

# **ALAN R. BAKER**

Department of Philosophy  
Swarthmore College  
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## **EDUCATION**

**Princeton University**, Princeton, New Jersey  
Ph.D. in Philosophy, 1999; M.A. in Philosophy, 1995  
Ph.D. Dissertation: “Indispensability and the Existence of Mathematical Objects”  
Advisors: Paul Benacerraf, Gideon Rosen

**University of Cambridge**, Emmanuel College, Cambridge  
B.A. Honours, First Class, in Philosophy, 1991  
Part Ia, Mathematics Tripos, 1989

## **AREAS OF SPECIALIZATION**

Philosophy of Mathematics, Philosophy of Science

## **AREAS OF COMPETENCE**

Logic, Philosophy of Mind, Metaphysics, Early Modern Philosophy

## **ACADEMIC POSITIONS HELD**

**Swarthmore College**, Swarthmore, Pennsylvania  
Chair, Department of Philosophy, 2012 – present  
Chair, Cognitive Science Program, 2012 – present  
Associate Professor, Department of Philosophy, 2008 – present  
Assistant Professor, Department of Philosophy, 2003 – 2008

**University of Oxford**  
Associate Fellow, CABDyN Complexity Centre, 2009 – present

**Xavier University**, Cincinnati, Ohio  
Assistant Professor, Department of Philosophy, 2000 – 2003

**University of Oxford**, St. John’s College  
Tutor in Philosophy, Hilary Term, 1999

**University of Cambridge**, Wolfson College  
Director of Studies in Philosophy, 1999 – 2000  
Junior Research Fellow, 1998 – 2000

**University of Ghana**, West Africa  
Assistant Lecturer, Department of Philosophy, 1991 – 1992

## TEACHING EXPERIENCE

### **Swarthmore College, 2003 – present**

Philosophy 1: *Introduction to Metaphysics and Epistemology*, Spring 2004  
Philosophy 7: *Paradox and Rationality*, Spring 2006  
Philosophy 12: *Logic*, Fall 2003, 2004, 2005, 2007, 2009, 2010, 2012  
Philosophy 18: *Philosophy of Science*, Spring 2004, 2006; Fall 2009, 2010  
Philosophy 25: *Philosophy of Mathematics*, Spring 2006, 2011  
Philosophy 31: *Advanced Logic*, Spring 2005, 2008, 2010  
Philosophy 86: *Philosophy of Mind*, Fall 2004, 2010, 2012  
Philosophy 118: *Philosophy of Mind and Cognitive Science (Honors Seminar)*, Fall 2003, 2005, 2007, 2009  
Philosophy 119: *Philosophy of Science (Honors Seminar)*, Spring 2005, 2008, 2010, 2011  
Philosophy 125: *Philosophy of Mathematics (Honors Seminar)*, Spring 2004

### **University of Oxford, 2012**

*Philosophy of Mathematics*, Hilary Term 2012 (course of 8 lectures)

### **Aarhus University, Denmark, 2011**

10 ECTS: *Emergence, Explanation and Complexity* (summer school, PhD level course)

### **University of Tartu, Estonia, 2007**

Philosophy 03.074: *Nominalism in Mathematics*, Spring 2007  
Philosophy 03.075: *Explanation in Science*, Spring 2007

### **Xavier University, 2000 – 2003**

Philosophy 290: *Theory of Knowledge*, Fall 2000; Spring / Fall 2001, 2003; Spring 2003  
Philosophy 311: *Symbolic Logic*, Fall 2000; Fall 2001; Fall 2002  
Philosophy 320: *Philosophy of Science*, Spring 2001  
English / Math / Philosophy 394: *Complexity and the Origin of Order*, Spring 2002  
Philosophy 345: *Seminar in Philosophy of Mathematics*, Spring 2003

### **University of Cambridge, 1998 – 2000**

Philosophy Tripos, Part II: *Abstract Objects*, Easter Term 2000 (course of 4 lectures)

