

# Thomas Lidbetter

## EDUCATION

**PhD in Mathematics, London School of Economics** 2009-2013

2013 Doctoral Dissertation Award, OR Society, UK

Thesis title: Hide-and-seeK and other Search Games

Supervisors: Prof Steve Alpern, Prof Bernhard von Stengel

**MSc in Operational Research (Distinction), London School of Economics** 2007-2009

Best total mark in cohort

Dissertation: 'Using data mining techniques to analyse a large financial dataset' (Distinction)

Courses included: Search Games, Mathematical Programming, Combinatorial Optimisation, Techniques of Operational Research

**Mmath in Mathematics (Part III), University of Cambridge (Trinity Hall)** 2004-2005

Essay: 'The Lagrangian of a Hypergraph' (Distinction)

Courses included: Functional Analysis, Banach Spaces, Extremal Combinatorics, Probabilistic Combinatorics

**MA in Mathematics (2.i), University of Cambridge (Trinity Hall)** 2001-2004

## AWARDS AND FUNDING

- 2016 – LSE Teaching and Learning Centre Teaching Prize
- 2015 – Funding of €7000 for project PGMO 2015 - 2015-3831H, "Search and surveillance games: theory, algorithms and applications" from *Fondation Mathematique Jacques Hadamard*
- 2013 Doctoral Dissertation Award for the most distinguished body of research leading to a doctorate in the field of Operational Research, from UK OR Society
- 2013 – LSE Department of Mathematics Class Teacher Prize
- 2011-2013 – LSE Department of Mathematics Research Studentship Award
- 2009 – Prize for best mark in cohort for MSc in Operational Research at the LSE

## RESEARCH INTERESTS

Search theory and algorithms, game theory, discrete optimisation, scheduling, mathematical biology

## CAREER HISTORY

- September 2016-date – Assistant Professor, Rutgers Business School, Department of Management Science and Information Systems
- September 2016-date – Visiting Fellow, London School of Economics, Department of Mathematics

- September 2013-August 2016 – LSE Fellow, London School of Economics, Department of Management/Department of Mathematics
- September 2011-2013 – Graduate Teaching Assistant, Department of Mathematics, London School of Economics
- April 2009 - September 2011 – Operational Research Analyst, Home Office, UK Civil Service
- September 2005-2007 – Supervisor of Mathematics, Trinity Hall, University of Cambridge

## JOURNAL ARTICLES

Lidbetter, T. (2017) On the Approximation Ratio of the Random Chinese Postman Tour for Network Search, *European Journal of Operational Research* 263(3):782-788

Papadaki, K., Alpern, S., Lidbetter, T. and Morton, A. (2016) Patrolling a Border, *Operations Research* 64(6):1256-1269

Csóka, E. and Lidbetter, T. (2016) The solution to an open problem for a caching game, *Naval Research Logistics* 63(1):23-31

Lidbetter, T. (2015) A caching game with infinitely divisible hidden material, *SIAM Journal on Control and Optimization* 52(5):3040-3056

Alpern, S., Lidbetter, T. (2015) Optimal Trade-Off Between Speed and Acuity When Searching for a Small Object. *Operations Research* 63(1):122-133

Alpern, S. and Lidbetter, T. (2014) Searching a Variable Speed Network. *Mathematics of Operations Research*, 39(3):697-711

Lidbetter, T. (2013) Search Games with Multiple Hidden Objects. *SIAM Journal on Control and Optimization* 51(4):3056–3074

Alpern, S. and Lidbetter, T. (2013) Mining Coal or Finding Terrorists: The Expanding Search Paradigm. *Operations Research*, 61(2):265-279

Alpern, S., Fokkink, R., Lidbetter, T. and Clayton, N. (2012) A Search Game model of the Scatter Hoarder's problem. *Journal of the Royal Society Interface*, 9(70):869-879

## BOOK CHAPTERS

Lidbetter, T. (2013) Search Games for an Immobile Hider. Alpern, S., Fokkink, R., Gasieniec, L., Lindelauf, R., Subrahmania, V.S. (ed.) *Search Theory: A Game Theoretic Perspective*, pp.17-28

## CONFERENCE PROCEEDINGS

Alpern, S., Lidbetter, T., Morton, A., Papadaki, K. Patrolling a pipeline. In *International Conference on Decision and Game Theory for Security 2016* Nov 2 (pp. 129-138). Springer International Publishing.

