

Shane Lubold

PhD Candidate in Statistics, University of Washington

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[Website](#) [Github](#) [Google Scholar](#)

Research statement: I am an expert in network analysis, survey design, and causal inference. I develop rigorous methods to collect and model sampled network data and I collaborate frequently with researchers in the social sciences. I am passionate about developing user-friendly and statistically rigorous software that allows researchers to better understand and learn from their data.

Research Interests: statistical analysis of network data, graphical models, experimental design, A/B testing, causal inference, missing or partial data, survey design, model selection, bayesian analysis, active and reinforcement learning, multi-armed bandit problems, network sampling, and clustering.

Education

PhD in Statistics, University of Washington, 2018-present

- Advised by Tyler McCormick (UW statistics) and Arun Chandrasekhar (Stanford economics).
- Selected Coursework: statistical inference, stochastic processes, numerical optimization, linear models.
- Z.W. Birnbaum award recipient (best candidacy exam in the UW statistics department in 2020, \$500)
- ARCS Fellowship (\$17,000).

B.S. in Mathematics, Barrett, the Honors College, Arizona State University, 2016

- Dean's Medalist for the School of Mathematical & Statistical Sciences and *summa cum laude*.
- Graduate-level coursework in measure theory (two semesters) and statistical theory.
- Thesis: "A Statistical Framework for Detecting Edges from Noisy Fourier Data Using Multiple Concentration Factors" ([PDF](#)).

Coding Skills

I have extensive experience with R, Python, MATLAB, L^AT_EX (PGFPlots and TikZ), and Slurm (serial and parallel computing). I have some experience with RCPP, SQL and SAS.

Published Work

1. **Shane Lubold** and Clark N. Taylor. "[Formal Definitions of Conservative PDFs with Data Fusion Applications.](#)" Information Fusion 88, 175-183, 2022
2. Clark N. Taylor and **Shane Lubold**. "[Verifying the Predicted Uncertainty of Bayesian Estimators.](#)" Proc. SPIE 10645, Geospatial Informatics, Motion Imagery, and Network Analytics VIII, 106450E, 2018

Papers under review (available on arXiv)

1. **Shane Lubold**, Arun Chandrasekhar, and Tyler McCormick, "[Identifying the latent space geometry of network formation models via analysis of curvature.](#)"
2. Emily Breza, Arun Chandrasekhar, **Shane Lubold**, Mengjie Pan, and Tyler McCormick, "[Consistently estimating graph statistics using Aggregated Relational Data.](#)"
3. **Shane Lubold**, Bolun Liu, and Tyler McCormick, "[Spectral goodness-of-fit test for complete and partial network data.](#)"

4. **Shane Lubold**, Bolun Liu, Adrian Raftery, and Tyler McCormick, “Bayesian Hyperbolic Multi-dimensional Scaling.”

Working Papers

1. **Shane Lubold**, Steve Wilkins-Reeves, and Tyler McCormick, “Estimating treatment effect in unobserved networks.”
2. **Shane Lubold** and Alicia Beckford Wassink, “The relationship between network structure and linguistic behavior in the Pacific Northwest.”
3. **Shane Lubold**, Arjun Subramonian, and Sara Beery, “Using animal social network structure to improve re-identification tasks.”

Teaching

Sole Instructor, University of Washington

- STAT 395: Probability II (Summer 2021). I designed and taught my own course on probability theory for 40 undergraduates. I wrote my own homework exercises and exams and coordinated with my own TA for the course. The topics covered include jointly distributed random variables; conditional distributions and densities; conditional expectations and variance; covariance, correlation, and Cauchy-Schwarz inequality; bivariate normal distribution; multivariate transformations; moment generating functions; sums of independent random variables; Central Limit Theorem; Chernoff’s inequality; Jensen’s inequality

Teaching Assistant, University of Washington

- STAT 421: Applied Statistics and Experimental Design (Autumn 2018)
- STAT 390: Statistical Methods in Engineering and Science (Spring 2019)
- STAT 567 Statistical Analysis of Social Networks (Autumn 2020)
- STAT 502: Applied Statistics and Experimental Design (Autumn 2021)

Undergraduate Teaching Assistant & Grader, Arizona State University

- Mathematical Structures (Summer 2016)
- Probability (Summer 2015)
- Calculus II (Summer 2016)
- Econometrics (Fall 2014 - Fall 2016)

Mentoring

1. Peter Liu (Oct 2020-Sept 2022). I worked with Peter Liu while he was an undergraduate student in the statistics department at the University of Washington. We worked on two projects. The first project deals with testing goodness-of-fit using complete and sampled network data. The second project, joint with Tyler McCormick and Adrian Raftery, deals with performing multi-dimensional scaling into hyperbolic spaces using a Bayesian framework. Peter is now a PhD student in the biostatistics department at Johns Hopkins.
2. Gordon An (Spring 2020) and Tahmin Talukder (Winter 2020). I mentored Gordon and Tahmin as part of the directed reading program in the statistics department at the University of Washington. I worked one-on-one with both students to study generative models for network data, to think about when these models were realistic models for observed network data, and to study when particular network structure (such as the existence of cliques) became likely or unlikely as the graph size grew. I wrote a custom set of exercises and notes for these students on these topics that we used.

Conference Abstracts

1. **Shane Lubold** and Clark N. Taylor. “An improved method for verifying the predicted uncertainty of Bayesian state estimators.” Accepted to *SPIE Conference on Defense + Commercial Sensing*, [Abstract](#).

