*, Baltimore, MD, July 2017.
2. Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Fourth Bayesian, Fiducial, and Frequentist Conference*, Harvard University, May 2017.
1. Covariance Selection in the Linear Mixed Effect Model. *Feature Extraction: Modern Questions and Challenges*, *NIPS*, Montreal, Canada, December 2015.

AWARDS

- Thank-a-Teacher Award, NCSU 2022
- LeRoy and Elva Martin Award for Teaching Excellence 2021 - 2022
- Best poster award, *Recycled Poster Session of the NC ASA* September 2019
- Graduate Student Travel Grant – 1,000 USD Summer 2018
- Carl M. Erikson Mathematics Department Scholarship 2011 - 2012
- Regents Scholarship 2009 - 2012
- National Scholars Program Scholarship 2008 - 2012

- Leader Award Scholarship

2009 - 2011

TEACHING AND ADVISING

Courses taught:

- Adv. computing for stat. methods (undergraduate; ST 495 NCSU) Spring '22, '23, '24
- Intro. to prob. and dist. theory (undergraduate; ST 371 NCSU) Fall '20
- Linear models (graduate; ST 705 NCSU) Spring '20, '21, '22, '23, '24
- Fundamentals of statistical inference II (graduate; ST 502 NCSU) Fall '19
- STOR-BIOS grad student boot camp (real analysis section; UNC) Summer '17
- Intro. to statistics (first year undergraduate; STOR 155 UNC) Spring '16, Fall '16
- Tutor (economics and mathematics undergraduate; EMU) '09 - '12

PhD students advised/co-advised:

7. Neil Dey (NCSU; expected graduation Summer 2025)
6. Emmett Kendall (NCSU; expected graduation Summer 2025)
5. Naomi Giertych (NCSU; expected graduation Summer 2024)
4. Jimmy Hickey (NCSU; expected graduation Summer 2024)
3. Mohamed Abba, PhD, NCSU 2023
2. Alexander Murph, PhD, UNC Chapel Hill 2023
1. Salil Koner, PhD, NCSU 2021

PhD committees served on:

8. Matthew Singer (NCSU; expected graduation Summer 2024)
7. Xinyu Zhang (NCSU; expected graduation Summer 2024)
6. Ian Grace (NCSU; expected graduation TBD)
5. Alvin Sheng (NCSU; expected Spring 2024)
4. Annie Tang, PhD, NCSU 2023
3. Kang Wang, PhD, NCSU 2023
2. Yin-Jen Chen, PhD, NCSU 2022
1. Pei-Shien Wu, PhD, NCSU 2022

Undergraduate students mentored:

5. Jack Ferrell (University of Florida; REU student 2021)
4. Carolina Kapper (High Point University; REU student 2021)
3. Maxwell Lovig (University of Louisiana, Lafayette; REU student 2021)
2. Emiliano Planchon (NCSU; REU student 2021)
1. Pragma Haravu (NCSU; expected graduation 2023)

DEPARTMENT SERVICE

- Admissions committee NCSU 2023-2024
- Search committee NCSU 2022-2023
- Seminar committee NCSU Spring 2021, Fall 2021
- Qualifying exam committee NCSU Aug '20, '23, '24, Jan '21, '22