### **University of Ghana, 1991 – 1992**

Philosophy Part 2: *Philosophy of Mind*  
Philosophy Part 1: *Deductive Logic*

## PUBLICATIONS

### Selected Papers in Refereed Journals

- “Science-Driven Mathematical Explanation,” *Mind* (forthcoming, 2012)
- “Indexing and Mathematical Explanation” (co-authored with Mark Colyvan), *Philosophia Mathematica*, 19, 323-334. (2011)
- “Mathematical Induction and Explanation,” *Analysis*, 70(4), 1-8 (2010)
- “Mathematical Explanation in Science,” *British Journal for the Philosophy of Science*, 60, 611-633 (2009)
- “Experimental Mathematics,” *Erkenntnis*, 68, 331-344 (2008)
- “Complexity Unfavoured,” *Analysis*, 68(1), 85-88 (2008)
- “Putting Expectations in Order: a Response to Nover and Hájek,” *Philosophy of Science*, 74(5), 692-700 (2007)
- “Occam's Razor in Science: a Case Study from Biogeography,” *Biology and Philosophy*, 22, 193-215 (2007)
- “Are There Genuine Mathematical Explanations of Physical Phenomena?” *Mind*, 114, 223-238 (2005)
- “Does the Existence of Mathematical Objects Make a Difference?” *Australasian Journal of Philosophy*, 81(2), 246-264 (2003)
- “Quantitative Parsimony and Explanatory Power,” *British Journal for the Philosophy of Science*, 54, 245-259 (2003)
- “The Indispensability Argument and Multiple Foundations for Mathematics,” *Philosophical Quarterly*, 53, 49-67 (2003)
- “Mathematics, Indispensability and Scientific Progress,” *Erkenntnis*, 55(1), 85-116 (2001)

### Other Papers in Refereed Journals

- “Complexity, Networks, and Non-Uniqueness,” *Foundations of Science* (forthcoming)
- “Explaining the Applicability of Mathematics in Science,” *Interdisciplinary Science Reviews, Special Issue: The Unreasonable Effectiveness of Mathematics*, 36.3, 255-267. (2011)
- “No Reservations Required? Defending Anti-Nominalism,” *Studia Logica*, 96, 129-141 (2010)
- “Complexity,” *The Reasoner*, 4(3), 44 (2010)
- “Simulation-Based Definitions of Emergence,” *Journal of Artificial Societies and Social Simulation*, 13(1) (2010)
- “A Counter on Counterpossibles,” *The Reasoner*, 1(2), 7-8 (2007)
- “Drinking Discretely: Parsons’s Old Peculiar,” *Analysis*, 67(4), 318-21 (2007)
- “Ambiguity in Inclusive and/or Exclusive Disjunction,” *Contemporary Philosophy*, 27(1-

2), 49-56 (2006)

“Malebranche’s Occasionalism: a Strategic Reinterpretation,” *American Catholic Philosophical Quarterly*, 79(2), 251-272 (2005)

“Maximizing Principles in Mathematical Methodology,” *Logique et Analyse*, 45, 269-281 (2004)

“Malebranche on Laws of Nature and God’s General Volitions,” *Logical Analysis and the History of Philosophy*, 7, 121-133 (2004)

“The Classification of Defects from Ultrasonic Data using Neural Networks,” *NDT International*, 22, 97-108 (1989)

### **Book Chapters, Conference Proceedings, Encyclopedia Entries, and Critical Reviews**

“Mathematical Explanation in Biology,” in *Explanation in Biology*, ed. C. Malaterre, Springer (forthcoming)

“Science and Mathematics: the Scope and Limits of Mathematical Fictionalism,” Book Symposium, *Metascience*, 21, 269-294 (2012)

“Complexity,” in *Key Terms in Logic*, ed. J. Williamson, Continuum, p. 15 (2010)

“Inference to the Best Explanation,” in *Key Terms in Logic*, p. 37 (2010)

