

# Forrest W. Crawford

Yale School of Public Health  
Department of Biostatistics  
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## Education

PhD Biomathematics, University of California Los Angeles (2012)

- Advisor: Marc A. Suchard

MS Biomathematics, University of California Los Angeles (2009)

BA Neuroscience, Oberlin College (2002)

## Professional Experience

*Senior Statistician* (2023 – present)

RAND Corporation, Santa Monica, CA

- Led teams working on biosecurity, AI, technology, pandemic prevention.
- Briefed White House, DHS, NIST and other high-level policymakers on emerging biotechnology issues.

*Associate Professor (with tenure), Biostatistics, Statistics & Data Science, Operations Management, Ecology & Evolutionary Biology* (2020 – present; on leave during 2024)

*Associate Professor* (2017-2020)

*Assistant Professor* (2012-2017)

Yale University, New Haven, CT

Other Yale affiliations: Center for Interdisciplinary Research on AIDS, Computational Biology and Bioinformatics inter-departmental program, Institute for Network Science, Public Health Modeling Concentration

- Received NIH Director's New Innovator Award (\$1.5MM)
- Built and led a research lab of quantitative scientists working on methodology, modeling, causal inference, with applications in biomedicine, infectious disease epidemiology, public health, social science.
- Published 72+ peer-reviewed articles; H-index 26, 3k+ citations.
- Gave 90+ invited presentations at university/industry seminars, legislative briefings, conferences
- Advised/mentored 6 postdoctoral scholars, 7 PhDs, 3 MS students; placed trainees in tenure-track faculty positions, McKinsey & Co, Meta/Facebook, Netflix, US FDA
- Led data science and modeling for Connecticut and Department of Public Health during COVID-19 pandemic
- Taught computational statistics, stochastic modeling, network analysis, causal inference, genetics; instructor rating 4.7/5
- Served as Associate Editor of four top Statistics journals

*Senior Scientist* (2021 – present)

Whitespace LTD, Alexandria, VA

- Led R&D and built analysis tools for geospatial intelligence startup

*Scientific Consultant / Subject Matter Expert* (2018 – present)

I work with private sector and government clients to solve problems in biomedicine, epidemiology, diagnostics, market forecasting, national security, and human rights. Selected clients:

- Twist Bioscience / Revelar Biotherapeutics (South San Francisco, CA)
- Metron Inc (Reston, VA)

- Global Diagnostic Systems (Potomac, MD)
- Re-open Connecticut Advisory Committee, Connecticut Department of Public Health
- US Department of Labor, Project to Accelerate Action Against Child Labor and Forced Labor
- US Department of State, NORC (Bethesda MD), Global Fund to End Modern Slavery

*Graduate Student Researcher*, University of California Los Angeles (2009-2012)

Los Angeles, CA

- Applied mathematics coursework
- Computational biology and evolutionary phylogenetics research

*Research Associate*, Department of Radiology, University of California San Francisco (2002-2006)

San Francisco, CA

- Magnetic resonance imaging software development
- MR and spectroscopic image acquisition and processing
- Statistical computing
- Neuro-oncology research

## Peer-Reviewed Publications

- [1] **Forrest W. Crawford**, K Webster, GL Epstein, D Roberts, J Fair, and S Nevo. “Securing commercial nucleic acid synthesis.” *RAND Report* (2024).
- [2] N Josephs, S Peng, and **Forrest W. Crawford**. “Communication network dynamics in a large organizational hierarchy.” *Annals of Applied Statistics In Press* (2024).
- [3] H Lu, **Forrest W. Crawford**, G S Gonsalves, and L E Grau. “Geographic and temporal trends in fentanyl-involved deaths in Connecticut, 2009-2019.” *Annals of Epidemiology* **79**, 32–38 (2023).
- [4] H Aroke, A Buchanan, N Katenka, **Forrest W. Crawford**, T Lee, ME Halloran, and C Latkin. “Evaluating the Mediating Role of Recall of Intervention Knowledge in the Relationship between a Peer-Driven Intervention and HIV Risk Behaviors among People Who Inject Drugs.” *AIDS & Behavior* **27**, 578–590 (2023).
- [5] J Sun, L Van Baelen, E Plettinckx, and **Forrest W. Crawford**. “Dependence-Robust Confidence Intervals for Capture–Recapture Surveys.” *Journal of Survey Statistics and Methodology* p. smac031 (2022).
- [6] M Erlendsdottir and **Forrest W. Crawford**. “Randomized controlled trials of biomarker targets.” *Clinical Trials* **20**, 47–58 (2022).
- [7] N Josephs, D Feehan, and **Forrest W. Crawford**. “A sample size formula for network scale-up surveys.” *Sociological Methods and Research In press* (2022).
- [8] D J Eck, O Morozova, and **Forrest W. Crawford**. “Randomization for the susceptibility effect of an infectious disease intervention.” *Journal of Mathematical Biology* **85** (2022).
- [9] L V Orr, **Forrest W. Crawford**, K Khoshnood, D Khouri, F M Fouad, D W Seal, and R Heimer. “Sociodemographic Characteristics and HIV Risk Behaviors of Native-Born and Displaced Syrian Men and Transgender Women Who Have Sex with Men in Lebanon.” *AIDS & Behavior* **26**, 4004–4011 (2022).
- [10] T Nguyen-Anh Tran, N B Wikle, F Yang, H Inam, S Leighow, B GentileSCO, P Chan, E Albert, E R Strong, K Brinda, J R Pritchard, L C Madoff, C M Brown, W P Hanage, E M Hanks, **Forrest W. Crawford**, and M F Boni. “SARS-CoV-2 attack rate and population immunity in southern New England, March 2020 - May 2021.” *JAMA Network Open* (2022).
- [11] O Prunas, J L Warren, **Forrest W. Crawford**, S Gazit, T Patalon, D M Weinberger, and V E Pitzer. “Vaccination with BNT162b2 reduces transmission of SARS-CoV-2 to household contacts in Israel.” *Science* **375**, 1151–1154 (2022).
- [12] **Forrest W. Crawford**, S Jones, M Cartter, S G Dean, J L Warren, Zehang Li, J Barbieri, J Campbell, P Kenney, T Valleau, and O Morozova. “Impact of close interpersonal contact on COVID-19 incidence: evidence from one year of mobile device data.” *Science Advances* **8** (2022). (Winner of the Innovative Tradecraft Competition at the US Geospatial Intelligence Foundation 2021 meeting).

