Tamsin E. Lee

Applied Mathematician

I am interested in applying mathematics to large data sets, and thus enhance our understanding of global issues to find effective solutions. I have proven to be adaptable within a wide variety of dynamic teams, rapidly acquiring knowledge and understanding, which has broadened my knowledge base and ensured excellent communication. I will continue to seek fresh challenges by leading new research and presenting the learnings to a wide range of audiences.

Academic Employment

- **January 2018 - To Date: Postdoctoral Researcher.**
  Swiss Tropical Public Health Institute, University of Basel
  Keywords: *malaria, drug resistance, Ross-McDonald model*
- **January 2014 - August 2017: Postdoctoral Researcher.**
  The Mathematical Institute, University of Oxford
  Scottish and Southern Energy Networks, Thames Valley Vision & Oxford-Emirates Lab
  Keywords: *time-series forecasting, finite mixture model, agent-based modelling, the genetic algorithm.*
- **April 2012 - December 2013: Postdoctoral Researcher.**
  The Botany Department, The University of Melbourne
  ARC Centre of Excellence for Environmental Decisions
  Keywords: *ecology, Bayes, survival analysis, species distribution model.*
- **October 2011 - February 2012: Postdoctoral Researcher.**
  Centre for the Mathematics of Human Behaviour (CMoHB)
  Centre for Integrative Neuroscience and Neurodynamics (CINN)
  Keywords: *neuroscience, fMRI scans, evolving networks, directed networks.*

Education

- **October 2007 - September 2011: Ph.D**
  University of Reading, Department of Mathematics.
  Modelling time-dependent partial differential equations using a moving mesh approach based on conservation (supervised by Prof. Mike Baines and Dr. Stephen Langdon).
  Keywords: *adaptive mesh, finite differences, finite elements, tumour growth, ground water flow, diffusion, porous media, semi-implicit time-stepping schemes.*
- **September 2006 - September 2007: MSc: *Numerical Solution of Differential Equations* (Merit).**
  University of Reading, Department of Mathematics.
  - **Modules completed include:** Numerical Methods of Initial and Boundary Value Problems, Theory of Differential Equations, Finite Element Methods, Dynamical Systems and Fluid Dynamics, and Communication and Research Skills.
  - **Thesis title:** *New methods for approximating acoustic wave transmission through ducts* (supervised by Dr. Nick Biggs and Dr. Pete Chamberlain).
    Keywords: *Helmholtz equation; mild-slope equation; modified mild-slope equation; scattering problem; trapped wave problem.*
- **September 2002 - July 2005: BSc: *Mathematical Sciences* (First class with Honours).**
  Oxford Brookes University, Department of Mathematics.
  - **Modules completed include:** Numerical Analysis, Simulation and Modelling, Further Discrete Mathematics, Graph Theory, Applied Algebra, Geometry, Complex Analysis.
  - **Thesis title:** Fourier Analysis and Wavelets (supervised by Prof. Mike Pidcock).
    Keywords: *Fourier transform, wavelet transforms, Haar wavelet.*

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Computing Skills

- ☐ Programming Languages: Visual Basic for Excel, C++, R,
- ☐ Mathematical Software Applications: Matlab, Maple, OpenBugs (Bayesian), Minitab, SPSS.
- ☐ Neuroscience Software Applications: FSL, SPM8.

