Shannon **Gallagher**

STATISTICIAN · PH.D.

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Current

National Institute of Allergy and Infectious Diseases — *Rockville, MD*

BIOSTATISTICS RESEARCH BRANCH | DEPARTMENT OF CLINICAL RESEARCH — *2019-Present*

Post-Doctoral Fellow

Education

Carnegie Mellon University — *Pittsburgh, PA*

PH.D. IN STATISTICS — *2014-2019*

M.S. IN STATISTICS — *2014-2015*

B.S. IN MATHEMATICAL SCIENCES (UNIVERSITY AND COLLEGE HONORS) — *2010-2014*

Dissertation: "Catalyst: agents of change. Integration of compartment and agent-based models for use in infectious disease methodology"

Advisor: William F. Eddy

Selected Publications and Reports

Azasi, Y.†, **Gallagher, S.K.**†, [and 11 others including Fay, Michael P., Miura, K., and Miller, Louis H.] († co-first author). "Bliss' and Loewe's additive and synergistic effects in Plasmodium falciparum growth inhibition by AMA1-RON2L, RH5, RIPR and CyRPA antibody combinations." *Scientific Reports*, 2020.

Gallagher, S.K. "Discussion of 'An epidemiological forecast model and software assessing interventions on COVID-19 epidemic in China.' " *Journal of Data Science*, 2020.

Gallagher, S.K., Chang, A., Eddy, W.F. "Exploring the nuances of R_0: Eight estimates and application to 2009 pandemic influenza." Pre-print available at: `https://arxiv.org/abs/2003.10442`. Submitted, 2020.

Gallagher, S.K., Frisoli K., and Luby, A. "Opening up the court (surface) in tennis grand slams." Accepted with major revisions to *Journal of Quantitative Analysis in Sports*, 2020.

Gallagher, S.K. and Follmann, D. "Branching process models to identify risk factors for infectious disease transmission." Submitted to *Journal of Computational and Graphical Statistics*, 2020.

Gallagher, S.K. and Eddy, W.F. "A hybrid compartment/agent-based model for infectious disease modeling." ENAR Epidemiology section student paper contest submission, 2019.

Gallagher, S.K., Richardson L.F., Ventura S.L., and Eddy, W.F. "SPEW: Synthetic Populations and Ecosystems of the World." *Journal of Computational and Graphical Statistics*, 2018.

Gallagher, S.K., Lombard, K., Dodd, L., and Proschan, P. "Using Kaplan Meier estimates in non-inferiority hypothesis tests." In prep., 2021.

Gallagher, S.K. and LeRoy, B.P. "`EpiCompare`: An `R` package to analyze and compare different infectious disease models." In prep., 2021.

Selected Presentations and Posters

Los Alamos National Laboratory — *Virtual Seminar*

INVITED PRESENTATION — *August, 2020*

"Use of multiple covariates in branching processes for modeling the spread of Tuberculosis."

Carnegie Mellon University — *Virtual Class*

GUEST LECTURE — *September, 2020*

"A foray into infectious disease modeling: compartment models."

Joint Statistical Meetings *Virtual Conference*

Poster/Presentation *August, 2020*

"Branching processes with covariates to model the spread of Tuberculosis."

ENAR *Virtual Conference*

Presentation *March, 2020*

"A Hybrid Compartment/Agent-Based Model for Infectious Disease Modeling."

George Washington University *Washington D.C.*

Guest Lecture *February, 2020*

"A brief survey of statistical models to analyze the transmission of infectious diseases."

Dissertation Defense *Pittsburgh, PA*

Presentation *July 2019*

"Catalyst: agents of change. Integration of compartment and agent-based models for use in infectious disease epidemiology."

Carnegie Mellon Sports Analytics Conference *Pittsburgh, PA*

Presentation – **Honorable Mention** *October 2018*

"Opening up the (court) surface in tennis grand slams." Joint work with Kayla Frisoli and Amanda Luby.

International Conference on Synthetic Populations *Lucca, Italy*

Presentation – **Invited Speaker** *February 2017*

"Generating Synthetic Ecosystems: A Tutorial" Joint work with Lee Richardson, Samuel Ventura, and William Eddy.

MIDAS National Conference *Washington D.C.*

Presentation *May 2016*

"Services for the MIDAS Network: Visualization and Synthetic Ecosystems." Joint work with Lee Richardson, Samuel Ventura, and William Eddy.

UP-STAT *Buffalo, NY*

Presentation – **2nd place** *March 2016*

"From forecasting the Flu to Predicting the 'Next' Disease." Joint work with Roni Rosenfeld, Ryan Tibshirani, Lee Richardson, Samuel Ventura, and William Eddy.

