Glenn Shafer www.glennshafer.com

Curriculum Vitae for Glenn Shafer

Glenn Shafer writes on the philosophy and history of probability and statistics. He retired from teaching in 2025 and is now University Professor Emeritus at Rutgers University.

Index to C.V.

- Books
- Articles
- Book Reviews
- Other Contributions
- Selected Unpublished Papers
- Presentations Since 1992
- Email Address
- Personal Information
- Education
- Employment
- Service at Rutgers University
- Academic Honors
- Editorial Service
- Memberships
- Principal Investigator for Grants
- Consulting

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Personal Information

Citizen of the United States. Born November 21, 1946, in Caney, Kansas.
Children: Richard, born March 3, 1978. Dennis, born April 28, 1981.
Married to Nell Irvin Painter on October 14, 1989.

Education

A.B., 1968, Mathematics, Princeton University
Ph.D., 1973, Statistics, Princeton University. Dissertation: *Allocations of Probability: A Theory of Partial Belief.*

back to top

Employment

- 1968-69 Peace Corps, Afghanistan
  - High school geometry teacher
- 1973-76 Department of Statistics, Princeton University
  - Assistant Professor
- 1976-84 Department of Mathematics, University of Kansas
  - Assistant Professor, 1976-78
  - Associate Professor, 1978-83
  - Professor, 1983-84
- 1984-92 School of Business, University of Kansas
  - Professor, 1984-87
  - Ronald G. Harper Distinguished Professor, 1988-92
- 1992-2025 Department of Accounting and Information Systems, Rutgers Business School
  - Distinguished Professor, 1992-2025
  - Board of Governors Professor 2004-2025
  - University Professor, 2015-2025
- 1996-Present Visiting Professor, Computer Learning Research Centre, Department of Computer Science, Royal Holloway College, University of London
- 2025-Present University Professor Emeritus, Rutgers University

Service at Rutgers University

- Appointments and Promotions Committee, Rutgers Business School. Member 1994-96, 1997-99, and 2009-2010. Chair 1995-96 and 1998-99.
- MBA Curriculum Task Force, Rutgers Business School, 1995-96. Organized the first major revision of the school's MBA curriculum in over ten years.
- Director, Rutgers Ph.D. in Management Program, 1997-2000 and 2003-2010. Reorganized the program's curriculum and its advising, admission, and funding policies.
- Promotion Review Committee, Rutgers University. Member 2001-2006.
- Dean, Rutgers Business School – Newark and New Brunswick, January 2011 to December 2014.

back to top

Academic Honors

- National Merit Scholar, 1964-68
- NSF Doctoral Fellow, 1970-73

- NSF Postdoctoral Fellow, 1978-79
- Guggenheim Fellow, 1983-84
- Fellow, Center for Advanced Study in the Behavioral Sciences, 1988-89
- Fellow, Institute of Mathematical Statistics, 1990
- Fellow, American Association for Artificial Intelligence, 1992
- Fulbright Fellow, Berlin, Germany, Spring 2001
- Gorenstein Award for Research and Service at Rutgers University, 2004
- Honorary doctorate in economics, University of Economics, Prague, 2009
- Kampé de Feriet Award, International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, Cádiz, Spain, June 2018
- Sarton Medal, University of Ghent. December 2018
- Volume 141 of *International Journal of Approximate Reasoning:* "Probability and Statistics: Foundations and History. In honor of Glenn Shafer," February 2022

Editorial Service

- Advisory Board, *International Journal of Approximate Reasoning*, 1986-
- Editorial Board, *International Journal of Intelligent Systems*, 1986-2022
- Editorial Board, *Electronic Journal for History of Probability and Statistics*, 2005-2013
- Associate Editor, Statistical Science, 2008-2022
- Associate Editor, *Journal of the American Statistical Association*, 1980-82
- Associate Editor, *Knowledge Engineering Review*, 1994-1998
- Reviewer for *Mathematical Reviews*, 1979-81
- Referee for journals in accounting, artificial intelligence, engineering, information science, management science, mathematical psychology, physics, probability and statistics, and philosophy of science