Publications

- ☐ **Lee, T. E.** (2017). The thin blue line between protesters and their counter-protesters. Submitted.
- ☐ Poghosyan, A. & **Lee, T. E.** (2017). Agent-based simulation for electric vehicles uptake and load impact on residential low voltage networks. Submitted.
- ☐ Foster, J. & **Lee, T. E.** (2017). Predicting peak behaviour for small-to-medium enterprises without a smart meter. Submitted. (Acting as supervisor for Joe Foster, MSc student.)
- ☐ **Lee, T. E.** (2017). Predicting key features of a substation without monitoring with an application. Submitted.
- ☐ **Lee, T. E.**, Bowman, C. & Roberts, D. L. (2017). Are extinction opinions extinct? Submitted.
- ☐ **Lee, T. E.** (2016). Year ahead forecasting of electricity consumption on the low voltage network. Submitted.
- ☐ Giasemidis, G., Haben, S., **Lee, T. E.**, & Singleton, C. (2017). A genetic algorithm approach for modelling low voltage network demands. Applied Energy, In press.
- ☐ Yunusov, T., Haben, S., **Lee, T. E.**, Ziel, F., Holderbaum, W., & Potter, B. (2017) Evaluating the Effectiveness of Storage Control in Reducing Peak Demand on Low Voltage Feeders. *Cired 2017, Research Innovation Forum Glasgow*, 626
- ☐ Grindrod, P., & **Lee, T. E.** (2017). On strongly connected networks with excitable-refractory dynamics and delayed coupling. *Royal Society Open Science*, **4**, 160192.
- ☐ **Lee, T. E.** (2016). Predicting key features of a substation without monitoring, *Emerging Energy Technologies Summit and Exhibition 2016 (EETSE'16).*
- ☐ **Lee, T. E.** (2016). Medium term forecasts of domestic electricity use. *Tokyo International Conference on Engineering and Applied Sciences* ISBN:978-986-93421-2-4.
- ☐ **Lee, T. E.** & Roberts, D. L. (2016). Devaluing rhinos as a theoretical game. *Ecological modelling*, **337**, 73–78.
- ☐ Grindrod, P. & **Lee, T. E.** (2016). Comparison of social structures within cities of very different sizes. Royal Society open science, **3(2)**, 150526.
- ☐ **Lee, T. E.**, Fisher, D., Blomberg, S. & Wintle, B. (2016). Extinct or still out there? Disentangling influences on extinction and rediscovery helps to clarify the fate of species on the edge. *Global change biology.* DOI: 10.1111/gcb.13421.
- ☐ Hinsley, A., **Lee, T. E.** & Roberts, D. L. (2016). Estimating the extent and structure of trade in horticultural orchids via social media. *Conservation biology*, **30(5)**, 1038–1047.
- ☐ **Lee, T. E.**, Black, S. A., Fellous, A., Yamaguchi, N., Angelici, F., Al Hikmani, H., Reed, J. M., Elphick, C. S & Roberts, D. L. (2015). Assessing uncertainty in sighting records: an example of the Barbary lion. *PeerJ*, **3**, e1224.
- ☐ Poghosyan, A., Greetham, D. V., Haben, S., & **Lee, T. E.** (2015). Long term individual load forecast under different electrical vehicles uptake scenarios. *Applied Energy.* **157**, 699–709.
- ☐ **Lee, T. E.**, Baines, M. J. & Langdon, S. (2015) A finite difference moving mesh method based on conservation for moving boundary problems. *Journal of Computational and Applied Mathematics*, **288**, 1–17.
- ☐ **Lee, T. E.**, Haben, S. A. & Grindrod, P. (2014). Modelling the weekly electricity consumption of small to medium enterprises. *Progress in Industrial Mathematics at ECMI 2014.* ISBN 978-3-319-23412-0.

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- ☐ Thompson*, C. J., **Lee, T. E.**, & McCarthy, M. A. (2014). Species distributions and area relationships. *Journal of theoretical biology*, **363**, 129–133.
- ☐ Clements, C., **Lee, T. E.**, & McCarthy, M. A. (2014). An experimental test of a Bayesian method for inferring extinction with varying search efforts (No. e466v1). *PeerJ PrePrints*.
- ☐ **Lee, T. E.** (2014). A simple numerical tool to infer whether a species is extinct. *Methods in Ecology and Evolution*, **5(8)**, 791–796.
- ☐ Baines, M. J. & **Lee, T. E.** (2014). A large time-step implicit moving mesh scheme for moving boundary problems. *Numerical Methods for Partial Differential Equations*, **30(1)**, 321–338.
- ☐ Thompson*, C. J., **Lee, T. E.**, Stone, L., Burgman, M. A. & McCarthy, M. (2013). Inferring extinction risks from sighting records. *Journal of Theoretical Biology*, **338**, 16–22.
- ☐ **Lee, T. E.**, McCarthy, M. A., Wintle, B., Bode, M., Roberts, D. L. & Burgman, M. A. (2013). Inferring extinctions from sighting records of variable reliability. *Journal of Applied Ecology*, **51** 251–258.
- ☐ **Lee, T. E.**, Baines, M. J., Langdon, S., & Tindall, M. J. (2013). A moving mesh approach for modelling avascular tumour growth. *Applied Numerical Mathematics*, 72, 99–114.

*Colin Thompson does not use computers, as such it is more representative to consider these two methods based papers as joint first author publications.

Videos

- ☐ An interview where I discuss categorising electricity customers (6th video down)
  `http://www.thamesvalleyvision.co.uk/the-videos/` (4 min)
- ☐ Giving an overview, using stop motion, of our research on electricity consumption. **Won best short film** at The Mathematical Institute, University of Oxford.
  `http://news.ssepd.co.uk/news/all-articles/2015/07/how-do-smart-grids-work/` (3 min)
- ☐ Showing how cities can be grouped by the communities of their corresponding Twitter networks.
  `https://youtu.be/kfjlesya26g` (4 min)
- ☐ Explaining game theory model on rhino poaching. It motivated a **BBC** article.
  `https://www.youtube.com/watch?v=LwkUWx5rE5A&feature=youtu.be`(10 min)
  `http://www.bbc.co.uk/bbcthree/item/90f87392-60d6-4eea-9578-0bdb49d0244f`

