

# Qian Zhao

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## EDUCATION

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Postdoctoral Scholar	Biomedical Data Science, Stanford University	2022-Present
Ph.D.	Statistics, Stanford University	2021
M.S.	Statistics, The University of Chicago	2016
B.S.	Physics, Fudan University, Shanghai, China	2014

## RESEARCH INTERESTS

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High-dimensional statistical inference, Statistical genetics, Nonparametric density estimation, Data science education, Reproducible research workflow, Precision medicine

## RESEARCH

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### **Postdoctoral researcher, Stanford University**

*Selecting genetic variants under sampling bias*

Advisor: Prof. Chiara Sabatti, Collaborator: Susan Service 2022-Present

Apply, develop, and evaluate statistical methods to identify genetic variants associated with endophenotypes to understand distinct and common genetic variants that affect severe mental disorders.

### **Graduate researcher, Stanford University**

*Inferring coefficients of a high-dimensional Generalized Linear Model (GLM)*

Advisor: Prof. Emmanuel Candès 2017-Present

Developed theories and methods to estimate the distribution of the maximum likelihood estimates (MLE) of a high-dimensional GLM as the number of variables grows with the number of observations.

*Constructing a moderate- to high-dimensional histogram*

Advisor: Prof. Guenther Walther 2017-Present

Developed a Beta-tree histogram for moderate- to high-dimensional data and provided confidence intervals for the average density in each region.

### **Technical Mentor, Data Science for Social Good, Stanford University**

*Identifying behavioral health conditions from police records*

Advisor: Dr. Balasubramanian Narasimhan

Summer 2022

We developed a data analysis pipeline for journalists from the California Reporting Project to identify police records that mention behavioral health conditions and output relevant information.

*Operationalizing equity tiebreaker in San Francisco student school assignment*

Advisor: Prof. Irene Lo

Summer 2021

We developed an equity tiebreaker and evaluated its effect on enhancing equity in elementary student assignment. We presented our work at the Ad hoc committee meeting on student assignment at San Francisco Unified School District.

### **Fellow, Data Science for Social Good, Stanford University**

*Forecasting platelet blood bag demand to reduce inventory wastage at the Stanford Blood Center*

Advisor: Prof. Chiara Sabatti and Dr. Balasubramanian Narasimhan

Summer 2019

We predicted platelet blood bag demand at the Stanford Blood Center by combining surgery information and recurring transfusion data.

## **PUBLICATIONS**

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### *Manuscript and preprints*

1. Sabatti, C. & **Zhao, Q.** (2022 *preprint*) Near-peer mentoring in data science: Two experiences at Stanford University
2. **Zhao, Q.** (2022) Growing by Mentoring: A guide for Data Science for Social Good mentors
3. Walther, G. & **Zhao, Q.** (2022 *preprint*) Beta-trees: Multivariate histograms with confidence statements
4. **Zhao, Q.** & Candès, E. (2022 *under review*). An adaptively resized parametric bootstrap for inference in high-dimensional generalized linear models, *arXiv 2208.08944*

### *Peer reviewed articles*

5. **Zhao, Q.**, Sur, P. & Candès, E. (2022). The asymptotic distribution of the MLE in high-dimensional logistic models: Arbitrary covariance. *Bernoulli* 28 (3)
6. Zhu, J., **Zhao, Q.**, Katsevich, E. & Sabatti, C. (2019). Exploratory gene ontology analysis with interactive visualization. *Scientific Reports* 9, 7793
7. Orlova, D.Y., Meehan, S., Parks, D., **Zhao, Q.** et al. (2018) QFMatch: Multidimensional flow and mass cytometry samples alignment. *Scientific Reports* 8, 3291

## PRESENTATIONS

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1. **Zhao, Q.**, “Selecting genetic variants using knockoffs under collider bias.” (Presentation) *Stanford Causal Science Conference*, Stanford University, Stanford, CA, 2022
2. **Zhao, Q.**, “Writing a reproducible manuscript in R.” (Lightning talk) *Gear-up for Science Data Symposium*, Stanford University, Stanford, CA, 2022
3. **Zhao, Q.**, Guthrie, E. & King, C. “Forecasting platelet blood bag demand to reduce inventory wastage at the Stanford Blood Center.” (Presentation) *RStudio Conference*, San Francisco, CA, 2020

## TEACHING & MENTORING

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### **Technical Mentor, Data Science for Social Good, Stanford University** Summer 2021, 2022

- Stanford Data Science for Social Good is a eight-week summer program where fellows tackle data science projects with positive social impact.
- Collaborated with community partners to formulate project goals, approaches, and milestones.
- Facilitated daily meetings where I guided fellows to brainstorm ideas, discuss different approaches, share progress, and provide feedback on each other’s work.
- Advised project work, presentations, and final report, where I asked for clarifying information, answered questions, suggested related research or approaches.
- Held working session with fellows and invited graduate students to speak on related data science topics.
- Met with fellows to discuss individual goals and provide relevant resources.
- Taught training sessions on multiple hypotheses testing, using Git for collaboration, and topic modelling.

