David Watson

20a Mildmay Grove South • London, N1 4RL
Phone: +44 (0)7478 730102 • Email: david.s.watson11@gmail.com

Education

University of Oxford **October 2017—January 2021**
- DPhil in Information, Communication, and the Social Sciences **Oxford, UK**
- Developed new methods for fair and interpretable machine learning
- Researched high-dimensional causal inference

The Alan Turing Institute **October 2018—September 2019**
- Doctoral Enrichment Student **London, UK**
- Helped draft ICO's *Project ExplAIn Guidance*
- Led weekly reading group on statistical learning theory

University of Oxford **October 2014—August 2015**
- MSc in Social Science of the Internet **Oxford, UK**
- Studied big data analytics, internet economics, and information visualisation
- Wrote a thesis on crowdsourcing in the natural sciences

Dartmouth College **September 2007—June 2011**
- BA in Philosophy, High Honors **Hanover, NH**
- Studied philosophy of science, linguistics, and literature
- Wrote a thesis on the metaphysics of quantum cosmology

Professional Experience

Postdoctoral Research Fellow, University College London **January 2021—**
- Conducting original research in causality and machine learning **London, UK**
- Co-supervising doctoral candidates at the Centre for Artificial Intelligence
- Assisting with undergraduate computer science and statistics courses

CTO and Co-Founder, ThermoAI **July 2018—**
- Overseeing NSF-funded R&D projects on combustion simulation and optimization **New York, NY**
- Writing research articles and grant applications with academic partners
- Coordinating with fellow chief executives on strategic vision

Data Scientist, Queen Mary University of London **November 2015—December 2020**
- Conducted exploratory and inferential analytics for bioinformatics projects **London, UK**
- Developed unsupervised learning algorithms for genomic data integration
- Created visualization software for gene expression studies

Teaching Assistant, University of Oxford **October 2018—December 2020**
- Lectured on the philosophy and ethics of information **Oxford, UK**
- Led seminars on the foundations of social data science
- Developed curricula for future MSc cohorts

Freelance Contributor, *The Economist* **March 2016—October 2019**
- Wrote articles for the Graphic Detail section and Game Theory blog **London, UK**
- Built simulations to estimate the probability of global events
- Collaborated with editorial staff to research and develop new stories

Assistant Editor, HarperCollins Publishers **December 2011—September 2014**
New York, NY

- Read and reviewed manuscripts for publication
- Launched and managed e-book classics program
- Appointed Editorial Director of the National Poetry Series

SELECT PUBLICATIONS

Kinney, D. & Watson, D. (2020). Causal feature learning for utility-maximizing agents. In *International Conference on Probabilistic Graphical Models* (pp. 257–268). Skørping, Denmark.

Nicholls, H.L., John, C.R., Watson, D., Munroe, P.B., Barnes, M.R., & Cabrera, C.P. (2020). Reaching the end-game for GWAS: Machine learning approaches for the prioritization of complex disease loci. *Frontiers in Genetics*, *11*, 350. DOI: 10.3389/fgene.2020.00350.

Watson, D. & Floridi, L. (2020). The explanation game: A formal framework for interpretable machine learning. *Synthese*. DOI: 10.1007/s11229-020-02629-9.

John, C.R., Watson, D., Russ, D., Goldmann, K., Ehrenstein, M., Pitzalis, C., … Barnes, M. (2020). M3C: Monte Carlo reference-based consensus clustering. *Scientific Reports*, *10*(1), 1816. DOI: 10.1038/s41598-020-58766-1.

Watson, D. (2019). The rhetoric and reality of anthropomorphism in artificial intelligence. *Minds & Machines*, *29*(3), 417-440. DOI: 10.1007/s11023-019-09506-6.

John, C.R., Watson, D., Barnes, M.R., Pitzalis, C., & Lewis, M. (2019). Spectrum: Fast density-aware spectral clustering for single and multi-omic data. *Bioinformatics*, *36*(4), 1159–1166. DOI: 10.1101/636639.

Watson, D. (2019). The price of discovery: A model of scientific research markets. In Öhman, C. & Watson, D. (Eds.), *The 2018 Yearbook of the Digital Ethics Lab* (pp. 51–63). Heidelberg: Springer. DOI: 10.1007/978-3-030-17152-0_5.

Öhman, C. & Watson, D. (Eds.) (2019). *The 2018 Yearbook of the Digital Ethics Lab*. Heidelberg: Springer. DOI: 10.1007/978-3-030-17152-0.

Öhman, C. & Watson, D. (2019). Are the dead taking over Facebook? A big data approach to the future of death online. *Big Data & Society*, *6*(1), 1-13. DOI: 10.1177/2053951719842540.

Watson, D., Krutzinna, J., Bruce, I.N., Griffiths, C.E.M., McInnes, I.B., Barnes, M.R., & Floridi, L. (2019). Clinical applications of machine learning algorithms: Beyond the black box. *BMJ*, *364*. DOI: 10.1136/bmj.l886.