Poster Presentations

- ☐ **Set for Britain** at Westminster Houses of Parliament, UK, *Devaluing rhinos as a game* (March 2017).
- ☐ **4th LV Workshop and TVCC Energy Seminar** at University of Reading, UK, *Modelling electricity use of small to medium enterprises* (March 2017).
- ☐ **Emerging Energies Technologies Summit and Exhibition** at Melbourne, Australia, *Using natural selection to model low voltage network demands* (December 2016).
- ☐ **Women in Mathematics Day**, organised by the London Mathematical Society, at the Isaac Newton Institute at Cambridge University, UK, *Seeking a numerical solution to an avascular tumour growth model using a moving mesh approach* (April 2010).
- ☐ **The Reading System Biology Network launch Day** at the University of Reading, UK, *Seeking a numerical solution to an avascular tumour growth model using a moving mesh approach* (April 2009).
- ☐ **The John Crank Legacy** at Brunel University, UK, *Finding a solution to the Crank-Gupta oxygen diffusion problem using a new numerical approach* (July 2008).

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Presentations

- **Workshop on understanding the cultural concepts within modelling** at the University of Bath, UK, *Predicting when terrorist groups are no longer active* (June 2017).
- **NTVV closedown event** at IET Savoy Place, London, *Understanding electricity customers* (March 2017).
- **13th Workshop on Stochastic Models, Statistics and Their Applications** at Humboldt Universitat ZU Berlin, Germany, *Categorising electricity customers* (February 2017).
- **Emerging Energies Technologies Summit and Exhibition** at Melbourne, Australia, *Predicting load characteristics of a substation without monitoring* (December 2016).
- **Engineering and Applied Sciences** at Tokyo, Japan ***Keynote speech**: Predicting electricity in the future.* (August 2016).
- **Weekly seminar** at EPFL, Geneva, Switzerland, *Strongly connected networks with excitable-refractory dynamics.* (July 2016).
- **ABM workshop** at KAPSARC, Riyadh, Saudi Arabia, *Using MCMC for a rolling forecast.* (February 2016).
- **Networks workshop** at Bath University, UK *Social networks in smart cities.* (July 2015).
- **The British Applied Maths Colloquium** at Strathclyde University, UK, *Social networks in smart cities.* (June 2015).
- **LV Networks workshop** at University of Oxford, UK, *Modelling small-to-medium enterprises.* (September 2014). Workshop facilitated by me.
- **European conference on Mathematics for Industry** at Taormina, Italy, *Modelling electricity use of small to medium enterprises.* (June 2014).
- **Intecol** at ExCeL, London, UK, *Is it extinct? That is the question* (August 2013).
- **Maths of Planet Earth** at Rydges Hotel, Melbourne, *Is it extinct? That is the question.* (July 2013).
- **Department of Mathematics seminar series** at La Trobe University, Australia, *Using a moving mesh method to model partial differential equations* (November 2012).
- **Modelling Approaches for Metabolomics** at the Department of Molecular Biology at Umea University, Sweden *Using networks to model the brain* (November 2011).
- **The British Applied Maths Colloquium** at Edinburgh University, UK, *Modelling avascular tumour growth using a moving mesh approach* (May 2010).
- **Seminar** at University of Reading, UK, *Modelling avascular tumour growth using a moving mesh approach* (April 2010).
- **Reading Systems Biology Network** (RSBN) seminar at University of Reading, UK, *Modelling avascular tumour growth using a moving mesh approach* (March 2010).
- **The Postgraduate Numerical Analysis** seminar day at Cardiff University, UK, *Modelling partial differential equations with a moving boundary using a moving mesh approach* (September 2009).
- **The Biennial Numerical Analysis Conference** at Strathclyde University, UK, *Modelling partial differential equations with a moving boundary using a moving mesh approach* (June 2009).
- **Numerical Analysis of Tumour Growth Problems** at University of Oxford, UK, *Modelling avascular tumour growth using a moving mesh approach* (May 2009).

Funding Received and Awards

- Invited by the Parliamentary and Scientific Committee to present my research at the Houses of Parliament (March 2017).

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- ☐ 'Most innovative idea' awarded at the Emerging Energies Technologies Summit and Exhibition (December 2016).
- ☐ Invited to be the keynote speaker at the Engineering and Applied Sciences conference, Tokyo (August 2016).
- ☐ Awarded Honorary Research Fellowship to mark my contribution to the School of Anthropology and Conservation, University of Kent (October 2015).
- ☐ Winner of short film competition at The Mathematical Institute, University of Oxford (June 2015). The video is available at http://news.ssepd.co.uk/news/all-articles/2015/07/how-do-smart-grids-work/
- ☐ A series of visits to the Oxford Centre for Collaborative Applied Maths (OCCAM) to aid my research (2008).
- ☐ Funding from Brunel University to attend and present a poster at the John Crank Legacy conference (2007).
- ☐ Scholarship from the Engineering and Physical Sciences Research Council (EPSRC) for PhD (September 2006).
- ☐ Scholarship from the Engineering and Physical Sciences Research Council (EPSRC) for MSc (September 2005).
- ☐ Awarded with a years free membership from the Institute of Mathematics and its Applications (IMA) for the highest grade (June 2005).

