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Current position

Professor, Computer Science Dept., Cornell University.

Education

Ph.D. (Comp. Sci.), University of Toronto (Jan. 1991).

Thesis: *Tractable Default Reasoning* Advisor: Hector Levesque

M.Sc. (Comp. Sci.), University of Toronto (1985).

Thesis: *Rule-Based Processing in a Connectionist Natural Language System*

Advisor: Graeme Hirst

M.Sc. (Physics), Delft University of Technology (1983).

Honors and Awards

Fellow of the Association for Computing Machinery (ACM, elected 2013).

Fellow of the American Association for the Advancement of Science (AAAS, elected 2003).

Fellow of the Association for the Advancement of Artificial Intelligence (AAAI, elected 2001).

Alfred P. Sloan Research Fellow (1999-2000).

NSF Faculty Early Career Development Award (1998-2002).

Stephen Miles '57, Excellence in Teaching Award, College of Engineering, Cornell Univ. (2002).

Cornell Outstanding Educator Award (2001).

AAAI Classic Paper Award at the 25th Conf. on Artificial Intelligence (AAAI-11) for the AAAI-92 paper "A New Method for Solving Hard Satisfiability Problems."

AAAI Classic Paper Award at the 25th Conf. on Artificial Intelligence (AAAI-11) for the AAAI-92 paper "Hard and Easy Distributions of SAT Problems."

Outstanding Paper Award at the 21st Conf. on Artificial Intelligence (AAAI-06) for the paper "Model Counting: A New Strategy for Obtaining Good Bounds."

Distinguished Paper Award at the Tenth Intl. Conf. on the Principles and Practice of Constraint Programming (CP-2004) for the paper "Statistical Regimes Across Constrainedness Regions."

1st Place, Optimal planning competition, Fourteenth International Conference on Automated Planning & Scheduling (ICAPS-04), Whistler, BC, 2004. SATPlan-04 planner.

Best Paper Award at the Thirteenth National Conference on Artificial Intelligence (AAAI-96) for the paper "Pushing the Envelope: Planning, Propositional Logic, and Stochastic Search."

Best Paper Award at the Tenth National Conference on Artificial Intelligence (AAAI-92) for the paper “Hard and Easy Distributions of SAT Problems.”

Best Paper Award at the First International Conference on Knowledge Representation and Reasoning (KR-89) for the paper “Hard Problems for Simple Default Logics.”

Best Paper Award at the Conf. of the Canadian Society for the Comp. Studies of Intelligence (CSCSI-88) for the paper “The Complexity of Model-Preference Default Theories.”

Honorable Mention, Best Paper Award at the Eleventh National Conference on Artificial Intelligence (AAAI-93), Washington, DC, 1993, for “Reasoning With Characteristic Models.”

Runner-up for the FOLLI Prize, for the paper entitled “Critical Behavior in the Satisfiability of Random Boolean Expressions.” *Science*, Vol. 264, 1994.

co-Chair, AAAI Presidential Panel on Longterm AI Futures: Societal Impact and Responsibilities, Asilomar, Pacific Grove, CA (2009).

Program co-Chair, Twenty Sixth Conference on Artificial Intelligence (AAAI-12), Toronto, Canada, 2012.

Chair, Section on Information, Computation, and Communication, AAAS (Chair Elect '09, Chair '10).

Elected to the Executive Council of the American Association for Artificial Intelligence, the policy making body for AAAI (1999-2002).

Advising related: (1) Best Student Paper for paper co-authored with Stefano Ermon (Ph.D. student) and Carla Gomes. “Computing the Density of States of Boolean Formulas.” *Proc. 16th Intl. on Princ. and Practice of Constraint Programming (CP 2010)*, 2010. (2) Honorable Mention, Best Student Paper for paper co-authored with Raghu Ramanujan (Ph.D. student). “Trade-Offs in Sampling-Based Adversarial Planning.” *Proc. of 21st Intl. Conf. on Automated Planning and Scheduling (ICAPS-11)*, 2011. (3) Ioannis Vetsikas (Ph.D. student) won the 2004 and the 2002 International Trading Agent Competition (TAC-04 & TAC-02), an E-commerce challenge. (4) Omar Khan was co-winner of the Computing Research Organization (CRA) Outstanding Undergraduate Award 2003. Research project on structural properties of NEC CiteSeer citation graph (co-advised with Prof. John Hopcroft).

Research Interests

Computational Sustainability, Knowledge Representation, Probabilistic and Logical Reasoning, Algorithms and Complexity, Planning, Learning, Game Theory, Cognitive Science, Multi-Agent Systems, and Connections between Computational Complexity and Statistical Physics.

Publications

Journal Papers

1. Kroc, Lukas; Sabharwal, Ashish; and Selman, Bart. Leveraging belief propagation, backtrack search, and statistics for model counting. *Annals of Operations Research*, 184(1), 209–231, 2011.

2. Kautz, Henry and Selman, Bart. The State of SAT. *Discrete Applied Mathematics*. Vol. 155(12): 1514-1524, 2007.
3. Hoffmann, Joerg; Gomes, Carla; and Selman, Bart. Structure and Problem Hardness: Goal Asymmetry and DPLL Proofs in SAT-Based Planning. *Logical Methods in Computer Science*. Vol. 3(1), 2007.
4. Gomes, Carla; Fernandez, Cesar; Selman, Bart; and Bessiere, Christian. Statistical Regimes Across Constrainedness Regions. *Constraints*. Vol. 10(4), 2005 pp. 317-337.
5. Bejar R.; Domshlak C.; Fernandez C.; Gomes C.; Krishnamachariand B.; Selman B.; and Valls M. Sensor networks and distributed CSP: Communication, Computation and Complexity. *Artificial Intelligence Journal*. Vol. 161(1/2), 2005, 117-147.
6. Boufkhad, Yancine; DuBoois, Olivier; Interian, Yannet; and Selman, Bart. Regular Random k-SAT: Properties of Balanced Formulas. *Journal of Automated Reasoning*. Vol. 35, nos. 1-3 (2005), pp. 181-200.
7. Gomes, Carla and Selman, Bart. Can Get Satisfaction. *Nature*, Vol. 435, June 9, 2005, pp. 751–752.
8. Hopcroft, John; Kulis, Brian; Khan, Omar; and Bart Selman. Tracking evolving communities in large linked networks. *Proc. Natl. Acad. of Sci. (PNAS)*, 5249–5253, 2004.
9. Gomes, Carla and Selman, Bart. Satisfied with Physics. *Science*, Vol. 297, Aug. 2, 2002, 784–785. (Invited perspective article.)
10. Gomes, Carla and Selman, Bart. Algorithm Portfolios. *Artificial Intelligence*, Vol. 126 (2001) 43–62.
11. Selman, Bart. Compute-Intensive Methods in Artificial Intelligence. *Annals of Mathematics and Artificial Intelligence*, Vol. 28 (2000), 35–41.
12. Gomes, Carla; Selman, Bart; Crato, Nuno; and Kautz, Henry. Heavy-tailed phenomena in satisfiability and constraint satisfaction problems. *J. of Automated Reasoning*, Vol. 24(1/2), 2000, 67-100.
13. Monasson, Remi; Zecchina, Riccardo; Kirkpatrick, Scott; Selman, Bart; and Troyansky, Lidror. Determining computational complexity from characteristic ‘phase transitions’. *Nature*, Vol. 400(8), 1999, 133–137.
14. Monasson, Remi; Zecchina, Riccardo; Kirkpatrick, Scott; Selman, Bart; and Troyansky, Lidror. 2+P-SAT: Relation of typical-case complexity to the nature of the phase transition. *Random Structures*, 1999, 414–435.
15. Kautz, Henry; Selman, Bart; and Shah, Mehul. ReferralNet: Combining Social Networks and Collaborative Filtering. *Commun. of the ACM*, 40, 3, 1997, 63–65.
16. Henry Kautz, Bart Selman, and Mehul Shah. The Hidden Web. *Artificial Intelligence Magazine*, 18(2), 1997, 27–36.

