Edwin Lock

Postdoctoral researcher
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Research interests

Algorithms and Complexity, Algorithmic Game Theory, Auctions and Markets

Research positions

2021-present **Postdoctoral Researcher**, *Computer Science and Economics Departments, Oxford University*.
2021–2024 **Research Fellow**, *Nuffield College, Oxford University*.

Education

2017–2022 **DPhil in Computer Science**, *Oxford University*.
Advisor: PW Goldberg. Supported by an EPSRC Scholarship.
2016–2017 **MSc in Mathematics and Foundations of Computer Science**, *Oxford University*.
2013–2016 **BSc in Mathematics**, *FernUniversität in Hagen*, Germany.
2008–2012 **BA in Music**, *Oxford University*.

Journal papers

2025 Competitive and Optimal Pricing with Budgets.
S Finster, PW Goldberg, and E Lock.
Theoretical Economics.

2023 Solving Strong-Substitutes Product-Mix Auctions.
E Baldwin, PW Goldberg, P Klemperer, E Lock.
Mathematics of Operations Research.

2022 Learning Strong Substitutes Demand via Queries.
PW Goldberg, E Lock and F Marmolejo-Cossío.
Transactions on Economics and Computation.

2019 Characterising and Recognising Game-Perfect Graphs.
SD Andres and E Lock.
Discrete Mathematics and Theoretical Computer Science.

Conference papers

2024 Decentralized Convergence to Equilibrium Prices in Trading Networks.
E Lock, BP Evans, E Kreacic, S Bhatt, A Koppel, S Ganesh, PW Goldberg.
39th Conference on Artificial Intelligence (AAAI'25)
Invited seminar at JPMorgan AI Research, New York.

2024 The Computational Complexity of the Housing Market.
E Lock, Z Qiu, A Teytelboym.
17th International Symposium on Algorithmic Game Theory (SAGT'24).

2023 Substitutes markets with budget constraints: solving for competitive and optimal prices.
S Finster, PW Goldberg, and E Lock.
19th Conference on Web and Internet Economics (WINE'23).

2023 Welfare-Maximizing Pooled Testing.
S Finster, M González Amador, E Lock, F Marmolejo Cossío, E Micha, AD Procaccia.
24th ACM Conference on Economics and Computation (EC'23).
Awarded best paper in applied modelling track.
Invited seminar at the Institute for Societal Computing, Saarbrücken.

2021 Optimal Testing and Containment Strategies for Universities in Mexico amid COVID-19.
L Benavides-Vázquez, H A Guzmán-Gutiérrez, J Jonnerby, P Lazos, E Lock, F J Marmolejo-Cossío, N Rajgopal and JR Tello-Ayala.
1st ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO'21).

2020 Learning Strong Substitutes Demand via Queries.
PW Goldberg, E Lock and F Marmolejo-Cossío.
16th Conference on Web and Internet Economics (WINE'20).
Nominated for best paper.

2020 Test and Contain: A Resource-Optimal Testing Strategy for COVID-19.
J Jonnerby, P Lazos, E Lock, F Marmolejo-Cossío, CB Ramsey and D Sridhar.
AI for Social Good 2020, Harvard CRCS Workshop.
Best poster video award at the *ACM SIGecom Global Challenges for Economics and Computation workshop* at EC'20.

Working papers

Implementing Walrasian Equilibrium: the Languages of Product-mix Auctions.
E Baldwin, P Klemperer, E Lock.
SSRN preprint.
Invited seminar at the Center for Research in Economics and Statistics (CREST), Paris.

Accelerated Preference Elicitation with LLM-Based Proxies.
D Huang, E Lock, F Marmolejo-Cossío, D Parkes.
ArXiv preprint.

Teaching and Supervision

2018–2021 **Departmental teacher**, *Computer Science Department, Oxford University*.
Taught postgraduate course in Computational Complexity to MSc and fourth-year undergraduate students. Supervised MSc theses, and demonstrated practicals.

2020–2022 **Lecturer**, *Balliol College, Oxford University*.
Taught undergraduate students in a range of computer science and mathematics courses. Set examinations and assisted with undergraduate admissions. (Also taught for six other Oxford Colleges.)

2019–now **Other supervision**.
Currently supervising undergraduate projects at Harvard University. Past supervision of postdoc hired under ACM GCEC'20 grant, and student interns (from Harvard and Edinburgh Universities) as part of *Test and Contain* research project.

2019 **Organiser and tutor**, *Dr. HN Science Centre*, Gauribidanur, India.
Organised, ran and taught at a science workshop in rural India. Introduced approx. 200 students to scientific techniques, provided hands-on experience with scientific equipment and familiarised students with cutting-edge research topics.

Professional activities

2021–now **Program Committee member** for conferences including *Economics and Computation (EC)*, the *Conference On Web And InterNet Economics (WINE)* and *Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO)*.

2021–now **Reviewer** for journals including *Information Processing Letters*, *Mathematics of Operations Research*, *Naval Research Logistics*, and *Transactions on Economics and Computation*.

2021 **Co-organised tutorial** on "Fairness and Discrimination through the Dual Lens of Mechanism Design and Machine Learning" at EC'21.

2020-2023 **Founding member and principal organiser** of the *Mechanism Design for Social Good (MD4SG)* healthcare working group. Supervised several research projects allocated between 12 group members.

Projects

COVID-19 Testing I co-founded Test and Contain, a project to design and implement resource-optimal COVID-19 testing. **Supported by an ACM SIGecom research grant ($25,000)**. Initiated and led collaboration with the Institute for Scientific Research and Technology (IPICYT) in Mexico on experimental trial to pilot the testing mechanism and algorithms in our paper "Welfare-Maximizing Pooled Testing". See `www.c-sef.com` for details.

Debt restructuring Collaborated with staff of the International Monetary Fund (IMF) to design an auction-based sovereign debt restructuring mechanism.

Tax credit markets Worked with industry partner, Bellus Ventures, to design a market platform for developers of renewable energy projects to sell Investment Tax Credits (ITCs).