Additional academic activities

Reviewer

- ☐ *Energies* (MDPI).
- ☐ *Applied Sciences* (MDPI).
- ☐ *Biological Conservation* (Elsevier).
- ☐ *Conservation Biology* (Wiley).
- ☐ *IEEE Transactions on Smart Grids* (Power and Energy Society).
- ☐ *Journal of Research and Development* (IBM).

Modelling workshops

- ☐ The UK Graduate Modelling Week at Nottingham University, *Modelling the uptake of fatty particles in the liver* (April 2009) - Using a system of ordinary differential equations we tested three different hypotheses. We compared our three different model solutions with experimental data, and discussed the biological indication.
- ☐ Postgraduate Modelling Week with Unilever, *Recommender systems* (April 2008) - Using Baysian probability we were better able to predict customer purchases after each visit to the shop, and hence provide appropriate product offers.

Supervising

- ☐ Supervisor (preparing for 2018): Industrially Focused Mathematical Modelling mini-project, University of Oxford, with Whizz Education.
- ☐ Robot Lab Leader (April - August 2016): Using swarm robots to model collective behaviour. Supervising a Masters student.
- ☐ University of Oxford (March 2016): Industrially Focused Mathematical Modelling (InFoMM) UK Graduate Modelling Camp.
- ☐ Complutense University of Madrid (June 2015): Supervising masters students through a modelling week solving a problem in industry. One student is particularly bright, and I am supervising him writing his first paper.
- ☐ The Nuffield Bursary Scheme (April 2009): This is where an A-level student (aged 17) is guided for four weeks through a short project that I devise, and then submits a detailed report at a later date.

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Additional studying:

- ☐ Springboard Programme for professional women (January - April 2017).
- ☐ Completed an eight week public speaking course (Rosarie Nolan at speakconfidently.com) (July 2015).
- ☐ LASR University of Oxford French course. Completed Intermediate (July 2016).
- ☐ Completed a twelve week Coursera course: *Model thinking* run by Prof. Scott E. Page, University of Michigan (September 2015).
- ☐ Completed a twelve week Coursera course: *Writing Science in Plain English* run by Anne E. Greene, University of Montana (September 2014).

Teaching

- ☐ **December 2015 - October 2016: Stipendiary Lecturer in Mathematics, Merton College, University of Oxford.**
  Teaching first and second year students, Fourier series, Statistics and Numerical analysis.
- ☐ **October 2014 - To date: Industrially Focused Mathematical Modelling affiliate the University of Oxford.**
  Lectures on Graph theory, Networks, Bayes, MCMC, and Algorithm analysis. Short industry focused projects. First year PhD students.
- ☐ **March 2012 - October 2012: Tutor at Monash University.**
  Modules included Partial differential equations, Advanced ordinary differential equations (third years), Advanced engineering mathematics (second years) and Functions and their applications (first years)
- ☐ **June 2006 - October 2011: Teacher at Reading Prison and Young Offenders Institute.**
  Preparing and teaching various classes, remedial mathematics, English, music, art and healthy living. Working with young offenders requires diplomacy, and remaining calm under challenging circumstances.
- ☐ **October 2006 - July 2011: Teaching assistant.**
  Topics taught include Matlab tutorials, Maple tutorials, Mathematics for computer scientists, Vectors and matrices, Algebra, Linear algebra, Calculus methods, and Analysis.
- ☐ **October 2006 - July 2011: Private tutorials.**
  The level ranged from remedial mathematics to second year undergraduate meteorology, and tutees ranged from high school students to mature students. I would teach two or three undergraduates at a time.

Other employment

- ☐ **June 2006 - October 2011: Disability Study Aider, University of Reading.**
  Involved working with students that have various disabilities. Together, the student and I would take notes in lectures and complete class exercises. Involved assisting with undergraduate exams in a large group.
- ☐ **August 2005 - September 2006: Customer Retention Adviser, British Gas Business, Cowley Business Park, Oxford.**
  Responsibilities included frequent communication with customers, independent handling of confidential data, and thorough knowledge of the different computer systems and database. Completed a SPEND training course - a recognised sales model.
- ☐ **September 2002 - July 2005 : Purchase Ledger, Oxford, Swindon and Gloucester Co-op/ Interviewer, NOP Marketing/ Sales Assistant, Lush.**
  During my undergraduate degree I had several part time jobs which required: investigating problems and proposing practical solutions; liaising with customers and the public; learning new computer systems; working within a team.

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