- [13] O Schultes, V Clarke, A D Paltiel, M Cartter, L Sosa, and **Forrest W. Crawford**. “COVID-19 Testing and Case Rates and Social Contact Among Residential College Students in Connecticut During the 2020-2021 Academic Year.” *JAMA Network Open* **12**, e2140602 (2021).
- [14] A Zulli, A Pan, S Bart, **Forrest W. Crawford**, E Kaplan, M Cartter, A Ko, M Sanchez, D Cozens, D Brackney, C Brown, and J Peccia. “Predicting daily COVID-19 case rates from SARS-CoV-2 RNA concentrations across a diversity of wastewater catchments.” *FEMS Microbes* **2** (2021).
- [15] O Morozova, Z Li, and **Forrest W. Crawford**. “One year of modeling COVID-19 transmission to support policymakers in Connecticut.” *Scientific Reports* **11**, 20271 (2021).
- [16] X Cai, W W Loh, and **Forrest W. Crawford**. “Identification of causal intervention effects under contagion.” *Journal of Causal Inference* **9**, 9–38 (2021). (Winner of best paper award, ASA Section on Statistics in Epidemiology).
- [17] K Khoshnood, FM Shebl, D Khoury, E Aara, R Barbour, **Forrest W. Crawford**, J Mokhbat, A Parpia, and R Heimer. “Reported History and Correlates of Drug Overdose among People Who Inject Drugs in Lebanon.” *Eastern Mediterranean Health Journal* **27**, 571–579 (2021).
- [18] J Chang, **Forrest W. Crawford**, and EH Kaplan. “Repeat SARS-CoV-2 Testing Models for Residential College Populations.” *Health Care Management Science* **24**, 305–318 (2021).
- [19] E Plettinckx, **Forrest W. Crawford**, J Antoine, L Gremeaux, and L Van Baelen. “How many people injected drugs over the last 12 months in Belgium? Estimates based on a capture-recapture and multiplier method.” *Drug and Alcohol Dependence* **219**, 108436 (2021).
- [20] L Orr, F Shebl, R Heimer, K Khoshnood, R Barbour, D Khouri, E Aaraj, and **Forrest W. Crawford**. “Violence and discrimination against men who have sex with men in Lebanon: the role of international displacement and migration.” *Journal of Interpersonal Violence* **36**, 10267–10284 (2021).
- [21] S Li, **Forrest W. Crawford**, and M Gerstein. “Using sigLasso to optimize cancer mutation signatures jointly with sampling likelihood.” *Nature Communications* **11**, 1–12 (2020).
- [22] D M Weinberger, J Chen, T Cohen, **Forrest W. Crawford**, F Mostashari, D Olson, V E Pitzer, N G Reich, M Russi, L Simonsen, A Watkins, and C Viboud. “Estimation of excess deaths associated with the COVID-19 pandemic in the United States, March to May 2020.” *JAMA Internal Medicine* **180**, 1336–1344 (2020).
- [23] H Shirado, **Forrest W. Crawford**, and N A Christakis. “Collective communication and behaviour in response to uncertain ‘Danger’ in network experiments.” *Proceedings of the Royal Society A* **476**, 20190685 (2020). (Dr. Shirado received the 2020 Marvin B. Sussman Best Dissertation Award in part for this paper).
- [24] N E Dean, P Gsell, R Brookmeyer, **Forrest W. Crawford**, C A Donnelly, S S Ellenberg, T R Fleming, M E Halloran, P Horby, T Jaki, P R Krause, I M Longini, S Mulangu, J Muyembe-Tamfum, M C Nason, P G Smith, R Wang, A M Henao-Restrepo, and V De Gruttola. “Creating a Framework for Conducting Randomized Clinical Trials during Disease Outbreaks.” *New England Journal of Medicine* **382**, 1366–1369 (2020).
- [25] S Cheng, D J Eck, and **Forrest W. Crawford**. “Estimating the size of a hidden finite set: Large-sample behavior of estimators.” *Statistics Surveys* **14**, 1–31 (2020).
- [26] O Morozova, **Forrest W. Crawford**, T Cohen, A D Paltiel, and F L Altice. “Cost-effectiveness of expanding the capacity of opioid agonist treatment in Ukraine: Dynamic modeling analysis.” *Addiction* **115**, 437–450 (2020).
- [27] **Forrest W. Crawford**, F M Marx, J Zelner, and T Cohen. “Transmission modeling with regression adjustment for analyzing household-based studies of infectious disease: application to tuberculosis.” *Epidemiology* **31**, 238–247 (2020). (Runner-up, 2020 Rothman Prize, Epidemiology).
- [28] Z R Li, E Xie, **Forrest W. Crawford**, J L Warren, K McConnell, J T Copple, T Johnson, and G S Gonsalves. “Suspected heroin-related overdoses incidents in Cincinnati, Ohio: A spatiotemporal analysis.” *PLoS Medicine* **16**, e1002956 (2019).
- [29] O Morozova, R E Booth, S Dvoriak, K Dumchev, Y Sazonova, T Salyuk, and **Forrest W. Crawford**. “Divergent estimates of HIV incidence among people who inject drugs in Ukraine.” *International Journal of Drug Policy* **73**, 156–162 (2019).
- [30] **Forrest W. Crawford**, O Morozova, A L Buchanan, and D Spiegelman. “Interpretation of the individual effect under treatment spillover.” *American Journal of Epidemiology* **188**, 1407–1409 (2019).

