Richard Creswell

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Oxford, England

Research Interests

- Statistical inference for challenging time series models.
- Epidemiology and computational biology of infectious diseases.
- Efficient inference for applied Bayesian nonparametrics.

Present Positions

Eric and Wendy Schmidt AI in Science Postdoctoral Fellow *Starting 2024 Jan.*
Department of Computer Science, University of Oxford, Oxford, England

Associate Research Fellow 2023 July–
Reuben College, University of Oxford, Oxford, England

EPSRC Doctoral Prize Researcher 2023 July–
Department of Computer Science, University of Oxford, Oxford, England

Past Positions

Doctoral Student 2019 Oct–2023 July
Department of Computer Science, University of Oxford, Oxford, England

Research Associate 2017 July–2019 Sep.
Massachusetts Host-Microbiome Center, Brigham & Women's Hospital,
Harvard Medical School, Boston, Massachusetts

Education

Doctor of Philosophy, **Computer Science** *(in progress; anticipated 2023)*
University of Oxford, Oxford, England

Master of Science, **Applied Mathematics**
Columbia University, New York, New York

Bachelor of Science, **Applied Physics *summa cum laude***
Columbia University, New York, New York

Teaching

Teaching demonstrator on the following modules at Oxford:

- SABS Software engineering (2020–2021, 2021–2022, 2022–2023).
- SABS Mathematical modelling (Michaelmas 2020).
- SABS Scientific computing (Hilary 2021).
- SABS Simulated data and reproducible data analysis (Summer 2021).
- UNIQ+ Machine Learning and Bayesian Inference training session (Summer 2021).

Supervision

Co-supervisor for the following students:

- Kit Gallagher (rotation student and subsequent research projects, 2022–).
- Talal Ali (UNIQ+ research intern, 2023).
- Kamil Ebanks (UNIQ+ research intern, 2023).
- Katherine Shepherd (rotation student and PhD, 2022–2023).
- Ioana Bouros (rotation and PhD, 2021–2023).

Other Activities

Bayesian Nonparametrics Reading Group 2023 Mar.–

- Founding member of a reading and study group for Bayesian nonparametrics at Oxford.

Statistical Consultant 2022 Aug.–2023 Mar.
Oxford University Innovation UKHSA COVID-19 Testing Evaluation

- I worked as a statistical consultant for Oxford University Innovation (OUI) in a collaboration with Ernst & Young (EY) to conduct an impartial retrospective analysis of the COVID-19 testing program in England, commissioned by the UK Health Security Agency (UKHSA).

Co-founder of Oxford Statistical Epidemiology Reading Group 2022 Oct.–2023 Mar.

- I co-founded and organized the Oxford Statistical Epidemiology Reading Group, a biweekly journal club covering epidemiology, statistics, modelling, and related fields.

CoMo-DTC COVID-19 Collaboration Organizing Team 2020 Oct.–2022 Mar.

- I joined the organizing team for the collaboration between Oxford's and Cornell's COVID-19 International Modelling Consortium (CoMo) and the Doctoral Training Centre (DTC) at Oxford. Our work included investigating the development of high-quality software for CoMo's model of COVID-19 transmission, and implementing a hierarchy of compartmental transmission models for purposes of model comparison. A particular focus of our work was developing software, a web app, and pedagogical notebooks to help introduce newcomers to the field of epidemiological modelling.

Bioinference Conference Organizing Committee 2021 Sep.–2023 May

- I worked on the organizing committees for the Bioinference 2022 and Bioinference 2023 conferences, which were funded by the London Mathematical Society, the Heilbronn Institute, and the Oxford Computer Science department.

Shakespeare Appreciation Society 2022 Oct.–

- Leading participant in the Shakespeare Society at the University of Munich, which runs regular virtual screenings and discussions of Shakespeare's plays and other relevant literature.

Skills

Programming: Python, C, C++, R, MATLAB, Stan.
Other computing: MPI, Unix/Linux, SQL, Git, LSF, Slurm, AWS EC2, object-oriented programming, software testing, continuous integration.
Design and web: LaTeX, Blender, Illustrator, Inkscape, matplotlib, Plotly Dash, Flask.
Other: Office for National Statistics (ONS) Full accredited researcher.

Honors, Awards, and Funding

- Schmidt AI in Science Fellowship (2023)—**£70,594** funding to conduct research on machine learning for epidemiological time series.
- EPSRC Doctoral Prize (2022)—**£27,221** funding to continue research at Oxford after finishing my DPhil.
- Invited one-week research visit to Colorado State University, Fort Collins (2022).
- Computer Science Scholarship (Oxford Department of Computer Science, 2019).
- EPSRC Doctoral Training Partnership (2019).
- Applied Physics Faculty Award (Columbia University, 2016).
- C. Prescott Davis Scholar (Columbia University, 2016).