back to top

Memberships

- American Statistical Association
- Institute of Mathematical Statistics

Principal Investigator for Grants

- National Science Foundation, GP43248 (1974-76), "The assessment of statistical evidence," $13,200
- National Science Foundation, MCS7801887 (1978-79), "Studies in probable and statistical inference," $7,705
- National Science Foundation, MCS8002213 (1980-83), "Studies in probable and statistical inference," $34,344
- National Science Foundation, MCS8301282 (1983-86), "Studies in probable and statistical inference," $30,000
- National Endowment for the Humanities, HL2067384 (1984-85), "Translation of Bernoulli's *Ars Conjectandi*," $21,000
- National Science Foundation, IST8405210 (1984-86), "Belief functions and fuzzy sets," $82,375
- Subcontract under Office of Naval Research, NOOO1485K0492 (1985-87), "Theory and applications of belief functions," $72,276
- Peat, Marwick, Mitchell Research Opportunities in Auditing (1986-87), "An interactive tool for managing uncertainty in expert systems for auditing," $109,320. With Prakash Shenoy and Rajendra Srivastava
- United Telecommunications and Kansas Advanced Technology Commission (1986-88), "Expert system research and development," $120,540. With Kenneth O. Cogger
- National Science Foundation, IST8610293 (1986-89), "Belief functions in artificial intelligence," $255,197
- National Science Foundation, IRI8902444 (1989-91), "Belief functions in artificial intelligence," $181,715. With Prakash Shenoy
- National Science Foundation, SBE9213674 (1992-95), "The unity and diversity of probability." $80,000
- National Science Foundation, (1999-2002), "The representation of causality for auditing." $338,114

back to top

Consulting

SRI International, Decision Sciences Consortium, BMD Corporation, Exxon Production Research, Allied Bendix, General Motors, Educational Testing Service, BDO Seidman

Teaching Awards

- Nominee, Hope Undergraduate Teaching Award, University of Kansas, 1979 and 1983

- G. Bailey Price Award for Outstanding Teaching of Graduate Mathematics, Department of Mathematics, University of Kansas, 1983
- Mentor Award from the University of Kansas Business School Doctoral Students Association, 1987, 1992

back to top

Publications

Books

1. *A Mathematical Theory of Evidence.* Princeton University Press, 1976.
2. *Readings in Uncertain Reasoning* (with Judea Pearl). Morgan Kaufmann, 1990.
3. *Probabilistic Expert Systems.* SIAM, 1996.
4. *The Art of Causal Conjecture.* MIT Press, 1996.
5. *Probability and Finance: It's Only a Game!* (with Vladimir Vovk) Wiley, 2001. A Japanese translation, by Kei Takeuchi and Masayuki Kumon, was published by Iwanami Shoten in 2006.
6. *Algorithmic Learning in a Random World,* by Vladimir Vovk, Alex Gammerman, and Glenn Shafer. Springer, 2005. Second edition, 2022.
7. *Game-Theoretic Foundations for Probability and Finance* (with Vladimir Vovk). Wiley, May 2019.
8. *The Splendors and Miseries of Martingales: Their History from the Casino to Mathematics.* (with Laurent Mazliak) Birkhäuser, September 2022.