17. Selman, Bart and Kautz, Henry. Knowledge Compilation and Theory Approximation. *Journal of the ACM*, Vol. 43, No. 2, 1996, 193–224.
18. Selman, Bart. Computational challenges in Artificial Intelligence, *ACM Computing Surveys*, 28(4es), 1996.
19. Selman, Bart and Kirkpatrick, Scott. Finite-Size Scaling of the Computational Cost of Systematic Search. *Artificial Intelligence*, Vol. 81, 1996, 273–295.
20. Selman, Bart and Levesque, Hector. Support Set Selection for Abductive and Default Reasoning. *Artificial Intelligence*, Vol. 82, 1996, 259–272.
21. Selman, Bart; Mitchell, David; and Levesque, Hector. Generating Hard Satisfiability Problems. *Artificial Intelligence*, Vol. 81, 1996, 17–29.
22. Selman, Bart; Kautz, Henry; and Cohen, Bram. Local Search Strategies for Satisfiability Testing, *Dimacs Series in Discr. Math. and Theoretical Computer Science*, Vol. 26, 1996, 521–532.
23. Kautz, Henry; Kearns, Michael; and Selman, Bart. Horn Approximations of Empirical Data. *Artificial Intelligence*, Vol. 74, 1995, 129–145.
24. Kirkpatrick, Scott and Selman, Bart. Critical Behavior in the Satisfiability of Random Boolean Expressions. *Science*, Vol. 264, 1994, 1297–1301. (Accompanied by a *Science* news article entitled “Pinning Down a Treacherous Border in Logical Statements” by Barry Cipra.)
25. Kautz, Henry; Selman, Bart; and Coen, Michael. Bottom-Up Design of Software Agents. *Communications of the ACM*, Vol. 37, no. 7, 1994, 143–146.
26. Selman, Bart and Levesque, Hector. The Complexity of Path-Based Inheritance. *Artificial Intelligence*, Vol. 62, 1993, 303–339.
27. Kautz, Henry and Selman, Bart. Hard problems for Simple Default Theories. *Artificial Intelligence*, Vol. 49, 1991, 243–279.
28. Selman, Bart and Kautz, Henry. Model-preference default theories. *Artificial Intelligence*, Vol. 45, 1990, 287–322.
29. Selman, Bart. Connectionist Systems for Natural Language Understanding. *Artificial Intelligence Review*, Vol. 1, no. 3, 1989, 23–31.
30. Niemantsverdriet, Jan W.; Flipse, Cees F.J.; Selman, Bart; Van Loef, Jan J.; and, van der Kraan, Adrie M. Influence of Particle Motion on the Mössbauer Effect in Microcrystals. *Physics Letters*, Vol. 100A, no. 8, 1984, 445–447.
31. Hoogland, Arne; Spaa, Jack; Selman, Bart; and, Compagner, A. A Special-Purpose Processor for the Monte-Carlo Simulation of Ising Spin Systems. *The Journal of Computational Physics*, Vol. 51, 1983, 250–260.

Conference Papers in Published Proceedings

32. Ermon, Stefano; Gomes, Carla; Selman, Bart; and Vladimirsky, Alexander. Probabilistic Planning With Non-linear Utility Functions and Worst Case Guarantees. *Proc. 11th Intl. Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS-12)*, Valencia, Spain, 2012.
33. Ermon, Stefano; LeBras, Ronan; Gomes, Carla; Selman, Bart; and van Dover. SMT-Aided Combinatorial Materials Discovery. *Proc. 15th Int. Conference on Theory and Appl. of Satisfiability Testing (SAT-12)*, 2012.
34. Ermon, Stefano; Gomes, Carla; and Selman, Bart. Uniform Solution Sampling Using a Constraint Solver As an Oracle. *Proceedings of the 28th Conference on Uncertainty in Artificial Intelligence (UAI 2012)*, 2012.
35. Ermon, Stefano; Xue, Yexiang; Gomes, Carla; and Selman, Bart. Learning Policies For Battery Usage Optimization in Electric Vehicles. *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD-12)*, September 2012.
36. Sung, Jaeyong; Ponce, Colin; Selman, Bart; and Saxena, Ashutosh. Unstructured human activity detection from RGBD images. *Proceedings of IEEE International Conference on Robotics and Automation (ICRA-12)*, 2012.
37. Ermon, Stefano; Gomes, Carla; and Selman Bart. A message passing approach to multiagent gaussian inference for dynamic processes. *Proc. 10th Intl. Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS-11)*, Taipei, Tawan, 2011.
38. Ermon, Stefano; Conrad, Jon; Gomes, Carla; and Selman Bart. Risk-Sensitive Policies for Sustainable Renewable Resource Allocation. *Proceedings of the 20th International Joint Conference on Artificial Intelligence (IJCAI-11)*, Barcelona, Spain, 2011.
39. Ermon, Stefano; Gomes, Carla; Sabharwal, Ashish; and Selman, Bart. Accelerated Adaptive Markov Chain for Partition Function Computation. *Proc. 25th Annual Conference on Neural Information Processing Systems (NIPS-11)*, 2011.
40. Ermon, Stefano; Gomes, Carla; and Selman Bart. A Flat Histogram Method for Computing the Density of States of Combinatorial Problems. *Proceedings of the 20th International Joint Conference on Artificial Intelligence (IJCAI-11)*, Barcelona, Spain, 2011.
41. Previti, Alessandro; Ramanujan, Raghuram; Schaerf, Marco; and Bart Selman. Applying UCT to Boolean Satisfiability. *Proc. 14th Int. Conference on Theory and Appl. of Satisfiability Testing (SAT-11)*, 2011.
42. Ramanujan, Raghuram and Selman, Bart. Trade-Offs in Sampling-Based Adversarial Planning. *Proceedings of 21st International Conference on Automated Planning and Scheduling (ICAPS-11)*, 2011. (Honorable mention, Best student paper award.)

43. Ermon, Stefano; Gomes, Carla; and Selman Bart. Computing the Density of States of Boolean Formulas. *Proceedings 16th International Conference on Principles and Practice of Constraint Programming (CP 2010)*, 2010. (Best student paper award.)
44. Ermon, Stefano; Conrad, Jon; Gomes, Carla; and Selman, Bart. Playing Games Against Nature: Optimal Policies for Renewable Resource Allocation, *Proceedings of the 26th Conference on Uncertainty in Artificial Intelligence (UAI 2010)*, 2010.
45. Ermon, Stefano; Gomes, Carla; and Selman Bart. Collaborative multiagent Gaussian inference in a dynamic environment using belief propagation. *Proc. 9th Intl. Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS-10)*, Toronto, Canada, 2010.
46. Ramanujan, Raghuram; Sabharwal, Ashish; and Selman, Bart. Understanding Sampling Style Adversarial Search Methods. *Proceedings of the 26th Conference on Uncertainty in Artificial Intelligence (UAI 2010)*, 2010.
47. Kroc, Lucas; Sabharwal, Ashish; and Selman, Bart. An Empirical Study of Optimal Noise and Runtime Distributions in Local Search. *Proc. 13th Int. Conference on Theory and Appl. of Satisfiability Testing (SAT-10)*, 2010.
48. Ramanujan, Raghuram; Sabharwal, Ashish; and Selman, Bart. On Adversarial Search Spaces and Sampling-Based Planning. *Proceedings of 20th International Conference on Automated Planning and Scheduling (ICAPS-10)*, Toronto, Canada, 2010.
49. Kroc, Lucas; Sabharwal, Ashish; Gomes, Carla; and Selman, Bart. Integrating Systematic and Local Search Paradigms. *Proceedings of the 21st International Joint Conference on Artificial Intelligence (IJCAI-09)*, 2009.
50. Kroc, Lucas; Sabharwal, Ashish; Gomes, Carla; and Selman, Bart. Relaxed DPLL Search for MaxSAT. *Proc. 12th Int. Conference on Theory and Appl. of Satisfiability Testing (SAT-09)*, 2009.
51. Kroc, Lukas; Sabharwal, Ashish; and Selman, Bart. Leveraging Belief Propagation, Backtrack Search, and Statistics for Model Counting. In *Proceedings of the 5th International Conference on Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems (CP-AI-OR'08)*, 2008.
52. Kroc, Lukas; Sabharwal, Ashish; and Selman, Bart. Survey Propagation Revisited. Counting Solution Clusters in Graph Coloring Problems Using Belief Propagation. *Proceedings of the 20th Annual Conference on Neural Information Processing Systems (NIPS-08)*, 2008.
53. Gomes, Carla; van Hoeve, Willem; Sabharwal, Ashish; Selman, Bart. Counting CSP Solutions Using Generalized XOR Constraints. *Proceedings of the 22nd National Conference on Artificial Intelligence (AAAI-07)*, 2007.
54. Gomes, Carla; Hoffmann, Joerg; Sabharwal, Ashish; Selman, Bart. From Sampling to Model Counting. *Proceedings of the 20th International Joint Conference on Artificial Intelligence (IJCAI-07)*, 2007.