References

- David Gavaghan (Professor of Computational Biology, University of Oxford).
  david.gavaghan@dtc.ox.ac.uk
- Ben Lambert (Senior Lecturer of Mathematics, University of Exeter).
  ben.c.lambert@gmail.com

Publications and Presentations

Journal papers

- B. Lambert, C. L. Lei, M. Robinson, M. Clerx, **R. Creswell,** S. Ghosh, S. Tavener, and D. J. Gavaghan: "Autocorrelated measurement processes and inference for ordinary differential equation models of biological systems," *Journal of the Royal Society Interface*, vol. 20 (2023).
- **R. Creswell,** M. Robinson, D. Gavaghan, K. V. Parag, C. L. Lei, and B. Lambert: "A Bayesian nonparametric method for detecting rapid changes in disease transmission," *Journal of Theoretical Biology*, vol. 558 (2023).
- **R. Creswell,**† D. Augustin,† I. Bouros,† H. J. Farm,† S. Miao,† A. Ahern,† M. Robinson, A. Lemenuel-Diot, D. Gavaghan, B. Lambert, and R. N. Thompson: "Heterogeneity in the onwards transmission risk between local and imported cases affects practical estimates of the time-dependent reproduction number," *Philosophical Transactions of the Royal Society, A,* vol. 380 (2022).
- S. A. van der Vegt,† L. Dai,† I. Bouros,† H. J. Farm,† **R. Creswell,**† O. Dimdore-Miles,† I. Cazimoglu, S. Bajaj, L. Hopkins, D. Seiferth, F. Cooper, C. L. Lei, D. Gavaghan, and B. Lambert: "Learning transmission dynamics modelling of COVID-19 using comomodels," *Mathematical Biosciences,* vol. 349 (2022).
- **R. Creswell,**† J. Tan,† J. W. Leff, B. Brooks, M. A. Mahowald, R. Thieroff-Ekerdt, and G. K. Gerber: "High resolution temporal profiling of the human gut microbiome reveals consistent and cascading alterations in response to dietary glycans," *Genome Medicine,* vol. 12 (2020).
- E. Bogart, **R. Creswell,** and G. K. Gerber: "MITRE: inferring features from microbiota time-series data linked to host status," *Genome Biology,* vol. 20 (2019).
- D. Zhang, D. Z.-R. Wang, **R. Creswell,** C. Lu, J. Liou, and I. P. Herman: "Passivation of CdSe Quantum Dots by Graphene and MoS_2 Monolayer Encapsulation," *Chemistry of Materials,* vol. 27, no. 14, pp. 5032–5039 (2015).

(†= joint first authorship.)

Conference and workshop papers (refereed)

- **R. Creswell,** M. K. Gibson, T. E. Gibson, J. W. Leff, and G. K. Gerber: "A multi-level Bayesian nonparametric model of longitudinal responses of the human microbiota to dietary interventions," *ICML and IJCAI Workshop on Computational Biology*, Stockholm, Sweden (2018).

Other publications

- **EY–Oxford Health Analytics Consortium:** *Evaluation of the national COVID-19 testing programme in England between October 2020 and March 2022* (2023).

Preprints

- **R. Creswell,** K. M. Shepherd, B. Lambert, G. R. Mirams, C. L. Lei, S. Tavener, M. Robinson, and D. J. Gavaghan: "Understanding the impact of numerical solvers on inference for differential equation models," arXiv:2307.00749 (2023).
- K. Gallagher, **R. Creswell,** D. Gavaghan, and B. Lambert: "Identification and Attribution of Weekly Periodic Trends in Epidemiological Time Series Data," medRxiv:2023.06.13.23290903 (2023).
- R. Naidoo, B. Andersen-Waine, P. Dahal, S. Dickinson, B. Lambert, M. C. Mills, C. Molyneux, E. Rowe, S. Pinto-Duschinsky, K. Stepniewska, R. Shretta, M. Voysey, M. Wanat, G. Yenidogan, L. J. White, **and the EY-Oxford Health Analytics Consortium:** "A multistage mixed-methods evaluation of the UKHSA testing response during the COVID-19 pandemic in England," medRxiv:2022.10.27.22281604 (2022).
- K. Gallagher,† I. Bouros,† N. Fan,† E. Hayman,† L. Heirene,† P. Lamirande,† A. Lemenuel-Diot, B. Lambert, D. J. Gavaghan, **and R. Creswell:** "Epidemiological Agent-Based Modelling Software (Epiabm)," arXiv:2212.04937 (2022).
- **R. Creswell,** B. Lambert, C. L. Lei, M. Robinson, and D. Gavaghan: "Using flexible noise models to avoid noise model misspecification in inference of differential equation time series models," arXiv:1410.5093 (2020).

Talks

- Inference for Expensive Systems in Mathematical Biology, Oxford, England (2022).
- Microbiome Mini-Symposium (on the event of the visit of the Wageningen University Microbiology Laboratory to Harvard Medical School), Boston, Massachusetts (2019).
- Forum for Advanced Biomedical Computation, Boston, Massachusetts (2018).
- MIT-Harvard Microbiome Symposium, Cambridge, Massachusetts (2018).

Poster presentations

- The Royal Society, Modelling the Covid-19 Pandemic: Achievements and Lessons, London, England (2022).
- Brigham & Women's Hospital Pathology Research Celebration, Boston, USA (2019).
- MIT-Harvard Microbiome Symposium, Cambridge, USA (2019).
- ICML and IJCAI Workshop on Computational Biology, Stockholm, Sweden (2018).
- Harvard Medical School Pathology Research Retreat, Boston, USA (2018).
- MIT-Harvard Microbiome Symposium, Cambridge, USA (2018).
- Computational Aspects of Biological Information, Microsoft Research New England, Cambridge, USA (2018).