Alexander Kuhn

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EDUCATION

University of Minnesota (UMN)   Minneapolis, MN

PhD, Statistics   (In progress)   September 2022 - Present

Minor in Data Science in Multi-Messenger Astrophysics

Oregon State University (OSU)   Corvallis, OR

M.S., Statistics. GPA: 4.00/4.00   June 2022

Assistantship recipient

Masters project: Studying the p-filter algorithm

Western Washington University (WWU)   Bellingham, WA

B.S., Mathematics with Distinction. GPA: 3.61/4.00   June 2020

Honors Thesis: Parametric and nonparametric multiple comparisons in repeated measures

Minor in Psychology

RESEARCH EXPERIENCE

UMN School of Statistics   Minneapolis, MN

NSF Research Fellow   September 2023 - Present

- Working with Profs. Sara Algeri, Galin Jones, and Claudia Scarlata to develop novel frequentist and Bayesian methods in astrophysics for detecting important features of high resolution data from the Euclid space telescope.

UMN School of Public Health (Biostatistics)   Minneapolis, MN

Research Assistant   May 2023 – August 2023

- Worked approximately 20 hours per week with Prof. Wei Pan to develop novel statistical methods and analyses for genomics data.

UMN School of Statistics   Minneapolis, MN

Research Assistant   January 2023 – May 2023

- Worked approximately 10 hours per week with Prof. Charles Doss to develop different computational approaches for parameter estimation of state-space (time-series) models inspired by COVID-19 case count data (or dynamic nonlinear models in general).

- Assisted in overseeing and reproducing analyses of current COVID-19 case count data in MN state carried out by masters students.
- Generated bi-weekly sets of plots for the public COVID-19 dashboard created by collaborators.

OSU Statistics Department   Corvallis, OR

Masters Project   January 2022 – June 2022
- Performed an extensive simulation study of the p-filter procedure presented in Barber & Ramdas (2017).
- Developed a variety of functions in R to generate, process, and visualize results of exploratory analysis.

Graduate reading course   January 2022 – March 2022
- Read through a series of papers and textbook materials discussing theory and methodology around bootstrap, jackknife, cross-validation and related resampling methods.
- Helped develop a set of materials and solutions for a prototype graduate course on resampling theory.
- Weakly meetings with Prof. Sarah Emerson and another student to share materials, proofs, simulations, etc.

Graduate reading course   April 2021 – June 2021
- Read through a series of papers on e-values and conformal inference with Prof. Debashis Mondal.
- Created slides to present and summarize materials, expanded on proven results, and conducted simulations in order to confirm/better understand results.
- Weakly meetings where I would present the contents of all or a portion of a paper, alongside some simulations, proofs, and/or ideas for new avenues of research.

WWU Mathematics Department   Bellingham, WA

Undergraduate/Graduate Researcher   April 2019 – June 2021
- Worked with Prof. Kimihiro Noguchi to generalize the theory of multiple comparisons by allowing each contrast to have nonlinear effect size measures.
- Derived limiting testing properties for the proposed procedure including control of the family-wise error rate and consistency in the asymptotic sense.
- Repeatedly presented results and related testing procedures to undergraduate peers to foster interest in statistics research and statistical

literacy at WWU.
- Continued work has gone into developing a Wild bootstrap method in R to estimate the relative effect in the above framework, though I mostly provide suggestions and proof-reading of code for this portion of the project.

WWU Psychology Department   Bellingham, WA
Undergraduate Research Assistant   April 2019 – August 2020
- Worked on a collaborative research project between WWU Psychology department and Whatcom Community College titled "3D Models in STEM Education" advised by Prof. Todd Haskell.
- Processed and coded several hours of student interview footage in order to analyze various uses of representations while students worked through statics engineering and integral calculus related problems.
- Extensive use of physical models and their role in representational competence.
- Observed several statics engineering undergraduate courses in order to identify key representational components in the classroom.
- Established a spin-off project to investigate the transfer effects of using physical models in place of lecture-based methods, particularly in statistics and probability.

PUBLICATIONS
- Submitted: Noguchi, K., **Kuhn, A.,** Carroll, P. "Simultaneous inference for effect sizes in general parametric models and its application to nonparametric multiple comparisons with repeated measures"
- Undergraduate Honors Thesis: **Kuhn, A.**, Noguchi, K. "Parametric and Nonparametric Multiple Comparisons in Repeated Measures."

