Objective

I extend the paradigm of Bayesian inference to cope with the challenges posed by modern machine learning techniques, simulation models, and large scale data.

Education / Qualifications

2016-2021
PhD in Statistical Science (Oxford-Warwick Statistics Programme)
Time at Oxford (1 year), Warwick (2 years), Alan Turing Institute (2 years); research visits at Duke (4 months), Amazon Research (5 months), and DeepMind (4 months).

2012-2016
Econometrics & Operations Research, BSc & MSc (Maastricht University)
Cum laude (for both BSc & MSc), ranked in top 1%, best thesis award, honours programme, Klaus-Murmann Fellow of the Foundation of German Business

2011
Abitur (Deutschorden-Gymnasium/Teutonic Order College Bad Mergentheim)
Ranked in top 1% in my federal state, 4 awards for outstanding academic achievement

Professional History

07/2021—present
Lecturer & EPSRC Fellow, UCL, Department of Statistical Science

10/2020—07/2021
Biometrika Fellow in Statistical Science, UCL, Department of Statistical Science

03/2018–-10/2020
Visiting Researcher at the Alan Turing Institute
Work on *Clean Air in London* (with London's Major's office) and *diabetic retinopathy* (with the Finnish Centre for AI).

Grants

07/2022——07/2025
EPSRC Fellow: Optimisation-centric Generalisations of Bayesian Inference (PI)
£325,660; 3-year research fellowship with 100% buyout to establish my research group on generalised Bayesian methods building on the work in my PhD thesis.

03/2024——03/2025
EPSRC Small Grant: Robust Foundations for Bayesian Inference (Co-I)
£59,985; 1-year project with 7.5% buyout to develop coherent and widely applicable ways of talking about, measure, and provably guarantee robustness.

10/2021—-07/2022
Biometrika Fellowship: Generalising Bayesian Inference (PI)
£122,232; 2-year fellowship to transition to research independence.

Publications & Preprints (2019—2023)

Working Papers

Altamirano, M., Briol, F. -X., & **Knoblauch, J.** (2023). Robust and Conjugate Gaussian Process Regression. Submitted to *International Conference on Artificial Intelligence and Statistics* 10.48550/arXiv.2311.00463

Dewaskar, M., Tosh, C., **Knoblauch, J.**, & Dunson, D. B. (2023). Robustifying likelihoods by optimistically re-weighting data. Submitted to *Journal of the American Statistical Association* http://arxiv.org/abs/2303.10525v1

Naslidnyk, M., Bharti, A., **Knoblauch, J.**, & Briol, F. -X. (2023). Robust Empirical Bayes for Gaussian Processes. Close to submission. https://tinyurl.com/4sjvzbck

Journals

Matsubara, T., **Knoblauch, J.**, Briol, F. X., & Oates, C. J. (2023). Generalized Bayesian Inference for Discrete Intractable Likelihood. *Journal of the American Statistical Association*, 1-11.

Knoblauch, J., Jewson, J., & Damoulas, T. (2022). An Optimization-centric View on Bayes' Rule: Reviewing and Generalizing Variational Inference. *Journal of Machine Learning Research*, *23*.

Matsubara, T., **Knoblauch, J.**, Briol, F., & Oates, C. J. (2022). Robust generalised Bayesian inference for intractable likelihoods. *Journal of the Royal Statistical Society: Series B*, *84*(3), 997-1022.

Jaskari, J., Sahlsten, J., Damoulas, T., **Knoblauch, J.**, Sarkka, S., Karkkainen, L., Hietala, K., & Kaski, K. (2022). Uncertainty-Aware Deep Learning Methods for Robust Diabetic Retinopathy Classification. *IEEE Access*, *10*, 76669-76681.

Peer-Reviewed Conferences

Wild, V. D., Ghalebikesabi, S., Sejdinovic, D., & **Knoblauch, J.** (2023). A Rigorous Link between Deep Ensembles and (Variational) Bayesian Methods. In *Advances in Neural Information Processing Systems*. Massachusetts Institute of Technology Press.