“A Medley of Philosophy of Mathematics: Review of *Philosophy of Mathematics: Set Theory, Measuring Theories, and Nominalism* edited by Gerhard Preyer and Georg Peter,” *Metascience*, 19(2), 221-224 (2010)

“William of Ockham,” in *Key Terms in Logic*, ed. J. Williamson, Continuum (2010)

“Mathematical Accidents and the End of Explanation,” in *New Waves in the Philosophy of Mathematics*, ed. O. Bueno & Ø. Linnebo, Palgrave Macmillan, 137-159 (2009)

“Emergence and Simulation,” *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, Volume 5: Complex Sciences* (2009)

“Nondeductive Methods in Mathematics,” *Stanford Encyclopedia of Philosophy* (2009)

“Mathematical Skepticism,” *Acta Universitatis Latviensis*, 739, 7-21 (2008)

“Is There a Problem of Induction for Mathematics?” in *Mathematical Knowledge*, ed. M. Leng, A. Paseau, & M. Potter, Oxford University Press, 59-73 (2007)

“Complex Thinking: the Emergence of Everything?”, in *The Baltic International Yearbook of Cognition, Logic and Communication, Volume 2: Complex Cognition and Qualitative Science*. ed. J. Skilters, Latvijas Universitate, 137-148 (2007)

Review of *A Structural Account of Mathematics* by Charles Chihara, *Notre Dame Journal of Formal Logic*, 47(3), 435-442 (2006)

“Simplicity,” in *The Stanford Encyclopedia of Philosophy* (2004; revised 2010)

“The New Science of Complexity,” in *History and Philosophy of Science*, ed. H. Lauer, Hope Publications, 373-382 (2003)

- Review of *The Foundations of Mathematics in the Theory of Sets* by J.P. Mayberry,  
*Australasian Journal of Philosophy*, 80(4), 533-4 (2002)
- “Philosophy and Complexity,” *Proceedings of the Fourth International Conference on  
Complex Systems* (2002)
- “Are the Laws of Nature Deductively Closed?” in *Causation and Laws of Nature  
(Australian Studies in the History and Philosophy of Science)*, ed. H. Sankey, Kluwer,  
91-109 (1999)
- “Classical Negation and the Definition of Logical Connectives,” *LOGICA Yearbook '97*,  
128-140 (1998)
- “Aspects of Indispensability: Infinitesimals and Quaternions,” in *Proceedings of the  
Canadian Society for the History and Philosophy of Mathematics* (1997)

### **Other Publications**

- “Mis (kui üldse miski) on ameerika filosoofia?” [“What (If Anything) Is American  
Philosophy?”], (in Estonian), *SIRP*, 25, June 15 2007, p. 14.
- “Philosopher in Residence,” Feature Story, Swarthmore College homepage  
<http://www.swarthmore.edu/x9389.xml>, January 2007
- “I Think, Therefore I Pass,” *New York Times Educational Supplement*, Nov. 6 2005, p. 39.