back to top

Articles

1. A theory of statistical evidence. *Foundations of Probability Theory, Statistical Inference, and Statistical Theories of Science*, Vol. II, pp. 365-436. W. L. Harper and C. A. Hooker, eds., Reidel. 1976.
2. Non-additive probabilities in the work of Bernoulli and Lambert. *Archive for History of Exact Sciences* **19** 309-370. 1978. Reprinted as Chapter 6 of *Classic Works of the Dempster-Shafer Theory of Belief Function*, edited by Ronald Yager and Liping Liu, Springer, 2008.
3. Allocations of probability. *Annals of Probability* **7** 827-839. 1979. Reprinted as Chapter 7 of Classic Works of the Dempster-Shafer Theory of Belief Functions, edited by Ronald Yager and Liping Liu, Springer, 2008.
4. Reliability described by belief functions (with A. M. Breipohl). *Proceedings 1979 Annual Reliability and Maintainability Symposium, IEEE*, pp. 23-27. 1981.
5. Constructive probability. *Synthese* **48** 1-60. 1981. Reprinted as Chapter 9 of Classic Works of the Dempster-Shafer Theory of Belief Functions, edited by Ronald Yager and Liping Liu, Springer, 2008.
6. Jeffrey's rule of conditioning. *Philosophy of Science* **48** 337-363. 1981.
7. Two theories of probability, *PSA 1978*, Vol. 2, pp. 441-464. Peter D. Asquith and Ian Hacking, eds. Philosophy of Science Association, East Lansing, Michigan. 1981.
8. Lindley's paradox (with discussion). *Journal of the American Statistical Association* **77** 325-351. 1982.
9. Belief functions and parametric models (with discussion). *Journal of the Royal Statistical Society, Series B* **44** 322-352. 1982. Reprinted as Chapter 10 of Classic Works of the Dempster-Shafer Theory of Belief Functions, edited by Ronald Yager and Liping Liu, Springer, 2008.
10. Bayes's two arguments for the rule of conditioning. *Annals of Statistics* **10** 1075-1089. 1982.
11. Belief functions. *Encyclopedia of Statistical Sciences* **1** 209. S. Kotz and N. L. Johnson, eds., Wiley. 1982.
12. The Bernoullis. *Encyclopedia of Statistical Sciences* **1** 214-219. S. Kotz and N. L. Johnson, eds., Wiley. 1982.
13. Adjusting P-values to account for selection over dichotomies (with Ingram Olkin). *Journal of the American Statistical Association* **78** 674-678. 1983.
14. A subjective interpretation of conditional probability. *Journal of Philosophical Logic* **12** 453-466. 1983.
15. Johann Heinrich Lambert. *Encyclopedia of Statistical Sciences* **4** 466-468. S. Kotz and N.L. Johnson, eds., Wiley. 1985.
16. Miller's paradox. *Encyclopedia of Statistical Sciences* **5** 502-503. S. Kotz and N. L. Johnson, eds., Wiley. 1985.
17. Moral certainty. *Encyclopedia of Statistical Sciences* **5** 623-624. S. Kotz and N. L. Johnson, eds., Wiley. 1985.
18. Nonadditive probability. *Encyclopedia of Statistical Sciences* **6** 271-276. S. Kotz and N. L. Johnson, eds., Wiley. 1985.
19. Languages and designs for probability judgment (with Amos Tversky). *Cognitive Science* **9** 309-339. 1985. Reprinted in *Decision Making,* edited by David Bell, Howard Raiffa, and Amos Tversky, Cambridge University Press, 1988, pp. 237-265. Reprinted as Chapter 13 of Classic Works of the Dempster-Shafer Theory of Belief Functions, edited by Ronald Yager and Liping Liu, Springer, 2008.
20. Hierarchical evidence. *Proceedings of the Second Conference on Artificial Intelligence Applications, Miami Beach, December 11-13, 1985*, pp. 16-21. IEEE Computer Society Press.
21. Conditional probability (with discussion). *International Statistical Review* **53** 261-277. 1985.