Altamirano, M., Briol, F. X., & **Knoblauch, J.** (2023). Robust and Scalable Bayesian Online Changepoint Detection. In *40th International Conference on Machine Learning, ICML 2023* (pp. 642-663).

Dellaporta, C., **Knoblauch, J.**, Damoulas, T., & Briol, F. -X. (2022). Robust Bayesian inference for simulator-based models via the MMD posterior bootstrap. In *International Conference on Artificial Intelligence and Statistics* (pp. 943-970).

Husain, H., & **Knoblauch, J.** (2022). Adversarial Interpretation of Bayesian Inference. In *Proceedings of The 33rd International Conference on Algorithmic Learning Theory* Vol. 167 (pp. 553-572). Paris, France: Proceedings of Machine Learning Research (PMLR).

Maroñas, J., Hamelijnck, O., **Knoblauch, J.**, & Damoulas, T. (2021). Transforming Gaussian Processes With Normalizing Flows. In

International Conference on Artificial Intelligence and Statistics (pp. 1081-1089).

Schmon, S. M., Cannon, P. W., & **Knoblauch, J.** (2020). Generalized Posteriors in Approximate Bayesian Computation. In *Third Symposium on Advances in Approximate Bayesian Inference*.

Knoblauch, J., Husain, H., & Diethe, T. (2020). Optimal Continual Learning has Perfect Memory and is NP-HARD. In *37th International Conference on Machine Learning, ICML 2020* (pp. 5283-5293).

Knoblauch, J., Jewson, J., & Damoulas, T. (2018). Doubly robust Bayesian inference for non-stationary streaming data with β-divergences. In *Advances in Neural Information Processing Systems* Vol. 2018-December (pp. 64-75).

Knoblauch, J., & Damoulas, T. (2018). Spatio-temporal Bayesian on-line changepoint detection with model selection. In *35th International Conference on Machine Learning, ICML 2018* (pp. 4260-4270).

Technical Reports

Knoblauch, J. (2019). Robust Bayesian Inference for Discrete Outcomes with the Total Variation Distance. https://arxiv.org/abs/2010.13456

Knoblauch, J. (2019). Robust deep gaussian processes. https://arxiv.org/abs/1904.02303

Knoblauch, J. (2019). Frequentist Consistency of Generalised Variational Inference. https://arxiv.org/abs/1912.04946

Prizes, Awards and Other Honours

Facebook Fellowship Award (10/2019—10/2021)
Grant of around $212,000 awarded to 21 of >1,000 applicants. First UK-based Fellow.

John Copas Award (05/2022)
Warwick University's best PhD thesis in statistics award

Artificial Intelligence and Statistics (AISTATS) Best Paper Award (04/2022).
Awarded to best paper out of 1685 submissions.

Neural Information Processing Systems (NeurIPS) Oral (12/2023)
Awarded to <1% out of >12,000 submissions as a marker of quality and significance.

Invitation to the Heidelberg Laureate Forum (HLF) (09/2020)
The HLF is a meeting between a hand-picked selection of young researchers, and laureates from maths and CS (winners of the Abel Prize, ACM A.M. Turing Award, ACM Prize in Computing, Fields Medal, IMU Abacus Medal and Nevanlinna Prize).

Best Poster Awards
07/2023 ICML @ G-Research
    £1000; >30 pre-selected ICML papers; judged by senior research staff
10/2019 PhD summit @ Facebook
    £500; >20 pre-selected students presenting; judged by Dr. Eytan Bakshy

Academic Supervision

Research group leadership
I established a new research group on Fundamentals of Statistical Machine Learning (3 staff, 7 students). We invite external speakers and disseminate the group's research.