### **SABBATICAL / VISITING POSITIONS HELD**

#### **University of Oxford**

Visiting Lecturer, Wadham College, January – July 2012

#### **Aarhus University, Denmark**

Visiting Professor, Aarhus Summer University, July – August 2011

#### **Northeastern University**

Visiting Research Professor, Department of Physics, August 2009

#### **University of Oxford**

Visiting Scholar, Wolfson College, September 2008 – July 2009

University Fellow, James Martin Institute, September 2008 – July 2009

#### **University of Warwick**

Visiting Scholar, Department of Philosophy, September 2008 – July 2009

#### **University of Tartu, Estonia**

Fulbright Scholar, Department of Philosophy, January – May 2007

#### **Whitehall Museum House, Middletown, Rhode Island (former home of George Berkeley)**

Scholar in Residence, July 2006; August - September 2008; July - August 2010

## **GRANTS AND AWARDS**

- ‘New Directions’ Post-Fellowship Award (\$50,000), Andrew W. Mellon Foundation, for two summers of research and collaboration in the area of complex systems, 2012 - 2013
- Mary Albertson Fellowship (\$40,000), Swarthmore College, for 2<sup>nd</sup> semester sabbatical leave support, 2011 – 2012
- Mellon TRICO Seed Grant Award (\$2,300), History and Philosophy of Mathematical Practice, 2011 – 2012
- Research Award (\$2,000), Swarthmore College, for research collaboration at the Santa Fe Institute, 2011
- Mellon TRICO Seed Grant Award (\$2,150), Project Leader, Science Studies, 2010 – 2011
- Penn Humanities Forum, Regional Fellowship (\$3,000), for participation in a weekly seminar on “Connections,” University of Pennsylvania, 2009 – 2010
- Mellon TRICO Seed Grant Award (\$3,000), Project Leader, Working Group in Mathematics and Philosophy, 2009 – 2010
- ‘New Directions’ Fellowship (\$224,000), Andrew W. Mellon Foundation, to study complexity science for one year in the UK, 2008
- The Sir Karl Popper Essay Prize, finalist, 2008
- Mellon TRICO Seed Grant Award (\$2,200), Project Leader, Working Group in Mathematics and Philosophy, 2008 – 2009
- Lang Discretionary Fund Award (\$1,800), for travel to attend Venice Summer School on Science and Religion, 2008
- Lakatos Research Fellowship (\$3,000), for travel, archival research, and temporary Visiting Researcher position at the London School of Economics, 2007 – 2008
- Mellon TRICO Seed Grant Award (\$3,000), Project Leader, Working Group in Mathematics and Philosophy, 2007 – 2008
- Inter-Country Travel Grant (\$500), Finnish Fulbright Commission, 2007
- Fulbright Scholarship (\$25,000), University of Tartu, Estonia, 2007
- Research Award (\$1,600), Swarthmore College, to purchase a laptop computer, 2006
- Swarthmore College Cognitive Science Program Travel Grant (\$1,500), to attend CogSciSoc Conference in Vancouver, 2006
- Korea Research Foundation Grant (\$3,000), for travel to Korea to give three public lectures on “The Philosophy of Applied Mathematics,” 2005
- Mellon Tri-College Fellow, 2004 – 2005
- Summer Research Fellowship, Xavier University, 2002
- President’s Interdisciplinary Initiative Grant (\$75,000), “Engaging Our World of Complexity,” 2001

Fellowship for Research Release Time, Xavier University, 2000

Junior Research Fellowship, Wolfson College, University of Cambridge, 1998 – 2000

Association of Princeton Graduate Alumni Award, 1996

*Mind* Association Travel Grant, to attend Mathematical Truth conference in Sicily, 1995

Graduate Fellowship, Princeton University, 1992 – 1997

M.T. Dodd's Prize for Philosophy, Economics & History, Emmanuel College, Cambridge, 1991 (one prize awarded annually for best performance in university Tripos exams)

Hooper Scholarship, Emmanuel College, Cambridge, 1990

## **PROFESSIONAL ACTIVITIES**

Referee for *Mind*, *Australasian Journal of Philosophy*, *Philosophy of Science*, *Erkenntnis*, *Nous*, *British Journal for the Philosophy of Science*, *Dialectica*, *Synthese*, *European Journal for the Philosophy of Science*, *American Philosophical Quarterly*, *International Studies in the Philosophy of Science*, *International Journal of Philosophical Studies*, and *Philosophical Quarterly*

Reviewer for *Notre Dame Journal of Formal Logic*, *Australasian Journal of Philosophy*, *Metascience*

External Examiner, University of Ghana, 2012

Examiner, Philosophy, Politics and Economics Prelims, University of Oxford, 2012

Editor, PhilPapers, Epistemology of Mathematics section, 2011 – present

Member, Board of Directors, Greater Philadelphia Philosophy Consortium, 2008 – present