55. Hoffmann, Jorg; Gomes, Carla; Selman, Bart; Kautz, Henry. SAT Encodings of State-Space Reachability Problems in Numeric Domains. *Proceedings of the 20th International Joint Conference on Artificial Intelligence (IJCAI-07)*, 2007.
56. Gomes, Carla; Hoffmann, Jorg; Sabharwal, Ashish; and Selman, Bart. Short XORs for Model Counting: From Theory to Practice. *Proceedings of the 9th International Conference on Theory and Applications of Satisfiability Testing (SAT 07)*, 2007.
57. Guo, Yunsong and Selman, Bart. ExOpaque: A Framework to Explain Opaque Machine Learning Models Using Inductive Logic Programming. *Proceedings of 19th IEEE International Conference on Tools with Artificial Intelligence (ICTAI 2007)*, 2007.
58. Kroc, Lukas; Sabharwal, Ashish; and Selman, Bart. Survey Propagation Revisited. *Proceedings 23rd Conference on Uncertainty and Artificial Intelligence (UAI-07)*, 2007.
59. van Hoes, Willem; Gomes, Carla; Selman, Bart; Lombardi, Michele. Optimal Multi-Agent Scheduling with Constraint Programming. *Proceedings of 22nd. National Conference on Artificial Intelligence, AAAI-07*, 2007.
60. Vetsikas, Ioannis; Jennings, Nicholas; and Selman, Bart. Generating Bayes-Nash Equilibria to Design Autonomous Trading Agents. *Proceedings of the 20th International Joint Conference on Artificial Intelligence (IJCAI-07)*, 2007.
61. Gomes, Carla P.; Sabharwal, Ashish; and Selman, Bart. Model Counting: A New Strategy for Obtaining Good Bounds. *Proceedings of 21st National Conference on Artificial Intelligence (AAAI-06)*, 2006. Best paper Award.
62. Gomes, Carla P.; Sabharwal, Ashish; and Selman, Bart. Near-Uniform Sampling of Combinatorial Spaces Using XOR Constraints. *Proceedings of the 20th Annual Conference on Neural Information Processing Systems (NIPS-06)*, 2006.
63. Hoffmann, Jorg; Gomes, Carla; and Selman, Bart. Structure and Problem Hardness: Goal Asymmetry and DPLL Proofs in Sat-Based Planning. *Proceedings of International Conference on Automated Planning and Scheduling (ICAPS-06)*, UK, 2006.
64. Sabharwal, Ashish; Anstegui, Carlos; Gomes, Carla P.; Hart, Justin W.; and Selman, Bart. QBF Modeling: Exploiting Player Symmetry for Simplicity and Efficiency. *Proceedings of the 9th International Conference on Theory and Applications of Satisfiability Testing (SAT 06)*, 2006
65. Selman, Bart. Integration of Learning and Reasoning Techniques. *Proceedings of the 16th Intl. Conference on Inductive Logic Programming. (ILP-2006)*, 2006.
66. Anstegui, Carlos; Gomes, Carla; and Bart Selman. Achilles' Heel of QBF. *Proc. AAAI*, 2005.
67. Vetsikas, Ioannis and Selman, Bart. Autonomous trading agent design in the presence of tradeoffs. *Proc. 4th Intl. Conference on Entertainment Computing (ICEC-05)*, Japan, 2005.
68. Wei, Wei; and Selman, Bart. A new approach to model counting. *Proc. 8th Int. Conference on Theory and Appl. of Satisfiability Testing (SAT-05)*, St. Andrews, UK, 2005.

69. Gomes, Carla; Fernandez, Cesar; Selman, Bart; Bessière, C. Statistical Regimes Across Constrainedness Regions *Proc. of 10th Intl. Conference on the Principles and Practice of Constraint Programming (CP-2004), Lecture Notes in Comp. Science*, 2004. (Distinguished Paper Award.)
70. Wei Wei; Jordan Erenrich; and Bart Selman. Towards efficient sampling: exploiting random walk strategies. *Proc. 19th Natl. Conference on Artif. Intell. (AAAI-04)*, San Jose, CA, 2004.
71. Haixia Jia; Cris Moore; and Bart Selman. From spin glasses to hard satisfiability formulas. *Proc. 7th Int. Conference on Theory and Appl. of Satisfiability Testing (SAT-04)*, Vancouver, BC, 2004.
72. Vetsikas, Ioannis and Selman, Bart. Equilibria for Design Tradeoffs in Autonomous Trading Agents. *Proc. 3rd Intl. Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS-03)*, New York, NY, 2003.
73. Hopcroft, John; Kulis, Brian; Khan, Omar; and Selman, Bart. Natural communities in large linked networks. *Proc. 9th Intl. Conf. on Knowl. Disc. and Data Mining (KDD-03)*, Washington, DC, 2003.
74. Williams, R.; Gomes, C.; and Selman B. Backdoors To Typical Case Complexity. *Proceedings of the 18th International Joint Conference on Artificial Intelligence (IJCAI03)*, AAAI Press, 2003.
75. Williams, R.; Gomes, C.; and Selman B. On the connections between backdoors, restarts, and heavy-tails in combinatorial search. *Proc. of the Sixth International Conference on Theory and Applications of Satisfiability Testing (SAT03)*, 2003.
76. Kautz, Henry and Selman, Bart. Ten challenges redux: propositional reasoning and search. *Proc. 9th Intl. Conf. on Constr. Program. (CP-03)*, Cork, 2003.
77. Wei, Wei and Selman, Bart. Accelerating Random Walks. *Proceedings of 8th Intl. Conference on the Principles and Practice of Constraint Programming (CP-2002)*, 2002.
78. Kautz, Henry; Horvitz, Eric; Ruan, Yongshao; Gomes, Carla; and Selman, Bart. Dynamic Restart Policies. *Proceedings of the Eighteenth National Conference on Artificial Intelligence (AAAI-02)*, Edmonton, Alberta, Canada, 2002, 674–682.
79. Chen, Hubie; Gomes, Carla; and Selman, Bart. Formal Models of Heavy-tailed Behavior in Combinatorial Search. *Proceedings of 7th Intl. Conference on the Principles and Practice of Constraint Programming (CP-2001), Lecture Notes in Computer Science*, Vol. 2239, Springer-Verlag, 2001, 408–422.
80. Horvitz, Eric; Ruan, Yongshao; Gomes, Carla; Kautz, Henry; Selman, Bart; and Chickering, Mark. A Bayesian Approach to Tackling Hard Computational Problems. *Proceedings 17th Conf. on Uncertainty and Artificial Intelligence (UAI-2001)*, Seattle, 2001.
81. Kautz, Henry; Ruan, Yongshao; Achlioptas, Dimitris; Gomes, Carla; Selman, Bart; and Stickel, Mark. Balance and Filtering in Structured Satisfiable Problems. *Proceedings of the 17th International Conference on Artificial Intelligence (IJCAI-2001)*, Seattle, 2001.