Angelopoulos, S., Dürr, C. and Lidbetter, T. The expanding search ratio of a graph, in *The 33rd International Symposium on Theoretical Aspects of Computer Science (STACS)*, 2016

Alpern, S., Fokkink, R., Op Den Kelder, J. and Lidbetter, T. (2010) Disperse or unite? A mathematical model of coordinated attack, in *Decision and Game Theory for Security - First International Conference, GameSec 2010*, Berlin, Germany, November 22-23, 2010. Proceedings; 01/2010

## WORKING PAPERS

Lin, K., Lidbetter, T. Searching for Multiple Objects in Multiple Locations (submitted to *Operations Research*)

Fokkink, R., Lidbetter T. and Véggh, L. On Submodular Search and Machine Scheduling (revised for *Mathematics of Operations Research*)

Bonato, A., Lidbetter, T. Bounds on the Burning Numbers of Spiders and Path-Forests (submitted to *Theoretical Computer Science*)

Alpern, S., Lidbetter, T. and Papadaki, K. Periodic Patrols on the Line and Other Networks (revising for *European Journal of Operational Research*)

Hellerstein, L. and Lidbetter, T. An Algorithmic Approach to Search Games: Finding Solutions Using Best Response Oracles (revising for *Operations Research*)

Alpern, S. and Lidbetter, T. Constant Factor Approximate solutions for Expanding Search on General Networks (submitted to *Annals of Operations Research*)

Angelopoulos, S., Dürr, C. and Lidbetter, T. The expanding search ratio of a graph (submitted to *Discrete Applied Mathematics*)

## INVITED TALKS

- *Search Theory and Machine Scheduling*, ORMS Seminar, Warwick Business School, UK, November 2017
- *Submodular Search and Machine Scheduling*, CSE Seminar, New York University, NY, USA, September 2017
- *Using a best response oracle to solve search games*, Operations Research Seminar Series, Naval Postgraduate School, Monterey, CA, USA, May 2017
- *Using a best response oracle to solve search games on graphs*, Graph Search Theory and Applications, Anogia, Crete, Greece, April 2017
- *Mining Coal or Finding Terrorists: the Expanding Search Paradigm*, Paris Game Theory Seminar, France, March 2017
- *Searching for many hidden objects*, Department of Management Science and Information Systems, Rutgers Business School, New Jersey, USA, March 2016
- *Searching for many hidden objects*, Department of Operations Research, Naval Postgraduate College, Monterey, California, USA, March 2016
- *Searching for many hidden objects*, Department of Industrial and Systems Engineering, University of Southern California, Los Angeles, USA, February 2016
- *The expanding search ratio of a graph*, 7<sup>th</sup> Workshop on Graph Search, Theory and Applications, Montreal, Canada, October 2015