22. Propagating belief functions with local computations (with Prakash Shenoy). *IEEE Expert* **1:3** 43-52. 1986.
23. The combination of evidence. *International Journal of Intelligent Systems* **1** 155-179. 1986.
24. Probability judgment in artificial intelligence. *Uncertainty in Artificial Intelligence,* pp. 127-135. J. F. Lemmer and L. N. Kanal, eds., North-Holland. 1986.
25. Savage revisited (with discussion). *Statistical Science* **1** 463-501. 1986. Reprinted in *Decision Making,* edited by David Bell, Howard Raiffa, and Amos Tversky, Cambridge University Press, 1988, pp. 193-234.
26. The construction of probability arguments (with discussion). *Boston University Law Review* **66** 799-823. 1986. Reprinted in *Probability and Inference in the Law of Evidence*, edited by Peter Tillers, Kluwer, 1988, pp. 185-204.
27. Probability judgment in artificial intelligence and expert systems (with discussion). *Statistical Science* **2** 3-44. 1987.
28. Belief functions and possibility measures. *The Analysis of Fuzzy Information*, *Vol. 1: Mathematics and Logic*, pp. 51-84. James C. Bezdek, ed., CRC Press. 1987.
29. Implementing Dempster's rule for hierarchical evidence (with Roger Logan). *Artificial Intelligence* **33** 272-298. 1987. Reprinted as Chapter 18 of Classic Works of the Dempster-Shafer Theory of Belief Functions, edited by Ronald Yager and Liping Liu, Springer, 2008.
30. Propagating belief functions in qualitative Markov trees (with Prakash Shenoy and Khaled Mellouli). *International Journal of Approximate Reasoning* **1** 349-400. 1987.
31. Modifiable combining functions (with Paul Cohen and Prakash Shenoy). *AI EDAM (Artificial Intelligence for Engineering Design, Analysis, and Manufacturing)* **1** 47-57. 1987.
32. Qualitative Markov networks (with Khaled Mellouli and Prakash Shenoy). *Uncertainty in Knowledge-Based Systems*, B. Bouchon and R. R. Yager, eds, pp. 69-74. Springer-Verlag. 1987.
33. Saint Petersburg paradox. *Encyclopedia of Statistical Sciences* **8** 865-870. S. Kotz and N. L. Johnson, eds., Wiley. 1988.
34. Sharp null hypotheses. *Encyclopedia of Statistical Sciences* **8** 433-436. S. Kotz and N. L. Johnson, eds., Wiley. 1988.
35. Propagation of belief functions: A distributed approach (with Prakash Shenoy and Khaled Mellouli). *Uncertainty in Artificial Intelligence* **2** 325-335. J. F. Lemmer and L. N. Kanal, eds. North-Holland. 1988.
36. Evidential reasoning using DELIEF (with Debra Zarley and Yen-Teh Hsia). *AAAI-88; Proceedings of the Seventh National Conference on Artificial Intelligence*, pp. 205-209. 1988.
37. Auditor's Assistant: A knowledge-engineering tool for audit decisions (with Prakash Shenoy and Rajendra Srivastava). *Proceedings of the 1988 Touche-Ross/ University of Kansas Symposium*, pp. 61-84. 1988.
38. An axiomatic framework for Bayesian and belief-function propagation (with Prakash Shenoy). *Proceedings of the Fourth Workshop on Uncertainty in Artificial Intelligence*, pp. 307-314, Minneapolis, MN, 1988.
39. The unity of probability. Pp. 95-126 of *Acting Under Uncertainty: Multidisciplinary Conceptions*, edited by George von Furstenberg, Kluwer (Boston), 1990.
40. Perspectives on the theory and practice of belief functions. *International Journal of Approximate Reasoning* **4** 323-362. 1990. PREPUBLICATION VERSION
41. The Bayesian and belief-function formalisms: A general perspective for auditing (with Rajendra Srivastava and with discussion). *Auditing: A Journal of Practice and Theory*, Volume 9 Supplement, 110-148, 1990.
42. Probability propagation (with Prakash Shenoy). *Annals of Mathematics and Artificial Intelligence* **2** 327-352. 1990. PREPUBLICATION VERSION
43. Axioms for probability and belief-function propagation (with Prakash Shenoy). *Uncertainty in Artificial Intelligence* **4**, pp. 169-198. R. D. Shachter, T. S. Levitt, L. N. Kanal, and J. F. Lemmer, eds. North-Holland, 1990. PREPUBLICATION VERSION. Reprinted as Chapter 20 of Classic Works of the Dempster-Shafer Theory of Belief Functions, edited by Ronald Yager and Liping Liu, Springer, 2008.
44. The unity and diversity of probability (with discussion). *Statistical Science* **5** 435-462. 1990. PREPUBLICATION VERSION
45. Why should statisticians be interested in artificial intelligence? Pp. 16-58 of *Proceedings of the Fifth Annual Conference on Making Statistics More Effective in Schools of Business*, University of Kansas, June 1-2, 1990, edited by Steven Hillmer and Lawrence A. Sherr. PREPUBLICATION VERSION
46. What is probability? In *Perspectives on Contemporary Statistics*, edited by David C. Hoaglin and David S. Moore. Mathematical Association of America, MAA Notes Number 21, pp. 93-105. 1992.
47. Belief-function formulas for audit risk (with Rajendra P. Srivastava). *The Accounting Review* **67** 249-283. 1992. PREPUBLICATION VERSION. Reprinted as Chapter 23 of Classic Works of the Dempster-Shafer Theory of Belief Functions, edited by Ronald Yager and Liping Liu, Springer, 2008.
48. The Dempster-Shafer theory. Pp. 330-331 of *Encyclopedia of Artificial Intelligence*, Second Edition, Stuart C. Shapiro, editor. Wiley. 1992. PREPUBLICATION VERSION
49. Can the various meanings of probability be reconciled? Pp. 165-196 of *A Handbook for Data Analysis in the Behavioral Sciences: Methodological Issues*, edited by Gideon Keren and Charles Lewis. Lawrence Erlbaum, Hillsdale, New Jersey, 1993. PREPUBLICATION VERSION
50. The early development of mathematical probability. Pp. 1293-1302 of *Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences*, edited by I. Grattan-Guinness. Routledge, London, 1993. PREPUBLICATION VERSION
51. Integrating statistical and non-statistical audit evidence using belief functions: A case of variable sampling (with Rajendra P. Srivastava). *International Journal of Intelligent Systems* **9** 519-539. 1994.