Supervision outcomes to date
In 2022/2023 alone, my students wrote 7 papers, presented at >15 occasions, and organised a 2-day workshop at UCL with >50 participants. Other achievements of note include
• William Gordon Seggie Brown Fellow at Edinburgh University [Takuo Matsubara]
• NeurIPS oral distinction [Veit Wild]
• Two *Best Student Paper Awards* from the ASA [Takuo Matsubara, Masha Naslidnyk];
• *Early Career Contributed Paper Award* from ISBA [Takuo Matsubara].
• "enrichment student" award at The Alan Turing Institute worth >£5,000 [Masha Naslidnyk].
• Winning funds for research visit to Helmholtz AI Centre worth >£10,000 [Masha Naslidnyk]
• Winning £500 poster competition with >30 participants, and judged by Prof. Guy Nason (Imperial College London) [Matias Altamirano].

Primary PhD supervisor

Matias Altamirano (10/2022—-present)
  Subsidiary supervisors: Dr. Francois-Xavier Briol.
  Topic: Robust Bayesian methods through kernel distances.
  Progress: 4 papers (including at ICML and AISTATS), 1 preprint in submission.

Yann McLatchie (10/2023–-present)
  Subsidiary supervisors: Dr. Edwin Fong (University of Hong Kong).
  Topic: Predictive Bayesian methods.
  Progress: 1 paper at NeurIPS workshop, 3 journal paper preprints in submission.

Secondary PhD supervisor

Takuo Matsubara, The Alan Turing Institute (06/2021–-06/2023)
  Primary supervisor: Prof. Chris Oates (University of Newcastle)
  Topic: Generalised Bayesian methods for tractable computation
  Progress: Co-supervised 2/3 thesis chapters published at JRSS-B and JASA.

Masha Naslidnyk (10/2021—present)
  Primary supervisor: Dr. Francois-Xavier Briol.
  Topic: Robust Inference for Gaussian Processes
  Progress: 3 papers (including at ICML and EMNLP), 2 preprints in submission.
  3-month research exchange with Dr. Krikamol Muandet

Veit Wild, Oxford University (10/2022—present)
  Primary supervisor: Prof. Dino Sejdinovic (University of Adelaide)
  Topic: Infinite-dimensional Generalised Variational Inference
  Progress: Hosted Veit at UCL10/2022—04/2023, co-supervised 2/4 thesis
      chapters (1 published as NeurIPS oral, 1 about to be submitted).

Gerardo Duran-Martin, Google & Queen Mary University (06/2023—present)
  Primary supervisors: Dr. Kevin Murphy (DeepMind), Dr. Alex Shestopaloff (QMU)
  Topic: Robust online learning algorithms
  Progress: I am co-supervising Gerardo's third thesis chapter

Invited Talks

I have given >50 invited talks in academia, industry, and at conferences.

Selected Conferences
IMS Asia Pacific Rim Meeting; Melbourne, Australia (01/2024)
Neural Information Processing Systems (NeurIPS); New Orleans, USA (12/2023)
Greek Stochastics; Naxos, Greece (07/2023)
ELLIS Theory workshop in Tuebingen, Germany (05/2023)
BayesComp in Levi, Finland (03/2023)
Artificial Intelligence & Statistics (AISTATS); remotely (08/2022)
Artificial Intelligence & Statistics (AISTATS); remotely (08/2021)
International Conference on Machine Learning (ICML); remotely (07/2020)
International Conference on Machine Learning (ICML); Stockholm, Denmark (07/2018)
Neural Information Processing Systems (NeurIPS); Montreal, Canada (12/2018)
Workshop for Computational Strategies for Large-Scale Statistical Data Analysis at the
International Centre for Mathematical Sciences; Edinburgh, UK (06/2018)

Selected Research Institutions & Seminars (06/2019—present)
UK: Bank of England, Oxford University (2x), Imperial College London (3x), Warwick
University (3x), Alan Turing Institute (2x), University of Glasgow, University of
Edinburgh, University of Lancaster, University of Sheffield, University of Leeds,
University of Manchester
International: Columbia University, Cornell University, Duke University, New York
University's Courant institute, Chinese University of Hong Kong, University of Adelaide,
Monash University, University of Geneva, Continual AI global seminar