O'Toole, S.M., Watson, D., Novoselova, T.V., Romano, L.E.L., King, P., Bradshaw, T.Y., … Chapple, J.P. (2019). Oncometabolite induced primary cilia loss in pheochromocytoma. *Endocrine-Related Cancer*, *26*(1), 165-180. DOI: 10.1530/ERC-18-0134.

Watson, D. & Floridi, L. (2018). Crowdsourced science: Sociotechnical epistemology in the e-research paradigm. *Synthese*, *195*(2), 741–764. DOI: 10.1007/s11229-016-1238-2.

Foulkes, A.C., Watson, D., Carr, D.F., Kenny, J.G., Slidel, T., Parslew, R., … Barnes, M.R. (2018). A framework for multi-omic prediction of treatment response to biologic therapy for psoriasis. *Journal of Investigative Dermatology*, *139*(1), 100–107. DOI: 10.1016/j.jid.2018.04.041.

Cabrera, C.P., Manson, J., Shepherd, J.M., Torrance, H.D., Watson, D., Longhi, M.P., … Brohi, K. (2017). Signatures of inflammation and impending multiple organ dysfunction in the hyperacute phase of trauma: A prospective cohort study. *PLOS Medicine*, *14*(7), e1002352. DOI: 10.1371/journal.pmed.1002352.

Foulkes, A.C., Watson, D., Griffiths, C.E.M., Warren, R.B., Huber, W., & Barnes, M.R. (2017). Research techniques made simple: Bioinformatics for genome-scale biology. *Journal of Investigative Dermatology*, *137*(9), e163–e168. DOI: 10.1016/j.jid.2017.07.095.

PREPRINTS

Watson, D. (2020). Conceptual challenges for interpretable machine learning. SSRN preprint, 3668444.

Watson, D. & Wright, M. (2019). Testing conditional independence in supervised learning algorithms. *arXiv* preprint, 1901.09917.

SOFTWARE

Watson, D. & Tansey, W. (2020). smoothFDR: An empirical Bayes method for exploiting spatial structure in large multiple-testing problems. URL: https://github.com/dswatson/smoothFDR.

Watson, D. (2020). bioplotr: Pretty, simple, optionally interactive plots for bioinformatics analysis pipelines. URL: https://github.com/dswatson/bioplotr.

Watson, D. & Wright, M. (2020). cpi: Testing conditional independence in supervised learning algorithms. URL: https://github.com/dswatson/cpi.

John, C.R. & Watson, D. (2020). M3C: Monte Carlo reference-based consensus clustering. URL: https://bioconductor.org/packages/release/bioc/html/M3C.html.

John, C.R. & Watson, D. (2020). Spectrum: Fast adaptive spectral clustering for single and multi-view data. URL: https://cran.r-project.org/package=Spectrum.

SELECT PRESENTATIONS

'Necessary and sufficient factors for contrastive local explanation.' The Digital Ethics Lab, University of Oxford, January 2021.

'Pragmatic causal feature learning.' International Conference on Probabilistic Graphical Models. Aalborg, September 2020.

'Conceptual challenges for interpretable machine learning.' ACM Conference on Fairness, Accountability, and Transparency in Machine Learning, Doctoral Consortium. Barcelona, January 2020.

'Machine learning for predicting clinical outcomes.' PSORT Showcase. Royal College of Physicians, London, November 2019.

'No explanation without inference: What's wrong with explainable AI and how to fix it.' The Digital Ethics Lab, University of Oxford, October 2019.

'Information ethics: Theories, problems, strategies.' Learn, develop & design: Ethics principles through cross-disciplinary collaboration. Royal College of Art, London, September 2019.

'The explanation game: A formal framework for interpretable machine learning.' 12th Annual MuST Conference on Statistical Reasoning and Scientific Error. Ludwig Maximilian University, Munich, July 2019.

'Interpretable machine learning for clinical medicine.' Mining Science Data for Medicine Workshop. University of Manchester, April 2019.

'The rhetoric and reality of anthropomorphism in artificial intelligence.' The Digital Ethics Lab, University of Oxford, January 2019.

'Attention economies and the ethics of design.' London Doctoral Design Centre, Royal College of Art, London, November 2018.

'High-dimensional model explanations with applications to genomics.' The Alan Turing Institute, London, April 2018.

'Formal frameworks for interpretable machine learning.' The Digital Ethics Lab, University of Oxford, November 2017.

‘The EAGLE has landed: real-time win probabilities in men’s major golf tournaments.’ MIT Sloan Sports Analytics Conference. Hynes Convention Center, Boston, February 2017.

‘Omics primer for clinicians: an introduction to high-dimensional statistics.’ British Association of Dermatologists Workshop. University of Manchester, December 2016.

‘Measuring the epistemological and social impact of citizen science.’ St. Anne’s College, University of Oxford, December 2016.

‘Modelling biologic response: clinical and statistical considerations.’ Stratified Medicine Workshop. Francis Crick Institute, London, October 2016.

‘Feature selection in high-dimensional classification problems.’ CSAMA Conference on Statistical Data Analysis for Genome Scale Biology. University of Padua, Brixen, July 2016.