Samuel Johnson

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ACADEMIC POSITIONS

London Mathematical Society Early Career Fellow *Mar. – Sep. 2027*
Department of Plant Sciences, University of Cambridge. *Host:* Professor Nik Cunniffe.

Mathematical Institute, University of Oxford *Mar. 2026 – Mar. 2027*
Postdoctoral Research Associate in Mathematical Epidemiology with Professor Robin Thompson.
Researching when spatial population structure changes epidemic forecasts of major outbreaks.

Lady Margaret Hall, University of Oxford *Sep. 2023 – Present*
Stipendiary Lecturer in Applied Mathematics.

EDUCATION

University of Oxford, Christ Church *Sep. 2021 – Jul. 2026*
DPhil in Mathematics; BBSRC Interdisciplinary Bioscience DTP.
Thesis: Mathematical models of single and collective cell migration in the cranial neural crest.
Supervisors: Professor Ruth Baker and Professor Philip Maini.

University of Cambridge, Gonville and Caius College *Oct. 2020 – Jun. 2021*
MASt in Applied Mathematics (Part III of the Mathematical Tripos).
Essay: Directed percolation and absorbing-state phase transitions.

University of Edinburgh *Sep. 2017 – May 2020*
BSc in Theoretical Physics (second-year direct entry).
Dissertation: Numerical approaches to self-organisation in agates.

TEACHING EXPERIENCE

Undergraduate teaching, Lady Margaret Hall *Sep. 2023 – Present*
Small-group tutorials for first- and second-year undergraduates. Undergraduate admissions.

Courses taught

Prelims Geometry
Prelims Fourier Series and PDEs
Prelims Computational Mathematics
Prelims Dynamics*
ASO Mathematical Modelling in Biology
ASO Integral Transforms
ASO Graph Theory
A7 Numerical Analysis

*Scheduled for 2026–27.

Additional teaching

ASO Graph Theory, Balliol College *2023*
C5.4 Networks, Mathematical Institute *2022*
Mathematical Modelling in Bioscience, Oxford DTC *2022*
Essential Mathematics, Oxford DTC *2022*

RESEARCH SUPERVISION

Undergraduate Summer Internship, University of Oxford *Summer 2026*
Supervised an undergraduate student who assisted in the production of the forthcoming manuscript entitled *Quantifying discrepancies in the final outbreak size between spatial and non-spatial models of pathogen transmission*.

UNIQ+ Summer Research Internships, University of Oxford *Summer 2026*
Supervised two undergraduate interns on a seven-week project: *Investigating the effect of edge pruning in disease models on networks*.

MSc in Mathematical Modelling and Scientific Computing *Hilary 2026*
Supervised four MSc students at the University of Oxford on a ten-week group project: *A mathematical model of cell–environment mechanobiology during eukaryotic chemotaxis*.

ACADEMIC SERVICE AND OUTREACH

Chair-elect, SMB Cell and Developmental Biology (CDEV) Subgroup *2026 – 2028*
Elected to the subgroup's leadership; helping to organise its seminars and annual-meeting events.

Access Committee member, Lady Margaret Hall *2025 – Present*
Helping to shape the college's outreach to students from under-represented backgrounds.

Mathematics mentoring, UNIQ and AMSP programmes *2023*
Led UNIQ mock tutorials and AMSP problem-solving classes for prospective undergraduates.

Peer review *2023 – Present*
Reviewed manuscripts for journals including *Mathematical Biosciences*, *Journal of the Royal Society Interface*, *Bulletin of Mathematical Biology*, and *Mathematics in Medical and Life Sciences*.

PROFESSIONAL EXPERIENCE

Mathematical Consultant, Smith Institute *Oct. 2024 – Jan. 2025*

- Designed, parameterised, and validated a Bayesian survival-analysis model in PyMC using large-scale asset datasets, producing probabilistic failure forecasts and risk rankings for preventative maintenance.
- Developed and maintained a statistical sales-forecasting model in R for a multinational corporation.
- Delivered reliable, production-ready statistical software using modular code design, Git version control, and unit testing.

SELECTED TALKS

Invited talk, Oxford Doctoral Training Centre *Jun. 2026*
Mathematical models of single and collective cell migration in the cranial neural crest.

Contributed talk, Society for Mathematical Biology (SMB) *Jun. 2026*
Cell and Developmental Biology subgroup seminar (online): *The spontaneous emergence of leaders and followers in a mathematical model of cranial neural crest cell migration.*

Contributed talks, SMB Annual Meeting and BMC–BAMC *2025*
Edmonton (July) and the joint British Mathematical Colloquium and British Applied Mathematics Colloquium, University of Exeter (June): *Mathematical optimisation of actin-driven protrusion formation in eukaryotic chemotaxis*.