- [31] L Zeng, J Li, and **Forrest W. Crawford**. “Empirical evidence of recruitment bias in a network study of people who inject drugs.” *American Journal of Drug and Alcohol Abuse* **45**, 460–469 (2019).
- [32] G S Gonsalves and **Forrest W. Crawford**. “Dynamics of the HIV outbreak and response in Scott County, Indiana, 2011-2015: a modelling study.” *The Lancet HIV* **5**, 569–577 (2018).
- [33] P M Aronow, **Forrest W. Crawford**, and J R Zubizarreta. “Confidence intervals for linear unbiased estimators under constrained dependence.” *Electronic Journal of Statistics* **12**, 2238–2252 (2018).
- [34] J Wu, **Forrest W. Crawford**, D A Kim, D Stafford, and N A Christakis. “Exposure, hazard, and survival analysis of diffusion on social networks.” *Statistics in Medicine* **37**, 2561–2585 (2018). (Winner of 2017 WNAR Outstanding Written Paper Award).
- [35] Y Liu and **Forrest W. Crawford**. “Estimating dose-specific cell division and apoptosis rates from chemosensitivity experiments.” *Scientific Reports* **8**, 1–8 (2018).
- [36] L S Ho, **Forrest W. Crawford**, and M A Suchard. “Direct likelihood-based inference for discretely observed stochastic compartmental models of infectious disease.” *Annals of Applied Statistics* **12**, 1993–2021 (2018).
- [37] O Morozova, T Cohen, and **Forrest W. Crawford**. “Risk ratios for contagious outcomes.” *Journal of the Royal Society Interface* **15**, 20170696 (2018).
- [38] **Forrest W. Crawford**, L S Ho, and M A Suchard. “Computational methods for birth-death processes.” *Wiley Interdisciplinary Reviews Computational Statistics* **10**, e1423 (2018).
- [39] **Forrest W. Crawford**, P M Aronow, L Zeng, and J Li. “Identification of homophily and preferential recruitment in respondent-driven sampling.” *American Journal of Epidemiology* **187**, 153–160 (2018).
- [40] J E Pachankis, M L Hatzenbuehler, K Wang, C L Burton, **Forrest W. Crawford**, J C Phelan, and B G Link. “The Burden of Stigma on Health and Wellbeing: A Taxonomy of Concealment, Course, Disruptiveness, Aesthetics, Origin, and Peril across 93 Stigmas.” *Personality and Social Psychology Bulletin* **44**, 451–474 (2018).
- [41] G Gunabushanam, J D Millet, E Stilp, **Forrest W. Crawford**, R L McNamara, and L M Scutt. “Computer-assisted detection of tardus parvus waveforms on Doppler ultrasound.” *Ultrasound* **26**, 81–92 (2018).
- [42] L S Ho, J Xu, **Forrest W. Crawford**, V N Minin, and M A Suchard. “Birth/birth-death processes and their computable transition probabilities with biological applications.” *Journal of Mathematical Biology* **76**, 911–944 (2018).
- [43] G S Gonsalves, **Forrest W. Crawford**, P D Cleary, E H Kaplan, and A D Paltiel. “An Adaptive Approach to Locating Mobile HIV Testing Services.” *Medical Decision Making* **38**, 262–272 (2018).
- [44] **Forrest W. Crawford**, J Wu, and R Heimer. “Hidden population size estimation from respondent-driven sampling: a network approach.” *Journal of the American Statistical Association* **113**, 755–766 (2018).
- [45] A R Bazazi, A Vijay, **Forrest W. Crawford**, R Heimer, A Kamarulzaman, and F L Altice. “HIV testing and awareness of HIV status among people who inject drugs in Greater Kuala Lumpur, Malaysia.” *AIDS Care* **30**, 59–64 (2018).
- [46] J Wu, **Forrest W. Crawford**, M Raag, R Heimer, and A Uusküla. “Using data from respondent-driven sampling to estimate the number of people who inject drugs, with application to the Kohtla-Järve region of Estonia.” *PLoS One* **12**, e0185711 (2017).
- [47] R Heimer, R Barbour, D Khoury, **Forrest W. Crawford**, F Shebl, E Aaraj, and K Khoshnood. “HIV Risk, Prevalence, and Access to Care among Men Who Have Sex with Men in Lebanon.” *AIDS Research and Human Retroviruses* **33**, 1149–1154 (2017).
- [48] L Chen, **Forrest W. Crawford**, and A Karbasi. “Submodular Variational Inference for Network Reconstruction.” *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)* (2017).
- [49] G J Culbert, **Forrest W. Crawford**, A Murni, A Waluyo, A R Bazazi, J Sahar, and F L Altice. “Predictors of Mortality within Prison and after Release among Persons Living with HIV in Indonesia.” *Research and Reports in Tropical Medicine* **8**, 25–35 (2017).
- [50] M Antillón, J L Warren, **Forrest W. Crawford**, D M Weinberger, E Kuruñ, G D Pak, J K Park, F Marks, and V E Pitzer. “The burden of typhoid fever in low- and middle-income countries: a meta-regression approach.” *PLoS Neglected Tropical Diseases* **11**, e0005376 (2017).
- [51] **Forrest W. Crawford**. “The graphical structure of respondent-driven sampling.” *Sociological Methodology*