82. Huang, Yi-Cheng; Selman, Bart; and Kautz, Henry. Learning Declarative Control Rules for Constraint-Based Planning *Proceedings 17th International Conference on Machine Learning (ICML-2000)*, Stanford, CA.
83. Achlioptas, Dimitris; Gomes, Carla; Kautz, Henry; and Selman, Bart. Generating Satisfiable Instances. *Proceedings of the Seventeenth National Conference on Artificial Intelligence (AAAI-00)*, Austin, TX, 2000.
84. Krishnamachari, Bhaskar; Xie, Xi; Selman, Bart; and Wicker, Stephen. Analysis of Random Walk and Random Noise Algorithms for Satisfiability Testing. *Proceedings of 6th Intl. Conference on the Principles and Practice of Constraint Programming (CP-2000). Lecture Notes in Computer Science*, Vol. 1894, Springer-Verlag, 2000.
85. Gomes, Carla P. and Selman, Bart. Heavy-tailed Distributions in Computational Methods. *Proceedings Application of Heavy Tailed Distribution in Economics, Engineering and Statistics (TAILS-99)*, Washington, DC, 1999.
86. Huang, Yi-Cheng; Selman, Bart; and Kautz, Henry. Control knowledge in planning: benefits and tradeoffs. *Proc. of the 16th Natl. Conf. on Artificial Intelligence (AAAI-99)*, 1999.
87. Kautz, Henry and Selman, Bart. Unifying SAT-based and graph-based planners. *Proc. of the 15th Intl. Joint Conf. on Artificial Intelligence (IJCAI-99)*, 1999.
88. Gomes, Carla P. and Selman, Bart. Heavy-tailed distributions in computational methods. *Proc. Application of Heavy Tailed Distribution in Economics, Engineering and Statistics (TAILS-99)*, Washinton, DC, 1999.
89. Gomes, Carla P.; Selman, Bart; and Kautz, Henry. Boosting Combinatorial Search Through Randomization. *Proceedings of the Fifteenth National Conference on Artificial Intelligence (AAAI-98)*, Madison, WI, 1998.
90. Gomes, Carla and Selman, Bart. Randomization in Backtrack Search: Exploiting Heavy-Tailed Profiles for Solving Hard Scheduling Problems. *Proceedings of the Fourth International Conference on Artificial Intelligence Planning Systems (AIPS-98)*, Pittsburgh, PA, 1998.
91. Kautz, Henry and Selman, Bart. The Role of Domain-Specific Knowledge in the Planning as Satisfiability Framework. *Proceedings of the Fourth International Conference on Artificial Intelligence Planning Systems (AIPS-98)*, Pittsburgh, PA, 1998.
92. Selman, Bart; Kautz, Henry; and McAllester, David. Computational Challenges in Propositional Reasoning and Search. *Proceedings of the Fifteenth International Joint Conference on Artificial Intelligence (IJCAI-97)*, Nagoya, Japan, 1997.
93. McAllester, David; Selman, Bart; and Kautz, Henry. Evidence for Invariants in Local Search. *Proc. of the Fourteenth National Conference on Artificial Intelligence (AAAI-97)*, New Providence, RI, 1997.

94. Gomes, Carla and Selman, Bart. Problem Structure in the Presence of Perturbations. *Proceedings of the Fourteenth National Conference on Artificial Intelligence (AAAI-97)*, New Providence, RI, 1997.
95. Gomes, Carla and Selman, Bart. Algorithm Portfolio Design: Theory vs. Practice. *Proceedings of the Thirteenth Conference on Uncertainty in Artificial Intelligence (UAI-97)*, New Providence, RI, 1997.
96. Gomes, Carla; Selman, Bart; and Crato, Nuno. Heavy-Tailed Probability Distributions in Combinatorial Search. *Proc. Constraint Programming '97*, Linz, Austria, 1997.
97. Kautz, Henry; McAllester, David; and Selman, Bart. Encoding Plans in Propositional Logic. *Proceedings of the Fifth International Conference on Knowledge Representation and Reasoning (KR-96)*, Cambridge, MA, 1996, 374–384.
98. Kautz, Henry and Selman, Bart. Pushing the Envelope: Planning, Propositional Logic, and Stochastic Search. *Proceedings of the Thirteenth National Conference on Artificial Intelligence (AAAI-96)*, Portland, OR, 1996, 1194–1201. (Best Paper Award.)
99. Kautz, Henry; Milewski, Al; and Selman, Bart. Agent Amplified Communication. *Proceedings of the Thirteenth National Conference on Artificial Intelligence (AAAI-96)*, Portland, OR, 1996, 3–8.
100. Selman, Bart; Brooks, Rodney; Dean, Thomas; Horvitz, Eric; Mitchell, Tom; and Nilsson, Nils. Challenge Problems for Artificial Intelligence. *Proceedings of the Thirteenth National Conference on Artificial Intelligence (AAAI-96)*, Portland, OR, 1996, 1340–1345.
101. Monasson, Remi; Zecchina, Riccardo; Kirkpatrick, Scott; Selman, Bart; and Troyansky, Lidror. Phase Transition and Search Cost in the 2+p-SAT Problem. *Proceedings of PhysComp-96*, Boston, MA, 1996.
102. Selman, Bart. Stochastic Search and Phase Transitions: AI Meets Physics. *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence (IJCAI-95)*, Montreal, Canada, 1995. (invited paper)
103. Gogic, Goran; Kautz, Henry; Papadimitriou, Christos; and Selman, Bart. The Comparative Linguistics of Knowledge Representation. *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence (IJCAI-95)*, Montreal, Canada, 1995.
104. Selman, Bart. Randomized Search Strategies for Model Finding. *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence (IJCAI-95)*, Montreal, Canada, 1995. (invited position statement)
105. Selman, Bart. Near-Optimal Plans, Tractability, and Reactivity. *Proc. of the Fourth Inter. Conference on Knowledge Representation and Reasoning (KR-94)*, Bonn, Germany, 1994, 521–529.
106. Selman, Bart; Kautz, Henry; and Cohen, Bram. Noise Strategies for Local Search. *Proc. of the Twelfth National Conference on Artificial Intelligence (AAAI-94)*, Seattle, WA, 1994, 337–343.

107. Kautz, Henry; Selman, Bart; Coen, Michael; and Ketchpel, Steven. An Experiment in the Design of Software Agents. *Proceedings of the Twelfth National Conference on Artificial Intelligence (AAAI-94)*, Seattle, WA, 1994, 438–443.
108. Kautz, Henry and Selman, Bart. An Empirical Evaluation of Knowledge Compilation. *Proc. of the Twelfth National Conf. on Artificial Intelligence (AAAI-94)*, Seattle, WA, 1994, 155–161.
109. Selman, Bart and Kautz, Henry. Domain-Independent Extensions to GSAT: Solving Large Structured Satisfiability Problems. *Proceedings of the Thirteenth International Joint Conference on Artificial Intelligence (IJCAI-93)*, Chambéry, France, 1993, 290–295.
110. Selman, Bart and Kautz, Henry. An Empirical Study of Greedy Local Search for Satisfiability Testing. *Proc. of the Eleventh Natl. Conf. on Artificial Intelligence (AAAI-93)*, Washington, DC, 1993, 46–51.
111. Kautz, Henry; Kearns, Michael; and Selman, Bart. Reasoning With Characteristic Models. *Proc. of the Eleventh Natl. Conf. on Artificial Intelligence (AAAI-93)*, Washington, DC, 1993, 34–39. (Honorable Mention, Best Paper Award.)
112. Selman, Bart. Domain-Specific Complexity Tradeoffs. *Proceedings of the Twelfth European Conference on Artificial Intelligence (ECAI-94)*, Amsterdam, The Netherlands.
113. Selman, Bart. Non-Systematic Search Methods for Model Finding. *Proceedings of the 1993 IEEE Intl. Conf. on Tools with AI*, Boston, MA, 1993. (Invited position paper.)
114. Selman, Bart; Levesque, Hector, and Mitchell, David. A New Method For Solving Hard Satisfiability Problems. *Proc. of the Tenth Natl. Conference on Artificial Intelligence (AAAI-92)*, San Jose, CA, 1992, 440–446.
115. Mitchell, David; Selman, Bart; and Levesque, Hector. Hard and Easy Distribution of SAT Problems. *Proc. of the Tenth Natl. Conf. on Artificial Intelligence (AAAI-92)*, San Jose, CA, 1992, 459–465. (Best Paper Award.)
116. Kautz, Henry and Selman, Bart. Forming Concepts for Fast Inference. *Proc. of the Tenth National Conference on Artificial Intelligence (AAAI-92)*, San Jose, CA, 1992, 440–446.
117. Kautz, Henry and Selman, Bart. Planning as Satisfiability. *Proceedings of the Tenth European Conference on Artificial Intelligence (ECAI-92)*, Vienna, Austria, 1992, 359–363.
118. Selman, Bart and Kautz, Henry. Knowledge Compilation Using Horn Approximations. *Proc. of the Ninth National Conference on Artificial Intelligence (AAAI-91)*, Boston, MA, 1991, 904–909.
119. Kautz, Henry and Selman, Bart. A General Framework for Knowledge Compilation. *Proceedings of the International Workshop on Processing Declarative Knowledge (PDK-91)*, 1991. Published as *Lectures Notes in Artificial Intelligence*, # 567, H. Boley and M.M. Richter (Eds.), Berlin: Springer-Verlag, 1991, 287–300.