PREPUBLICATION VERSION

52. The subjective aspect of probability. Pp. 53-73 of *Subjective Probability*, edited by George Wright and Peter Ayton. Wiley, 1994. PREPUBLICATION VERSION
53. Propagating beliefs in AND-trees (with Rajendra P. Srivastava and Prakash P. Shenoy). *International Journal of Intelligent Systems* **10** 647-664. 1995. PREPUBLICATION VERSION
54. Philosophical foundations for causal networks. Pp. 3-12 of *Advances in Intelligent Computing*, edited by Bernadette Bouchon-Meunier, Ronald R. Yager, and Lotfi A. Zadeh. Springer Verlag, Lecture Notes in Computer Science 945. 1995. PREPUBLICATION VERSION
55. The significance of Jacob Bernoulli's *Ars Conjectandi* for the philosophy of probability today. *Journal of Econometrics*. **75** 15-32. 1996. PREPUBLICATION VERSION
56. Causal relevance. Pp. 187-208 of *Reasoning with Uncertainty in Robotics*, edited by Leo Dorst, Michiel van Lambalgen, and Frans Voorbraak. Springer Verlag, Lecture Notes in Artificial Intelligence 1093. 1996. PREPUBLICATION VERSION
57. Vanishing tetrad differences and model structure (with Alexander Kogan and Peter Spirtes). *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems* **4** 209-224. 1996. PREPUBLICATION VERSION. RUTCOR RESEARCH REPORT
58. The situation of causality. *Foundations of Science* **1** 543-563. 1996. PREPUBLICATION VERSION
59. Lindley's paradox. *Encyclopedia of Biostatistics*, P. Armitage and T. Colton, eds., Wiley. 1997. PREPUBLICATION VERSION
60. A logic of action, causality, and the temporal relations of events (with Richard Scherl). Pp. 89-96 of the *Proceedings of the Fifth International Workshop on Temporal Representation and Reasoning (Time-98)*, edited by Lina Khatib and Robert Morris. Los Alamitos, Calif.: IEEE Computer Society. 1998 PREPUBLICATION VERSION
61. Mathematical foundations for probability and causality. Pp. 207-270 of *Mathematical Aspects of Artificial Intelligence*, edited by Frederick Hoffman. American Mathematical Society, Symposia in Applied Mathematics, Volume 55. 1998. PREPUBLICATION VERSION
62. Causal logic. Pp. 711-719 of *Proceedings of the 13th European Conference on Artificial Intelligence (ECAI-98)*, edited by Henri Prade. Chichester: Wiley. 1998. PREPUBLICATION VERSION
63. Causal conjecture. Pp. 17-32 of *Causal Models and Intelligent Data Management*, edited by Alex Gammerman. Springer. 1999. PREPUBLICATION VERSION
64. The logic of events (with Peter R. Gillett and Richard Scherl). *Annals of Mathematics and Artificial Intelligence* **28** 315-389. 2000. PREPUBLICATION VERSION
65. Causality and responsibility. *Cardozo Law Review* **22** 101-123. 2001. PREPUBLICATION VERSION
66. Nature's possibilities and expectations. Pp. 147-166 of *Probability Theory : Philosophy, Recent History and Relations to Science*, edited by Vincent F. Hendriks, Stig Andur Pedersen, and Kaus Frovin Jørgensen. Kluwer (Synthese Library, Vol. 297). 2001. PREPUBLICATION VERSION