- 46, 187–211 (2016).
- [52] A Kunkel, **Forrest W. Crawford**, J Shepherd, and T Cohen. “Benefits of continuous isoniazid preventive therapy may outweigh resistance risks in a declining TB/HIV co-epidemic.” *AIDS* **30**, 2715–2723 (2016).
- [53] L Chen, A Karbasi, and **Forrest W. Crawford**. “Estimating the size of a large network and its communities from a random sample.” *Advances in Neural Information Processing Systems* **29** (2016).
- [54] **Forrest W. Crawford**, TC Stutz, and K Lange. “Coupling bounds for approximating birth-death processes by truncation.” *Statistics and Probability Letters* **109**, 30–38 (2016).
- [55] V Pitzer, J Bilcke, E Heylen, **Forrest W. Crawford**, M Van Ranst, M Zeller, and J Matthijnssens. “Did Large-Scale Vaccination Drive Changes in the Circulating Rotavirus Population in Belgium?” *Scientific Reports* **5**, 18585 (2015).
- [56] L Chen, **Forrest W. Crawford**, and A Karbasi. “Seeing the Unseen Network: Inferring Hidden Social Ties from Respondent-Driven Sampling.” In *Proceedings of The 30th AAAI Conference on Artificial Intelligence and the 28th Innovative Applications of Artificial Intelligence Conference*, volume 30 (2015).
- [57] A R Bazazi, **Forrest W. Crawford**, A Zelenev, R Heimer, A Kamarulzaman, and F L Altice. “HIV Prevalence Among People Who Inject Drugs in Greater Kuala Lumpur Recruited Using Respondent-Driven Sampling.” *AIDS & Behavior* **19**, 2347–2357 (2015).
- [58] **Forrest W. Crawford**. “Hidden network reconstruction from information diffusion.” In *18th International Conference on Information Fusion*, pp. 180–185 (2015).
- [59] PM Aronow, A Coppock, **Forrest W. Crawford**, and DP Green. “Combining list experiment and direct question estimates of sensitive behavior prevalence.” *Journal of Survey Statistics and Methodology* **3**, 43–66 (2015).
- [60] **Forrest W. Crawford**, RE Weiss, and MA Suchard. “Sex, lies, and self-reported counts: Bayesian mixture models for longitudinal heaped count data via birth-death processes.” *Annals of Applied Statistics* **9**, 572–596 (2015).
- [61] I Quintero, P Keil, W Jetz, and **Forrest W. Crawford**. “Historical Biogeography Using Species Geographical Ranges.” *Systematic Biology* **64**, 1059–1073 (2015).
- [62] PM Aronow and **Forrest W. Crawford**. “Nonparametric identification for respondent-driven sampling.” *Statistics and Probability Letters* **106**, 100–102 (2015).
- [63] **Forrest W. Crawford** and D Zelterman. “Markov counting models for correlated binary responses.” *Biostatistics* **3**, 427–440 (2015).
- [64] WH Mulder and **Forrest W. Crawford**. “On the distribution of interspecies correlation for Markov mutation models on Yule trees.” *Journal of Theoretical Biology* **364**, 275–283 (2015).
- [65] ES Braun, **Forrest W. Crawford**, MM Desai, J Meek, PD Kirley, L Miller, EJ Anderson, O Oni, P Ryan, R Lynfield, M Bargsten, NM Bennett, KL Lung, A Thomas, E Mermel, M Lindegren, W Schaffner, A Price, and SS Chaves. “Obesity not associated with severity among hospitalized adults with seasonal influenza virus infection.” *Infection* **43**, 569–575 (2015).
- [66] **Forrest W. Crawford**, VN Minin, and MA Suchard. “Estimation for General Birth-Death Processes.” *Journal of the American Statistical Association* **109**, 730–747 (2014).
- [67] **Forrest W. Crawford** and MA Suchard. “Diversity, disparity, and evolutionary rate estimation for unresolved Yule trees.” *Systematic Biology* **62**, 439–455 (2013).
- [68] OG Pybus, MA Suchard, P Lemey, F Bernadin, A Rambaut, **Forrest W. Crawford**, RR Gray, N Arinaminpathy, S Stramer, MP Busch, and E Delwart. “Unifying the spatial epidemiology and evolution of emerging epidemics.” *Proceedings of the National Academy of Sciences USA* **109**, 15066–15071 (2012).
- [69] **Forrest W. Crawford** and MA Suchard. “Transition probabilities for general birth-death processes with applications in ecology, genetics, and evolution.” *Journal of Mathematical Biology* **65**, 553–580 (2012).
- [70] S Saraswathy, **Forrest W. Crawford**, KL Lamborn, A Pirzkall, S Chang, S Cha, and SJ Nelson. “Evaluation of MR markers that predict survival in patients with newly diagnosed GBM prior to adjuvant therapy.” *Journal of Neuro-Oncology* **91**, 69–81 (2008).
- [71] **Forrest W. Crawford**, IS Khayal, C McGue, S Saraswathy, A Pirzkall, S Cha, KR Lamborn, S Chang, MS Berger, and SJ Nelson. “Relationship of pre-surgery metabolic and physiological MR imaging param-