120. Selman, Bart and Levesque, Hector J. Abductive and Default Reasoning: A Computational Core. *Proceedings of the Eighth National Conference on Artificial Intelligence (AAAI-90)*, Cambridge, MA, 1990, 343–348.
121. Selman, Bart and Levesque, Hector J. The Tractability of Path-Based Inheritance. *Proceedings of the Eleventh International Joint Conference on Artificial Intelligence (IJCAI-89)*, Detroit, MI, 1989, 1140–1145.
122. Kautz, Henry A. and Selman, Bart. Hard Problems for Simple Default Logics. *Proc. of the First Inter. Conf. on Knowledge Representation and Reasoning (KR-89)*, Toronto, Ont., 1989, 189–197. (Best Paper Award.)
123. Selman, Bart and Kautz, Henry. The Complexity of Model-Preference Default Theories. *Proceedings of the Seventh Biennial Conference of the Canadian Society for the Computational Studies of Intelligence (CSCSI-88)*, Edmonton, Alberta, 1988, 102–109. (Best Paper Award.)
124. Selman, Bart and Hirst, Graeme. A Rule-Based Connectionist Parsing System. *Proceedings of the Seventh Annual Conference of the Cognitive Science Society*, Irvine, CA, 1985, 212–219. (Also appeared in the collection of working papers of the First Connectionist Summer School, Dept. of Computer Science, Carnegie-Mellon University, June 1986.)

Book Chapters and Book Reviews

125. Gomes, Carla; Sabharwal, Ashish; and Selman, Bart. Model Counting: A New Strategy for Obtaining Good Bounds. In: *Knowing, Reasoning, and Acting. Essays in Honour of Hector J. Levesque*. Lakemeyer, G. and McIlraith, S.A. (eds.), College Publications, King’s College London, London, UK, 2011.
126. Sabharwal, Ashish; and Selman, Bart. Book Review of Artificial Intelligence: A Modern Approach, Third Edition. In *Artificial Intelligence*, Vol. 175(5–6), 935–937, 2011.
127. Gomes, Carla; Sabharwal, Ashish; and Selman, Bart. Model Counting. In *Handbook of Satisfiability*, A. Biere, M. Heule, H. van Maaren, and T. Walsh (Eds.), IOS Press, 2009. (Invited chapter.)
128. Kautz, Henry; Sabharwal, Ashish; and Selman, Bart. Incomplete Algorithms. In *Handbook of Satisfiability*, A. Biere, M. Heule, H. van Maaren, and T. Walsh (Eds.), IOS Press, 2009. (Invited chapter.)
129. Gomes, Carla; and Selman Bart. Hill Climbing Search. In *Nature Encyclopedia of Cognition*, Nature Publ., 2002.
130. Kirkpatrick, Scott and Selman, Bart. Statistical Physics and Computational Complexity. In *More is different — Fifty years of condensed matter physics*. Book in honor of Nobel Laureate Philip W. Anderson, Princeton Series in Physics, edited by N. Ong and R. Bhatt, 2001, 331–339.
131. Gomes, Carla; Selman Bart; Crato, Nuno; Kautz, Henry. Heavy-tailed phenomena in satisfiability and constraint satisfaction problems. In *SAT-2000, Highlights of Satisfiability Research in the Year 2000*. Kluwer Academic Publishers, Holland, 2000.

132. Selman, Bart. Greedy Local Search. In *MIT Encyclopedia of the Cognitive Sciences (MITECS)*, Robert A. Wilson and Frank C. Keil (Eds.) Cambridge: MIT Press, 1999, 357–359. (invited contribution)
133. Selman, Bart. Analogical Representations. In *Cognition and Knowledge Representation*, Z. Pylyshyn (Ed.).
134. Kautz, Henry and Selman, Bart. Forming Concepts for Fast Inference. In *Theor. Foundations of Knowl. Representation and Reasoning*, B. Nebel and G. Lakemeyer (Eds.), Berlin: Springer-Verlag, 1994.
135. Selman, Bart and Levesque, Hector J. The Tractability of Path-Based Inheritance. In *Inheritance Hierarchies in Knowledge Representation and Programming Languages*, M. Lenzerini, D. Nardi, and M. Simi (Eds.), Chichester, England: John Wiley, 1991, 83–94.
136. Selman, Bart and Kautz, Henry A. The Complexity of Model-Preference Default Theories. In *Non-Monotonic Reasoning*, M. Reinfrank, J. de Kleer, M.L. Ginsberg, and E. Sandewall (Eds.), a volume in the Lecture Notes in AI series, Berlin: Springer-Verlag, 1989, 115–130.
137. Selman, Bart and Hirst, Graeme. Parsing as an Energy Minimization Problem. In *Genetic Algorithms and Simulated Annealing*, L. Davis (Ed.), a volume in the Pitman Series of Research Notes in Artificial Intelligence, London: Pitman; Los Altos, CA: Morgan Kaufmann, 1987, 141–154. Reprinted in *Parallel Models of Natural Language Computation*, G. Adriaens and U. Hahn (Eds.), Norwood, NJ: Ablex Publishing 1994.

Other Publications

138. Selman, Bart and Kautz, Henry. Knowledge Compilation and Approximate Reasoning. *Proceedings of the 35th National Conference on Operations Research (TIMS/ORSA)*, Chicago, 1993.
139. Selman, Bart. Tractable Default Reasoning. Ph.D. Thesis, Technical Report, University of Toronto, Jan. 1991.
140. Selman, Bart. Computing Explanations. *Proceedings of the AAAI Spring Symposium on Abduction*, Palo Alto, 1990, 89–90.
141. Selman, Bart. Book review of “The Connection Machine” by D. Hillis. *Canadian Artificial Intelligence*, 1990.
142. Selman, Bart. Analogues. CSRI Technical Note #47, Dept. of Computer Science, University of Toronto, Toronto, Canada, 1987.
143. Selman, Bart. Vivid Representations and Analogues. *Proceedings of the Second Annual UB Graduate-Conference on Computer Science*, J. Geller and K. Bettinger (Eds.), Buffalo, New York (1987).
144. Becker, Sue and Selman, Bart. An Overview of Knowledge Acquisition Methods For Expert Systems. Technical Report CSRI-184, Dept. of Computer Science, University of Toronto, Toronto,

Canada, 1986.

145. Selman, Bart. Rule-Based Processing in a Connectionist System for Natural Language Understanding. Technical Report CSRI-168, Dept. of Computer Science, University of Toronto, Toronto, Canada, 1985.

Teaching

Foundations of Artificial Intelligence. (CS-472) Introduces the foundational concepts and methods of AI: Search Methods, Knowledge Representation and Reasoning, Learning, and Planning. I developed course material to emphasize algorithmic aspects and rigorous foundational material (e.g., formal representation languages and computational learning theory).

Foundations of Artificial Intelligence, Practicum. (CS-473) A project class in AI, taught in conjunction with CS-472. Students work on projects from areas such as game playing, planning, learning, reasoning, and software agents.

Advanced Artificial Intelligence. (CS-672) A graduate course in AI. We cover a series of research papers in knowledge representation, reasoning, learning, and planning. Students write reaction essays and do a final course project, selected from a wide range of topics in AI.

