ANDREW JORDAN VITA PRINSTER (DREW)

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EDUCATION

Johns Hopkins University, Baltimore, MD 2021 – present

Ph.D. student in Computer Science (GPA: 3.9)

AI and Healthcare Lab – Malone Center for Engineering in Healthcare & Mathematical Institute for Data Science (MINDS)

Yale University, New Haven, CT 2017 – 2021

B.S. Computer Science and Mathematics (GPA: 3.84)

Graduated with Distinction in the Major; Yale Global Health Scholar

PUBLICATIONS

[1] **Prinster, D.***, Stanton, S.*, Liu, A., & Saria, S. "Conformal Validity Guarantees Exist for Any Data Distribution (and How to Find Them)." *The International Conference on Machine Learning* (ICML), 2024.[1]

[2] **Prinster, D.**, Liu, A., & Saria, S. "JAWS-X: Addressing Efficiency Bottlenecks of Conformal Prediction Under Standard and Feedback Covariate Shift", Oral (Top ~2% of submissions) at *The International Conference on Machine Learning* (ICML), 2023.

[3] **Prinster, D.**, Liu, A., & Saria, S. "Efficient Approximate Predictive Inference Under Feedback Covariate Shift with Influence Functions", Extended abstract in proceedings of *Conformal and Probabilistic Prediction with Applications* (COPA), 2023.

[4] **Prinster, D.**, Liu, A., & Saria, S. "JAWS: Auditing Predictive Uncertainty Under Covariate Shift." *Advances in Neural Information Processing Systems* (NeurIPS), 2022.

[5] **Prinster, D.**, Resasco, J., & Nufio, C. "Weather variation affects the dispersal of grasshoppers beyond their elevational ranges", in *Ecology and Evolution*, 2020.

[6] **Prinster, D.**, Hoskins., & Strode, P. "Pitfall traps & diversity indices: Using quantitative reasoning to test edge effect theory." *The American Biology Teacher*, 2019.

ACCEPTED PAPERS (IN PRESS AWAITING PUBLICATION)

[7] **Prinster, D.***, Mahmood, A.*, Saria, S., Jeudy, J., Lin, C.H., Yi, P., & Huang, C.M. "Care to Explain? AI Explanation Types Differentially Impact Chest Radiograph Diagnostic Performance and Physician Trust in AI", In Press at *Radiology*.

[8] Beghini, F.*, Pullman, J.*, Alexander, M. Vishnempet Shridhar, S., **Prinster, D.**, ... "Detailed Social Network Interactions and Gut Microbiome Strain-Sharing Within Isolated Honduras Villages", In Press at *Nature*.

MANUSCRIPTS CURRENTLY IN REVIEW

[9] **Prinster, D.**, Alexander, M., & Christakis, A. "Exact Sequence Variants Analysis of Human Gut Microbiome and Personality Traits Conditional on Host Genetics", In "revise and resubmit" at *Nature Communications Biology*.

RECOGNITION & FELLOWSHIPS

- Amazon Institute for Interactive AI (AI2AI) PhD Fellowship 2024-2025 — 2024
- Johns Hopkins Mathematical Institute for Data Science (MINDS) Spring Fellowship — 2024
- Oral presentation (Top ~2% of submissions) of [2] at *The International Conference on Machine Learning*. (The only Oral presentation out of 15 *ICML* 2023 papers on conformal prediction.) — 2023
- Outstanding Reviewer at *Machine Learning for Health Symposium* — 2022
- Heinrich von Staden Cup, Ezra Stiles College "to a senior who most consistently challenged the social and intellectual conscience of the College." — 2021
- National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Honorable Mention — 2021
- Yale College Dean's Summer Research Fellowship — 2020
- Ezra Stiles John E. Linck & Alanne Headland Linck Fellowship — 2020, 2019, 2018
- Ezra Stiles Gary Stein Fellowship — 2020, 2019, 2018
- Ezra Stiles Richter Fellowship — 2019
- Unite For Sight Volunteer of the Year — 2019
- Howard W. Hilgendorf Memorial Fellowship — 2018
- National Merit Scholarship Winner — 2017

INVITED TALKS & PRESENTATIONS

- (Talk) Lindemann Lab, University of Southern California (USC) — Oct. 2024
- (Poster) Mathematics of Trustworthy Machine Learning Workshop, SIAM Mathematics of Data Science (MDS24) — Oct. 2024
- (Talk) Amsterdam Machine Learning Lab (AMLab) Seminar — Sep. 2024
- (Talk) Active Learning Reading Group, Johns Hopkins University Applied Physics Laboratory (APL) — Aug. 2024

[1] Four reviewers unanimously voted to accept this paper, with one reviewer commenting "I believe this paper could become seminal in the area of conformal prediction" and listing the confidence in their review as "absolutely certain."