- eters to survival for patients with untreated GBM.” *Journal of Neuro-Oncology* **91**, 337–351 (2008).
- [72] IS Khayal, **Forrest W. Crawford**, S Saraswathy, KR Lamborn, SM Chang, S Cha, TR McKnight, and SJ Nelson. “Relationship between choline and apparent diffusion coefficient in patients with gliomas.” *Journal of Magnetic Resonance Imaging* **27**, 718–725 (2008).
- [73] JC Crane, **Forrest W. Crawford**, and SJ Nelson. “Grid enabled magnetic resonance scanners for near real-time medical image processing.” *Journal of Parallel and Distributed Computing* **66**, 1524–1533 (2006).
- [74] S Cha, T Tihan, **Forrest W. Crawford**, NJ Fischbein, S Chang, A Bollen, SJ Nelson, M Prados, MS Berger, and WP Dillon. “Differentiation of low-grade oligodendrogliomas from low-grade astrocytomas by using quantitative blood-volume measurements derived from dynamic susceptibility contrast-enhanced MR imaging.” *American Journal of Neuroradiology* **26**, 266–273 (2005).
- [75] X Li, DB Vigneron, S Cha, EE Graves, **Forrest W. Crawford**, SM Chang, and SJ Nelson. “Relationship of MR-derived lactate, mobile lipids, and relative blood volume for gliomas in vivo.” *American Journal of Neuroradiology* **26**, 760–769 (2005).

## Commentaries, Discussions, and Op-Eds

- [1] G S Gonsalves and **Forrest W. Crawford**. “How Mike Pence Made Indiana’s HIV Outbreak Worse.” *Politico* (2020).
- [2] G S Gonsalves and **Forrest W. Crawford**. “Lessons learned from the Indiana HIV outbreak.” *HIV Specialist* **10** (2018).
- [3] **Forrest W. Crawford**. “Discussion of “Co-authorship and citation networks for statisticians” by Pengsheng Ji and Jiashun Jin.” *Annals of Applied Statistics* **10** (2016).

## Submitted Manuscripts

- [1] J Sun and **Forrest W. Crawford**. “The role of discretization scales in causal inference with continuous-time treatment.” *Submitted* (2023).
- [2] S Schulz, R Pastor, C Koyuncuoglu, **Forrest W. Crawford**, D Zernick, A Karch, and S Rüdiger. “Real-time Dissection and Forecast of Infection Dynamics during a Pandemic.” *Submitted* (2023).
- [3] J Sun and **Forrest W. Crawford**. “Causal identification for continuous-time stochastic processes.” *Submitted* (2024). (Winner of Best Student Paper award at 2023 Lifetime Data Science Conference (LiDS)).
- [4] M Erlendsdottir, S Eshghi, and **Forrest W. Crawford**. “Modeling COVID-19 care capacity in a major health system.” *Submitted* (2021).
- [5] X Cai, E Kenah, and **Forrest W. Crawford**. “Causal identification of infectious disease intervention effects in a clustered population.” *Submitted* (2021).

## Working Papers

- [1] A Djorno and **Forrest W. Crawford**. “Mutually exciting point processes for crowdfunding platform dynamics.” *Working Paper* (2024).
- [2] Y Zhang, O Morozova, and **Forrest W. Crawford**. “Two perspectives on direct effects under interference.” *Working Paper* (2024).
- [3] M Battaglini, **Forrest W. Crawford**, E Patacchini, and S Peng. “A Graphical Lasso Approach to Estimating Network Connections: The Case of U.S. Lawmakers.” *Working Paper* (2020).