Heuristic Search Methods for Optimization. (CEE 509 / CS-574) Together with Prof. Christine Shoemaker (Civil and Environmental Engineering), I have developed a new interdisciplinary course on modern heuristic search methods for optimization. The lectures cover a variety of optimization methods including simulated annealing, tabu search, genetic algorithms, randomized and derandomized strategies, biased random walk methods, and direct search methods. We cover both theory and practice. The lectures are supplemented with a series of guest lectures to introduce the students to a range of applications from a variety of disciplines, such as computational biology, economics, operations research, mechanical engineering, environmental engineering, artificial intelligence and computer science.

Individual research projects. (CS490/CS790) I supervise a number of independent student (undergraduate and M.Eng.) research projects in AI and related areas. Approx. 5 projects per term.

Project course for Cornell's Systems Engineering Option. As part of the project course for Cornell's Systems Engineering Option, I was the AI advisor for the Cornell Robocup team (1999 & 2000). The students built mobile robots, together with global vision, communications, and strategy systems, for playing soccer on a ping-pong table. Prof. Raffaello D'Andrea is the main advisor for the project.

Autonomous submarine project. AI advisor for Cornell's Autonomous Submarine project (2000). In this effort, two teams of students build autonomous submarines that participate in a national competition.

NASA SHARP Plus program. Mentor for the NASA SHARP Plus program (Quality Education for Minorities Network).

Invited Talks

Conferences / Symposia: Going Beyond NP: New Challenges in Inference Technology, Statistical Mechanics and Unsatisfiability, Stockholm, Sweden, May 2012; *Solving Large-Scale Computational Problems Using Insights From Statistical Physics*, Princeton Plasma Physics Laboratory (PPPL) Colloquium Series, Princeton, NJ, Febr. 2012; *Non-DPLL Approaches to Boolean SAT Solving*, First International SAT/SMT Solver Summer School, MIT, Cambridge, MA, June 2011; *Going Beyond NP: New Challenges in Inference Technology*, Catalan AI Conference (CCIA 2011), Lleida, Spain, 2011; *Combining Probabilistic and Logical Inference Methods*, Statistical Relational AI (Star AI), San Jose, CA, August 2011; *AI 2010: Wall-e or Rise of the Machines?*, Panel at South by South West (SXSW-10) Interactive, Austin, TX, March 2010; *Computational Sustainability*, Yahoo! Open Cirrus Summit, Sunnyvale, CA, January 2010; *Sampling and Model Counting*, Constraint Programming and Optimization '09, El Paso, TX, Nov. 2009; *Probabilistic and Logical Methods for Model Counting and Sampling*, Physics of Algorithms '09, Sante Fe, NM, Sept. 2009; *AAAI Study on Long-Term AI Futures*, co-moderator, IJCAI-10 panel, July 2009; *Combinatorial Problems (series of three lectures; Finding Solutions, Counting and Sampling Solutions, and The Next Level of Complexity)*, 2nd Asian-Pacific School on Statistical Physics and Interdisciplinary Applications, Collective Dynamics and Information Systems Program (KITPC-08), Kavli Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing, China, March 2008; *The Synthesis of Probabilistic and Logical Inference Methods*, Colloquium, Microsoft Research New England, Cambridge, MA, April 2008; *Satisfied by Message Passing: Probabilistic Techniques for Combinatorial Problems*, (invited tutorial with Lukas Kroc and Ashish Sabharwal), LION-3, Trento, Italy, Jan., 2008; *Planning as Satisfiability: A Survey*, Symbolic Computation for Constraint Satisfaction Problems, Washington, DC, Nov. 2008; *Satisfied by Message Passing: Probabilistic Techniques for Combinatorial*, (invited tutorial, with Lukas Kroc and Ashish Sabharwal) 23rd Conf. on Artificial Intelligence (AAAI-08), Tutorial Forum, Chicago, IL, July 2008; *Beyond Traditional SAT Reasoning: QBF, Model Counting, and Solution Sampling*, (invited tutorial with Ashish Sabharwal) 22nd Conference on Artificial Intelligence (AAAI-07), Tutorial Forum, Vancouver, BC, Canada, July 2007 *Quantified Boolean Formula (QBF) Reasoning*, (with Carla Gomes and Ashish Sabharwal) Tutorial for DARPA program planning, Washington, DC, Feb. 2007 *The Convergence of Logical and Probabilistic Reasoning*, Nineteenth International Joint Conference on Artificial Intelligence (IJCAI-05, plenary talk), Edinburgh, Scotland, August 2005; *Advances in Large-Scale Reasoning Systems*, Biennial Israeli Symp. on the Foundations of AI (BISFAI-05, plenary talk), Haifa, Israel, June 2005; *Algorithmic Adventures at the Interface of Computer Science, Statistical Physics, and Combinatorics*, Tenth Intl. Conference on the Principles and Practice of Constraint Programming (CP-04, plenary talk), Toronto, Canada, August 2004; *Phase Transitions and Algorithm Design*, Annual Meeting American Assoc. for the

Advancement of Science (AAAS-04), Symposium on Phase Transitions, Seattle, WA, 2004; *Recent Advances in Fast Large-Scale Reasoning Methods*, Second International Workshop on Bounded Model Checking (BMC-04, plenary talk), Boston, MA, 2004; *Recent Advances in Fast Large-Scale Reasoning Methods*, Fifth Metaheuristic International Conference (MIC-03, plenary talk), Kyoto, Japan, August 2003; *Phase Transitions in Combinatorial Problems*, Phase Transitions and Algorithmic Complexity, Institute for Pure and Applied Mathematics, UCLA, May 2002; *Recent Advances in Combinatorial Search*, The Sante Fe Institute, Sept. 2001; *Connections Between Statistical Physics and Computer Science*. Advances in Solid State Physics, meeting in honor of Nobel Laurate Philip Anderson, Aspen, Co., January 2000; *Recent Progress in Propositional Reasoning Methods*. IEEE Symposium on Logic in Computer Science (LICS-00, plenary talk), Santa Barbara, California, USA, June, 2000. *Satisfiability Testing: Theory and Practice*.; DIMACS Symposium on “Faster Exact Solutions for NP-Hard Problems”, Princeton, NJ, Febr. 2000; *Challenge Problems for Planning and Reasoning*. Australian National Conference on Artificial Intelligence, Australia, July 1998 (plenary talk); *Advances in Propositional Reasoning and Search*. Natl. Program on Automated Deduction, Germany, July 1998 (plenary talk); *Satisfiability Testing: Theory and Practice*. Theory Day, Univerity of Ottawa, Ottawa, Sept. 1997; *Resource Tradeoffs in Planning, Reasoning, and Search*. AAAI Fall Symposium on Flexible Computation, Boston, MA, Oct. 1996 (plenary talk); *Stochastic Search and Phase Transitions: AI Meets Physics*. Fourteenth International Joint Conference on Artificial Intelligence (IJCAI-95, plenary talk), Montreal, Canada, 1995; *Agent Amplified Communication*. Fifteenth IEEE International Conference on Distributed Computing Systems, Vancouver, Canada, May 1995; *Satisfiability Testing*. Natl. Conference on Operations Research (TIMS/ORSA, Satisfiability cluster), 1994; *Bridging the Gap Between Theory and Practice in Knowledge Representation and Reasoning*. Fourth South American Congress on Artificial Intelligence, Caracas, Venezuela, Oct. 1994 (plenary talk); *Local Search Strategies for Satisfiability Testing*. Intl. Symp. on Mathematics and Artificial Intelligence, Jan. 1994; *Satisfiability Testing: Results and Challenges*. Second DIMACS Algorithm Implementation Challenge, Oct. 1993; *Stochastic Inference*. National Conference on Operations Research (TIMS/ORSA, Constraints and satisfiability cluster), April 1993; *Hard Problems for Simple Default Logics*. Intl. Joint Conference on Artificial Intelligence (IJCAI-89), August 1989; *The Tractability of Path-Based Inheritance*. Intl. Symp. on Mathematics and Artificial Intelligence, Jan. 1990.