Honors & Awards

2020	**Selected Carnegie Mellon University Student Speaker for 2020 Commencement**, Conferral of Degrees. Full program available at: `https://www.cmu.edu/commencement/`.	*Virtual*
2018	**Honorable Mention**, Carnegie Mellon University Sports Analytics Conference Reproducible Paper Competition. $\$1,000$ award.	*Pittsburgh, PA*
2018, 2014	**Honorable Mention**, Gertrude M. Cox Scholarship. ASA Committee on Women in Statistics and the Caucus for Women in Statistics.	
2018	**Scholarship Recipient**, Summer Institute in Statistics and Modeling. Tuition and travel stipend.	*Seattle, WA*
2017	**Selected Presenter**, AT&T Labs Graduate Student Symposium. One of fourteen PhD students out of 79 applicants selected. Awarded $800 in travel funding.	*New York, NY*
2016	**Hackathon Champion**, MIDAS MISSION Public Health Hackathon. Awarded $3,000 prize.	*Pittsburgh, PA*
2016	**2nd place**, Student presentation at UP-STAT conference.	*Buffalo, NY*
2014	**Judith A. Resnik Award for Outstanding Women in the Sciences**, Carnegie Mellon University.	*Pittsburgh, PA*
2013	**Phi Beta Kappa Honor Society**, Fall induction.	*Pittsburgh, PA*

Software

2020	`InfectionTrees` **R package**, **Gallagher, S.K.** and Follmann, D. Analysis, vignettes, and code for studying transmisison trees and incorporating information from individuals. Available at `https://skgallagher.github.io/InfectionTrees/articles/getting-started.html`.
2019-2020	`loewesadditivity` **Shiny App**, **Gallagher, S.K.**. Online interface for modelling synergy, antagonism, or Loewe additivity between varying dose combinations of different compounds. Available at `https://additivity.niaid.nih.gov/`.
2019-2020	`loewesadditivity` **R Package**, **Gallagher, S.K.** and Fay, M. P. Software for modelling synergy, antagonism, or Loewe additivity between varying dose combinations of different compounds. Available at `www.github.com/skgallagher/loewesadditivity`.
2019-2020	`EpiCompare`, **Gallagher, S.K.** and Leroy, B. Software for simulation and analysis of disease data via ternary plots. Available at `https://skgallagher.github.io/EpiCompare/index.html`.

2019 `catalyst`, **Gallagher, S.K.**. Software for simulation, testing, and analysis of compartment and agent-based models. Available at `www.github.com/skgallagher/catalyst`.

2018 `spew`, Richardson L., **Gallagher, S.K.**, Ventura, S., and Eddy, W.F. R package for synthetic ecosystem generation. Available at `www.github.com/lrichardson/spew`.

2016 `spewview`, **Gallagher, S.K.** and Richardson L. R Shiny application for infectious disease visualization. Available at `www.github.com/skgallagher/hackathon`.

Research, Teaching, and Work Experience

National Institute of Allergy and Infectious Disease *Rockville, MD*

Post-Doctoral Fellow *2019-2021*

- Worked with Dean Follmann to analyze the effect of smear status on spread of Tuberculosis
- Devised and implemented statistical model to analyze the synergy of antibody pair combinations for Malaria vaccine efforts
- Analyzed survival probability under different loss to follow up scenarios
- Helped lead a retrospective analysis of the COVID-19 ACTT-1 Clinical Trial to identify subgroups that respond to remdesivir

Carnegie Mellon University *Pittsburgh, PA*

Research and Teaching Assistant *2014-2019*

- Developed and presented material for the Summer Undergraduate Research Experience in Statistics
- Generated high-resolution synthetic ecosystem of the U.S. and 70+ countries for use in agent-based models for transmission of disease
- Oversaw lab for 100 students, organized and led review sessions for a variety of statistics and mathematics classes including Epidemiology, Statistical Computing, Intro to Probability, Advanced Undergraduate Research, Concepts of Mathematics, and Multi-dimensional Calculus

PNC *Pittsburgh, PA*

Graduate Intern *2015*

- Scraped and analyzed social media data for sentiment analysis
- Parallelized code via Hadoop

Professional Service

2020-PRESENT **Mentor to students**, National Insitute of Allergy and Infectious Diseases
- Statistical mentor for a student's research study to complete her Masters of Health Sciences in Clinical Research Training Program at Duke School of Medicine
- Undergraduate student research co-advisor to a Carnegie Mellon University statistics student along with Professor Joel Greenhouse

2016-PRESENT **Reviewer**, Statistics in Medicine, Clinical Infectious Diseases, Statistics and Public Policy, Journal of Quantitative Analysis in Sports, Journal of Data Science

2018-2019 **PI**, ProSeed/Crosswalk recipient for $1600 to seed a mentorship program across all levels of students within the Stat&DS community

2018-2019 **President**, Carnegie Mellon University Women in Statistics.
- Organized Women in Data Science Pittsburgh @CMU as an Executive Committee Member. Inivted speakers and sponsors, helped organize venue logistics, sent out invitations for for attendance, and created the 2018 website
- Maintained the Women in Statistics Website from 2017-2018
- Organized a seminar by former PhD student about her experiences as a post-doc at Harvard Biostatistics (2017)
- Organized a panel about applying to graduate school for 30+ undergraduate and masters students (2016)
- Organized dinner with new dean of Mellon College of Science (2016)

2016-2018 **Co-Organizer**, Pittsburgh useR. Organized meet-ups for 30+ members on a variety of topics including cross-language coding and integrating R with `github`

2016-2017 **Judge and volunteer**, Tartan Data Science Cup - three separate events.

2016-2017 **Vice President**, CMU Women in Statistics.

2016 **Presenter**, Coding for Girls

Relevant Course Work

- Machine Learning I and II (**Grad**)
- Statistical Computing (**Grad**)
- Modern Regression (**Grad**)
- Hierarchical Models (**Grad**)
- Multivariate Methods and Data Mining
- Data Matching and Record Linkage
- Advanced Methods for Data Analysis
- Epidemiology