## Presentations

### 2024

AI and the Next Pandemic Panel, University College Dublin  
 Statistical Methods for Infectious Diseases Workshop, Pennsylvania State University  
 Provost’s AI Task Force Panel, Yale

**2023**

Seminar, Department of Statistics & Actuarial Science, University of Iowa  
Invited talk, Public Health Conversation, Boston University School of Public Health  
Seminar, RAND Corporation  
Invited talk, Brown CFAR Symposium on Statistics and Data Science in HIV  
Seminar, Department of Statistics, University of Washington

**2022**

Seminar, X, The Moonshot Factory (Alphabet/Google)  
Seminar, Mailman School of Public Health, Columbia University  
Seminar, Department of Biostatistics, McGill University, Montréal  
Seminar, Health Policy, Harvard Medical School  
Invited talk, Joint Statistical Meetings, Washington D.C.  
Invited talk, International Society for Bayesian Analysis annual meeting, Montréal  
American Causal Inference Conference, Berkeley, CA  
Seminar, Centre de Recherches Mathématiques, Université de Montréal  
Seminar, Research at Yale Speaker Series  
Invited talk, Utah Winter Operations Conference

**2021**

Invited talk, CMStatistics  
Seminar, Department of Statistics, University of Florida  
Seminar, Department of Biostatistics, Boston University  
Invited talk, Joint Statistical Meetings 2021  
Invited talk, ENAR 2021  
Invited talk, Causal Inference Reading Group, Department of Biostatistics, Columbia University  
Plenary, National Science Foundation, Division of Mathematical Sciences Student Conference on COVID-19 Modeling  
Seminar, Operations, Yale School of Management  
Seminar, Yale Occupational and Environmental Medicine Conference Series

**2020**

Panelist, Yale Day of Data  
COVID-19 Briefing to CT house Republican Caucus  
COVID-19 Briefing to CT house Democratic Caucus  
Invited talk, Society of Mathematical Biology Annual Meeting  
Panelist, Yale Engage: “Surveillance and Modeling: A new normal for business operations post-COVID”  
Seminar, Institute for Mathematics and its Applications, University of Minnesota  
Seminar, Department of Biostatistics, Yale School of Public Health  
Invited Talk, Dean’s Workshop, Yale School of Medicine  
Invited talk, Eastern North American Region of the International Biometric Society  
Invited talk, COVID-19 HASTE Workshop, Yale School of Engineering & Applied Science  
Invited talk, Mathematical modelling and statistical analysis of infectious disease outbreaks, Centre International de Rencontres Mathématiques, Marseille, France  
Seminar, Center for Empirical Research on Stratification and Inequality, Yale Department of Sociology

**2019**

Invited session, American Mathematical Society Special Session on Stochastic Processes, Probability & Integration Theory, Riverside, CA  
Seminar, National Institute of Allergy and Infectious Diseases, Division of Clinical Research – Biostatistics Research Branch, Bethesda, MD  
Seminar, Department of Statistical Science, Duke University  
Seminar, Department of Statistics, University of Connecticut  
Invited session, Joint Statistical Meetings, Denver, CO

Invited session, Society of Mathematical Biology, Montréal, Canada  
Plenary, Journées de Statistique, Nancy, France  
Invited session, New England Statistics Symposium  
Seminar, Data Science, Brown University  
Seminar, Microsoft Research  
Seminar, Department of Biostatistics, University of North Carolina

### **2018**

Seminar, Department of Statistical Sciences, University of Toronto  
Seminar, Center for Interdisciplinary Research on AIDS  
Career panel, New England Statistical Society NextGen Data Science Day  
Seminar, College of Public Health, Ohio State University  
Seminar, Yale HIV Research Club  
Seminar, Health Policy & Management, Yale School of Public Health  
Invited session, Joint Statistical Meetings, Vancouver, BC  
Invited session, Network Causal Inference and Design of Experiments Satellite, NetSci, Paris  
Webinar, European Monitoring Centre for Drugs and Drug Addiction  
Seminar, Department of Biostatistics, University of Washington  
WHO Blueprint Plan of Action workshop, Harvard T. H. Chan School of Public Health  
Seminar, Department of Biostatistics, Harvard T. H. Chan School of Public Health  
Seminar, Department of Politics, New York University  
Seminar, Department of Biostatistics and Epidemiology, University of Massachusetts Amherst

### **2017**

Seminar, Yale Institute for Network Science  
Seminar, Departments of Biostatistics and Epidemiology, Harvard T. H. Chan School of Public Health  
Seminar, Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health  
Joint Statistical Meetings, Baltimore, MD  
SIMID Workshop, Antwerp, Belgium  
Seminar, Department of Statistics, North Carolina State University  
New England Statistics Symposium, Storrs, CT  
Seminar, Veteran's Affairs Healthcare System, West Haven, CT  
Seminar, Department of Statistics, Simon Fraser University, BC, Canada  
New England HIV Implementation Science Network symposium, Providence, RI  
Seminar, Department of Statistics, Harvard University