Universities: Univerity of Texas, Austin (Colloquium 2012); Carnegie Mellon University (CMU Intelligence Seminar, 2011); Cornell University (Physics Colloquium, 2010); Helsinki University of Technology (TKK), (Colloquium, 2008); Washington University, St. Louis, (Colloquium, 2008); University of Rochester (Colloquium 2007); University of Illinois at Chicago (Distinguished Lecturer Seminar Series, 2007); University of Washington (AI Seminar Series, 2004); University of Waterloo (CS Seminar Series, 2004); City University of New York (CS Colloquium, 2004); Sante Fe Institute (Seminar Series, 2004); Carnegie-Mellon Univeristy (AI Seminar Series, 2003); Dept. of Physics, Mich. State Univ. (“Science At The Edge” Colloquium Series 2003); Univ. of Kentucky (Distinguished Lecturer Series 2002); Stanford University (Broad Area Colloq., March 2001); Univ. of Southern California (March 2000);

Univ. of California at San Diego (Distinguished Lect. Series, Jan. 2000); Massachusetts Institute of Technology (AI Colloq. Series, Dec. 1999); University of Alberta (1999); Cornell Univ. (1997); University of Washington (1997); Princeton University (CS Colloq. 1996); Carnegie-Mellon University (1996); Univ. of Toronto (CS Colloq., 1996); Johns Hopkins (1995); Univ. of Pennsylvania (Distinguished Lect. Series, 1995); Univ. of Paris IV (Distinguished Lect. Series, 1995); Beijing University (Distinguished Lect. Series, 1995); Stanford University (1995); Univ. of California at Berkeley (1994); Univ. of California at Los Angeles (1994); Univ. of Rochester (CS Colloq., 1994); Univ. of British Columbia (1993); Columbia University (CS Colloq., 1993); Courant Institute (CS Colloq., 1993); Univ. of Lisbon (1993); Univ. of Marseille (1993); York University (Distinguished Lecture Series, 1993); Harvard University (CS Colloq., 1995); M.I.T. Artificial Intelligence Lab (1992); University of Washington (1991); Harvard University (CS Colloq., 1991); Univ. of Washington (1991); Univ. of Linköping (1991); Brown University (CS Colloq., 1990); Columbia University (CS Colloq., 1990); Univ. of British Columbia (1990); Univ. of California at San Diego (1990); Univ. of Illinois at Urbana-Champaign (1990); Univ. of California at Los Angeles (1989); Univ. of Waterloo (1989).

Industry: Microsoft Research, AT&T Bell Laboratories (CS seminar; physics seminar), German Inst. for AI Research, NEC Research (Princeton), Siemens Research Center, SRI International, Xerox Parc.

Employment History

Since July 1997	Associate Professor, Computer Science Dept., Cornell University (received tenure in 2000; promoted to Full in 2005).
Dec. 1990–June 1997	Research Scientist, Artificial Intelligence Principles Research Department, AT&T Bell Laboratories. Director: Ron Brachman.
Summer 1989	Course Instructor for “Applications of Computer Programming” at the University of Toronto.
1986–1989	Teaching Assistant at the University of Toronto. Courses included: Programming methodology, Discrete mathematics for computer science, Data processing, and Computer organization.

Patents

“Optimization of Information Bases”, US patent issued Nov. 1993 (joint with Henry Kautz). The patent concerns techniques for speeding query answering in data bases or knowledge bases by first creating an approximation of the data base or knowledge base.

“Message Filtering Techniques” US patent issued April, 1997 (joint with Henry Kautz and Al Milewski). The patent gives the design of a software agent platform for enhanced person-to-person communication and expertise location based on a notion of referral chaining.

“Methods and Apparatus for Constraint Satisfaction”, US patent issued June 1997 (joint with Henry Kautz). The patent concerns a method for dynamically adjusting the weights on constraints to increase the efficiency of local search methods.

“A Software Agent Architecture”, US patent filed in Feb. 1994 (joint with Michael Coen, Henry Kautz, and Steven Ketchpel). The patent gives a design for an email-based agent platform.

Grants

NSF, Co-PI Investigator — Computational Sustainability: Computational Methods for a Sustainable Environment, Economy, and Society, Expeditions in Computing. (2008-2013). \$10M.

NSF, PI — Extending the Reach of SAT Technology: Quantification, Counting, and Sampling. (2007-2010) \$449K.

NSF, co-PI — Harnessing Statistical Physics for Computing and Communication. (2008-2012) Collaborative, Cornell part \$260K.

Kodak and NYS, Co-PI — Computational Intelligence for Print Shop Workflows. (2007–2008). \$170K.

DARPA, High Performance Reasoning Technology. Joint with Carla Gomes, Christoph Kreitz, and Robert Constable, 2003-2008, \$3,500,000.

NSF, Emerging Communities in Large Linked Networks. Joint with John Hopcroft, 2003-2005, \$350,000.

DARPA, Controlling Computational Cost: Structure, Phase Transitions, and Randomization. Joint with Carla Gomes, 2000-2004, \$1,621,041.

NSF, 2000-2004, \$450,000.

DARPA, Principled Analysis & Synthesis of Agent Systems Using Tools from Statistical Physics. Joint with Carla Gomes, 2000-2003, \$750,000.

AFOSR MURI, Cooperative Control in Uncertain, Adversarial Environments. Joint with Caltech, MIT, and UCLA. Cornell portion (2001-2006): \$1,000,000.

Alfred P. Sloan Research Fellowship, 1999-2000, \$35,000.

AFOSR DURIP, \$158,000, for 32-node Compute Cluster for a Platform for the Experimental Study of Combinatorial Methods in Planning. Joint with Carla Gomes, 1999–2000, \$158,000.

NSF Faculty Early Career Development Award, Compute-Intensive Methods for Artificial Intelligence. 1998-2003, \$300,000.

Professional and Service

Advisory Board Member, *Logical Methods in Computer Science*.

Advisory Board Member, *Journal of Artificial Intelligence Research*.

Editorial Board, *Journal on Satisfiability, Boolean Modeling and Computation*.

Editorial Board, *Constraints: An International Journal*.

Editorial Board, *Annals of Mathematics and Artificial Intelligence*.

Associate Editor, *Journal of Artificial Intelligence Research* (1996–2000).

Advisory board, *7th Int. Conf. on Theory and Appl. of Satisfiability Testing (SAT-04)*.

Chair, ACM Distinguished Dissertation Award committee (2010). Committee member ('06-'10).
 Chair Learning and Intelligent Optimization (LION 3), Trento, Italy, 2009.
 co-Director, Summer School on Statistical Physics and Probabilistic Methods in Computer Science, Intl. Centre for Theoretical Physics, Trieste, Italy, August 2002.
 Program co-Chair Fourth International Symposium on the Theory and Applications of Satisfiability Testing (SAT-2001), Boston, MA, 2001.
 Program co-Chair of the Seventh International Conference on Knowledge Representation and Reasoning (KR-00), Berkenridge, CO, April 2000.
 Member Executive Council of the *American Association of Artificial Intelligence (AAAI)* (1999-2002).
 Editor, Special Issue of *Theoretical Computer Science* on the Boolean Satisfiability Problem (2001).
 Editor, Special Issue of the *Annals of Mathematics and Artificial Intelligence* with selected papers from *Math&AI-00* (to appear).
 Editor, Special Issue of the *Annals of Mathematics and Artificial Intelligence* with selected papers from *Math&AI-96*, June 1998.
 Program Chair, Fourth International Symposium on Mathematics and Artificial Intelligence, Jan. 1996.
 Member, ACM Working Group on Strategic Dirs. in Artificial Intelligence, Boston, MA, 1996.
 Member, Editorial Board, special issue of *Connection Science* on Natural Language, 1988.
 Member, DARPA Future Directions Study Group (ISAT) , Study on Probabilistic Methods in Computational Systems and Infrastructure, Woodshole, MA, August 1999.
 Program Committees: AAAI-12; UAI-12; SAT-12; AAAI-11; IJCAI-11; AAMAS-10; ICAPS-10; AAAI-10; UAI-09; IJCAI-09; SAT-08; AAAI-08; AAAI-07; IJCAI-05; AAAI-05; ICAPS-05; KR-04; SAT-04; ICAPS-03; IJCAI-03; The 18th Natl. Conf. on Artificial Intelligence (AAAI-02); Symp. on Abstraction, Reformulation and Approximation (SARA-02); Computational Logic 2002; The 17th Natl. Conf. on Artificial Intelligence (AAAI-00); The 16th Conf. on Uncertainty in Artificial Intelligence (UAI-00); The 14th European Conference on Artificial Intelligence (ECAI-00); Symp. on Abstraction, Reformulation and Approximation (SARA-00); Computational Logic 2000 (CL2000); The 16th Natl. Conf. on Artificial Intelligence (AAAI-99); The 16th Intl. Joint Conf. on Artificial Intelligence (IJCAI-99); The 5th Intl. Conf. on Principles and Practice of Constraint Programming (CP-99); AAAI Fall Symposium on Question Answering System (1999); The 15th Natl. Conf. on Artificial Intelligence (AAAI-98); The 13th European Conference on Artificial Intelligence (ECAI-98); The 4th Intl. Conf. on Artificial Intelligence Planning Systems (AIPS-98); Symp. on Abstraction, Reformulation and Approximation (SARA-98); The 6th Int. Conf. on Principles of Knowledge Representation and Reasoning (KR-98); The 8th intl. Conf. on Artificial Intelligence: Methodology, Systems, Applications (AIMSA-98); The 15th Intl. Joint Conf. on Artificial Intelligence (IJCAI-97); The 14th Natl. Conf. on Artificial Intelligence (AAAI-97); The 13th Natl. Conf. on Artificial Intelligence (AAAI-96); The 14th Intl. Joint Conf. on Artificial Intelligence (IJCAI-95); The 12th Natl. Conf. on Artificial Intelligence (AAAI-94); The 4th Intl. Conf. on Principles of Knowledge Representation and Reasoning (KR-94); The 11th Natl.