Invited talk, Swansea University *Apr. 2024*
Joint talk with Professor Philip Maini: *Follow the leader: collective cell migration in the cranial neural crest.*

HONOURS AND AWARDS

Teaching Award, Mathematical Institute, University of Oxford *Oct. 2026*

Poster Prize, Oxford–Japan Symposium, University of Oxford *Sep. 2025*

Poster Prize (Runner-up), The Extracellular Matrix: How to Model Structure Complexity, CECAM-HQ-EPFL, Lausanne *Mar. 2023*

Gonville and Caius College Bursary, £1,333 *Oct. 2020*

Theoretical Physics Dissertation: First place, University of Edinburgh *Jun. 2020*

University of Edinburgh Career Acceleration Scholarship, £2,000 *Apr. 2019*

University of Edinburgh Scholarship, £7,250 per year *2017 – 2020*

FELLOWSHIPS AND FUNDING

EPSRC Mathematical Sciences Small Grant, £80,000 requested; co-applicant with Professor Robin Thompson *Under review*

London Mathematical Society Early Career Fellowship, £11,720 *Mar. – Sep. 2027*

Christ Church Research Travel Grant, £2,000 *Aug. 2025*

BBSRC Doctoral Studentship, £26,000 per year *2021 – 2025*

PUBLICATIONS AND PREPRINTS

Journal publications

1. **Johnson, S.W.S.**, Parsons, M., Baker, R.E. and Maini, P.K. (2026). An energy-based mathematical model of actin-driven protrusions in eukaryotic chemotaxis. *Biophysical Journal* **125**(19), 5494–5515. doi:10.1016/j.bpj.2026.08.001.

2. **Johnson, S.W.S.**†, Jewell, T.J.†, Baker, R.E. and Maini, P.K. (2026). Cell–cell adhesion cannot sustain extended follower streams in a minimal non-local model of leader–follower migration. *Journal of Theoretical Biology* **634**, 112561. doi:10.1016/j.jtbi.2026.112561.

3. Leibenzon, A., **Johnson, S.W.S.**, Baker, R.E. and Assaf, M. (2026). Spatial correlations in susceptible-infected-susceptible processes on random regular graphs. *Physical Review E* **113**(6), 064307. doi:10.1103/fb7n-ll8x.

4. **Johnson, S.W.S.**, Kulesa, P.M., Baker, R.E. and Maini, P.K. (2026). Mathematical modeling predicts novel mechanisms of stream confinement from Trail/Colec12/Dan in the collective migration of cranial neural crest cells. *Developmental Dynamics* **255**(1), 43–65. doi:10.1002/dvdy.70072.

5. Martina-Perez, S.F., **Johnson, S.W.S.**, Crossley, R.M., Kasemeier, J.C., Kulesa, P.M. and Baker, R.E. (2025). Optimal control in combination therapy for heterogeneous cell populations with drug synergies. *Bulletin of Mathematical Biology* **87**(11), 159. doi:10.1007/s11538-025-01508-z.

6. **Johnson, S.**†, Crossley, R.M.†, Tsingos, E.†, Bell, Z., Berardi, M., Botticelli, M., Braat, Q.J.S., Metzcar, J., Ruscone, M., Yin, Y. and Shuttleworth, R. (2024). Modeling the extracellular matrix in cell migration and morphogenesis: a guide for the curious biologist. *Frontiers in Cell and Developmental Biology* **12**, 1354132. doi:10.3389/fcell.2024.1354132.

Book chapters

7. **Johnson, S.W.S.**, Baker, R.E. and Maini, P.K. (2026). Integrating mathematical modeling and experiments in the study of collective neural crest cell migration. In: Maini, P.K., Nishimori, H., Sekimura, T. and Yamaguchi, T. (eds), *Patterns and Forms in Nature: From Organisms to Collective Behaviors in Biological Systems*. Theoretical Biology. Springer, Singapore. Chapter 2, pp. 21–41. doi:10.1007/978-981-92-0331-4_2.

Preprints

8. Patrascan, I., King, J.W.D.†, Maziak, N.†, Crossley, R.M., **Johnson, S.W.S.**, Ceccarelli, A., McFarlane, I., Guo, Y., Karimi, M.M., Fisher, A.G., Baker, R.E., Vaquerizas, J.M. and Merkenschlager, M. (2026). Locus-specific spatial and transcriptional dynamics direct T cell lineage choice in the thymus. bioRxiv. doi:10.64898/2026.10.26.761611. *Under peer review at Nature Genetics.*

9. Falcó, C., **Johnson, S.W.S.**, Dalwadi, M.P. and Maini, P.K. (2026). Theory of adhesion-driven self-organisation in growing tissues. arXiv:2604.26928. *Under peer review at the Journal of the Royal Society Interface.*

10. **Johnson, S.W.S.**, Baker, R.E. and Maini, P.K. (2026). The spontaneous emergence of leaders and followers in a mathematical model of cranial neural crest cell migration. arXiv:2601.00374. *Under peer review at the Journal of Theoretical Biology.*

† Equal contribution. Where I share first authorship, I have listed my name first; the published author order may differ.