### **Teaching Assistant, Stanford University** 2016-2021

#### *Undergraduate level courses*

#### “Biostatistics” Winter 2021, Fall 2019

Introductory course in statistical methods for biological data (t-test, categorical data analysis, linear regression).

#### “Statistical methods in engineering and the physical sciences” Fall 2020, Spring 2018

Introductory course in probability and statistical methods for undergraduates majoring in physical science and engineering.

#### “Introduction to statistical methods” Summer 2020

Introductory course in statistics for undergraduate and high school students (data summary and visualization, sampling, hypothesis testing, modelling continuous and categorical relationships).

#### “Data science 101” Spring 2020

Undergraduate course in statistics (data visualization, sampling and resampling, linear models, hypothesis tests).

“Riding the data wave” Fall 2019  
Freshman seminar on basic statistical concepts (mean, variation, association) and exploratory data analysis.

### *Graduate level courses*

“Introduction to statistical learning” Winter 2019  
Upper-division undergraduate and masters level course on introductory machine learning methods (regression, clustering, splines).

“Data mining and analysis” Fall 2016, Summer 2017  
Upper-division undergraduate and masters level course applied machine learning methods (regression, clustering, splines, and semiparametric methods).

“Applied multivariate analysis” Winter 2020  
Upper-division undergraduate and masters level course in applied multivariate statistical methods (PCA, clustering, mixture models, EM algorithms).

“Advanced statistical theory” Spring 2019  
Topic class in advanced statistical theory (concentration, high-dimensional PCA, nonparametric methods, compressed sensing, graphical models and message passing algorithm).

“Modern applied statistics: Learning” Winter 2019  
Advanced course in applied machine learning methods (regression, clustering, splines and reproducing kernel Hilbert space).

“Theory of statistics” Spring 2018  
Graduate level course in advanced statistical theory (multiple testing, knockoff, selective inference, estimating a multivariate Normal mean).

## **AWARDS**

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**Departmental Teaching Assistant Award** June 2020  
Department of Statistics, Stanford University

## **SERVICE & OUTREACH**

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**Justice, Equity, Diversity and Inclusion (JEDI) committee** Postdoc representative  
Department of Biomedical Data Science, Stanford University Fall 2022-Present

- Identify students’ and faculties’ perspectives on specific issues and suggestions.
- Design and coordinate activities to create a more diverse and inclusive environment in the department.

**Stanford Future Advancers of Science and Technology (FAST)** Mentor & Outcomes officer  
Stanford University 2020-Present

- FAST is a program where Stanford graduate students mentor local high schoolers on science projects and share enthusiasm for science and research. High school students

present their work in local science fairs, state science fairs, and an annual Symposium at Stanford University.

- Meet with students twice a month to brainstorm project ideas, carry out experiments and analyze data.
- Design and analyze program surveys and interviews to assess the effect of the FAST on students' confidence and ability to conduct scientific inquiries, and their attitude towards STEM fields, as well as mentors' confidence in mentoring high schoolers. Recommended mentor training topics based on survey results.

**Inclusive Mentoring in Data Science Workshop** Mentor

Stanford University

Winter 2022

- Mentored an underrepresented minority student from non-R1 institution to plan academic and career trajectory, prepare resume, and discuss data science topics.

**Stanford Women in Math Mentoring (SWIMM)** Mentor

Stanford University

2017-2020

- SWIMM is a mentoring program to encourage undergraduate women to pursue advanced study in mathematics by pairing them with graduate student mentors, sharing resources about events, courses, and fellowship applications, and introducing them to a network of other undergraduate students.
- Monthly meetup and check-in with undergraduate mentee to discuss course selection, campus life and career development.

**Ph.D. student social coordinator**

Department of Statistics, Stanford University

2017

- Organized department social events, e.g., tea, happy hours and Chinese New Year potluck.
- Applied for Stanford SPICE grant (Student Projects for Intellectual Community Enhancement) (\$5000) to fund department retreats where Ph.D. students present their research in a casual environment, and socialize with fellow students and faculty members (more than 75% Ph.D. students and three faculty members attend each year).