### **2016**

International Chinese Statistical Association, Shanghai, China  
Seminar, Shanghai Jiao Tong University, Shanghai, China  
Seminar, Network Science Institute, Northeastern University, Boston, MA  
Networks in Public Health Workshop, Center for Interdisciplinary Research on AIDS, Yale  
Discussant, Theory of Agnostic Statistics, Yale  
Joint Statistical Meetings, Chicago, IL  
International Biometric Conference, Victoria, BC, Canada  
Political Networks, Washington University, St. Louis, MO  
Atlantic Causal Inference Conference, New York, NY  
Causal Inference with Highly Dependent Data in Communicable Diseases Research, Harvard  
Workshop on Incomplete Network Data, Sandia National Labs, Livermore, CA  
Center for Communicable Disease Dynamics at the Harvard T.H. Chan School of Public Health  
Center for Research on Inequalities and the Life Course, Yale  
Operations Department, Yale School of Management

### **2015**

Seminar, Biostatistics, Brown University School of Public Health, Providence, RI



Seminar, Biostatistics and Biomathematics, Fred Hutchinson Cancer Research Center, Seattle, WA  
 Yale Day of Data  
 Seminar, Department of Statistics, University of Wisconsin, Madison, WI  
 Invited talk, FUSION, Washington, DC  
 Computational Social Science Summit, Chicago, IL  
 Invited talk, Statistical Society of Canada Meeting, Halifax, NS  
 Invited talk, New England Statistics Symposium, Storrs, CT  
 Public Health Modeling Seminar; Yale, New Haven CT  
**2014**  
 Yale Institute for Network Science; Yale, New Haven CT  
 Center for Interdisciplinary Research on AIDS, Yale  
 Joint Statistical Meetings, Boston, MA  
 UNAIDS workshop on population size estimation, University of Massachusetts Amherst, Amherst, MA  
 Invited panelist, career development session, New England Statistics Symposium; Boston, MA  
 INSNA Sunbelt Conference, St. Petersburg, FL  
 Invited talk, INFORMS Optimization Society Conference; Rice University, Houston, TX  
 Seminar, Public Health Modeling Seminar; Yale, New Haven CT  
 Seminar, MacMillan Center for the Study of American Politics Workshop on Quantitative Research Methods; Yale University, New Haven, CT  
**2013**  
 Seminar, Department of Biostatistics; Harvard School of Public Health, Boston, MA  
 Seminar, Department of Statistics; University of Connecticut, Storrs, CT  
 Contributed Talk, Joint Statistical Meetings; Montréal, Canada  
 Institute of Mathematical Statistics New Researchers Conference; Montréal, Canada  
 Invited talk, New England Statistics Symposium; Storrs, CT  
 Seminar, Ecology and Evolutionary Biology Department, Yale; New Haven CT  
**2012**  
 Contributed talk, SuSTaIn workshop; Bristol, UK  
 Contributed talk, Joint Statistical Meetings; San Diego, CA  
 Poster, International Society for Bayesian Analysis; Kyoto, Japan  
 Seminar, Carnegie Mellon Statistics; Pittsburgh, PA  
 Seminar, Yale Biostatistics; New Haven, CT  
**2011**  
 Case Studies in Bayesian Statistics and Machine Learning; Pittsburgh, PA  
**2010-2012**  
 Systems and Integrative Biology Retreat; Los Angeles, CA  
**2006**  
 International Society for Magnetic Resonance in Medicine Scientific Meeting; Seattle, WA  
**2004**  
 International Society for Magnetic Resonance in Medicine Scientific Meeting; Kyoto, Japan  
 American Society for Neuroradiology Scientific Meeting; Seattle, WA  
 Advances in Imaging Research Symposium; San Francisco, CA

## Awards & Recognition

2021 Runner-up, Rothman Prize, Epidemiology, for “Transmission Modeling with Regression Adjustment for Analyzing Household-based Studies of Infectious Disease: Application to Tuberculosis”  
 2020 Best paper award, “Identification of causal intervention effects under contagion”, ASA Section on Statistics and Epidemiology

2019 Best Biostatistics Thesis Award, MS advisee Ning Zhang  
2018 Best undergraduate Statistics & Data Science Thesis, Undergraduate research advisee Evaline Xie  
2017 WNAR outstanding written paper award for “Exposure, hazard, and survival analysis of diffusion on social networks”  
2016 NIH Director’s New Innovator Award (\$1.5M)  
2014 Yale Center for Clinical Investigation Scholar Award  
2012 Travel Award, SuSTaIn workshop  
2012 Travel Award, International Society for Bayesian Analysis  
2012 Travel Award, Statistical Analysis of Neural Data  
2011 Young Researcher presentation, Case Studies in Bayesian Statistics and Machine Learning  
2011 Travel Award, Case Studies in Bayesian Statistics and Machine Learning  
2011 Travel Award, Summer Institute in Statistics and Modeling Infectious Disease  
2010 Travel Award, Bayesian Nonparametric Statistical Methods  
2011-2012 Regents Fellowship  
2010-2011 University Fellowship  
2008-2012 NIH Systems and Integrative Biology Training Grant

## Professional activities

### **Associate Editor:**

2020- Observational Studies  
2016-2023 Annals of Applied Statistics  
2017-2020 Journal of the American Statistical Association (Theory & Methods)  
2013-2016 Statistics and Probability Letters