PRESENTATIONS
JSM 2024 Contributed Poster Session in Astrostastics   Portland, OR
Presenter   August 2024
- **Kuhn, A.**, Zabelle, B., Algeri, S., Jones, G., Scarlata, C. "Frequentist and Bayesian approaches to spectral line detection in astronomy".

JMM 2022 Contributed Session on Applications of Statistics   Seattle, WA
Co-Author   January 2022

Carroll, P., **Kuhn, A.**, Noguchi, K. "Wild Bootstrap Implementation of Nonparametric Multiple Comparison Procedure with Log Odds Transformation on the Relative Effects in the One-Way Repeated Measures Setting."

JSM 2021 Submitted Speed Session   Virtual

Co-Author   August 2021

- Carroll, P., **Kuhn, A.**, Noguchi, K. "Wild Bootstrap Implementation of Nonparametric Multiple Comparisons with Effect Size Generalization in the One-Way Repeated Measures Setting."

W2D2S2 2021 Seminar   Virtual

Co-Author   May 2021

- Carroll, P., **Kuhn, A.**, Noguchi, K. "Power Curve Simulation Study of Nonparametric Multiple Contrast Testing Procedures for One-Way Repeated Measures Experimental Design."

WWU Honors Seminar   Bellingham, WA

Presenter   June 2020

- Gave a 45 minute discussion of my undergraduate thesis "Parametric and Nonparametric Multiple Comparisons in Repeated Measures" to an audience of about 40 people from the Honors College and Math department.

JMM 2020 Undergraduate Poster Session   Denver, CO

Presenter   January 2020

- **Kuhn, A.**, Carroll, P., Noguchi, K. "Effect Size Generalization of the General Parametric Model."

AWARDS

- UMN DSMMA Research Training Stipend ($34,000)
- OSU Justus F. Seely Award for Top First-Year Student ($400)
- American Mathematical Society Travel Grant ($400)
- WWU Academic Achievement Award ($4000)
- Western Leadership Forum Scholarship ($2000)
- Bowman Family Distinguished Scholars in Leadership ($5500)

TEACHING EXPERIENCE

UMN School of Statistics   Minneapolis, MN

Graduate Teaching Assistant   August 2022 – May 2023
- Teaching assistant for STAT 3032: Regression and Correlated Data.
- Led weekly labs to groups of 15-30 students covering various topics in linear regression, hypothesis testing, generalized linear models, and time series data.
- Responsible for grading and providing feedback to approximately 70 students.
- First semester worked as the only TA for the course (50% appointment); second semester worked alongside another TA (25% appointment.
- Held weekly office hours to assist students outside of lab.

OSU Statistics Department   Corvallis, OR
Graduate Teaching Assistant   September 2020 – June 2022
- Courses taught: Methods of Data Analysis for Graduate Students, Introduction to Statistical Methods II, Introduction to Statistics for Engineers, and Principles of Statistics.
- Assisted teaching undergraduate/graduate courses in statistics with an average size of 150 - 200 students in both in-person and remote modalities.
- Led multiple labs and recitations for groups of 10 - 30 students covering basic ideas in sampling, parametric and nonparametric hypothesis testing, experimental design, and linear regression among other things.
- Extensive grading of exams and student coursework, working to provide meaningful feedback to students.
- Worked to provide an inclusive environment for my students and encouraged frequent communication to help overcome student difficulties with the on-line setting and other complications due to COVID-19.

Service

Statistics Liaison Committee   Minneapolis, MN
Member   September 2023 - Present
- Organize student events including student seminars, coffee hours, and meeting with visiting faculty.
- Provide a means of communication between students and departmental admin.

Statistics Directed Reading Groups   Minneapolis, MN
Co-organizer   January 2023 - Present
- Help match undergraduate students interested in statistics research with

graduate students.

- Co-led a reading group with seven undergraduate students on multiple hypothesis testing and biostatistics applications.
- Selected papers bi-weekly to discuss and introduce new concepts. Focused on critical reading skills and how to parse complex information.

TECHNICAL SKILLS & MEMBERSHIPS

- Extensive use of R, Markdown, and Latex
- Proficient with Microsoft and Google suite, i.e. sheets/excel, word/docs, etc.
- Comfortable with Linux environment, Python, and Git
- Exposure to SAS, Java, SQL
- Member of the American Statistical Association