Panelist, Fulbright Orientation for Europe and Eurasia, Washington DC, June 2007

Panelist, Cross-cultural Learning and Teaching Experiences, University of Tartu, Estonia, May 2007

Consultant on proposal for BBC documentary program, "Counterfactuals in Science," 2007

Consultant for Logic, Metaphysics, and Philosophy of Mathematics, Broadview Press, 2006

Co-organizer, GPPC Undergraduate Conference, Philadelphia, February 2005

Subject referee for Philosophy of Mathematics, Acumen Publishers, 2004

Committee member, Greater Philadelphia Philosophy Consortium, 2004 – present

Participant in 'Emergence and Complexity' Reading Group, Bryn Mawr College, 2003 – 8

Participant in Greater Philadelphia Philosophy Consortium, Philosophy of Science Reading Group, 2003 – present

Editorial consultant for textbook *History and Philosophy of Science*, ed. H. Lauer, Hope Publications, 2003

Consultant for online logic textbook, *Introductory Logic*, published by Teall Review, 2002

Steering Committee member for Xavier University's Service Learning Program in Ghana, West Africa, 2002

Examiner, Part Ib Philosophy Tripos, University of Cambridge, 1999 – 2000

Undergraduate supervisions for Wolfson College, Queens College, Newnham College, Cambridge in: *Metaphysics and Philosophy of Mind* (Part Ia, Part Ib); *Philosophy of Science* (Part Ib, Part II); *Logic* (Part Ia, Part Ib), 1998 – 2000

Interviewer, undergraduate admissions (Philosophy), Wolfson College, Cambridge, 1998 – 9

Undergraduate tutorials for St. John's College, Oxford, in: *Descartes* (PPE Prelims); *Logic*, (PPE Prelims); *Philosophy of Mathematics* (Mathematics and Philosophy), 1999

### **RECENT INVITED TALKS AND CONFERENCE PAPERS (since 2008)**

"Mathematical Properties and Explanation," Invited Talk, Logic and Cognitive Science Lecture Series, North Carolina State University, November 2012

"Metametaphysics," Faculty Lunch talk, Swarthmore College, October 2012

"Numbers, Insects, and Mathematical Explanation," Invited Lecture, University of Ghana, West Africa, July 2012

"Mathematical Contributions to Explanation," Wadham College Philosophy of Mathematics Workshop, Oxford, June 2012

"Making Sense of Mathematical Counterfactuals," Philosophy of Mathematics Seminar, University of Oxford, May 2012

"Matching Mathematics to the World," Department of Philosophy Seminar Series, University of Leeds, May 2012

"Matching Mathematics to the World," Philosophy Club, University of St. Andrews, March 2012

"Absolutely Normal Numbers," Mathematics Department Colloquium, Swarthmore College, November 2011

"Matching Mathematics to the World," Colloquium Talk, Institute for the History and Philosophy of Science, Paris, October 2011

"Paradoxes for Mathematics: a Philosophical Perspective," Invited Lecture, Ride the Tide Program for Admitted Students, Swarthmore College, April 2011

"The Extended Mind," Cognitive Science Group, Swarthmore College, April 2011

"Inference to the Best Mathematical Explanation," Workshop on Explanation in Mathematics, Toronto University, October 2010