**Reviewer:** American Journal of Epidemiology, Annals of Applied Statistics, Annals of Statistics, Australian & New Zealand Journal of Statistics, Biometrics, Biometrika, Biostatistics, BMC Public Health, BMJ Open, Clinical Infectious Diseases, Clinical Trials, Computational Statistics and Data Analysis, Electronic Journal of Statistics, Epidemiologic Methods, Epidemiologic Reviews, Epidemiology, INFORMS Journal on Applied Analytics, International Journal of Drug Policy, Journal of the American Statistical Association, Journal of Official Statistics, Journal of Mathematical Biology, Journal of Molecular Evolution, Journal of Theoretical Biology, Journal of the Royal Society Interface, Journal of the Royal Statistical Society, Journal of Survey Statistics and Methodology, Journal of Urban Health, Medical Decision Making, PloS One, Proceedings of the National Academy of Sciences, Sociological Methodology, Statistical Science, Statistical Methods in Medical Research, Statistics and Probability Letters, Statistics in Medicine, Survey Methodology

**Advisory Panels:** Expert panel to review MAP Project to Accelerate Action Against Child Labor and Forced Labor, US Department of Labor, July 2020

Expert Panel on Evaluation of Program to End Modern Slavery, US State Department, August 2020

Re-open Connecticut Advisory Panel, April–June 2020

Technical Advisory and Peer-Review Panel, Global Fund to End Modern Slavery, 2019-present

World Health Organization Blueprint Plan of Action: Combining evidence from randomized trials across outbreaks  
March 2018

**Member:** American Statistical Association, Institute of Mathematical Statistics, International Biometric Society, New England Statistical Society, American Public Health Association

**Grant review/Study section:** United States Department of Labor, NIH Director’s New Innovator Award, National Institute on Drug Abuse, Advancing Exceptional Research on HIV/AIDS and Substance Abuse, Office of Behavioral and Social Sciences Research, National Institutes of Health, Joint NSF/NIH Initiative on Quantitative Approaches to Biomedical Big Data, Center for Interdisciplinary Research on AIDS

## Mentoring

### Postdocs

Nathaniel Josephs, Assistant Professor, Department of Statistics, North Carolina State University

Olga Morozova, Assistant Professor, Department of Public Health Sciences, Biological Sciences Division, University of Chicago

Zehang Richard Li, Assistant Professor, Department of Statistics, UC Santa Cruz

Daniel J. Eck, Assistant Professor, Department of Statistics, University of Illinois Urbana-Champaign

Soheil Eshghi, Associate, McKinsey & Company

Yushuf Sharker, Center for Drug Evaluation and Research, US Food and Drug Administration

### PhD students

Samantha Dean (current), Biostatistics

Alexandra Djorno (current), Statistics & Data Science

Yichi Zhang (current), Biostatistics

Jinghao Sun, Biostatistics, Postdoc, Center for Causal Inference, University of Pennsylvania

Xiaoxuan Cai, Assistant Professor, Department of Statistics, The Ohio State University

Margret Erlendsdottir, MD/PhD Biostatistics

### MS students

Ning Zhang, Biostatistics (Winner of best Biostatistics Thesis Award), now at UNC Biostatistics

Natalee Desotell, Epidemiology of Microbial Diseases

Si Cheng, Biostatistics, now at University of Washington Biostatistics

Jiacheng Wu, PhD in Biostatistics, University of Washington Biostatistics. Now at Facebook.

Elise Braun, Biostatistics

Sarah Elfenbein, Computational Biology & Bioinformatics

### Undergraduates

Evaline Xie, Statistics & Data Science (Winner of best undergraduate Statistics & Data Science Thesis)

### PhD dissertation committee

Julian Zhou, Computational Biology & Bioinformatics

Hirokazu Shirado, Sociology

Kristina Yim, Genetics

Olga Morozova, Epidemiology of Microbial Diseases

Gregg Gonsalves, Epidemiology of Microbial Diseases

Joe Lewnard, Epidemiology of Microbial Diseases

Shantao Li, Computational Biology and Bioinformatics

Yiming Hu, Biostatistics

Ignacio Quintero, Ecology and Evolutionary Biology

Xiu Huang, Computational Biology and Bioinformatics

Ken Hui, Computational Biology and Bioinformatics

### PhD qualifying committee

Marina Antillon, Epidemiology of Microbial Diseases

Alexander Bazazi, Epidemiology of Microbial Diseases

### MD thesis committee

John Millet, MD. (Radiology)

### Academic advising

MS academic advisee: Yunwei Wang, Biostatistics

PhD academic advisee: Briana Cameron, Biostatistics

MS academic advisee: Wei Jiang, Biostatistics

MS academic advisee: Xiaotian Wu, Biostatistics

### Other

International AIDS trainee: Aleksandr Sirotkin

## University service

2022-2023 Co-Director (with A. David Paltiel), Public Health Modeling Concentration  
2019 NESS Program Committee  
2018 YSPH Diversity Committee  
2017-2018 Co-Director (with Virginia E. Pitzer), Public Health Modeling Concentration  
2013 CBB Admissions committee  
2012-2014 Department of Biostatistics seminar chair

## Teaching

2020-2022 BIS 534 Stochastic models  
2019,2021 Summer Course in Public Health Modeling  
2013-2017 BIS 557A Computational Statistics, Yale School of Public Health  
2016 BIS 600 Advanced Causal and Network Statistics, Yale School of Public Health (with P. M. Aronow)  
2013 FSCI 6302 Population genetics, University of West Indies Mona, Jamaica