- *Search games with submodular payoff functions*, Mathematical Sciences Seminar, Birkbeck, University of London, October 2015
- *The expanding search ratio of a graph*, 27<sup>th</sup> European Conference on Operational Research, University of Strathclyde, July 2015
- *Search games with submodular payoff functions*, Workshop on Search Games and Rendezvous, The Shard, London, July 2015
- *Optimal search for a small (or well hidden) object*, Department of Mathematics, Technical University of Delft, Netherlands, February 2015
- *Optimal search for a small (or well hidden) object*, International Conference on Applied Mathematical Optimization and Modeling, University of Warwick, UK, April 2014
- *Expanding search on a network*, 6<sup>th</sup> Workshop on Graph Searching, Theory and Applications, Institut d'Etudes Scientifiques de Cartèse, Corsica, France, April 2014
- *A caching game with continuous hiding material and continuous search effort*, Workshop on Game Theory and Computational Complexity, University of Strathclyde, UK, March 2014
- *Optimal search for a small (or well hidden) object*, Management Science Seminar, London School of Economics, UK, October 2013
- *A search game model of the speed-acuity trade-off*, Conference on Mathematical Models of Ecology and Evolution, University of York, UK, August 2013
- *Optimal search for a small (or well hidden) object*, European Conference on Operational Research, Rome, Italy, July 2013
- *Search games with multiple hidden objects*, Karlsruher Institut für Technologie, Operations Research Colloquium, Germany, January 2013
- *A game theoretic approach to geographic profiling*. OR Society Criminal Justice Special Interest Group seminar, London, UK, June 2012
- *Searching for multiple hidden objects*. Optimization and Incentives Seminar, Statistical Laboratory, University of Cambridge, UK, June 2012
- *Expanding search for one or more hiders*. Workshop on Search and Rendezvous, Lorentz Centre, Netherlands, May 2012
- *Expanding search for an immobile hider on a network*, Department of Mathematics Lunchtime Seminar, London School of Economics, UK, October 2011
- *A search game model of terrorist attack*, Knowledge Sharing Seminar, Home Office, UK, September 2011

## TEACHING

### Rutgers Business School

- 2017-18
  - *Introduction to Probability* (Graduate Course)
  - *Introduction to Business Research Methods* (Undergraduate course)
- 2016-17
  - *Game Theory* (new PhD course)
  - *Introduction to Probability* (Graduate Course)
  - *Introduction to Business Research Methods* (Undergraduate course)

### London School of Economics

- 2015-16
  - Course leader, lecturer, seminar/class teacher for postgraduate/3<sup>rd</sup> year undergrad. course, MA402/MA301, *Game Theory*
  - Course leader, lecturer, seminar teacher for postgrad course, MA419, *Search Games*
  - Course leader, lecturer and class teacher for 3<sup>rd</sup> year undergrad. course, MA316, *Graph Theory*
- 2014-15
  - Course leader, lecturer and class teacher for 3<sup>rd</sup> year undergrad. course, MG313, *Practical Optimisation Modelling*
  - Course leader, lecturer and seminar teacher for postgrad. course, OR428, *Model Building in Mathematical Programming*.
- 2013-14
  - Class teacher for 3<sup>rd</sup> year undergrad. course, OR301, *Model Building in Operational Research*
  - Seminar teacher for postgrad. course, OR428 *Model Building in Mathematical Programming*
- 2011-13
  - Class teacher for third year undergraduate course, MA300/301 *Game Theory*
  - Class teacher for first year undergraduate course, MA103 *Introduction to Abstract Mathematics*

### University of Cambridge

- 2005-2007 – Taught mathematics to first year undergraduates in small groups of 2 or 3, marked student assignments

### OTHER PROFESSIONAL EXPERIENCE

- July 2017 – Organizer for workshop on Search Games and Rendezvous, Shard, London
- June 2016 – Organizer for workshop on Search Games: Theory and Algorithms, Lorentz Center, Netherlands
- July 2015 – Organizer for Workshop on Search Games and Rendezvous, The Shard, London, UK
- December 2014 – Programme committee member for IMA Conference on Game Theory and its applications, St Anne's College, University of Oxford, UK
- April 2014 - Session organiser for International Conference on Applied Mathematical Optimization and Modeling, Warwick Business School, UK
- August 2013 - Session organiser for Mathematical Models of Ecology and Evolution Conference, University of York, UK
- 2016 – Examiner for University of London
- 2012-2016 – Assistant examiner for University of London
- 2016-date – Member of INFORMS

**Referee for:**

*Theoretical Computer Science, Transactions on Algorithms, Bulletin of the Malaysian Mathematical Sciences Society, Mathematical Methods in the Applied Sciences, International Game Theory Review, Annals of Operations Research, Networks, Theory and Decision, Operations Research, Naval Research Logistics, Probability in the Engineering and Informational Sciences, IIE Transactions, Annals of Operations Research, OR Spectrum, European Journal of Operations Research, International Journal of Game Theory*