- “Explanatory Relations Between Mathematical and Physical Hypotheses,” Workshop on Mathematics and Explanation, Aarhus University, Denmark, August 2010
- “Mad Science and Martian Science,” Invited Lecture, Ride the Tide Program for Admitted Students, Swarthmore College, April 2010
- “Varieties of Emergence,” Guest lecture, Introduction to Cognitive Science, Swarthmore College, April 2010
- “Emergence and Simulation,” Research Seminar, Santa Fe Institute, March 2010
- “Approaches to Characterizing Emergence,” Panel Discussion, Cooper Foundation Event on Examining the Sacred, Science, and Meaning, Swarthmore College, February 2010
- “The ‘New’ Science of Networks,” Faculty lunch talk, Swarthmore College, November 2009
- “Science-Driven Mathematical Explanation,” lunchtime talk, Center for Philosophy of Science, University of Pittsburgh, October 2009
- “Only Connections?,” Penn Humanities Forum, September 2009
- “Real Networks?,” Research Seminar, Department of Physics, Northeastern University, August 2009
- “Mathematical Induction and Explanation,” Work-in-Progress Seminar Series, Subfaculty of Philosophy, University of Oxford, July 2009
- “Emergence in Complex Systems,” Conceptual Foundations in Systems Biology Seminar Series, University of Oxford, June 2009
- “Biological Systems and Biological Networks,” Conceptual Foundations in Systems Biology Seminar Series, University of Oxford, May 2009
- “Networks as Representations and Networks in the World,” CABDyN Seminar Series, University of Oxford, May 2009
- “Are Networks Real?,” Bath Institute for Complex Systems, May 2009
- “Parts, Wholes, and Emergence,” Serious Metaphysics Group, University of Cambridge, May 2009
- “Topological Definitions of Emergence,” 2<sup>nd</sup> EmergeNET Meeting, Glasgow, March 2009
- “Emergence and Simulation,” First International Conference on Complex Sciences: Theory and Applications, Shanghai, China, February 2009

- “Geometry, Indispensability and Explanation,” Philosophy of Mathematics Seminar, University of Oxford, January 2009
- “Angles and Insects: Geometrical Explanation in Science,” Workshop on Explanation, Indispensability of Mathematics and Scientific Realism, University of Leeds, January 2009
- “The Unreasonableness of Asking Why Mathematics is Effective,” Research Symposium: “Unreasonable Effectiveness?” Historical Origins and Philosophical Problems for Applied Mathematics, All Souls College, Oxford, December 2008
- “Scientific Representation,” M.A. Research Seminar, University of Leeds, December 2008
- “What (if Anything) Makes a Scientific Image ‘Fraudulent’?”, History and Philosophy of Science Seminar Series, University of Leeds, December 2008
- “The Philosophy of Applied Mathematics,” Kyoto University, Japan, November 2008
- “Mathematical Explanation in Science,” Keio University, Japan, November 2008
- “Some Philosophical Perspectives on Complexity,” James Martin Institute for Science and Civilization, University of Oxford, October 2008
- “Mathematical Explanation in Science: One Issue or Two?”, University of Liverpool, October 2008
- “Simulation-Based Definitions of Emergence,” Epistemological Perspectives on Simulation III, Lisbon, October 2008
- “Is the Applicability of Mathematics ‘Miraculous’?”, Venice Summer School on Science and Religion, May 2008
- “Mathematical Accidents and the End of Explanation,” Invited Talk, New Waves in the Philosophy of Mathematics Conference, Miami, April 2008
- “A State of Emergence: E,” Bryn Mawr Emergence Group, Bryn Mawr College, April 2008
- “Mathematical Explanation in Science,” Department of History and Philosophy of Science, University of Cambridge, March 2008

**COLLEGE ACTIVITIES AND SERVICE**

Organizer, 3<sup>rd</sup> Annual Mathematics and Philosophy Colloquium, Swarthmore College, 2010

Committee member, Tri-College Mellon Committee, 2009 – 2011

Assistant Coach, Swarthmore College Men's Squash Team, 2009 – 2011

Organizer, "Proof and Understanding," Mathematics and Philosophy Colloquium,  
Swarthmore College, 2008

Committee member, Writing Program Advisory Committee, 2007

Participant, Mellon Tri-College Faculty Seminar, "Imaging in Science," 2007 – 2008

Founder and organizer, Swarthmore College Shogi (Japanese Chess) Club, 2004 – present

Committee member, Cognitive Science Committee, 2003 – present

Committee member, Fellowships and Prizes Committee, 2003 – 2006