Enterprise & External Engagement

Scientific Collaborations with Industry Partners
DeepMind (Dr. Kevin Murphy); 2023—present.
AstraZeneca (Dr. Tom Diethe); 2023—present.
Amazon (Dr. Hisham Husain); 2020—present; **2 publications**
Improbable (Dr. Patrick Cannon, Dr. Sebastian Schmon); 2020/2021; **1 publication**
Lloyds Banking Group (Dr. Lara Vomfell); 2020/2021; **1 preprint**

Scientific Advisor
Idoven (06/2023—present): Spanish $19m startup developing technology that predicts
heart failure days or weeks before it occurs (https://www.idoven.ai/). Idoven has already
committed to funding a PhD studentship through the CASE scheme next year.
HopStair (03/2022—present): Pre-seed London-based startup building a wellness app
to boost user happiness via targeted nudges (https://hopstair.com/).

Invited Talks (10/2020—present)
Google Brain (Mountain View, USA), DeepMind (London, UK), Amazon Research
(Cambridge, UK), Facebook [now Meta] (Menlo Park, USA + London), Improbable
(London), ResistantAI (Prague, CZE), G-Research (London), Idoven (Madrid, ESP)

Teaching-related activities

PhD-level course on report writing and presentation (departmental CDT)
I volunteered to design this training session for the departmental CDT bid & ran it in 03/2023

Masterclass on optimisation-centric generalisations of Bayesian Inference
I have been invited to teach optimisation-centric generalisations of Bayesian inference at
- AI CDT summit between Bristol, Bath, and UCL (2023)
- Postdoc summit for Bayes4Health & CoSInES at Cambridge (2022)
- the Alan Turing institute (2019)
- Amazon Research (2019)
- DeepMind's *Theory and Foundations* Team (2021).

Mentoring of Students & BSc/MSc supervision
- I have volunteered to take on UGs as personal tutor.
- Mentored UGs from an underrepresented background via In2Research for 8 weeks.
- Thesis supervision for 2 UG and 2 MSc students.
  (1 publication, 1 PhD at Cambridge, 1 preprint in submission)

Earlier experiences
- Bachelor's second-year Probability and Statistics tutorials (Maastricht University; 2016)
- Master's level Probability Theory tutorials (Warwick University; 2020)
- Master's level Monte Carlo methods (Warwick University; 2019-2021)

Services to the Community

Editor/Area Chair
Artificial Intelligence & Statistics (AISTATS) 2022—-present

Organisation of Workshops & Events
- Founder and organiser of fortnightly online seminar on generalised Bayesian methods (10/2022—present); attended by leading figures, including Prof. Chris Holmes (Oxford University), Prof. David Dunson (Duke University), Dr. Jeffrey Miller (Harvard University), Prof. Pierre Alquier (ESSEC Singapore), Prof. David Stephens (McGill), Prof. Chris Oates (Newcastle).
- Organiser of the Data-Centric Engineering (DCE) seminar series at the Alan Turing Institute 07/2020—10/2021; regularly attended by >35 mostly UK-based researchers.
- Founder & organiser of monthly drinks round of early career researchers in statistics & machine learning based at UCL, Imperial, LSE, and the Alan Turing Institute.
- Organiser of 2-day workshop in 0/42024 on variational methods with >50 participants.
- Member of the scientific committee for BAYSM 2023
- Organiser of session on approximate Bayesian inference at BayesComp 2023
- Organiser of 4 reading groups since 2021

Reviewer
Journals: Journal of the Royal Statistical Society, Series B, Journal of the American Statistical Association, Biometrika, Statistics and Computing, Bayesian Analysis, Journal of Machine Learning Research, Transactions of Machine Learning Research, Machine Learning, IEEE Transactions on Pattern Analysis and Machine Intelligence

Conferences: Artificial Intelligence & Statistics, Neural Information Processing Systems, International Conference on Machine Learning, International Conference on Learning Representations, Advances in Approximate Bayesian Inference