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FACULTY GRANT & BOOK DRAFTING EXPERIENCE

AI and Healthcare Lab (Dr. Suchi Saria & Dr. Anqi Liu) – JHU 2021 – present

- *Grant Drafter* – Wrote initial grant app. draft for $700,000 from Gordon and Betty Moore Foundation, awarded to Dr. Saria.
- *Grant Drafter* – Wrote initial grant app. draft on AI monitoring component of larger ARPA-H grant.
- *Grant Drafter* – Wrote initial grant app. draft for U.S. Food and Drug Administration, pending award decision in 2024.

Undergraduate Researcher, Human Nature Lab – Yale University 2019 – 2022

- *Book Contributor* – Researched and drafted sections for *Apollo's Arrow*, book on COVID-19 pandemic by Dr. Nicholas Christakis.
- *Grant Contributor* – Researched and drafted Templeton Foundation grant on intellectual humility and cooperation research.

WORKSHOP-EQUIVALENT PRESENTATIONS (ALL FIRST-AUTHOR)

- "Care to ExplAIn? AI Explanation Types Differentially Impact Physician Diagnostic Performance and Trust in AI" (presentation of [7]), Oral presentation at the *Conference on Machine Intelligence in Medical Imaging*, 2023.
- "JAWS: Auditing Predictive Uncertainty Under Covariate Shift" (presentation of [4]), *International Conference on Machine Learning: Workshop on Distribution-Free Uncertainty Quantification*, 2022.
- "Global Associations Between National Non-Communicable Disease Burden and COVID-19 Outcomes", *Unite For Sight Global Health and Innovation Conference: Student Leaders in Global Health Session*, 2021.
- "Exact sequence variant analysis of the gut microbiome and human psychometric phenotypes conditional on host genetics" (presentation of [9]), *Cold Spring Harbor Laboratory Biological Data Science Conference: Personalized Medicine Session*, 2020.
- "Weather variation affects the dispersal of grasshoppers beyond their elevational ranges" (presentation of [5]), *Ecological Society of America Annual Meeting*, 2020.
- "Survey to Address Perceptions of Cataract Surgery in Adult Outreach Patients Who Receive a Diagnosis in Honduras", *Unite For Sight Global Health and Innovation Conference: Student and Young Leaders in Global Health*, 2019.

RESEARCH EXPERIENCE

AI in Healthcare & Trustworthy AI Labs (Dr. Suchi Saria & Dr. Anqi Liu) – Johns Hopkins 2021 – present

- *First author* – *ICML 2024* paper [1]: Proved and demonstrated how conformal prediction (CP) can theoretically extend to any (non-exchangeable) data distribution; Practical applications account for feedback-loop shifts induced by actions of AI agents.
- *First author* – *NeurIPS* 2022 paper "JAWS" [4] on CP methods for AI/ML uncertainty quantification under covariate shift.
- *First author* – *ICML* 2023 paper "JAWS-X" [3] extending [4] to feedback-loop shifts and further computational relaxations.
- *First author* – *COPA* 2023 extended abstract [2] on highly efficient approximation of method in [3] using influence functions.
- Future theory directions: Comprehensively addressing technical challenges to using conformal prediction methods in real world.
- Future application directions: Compiling improved CP methods in [1-4] into framework for reliable and regulatable AI, and integrating with deployed clinical AI tools and LLMs to demonstrate utility for end-users and administrators/regulators.

Intuitive Computing Lab (Dr. Chien-Ming Huang) – Johns Hopkins University 2021 – present

- *First author* – Manuscript [7] on physician-AI cooperation in radiology, in press at *Radiology*.
- Found that physicians tend to trust local AI explanations more than global explanations, with impacts on diagnostic performance.
- Future directions: Physician-AI interaction experiments to study utility of conformal prediction methods [1-4].

Undergraduate Researcher, Human Nature Lab – Yale University 2019 – 2022

- *First author* – Submission [9] on microbiome, host genetics, and psychosocial variables in UK twins dataset.
- *Co-author* – Manuscript on associations between human microbiome strains and social network structure.
- Led psychosocial phenotypes (mental health and well-being) aspects of Honduras Microbiome and Social Networks project.

Undergraduate Researcher, Gerstein Lab – Yale University 2020 – 2021

- *First author* – Poster presentation at 2021 Cold Spring Harbor Laboratory Genome Informatics Conference.
- Senior thesis: "Quantifying exogenous RNA sequence alignment reliability and observability in the exceRpt pipeline"
- Contributed to exceRpt: extracellular RNA profiling pipeline of the NIH Extracellular RNA Communication Consortium.
- Collaborated with Yale Human Nature Lab to process Honduras microbiome samples, to study microbiome and genome privacy.

Principal Investigator, Unite For Sight (UFS) Global Impact Lab Honduras & ZOE Eye Clinic 2018 – 2021

- Collaborated with ZOE and UFS to design and conduct global health study based on the needs of the local clinic (ZOE) [9].
- Certified in Global Health Program Delivery and Global Health Research through UFS University.

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Researcher, Entomology Section - CU Boulder Museum of Natural History 2014 – 2020

- Used multiple regression models to explain how weather affects grasshopper dispersal along Rocky Mountain Front Range [4].