Conf. on Artificial Intelligence (AAAI-93); The 10th Natl. Conf. on Artificial Intelligence (AAAI-92). AAAI-94 Workshop on the Empirical Evaluation of Search Methods, Seattle, August 1994 (Chair); The 5th Intl. Conf. on Artificial Intelligence Planning & Scheduling Systems (AIPS-00), Berkenridge, CO, 2000; AIPS-00 Workshop on Analyzing and Exploiting Domain Knowledge for Efficient Planning, Berkenridge, CO, 2000; AIPS-98 Workshop on Constraint-Based Planning, Pittsburgh, PA, 1998; AAAI Fall Symposium Workshop on Recommender Systems, Madison, WI, 1998; AAAI-98 Workshop on Intelligent Agents, Madison, WI, 1998; AAAI-97 Workshop on Constraints and Agents, Providence, RI, 1997; Intl. SAT Competition & Symposium, Beijing, March, 1996 (Chair); ECAI-96 Workshop on Advances in Propositional Deduction, Budapest, 1996; ECAI-97 Workshop on Empirical Methods in AI, Budapest, August, 1997; First Intl. Joint Workshop on AI and OR, Oregon, June, 1995; IJCAI-95 Workshop on Nonmonotonic Reasoning, Montreal, Aug. 1995; AAAI Fall Symposium on Relevance, New Orleans, Nov. 1994; ECAI-94 Workshop on Algorithm Complexity and Commonsense Reasoning, Amsterdam, August 1994; AAAI93 Spring Symposium on AI and NP-hard Problems, Palo Alto, 1993; AAAI Spring Symposium on Knowledge Assimilation, Palo Alto, 1992. AAAI-92 Workshop on the Tractable Reasoning, San Jose, July 1992 (Chair); Workshop on Knowledge Representation and Reasoning, Edmonton, Alberta, June 1988 (Chair).

Chair, AAAI Educational Forum, Natl. Conf. on Artificial Intelligence (AAAI-99), Orlando, Fl.
co-Chair, AAAI Educational Forum, Natl. Conf. Artificial Intelligence (AAAI-98), Madison, WI.
co-Chair, AAAI Educational Forum, AAAI-97, Providence, RI, August 1997.

Chair, Panel on Challenge Problems for Artificial Intelligence, AAAI-96, Portland, OR, 1996.

Foreign Advisor for the High Tech Programme of the People's Republic of China, 1995.

Student advising at Cornell: Yexiang Xue (Ph.D., expected '15), Ronan Le Bras (Ph.D., expected '14), Stefano Ermon (Ph.D., expected '13), Raghu Ramanujan (Ph.D. '12), Lukas Kroc (Ph.D. '10), Yannet Interian (Ph.D., Appl. Math., '07), Ioannis Vetsikas (Ph.D. '06), Wei Wei (Ph.D. '05), Hubert Chen (Ph.D. '04, main advisor: Dexter Kozen), Yi-Cheng Huang (Ph.D. '02), Bhaskar Krishnamachari (Ph.D., ECE '00, main advisor: Steve Wicker).

Student advising at Bell Labs: Michael Coen, Bram Cohen, Steven Ketchpel, David Mitchell, Charles Musco, and Mehul Shah.

External examiner (Ph.D.): Felipe Trevizan, CMU; Bryan Silverthorn, UT Austin, 2012; Matti Jarvisalo, Helsinki University of Technology, 2008; Wei Wanxia, Univ. of New Brunswick, 2008; Horst Samulowitz, University of Toronto, 2007; Duc Nghia Pham, Griffith Univ., 2006; Eugene Nudelman, Stanford University, 2005; Frederic Lardeux, Univ. of Angers, France, 2005; Djamal Habel, University of Paris, 2004; Finnegan Southey, University of Waterloo, 2004; Holger Hoos, Darmstadt University of Technology, Darmstadt, Germany, 2000; Yury Smirnov, CMU, Pittsburgh, PA, 1996; Yamine Boufkhad University of Paris, Paris, 1996; Ningchuan Shen, Beijing University, Beijing, China, 1995; Christer Backstrom, Linköping University, Sweden, 1992.

Reviewer for *Science*, *JACM*, *Artificial Intelligence*, *Computational Intelligence*, *Computational Linguistics*, *Journal of Computation and Logic*, *Connection Science*, *Information Processing Letters*, *IEEE Transactions*, *IJCAI*, *AAAI*, *CSCSI*, *ECAI*, *ACM Diss. Award Series*, and *NSF*.

Pointers in general science/business press

- BBC Radio 4 interview on the Ethics and Impact of AI, August 3rd, 2009.
- CNN/KSRO Newstalk interview on the Ethics and Impact of AI, July 28th, 2009.
- New York Times article discussing AAI Presidential Panel of Long-Term AI Futures, by John Markoff, July 25, 2009.
- In New Scientist, “Talking paperclip inspired less irksome virtual assistant,” July 29, 2009.
- In New Scientist, “Smart machines: What is the worst that could happen?,” July 27, 2009.
- In SEED Magazine, on Robotic Science, April 2, 2009.
- In Scientific American, “Graph Theory and Teatime: Deep in the heart of Microsoft” by Gary Stix, Febr. 2007.
- A Mathematical Phase Transition*, by Tony Phillips (on-line, American Mathematical Society), Nov., 2002. Discusses [9, 21, 115].
- Computing Satisfaction*, by Ivars Peterson, *Science News*, Vol. 157, 19, 2000. Discusses [12, 13].
- Foul play won the day in RoboCup*, by Charles Seife, *New Scientist*, August 14, 1999.
- Separating Insolvable and Difficult*, by George Johnson, *The New York Times*, July 13, 1999. Discusses [13].
- Solving Problems in Finite Time*, by Philip W. Anderson, *Nature*, Vol. 400, 8 July, 1999, 115–116. Discusses [13].
- As Easy As EQP*, by Barry Cipra, *What’s Happening in the Mathematical Sciences*, publication of the American Mathematical Society, Vol. 4. Discusses [21, 101].
- Finding What You Want On the Web May Get Easier*, by Rebecca Quick, *The Wall Street Journal*, Nov. 6, 1997, B6. Discusses ReferralWeb [15, 16].
- Can’t Get No Satisfaction*, by Brian Hayes, *American Scientist*, Vol. 85, March/April 1997, pp. 108–112. Discusses [21, 101, 115].
- Les Lois de Tout ou Rien, (0-1 Laws)*, by J.P. Delahaye, *Pour La Science* (French edition of Scientific American), Vol. 213, July 1995. Discusses [24, 114].
- Pinning Down a Treacherous Border in Logical Statements*, by Barry Cipra, *Science*, Vol. 264, 1994, pp. 1249. News article accompanying [24].