Academic Talks

1. **Shane Lubold** “Identifying the latent space geometry of network formation models via analysis of curvature.” Joint Statistical Meetings, Seattle WA, August 2022.
2. **Shane Lubold** “Identifying the latent space geometry of network formation models via analysis of curvature.” International Society for Bayesian Analysis, Montreal, June 2022.
3. **Shane Lubold** “Identifying the latent space geometry of network formation models via analysis of curvature.” University of Washington, May 2022.
4. **Shane Lubold** “Inference from sampled network data.” Student statistics seminar at the University of Washington, May 2022.
5. **Shane Lubold** “Identifying the latent space geometry of network formation models via analysis of curvature.” University of Wisconsin, May 2021.
6. **Shane Lubold** “Identifying the latent space geometry of network formation models via analysis of curvature.” *Invited talk*, Joint Statistical Meetings, Seattle WA, August 2020.
7. **Shane Lubold** “Random Graphs and Parameter Estimation in Latent Space Models.” Statistics and Probability Association, Department of Statistics, University of Washington, February 2020.
8. **Shane Lubold** and Sébastien Motsch. “Application of Wasserstein Distance to Biological Systems.” Joint Mathematics Meetings, Seattle WA, January 2016.
9. **Shane Lubold** and Anne Gelb. “Concentration Factor Design Using Corrupted Data in Fourier Edge Detection.” Southwestern Undergraduate Mathematics Research Conference (SUnMaRC), El Paso TX, February 2015.
10. **Shane Lubold** and Anne Gelb. “Higher-order Concentration Factor Design for Nonlinear Underlying Functions in Fourier Edge Detection.” Joint Mathematics Meetings, San Antonio TX, January 2015.

Posters

1. **Shane Lubold** and Clark N. Taylor. “Conservative PDFs and Goodness-of-Fit Tests Using Super-level Sets.” Air Force Research Laboratory Automatic Target Recognition Center Summer Workshop, Dayton OH, August 2017.
2. **Shane Lubold** and Anne Gelb. “A Statistical Framework for Detecting Edges from Noisy Fourier Data Using Multiple Concentration Factors.” Arizona State University Honors Thesis Symposium, Tempe AZ, April 2016.

Awards

International society for Bayesian analysis travel grant, Fall 2022

- Awarded travel grant to travel to ISBA 2022 to deliver invited presentation.

Z.W. Birnbaum award, University of Washington, Fall 2021

- Awarded for best candidacy exam in the UW statistics department

ARCS Fellowship, University of Washington, Fall 2018

- Three year fellowship from the ARCS Foundation to support graduate students in the STEM fields.

Fulbright Scholar, United States Department of State, March 2017

- Awarded to study Stein's method and convergence rates in central limit theorem with Ivan Nourdin at the University of Luxembourg.

Dean's Medalist, ASU School of Mathematical & Statistical Sciences, December 2016

- Awarded to one graduating student in the School of Mathematical & Statistical Sciences.

Bidstrup Undergraduate Research Fellowship, Bidstrup Foundation, August 2016

- Awarded a \$2,000 grant from the Bidstrup Foundation Undergraduate Fellows Program to study PDE- and particle-based approximations of biological processes.

Outstanding Undergraduate in French, ASU School of International Letters and Cultures, May 2016

- Awarded to one undergraduate in the french department per year.

Phi Beta Kappa, Phi Beta Kappa Society, May 2015

- Awarded to less than 1% of students at ASU.

Undergraduate Summer Enrichment Award, ASU College of Liberal Arts & Sciences, May 2015

- Awarded a \$2,000 grant from Arizona State University to study statistical algorithms for Fourier edge detection.

National Scholar, ASU Barrett Honors College, May 2012

- Full-ride National Merit Scholarship to attend Arizona State University.

Research Experience

University of Washington

2019-Present

Department of Statistics

Advisor: Tyler McCormick

- Statistical analysis of networks, survey design, causal inference on networks, estimating sizes of hard-to-reach populations, multi-dimensional scaling and clustering.

Mathematics Research Unit

2017-2018

University of Luxembourg

Advisor: Ivan Nourdin

- Stein's method for studying convergence rates in central limit theorems.

Sensors Directorate

Summer 2017-Summer 2018

Air Force Research Laboratory, Dayton OH

Advisor: Clark N. Taylor

- Data fusion and uncertainty quantification.

School of Mathematical & Statistical Sciences

Spring 2017

Arizona State University, Tempe AZ

Advisor: John Fricks

- Functional central limit theorems for paused Brownian motion.

School of International Letters and Culture

Fall 2016

Arizona State University, Tempe AZ

Advisor: Markus Cruse

- Statistical analysis of spelling variations in Marco Polo's manuscripts. (Resulting [paper](#).)

Department of Mathematics & Statistics

Summer 2016

San Diego State University, San Diego CA

Advisor: Jorge Carlos Román

- Non-asymptotic error bounds for estimates of posterior parameters in Bayesian models.

School of Mathematical & Statistical Sciences

Fall 2015

Arizona State University, Tempe AZ

Advisor: Sébastien Motsch

- PDE-based and particle-based approximations of stochastic biological processes.

School of Mathematical & Statistical Sciences

Summer 2014

Arizona State University, Tempe AZ

Advisor: Eric Kostelich

- Numerical methods for solving stochastic differential equations.

Service

Reviewer for *Bayesian Analysis* and the *Journal of Computational and Graphical Statistics*.