Lab Assistant, Taatjes Lab - CU Boulder Chemistry and Biochemistry Department Summers, 2015 & 2016

- Independently investigated how activators affect transcription of the HSP70 gene, a part of a larger project on promoter proximal pausing of Pol II. See: tinyurl.com/prinster-research-2
- Assisted in project aimed at elucidating the role of cyclin dependent kinase 8's (CDK8's) carboxyl terminal domain with relation to the molecule's kinase activity and association in the CDK8 four protein module.

SERVICE, TEACHING, & LEADERSHIP

Reviewer & Program Committee Roles

- Program Committee & Reviewer – NeurIPS Workshop on Statistical Frontiers in LLMs and Foundation Models 2024
- Reviewer – Uncertainty in Artificial Intelligence (UAI) 2024
- Outstanding Reviewer – Machine Learning for Health (ML4H) Symposium 2022, 2023
- Reviewer – ICML Workshop on Spurious Correlations, Invariance and Stability 2023
- Reviewer – Conference on Information Sciences and Systems (CISS) 2023

Teaching Assistant, "Advanced Machine Learning: ML for Trustworthy AI" (Dr. Anqi Liu) 2023

- Wrote and graded problem sets; Lectured on distribution-free uncertainty quantification; Hosted regular office hours.

Graduate Student Council, Johns Hopkins Computer Science 2022 – present

- Orientation and Recruitment Chair – Organize student-led orientation and recruitment events, including student panels.
- Prospective Student Outreach – Advise prospective CS PhD students from underrepresented backgrounds on their applications.

Volunteer, NeurIPS 2022 High School Outreach Program 2022

- Organizer – Mini workshop on "Trustworthy AI" centering on discussions of AI ethics, bias, and participatory design.
- Group leader – Spent day with high school student group for educational outreach day on AI and society.

Global Impact Fellow, Unite For Sight (UFS) Honduras & ZOE Eye Clinic 2018 – 2021

- Volunteer – Patient check-in, visual acuity screening, eyeglass distribution, etc. for ~30 outreach trips over 8 weeks.
- Blog Contributor – UFS requested to incorporate blog into Honduras training modules. See: tinyurl.com/prinster-ufs-blog
- Campus Representative – Top 2% of UFS alumni. Present about UFS programs and communicate with interested students.

Counselor, Camp Kesem Yale 2018 – 2021

- Coordinator of Development Committee – Organized counselor fundraising to reach $135,000 for the 2018-2019 school year.
- Counselor and Outreach Committee Member – Weeklong summer camp for kids whose parents have been affected by cancer.

Volunteer, HAVEN Free Clinic Social Services Department 2017 – 2019

- Assisted uninsured residents with health-related social/financial needs, e.g. medical debt relief, Medicaid application.
- Provided information on local resources, e.g. nutrition assistance, food pantries, clothing banks, legal assistance.

Volunteer Adaptive Snow Sports Instructor, Ignite Adaptive Sports – Eldora Mountain Resort 2014 – 2021

- 2017-2018 Lead Instructor; 2016 Junior Instructor of the Year; 2015-2017 Junior Instructor Coordinator.
- 2016 Annual Gala Benefit Marketing Committee Co-Chair – Helped raise > $55,000 for program scholarships and equipment.
- 2017 Ignite Stories Project Lead – Wrote stories of Ignite members for community publication. See: tinyurl.com/ignite-stories

First-Year Organic Chemistry Peer Tutor, Yale Department of Chemistry Fall 2019

- Peer tutor for accelerated organic chemistry course for advanced first-year students.
- Served as in-class teaching assistant, ran structured study hall review sessions, reached out to support struggling students.

NON-ACADEMIC SOCIETIES & JOBS

Chaplain Fellow, Yale Chaplain's Office 2019 – 2021

- Service work, visits to local religious communities, and group reflection through weeklong training in Washington D.C.
- Organized inclusive discussions in Ezra Stiles College around topics of spiritual and religious practices, diverse worldviews.

Student Activities Committee Member, Ezra Stiles College 2018 – 2021

- Organized residential college community events such as Medieval Knight and finals period study breaks.
- Coordinated the production of personalized welcome cards for first-years and sophomores in Ezra Stiles.

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INTERESTS & SKILLS

Interests: Lifetime soccer player, runner, hiker, skier and snowboarder. Convert to vegetarianism and meditation. Enjoys good books, drawing and painting, board games, meaningful conversations and experiences with friends and family, and reflection.

Some favorite books: *All the Light We Cannot See*, *Klara and the Sun*, *Unbroken*, *The Spirit Catches You and You Fall Down*, *Just Us*.
Favorite podcasts: "Sean Carroll's Mindscape", "The Ezra Klein Show", "NPR's Rough Translation", "80,000 Hours".

Skills: *Language:* Spanish, advanced *Computer:* Python, R, C/C++, Java, JavaScript, HTML