67. A new understanding of subjective probability and its generalization to lower and upper prevision (with Peter R. Gillett and Richard Scherl). *International Journal of Approximate Reasoning*. **33** 1-49. 2003. PREPUBLICATION VERSION
68. Kolmogorov's contributions to the foundations of probability (with Vladimir Vovk). *Problems of Information Transmission*. **39** 21-31. 2003. PREPUBLICATION VERSION
69. Subjective Probability and Lower and Upper Prevision: A New Understanding (with Peter R. Gillett and Richard Scherl). Pp. 511-525 of ISIPTA '03: Proceedings of the Third International Symposium on Imprecise Probabilities and Their Applications, Lugano, Switzerland, edited by Jean-Marc Bernard, Teddy Seidenfeld, and Marco Zaffalon. Carleton Scientific 2003. PREPUBLICATION VERSION
70. Self-calibrating Probability Forecasting (with Vladimir Vovk and Ilia Nouretdinov). Pp. 1133-1140 of NIPS 2003: Advances in Neural Information Processing Systems 16 - Proceedings of the 2003 Conference (v. 16), edited by Sebastian Thrun, Lawrence K. Saul, Bernhard Schölkopf. MIT Press June 2004.
71. Defensive forecasting (with Vladimir Vovk and Akimichi Takemura). In AISTATS 2005: Proceedings of the 10th International Workshop on Artificial Intelligence and Statistics, Barbados, January 6-8, 2005, edited by Robert Cowell and Zoubin Ghahramani, pp. 365-372. 2005.
72. Defensive forecasting for linear protocols (with Vladimir Vovk, Ilia Nouretdinov, and Akimichi Takemura). In *Algorithmic Learning Theory: Proceedings of the 16th International Conference, ALT 2005, Singapore, October 8-11, 2005,* edited by Sanjay Jain, Hans Ulrich Simon, Etsuji Tomita. Lecture Notes in Computer Science, Volume 3734. Springer-Verlag. 2005. RELATED WORKING PAPER.
73. Good randomized sequential probability forecasting is always possible (with Vladimir Vovk). *Journal of the Royal Statistical Society, Series B*. 67 747-764. 2005. RELATED WORKING PAPER
74. The sources of Kolmogorov's *Grundbegriffe* (with Vladimir Vovk). *Statistical Science* Vol. 21, No. 1, pp. 70-98, 2006. RELATED WORKING PAPER.
75. The Game-Theoretic Framework for Probability. In IPMU 2006: Proceedings of the 11th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, Paris, July 2-7, 2006, pp. 3-10. 2006. PREPUBLICATION VERSION.
76. A probabilistic logic based on the acceptability of gambles (with Peter R. Gillett and Richard B. Scherl). *International Journal of Approximate Reasoning*. **44**(3) 281-300. 2007. PREPUBLICATION VERSION.
77. From Cournot's principle to market efficiency. Pp. 55-95 of Augustin Cournot: Modelling Economics, edited by Jean-Philippe Touffut and published by Edward Elgar, 2007. The article also appeared in French, as "Du

principe de Cournot au marche éfficient," pp. 83-132 of La Société du probable: Les mathématiques sociales après Augustin Cournot, edited by by Jean-Philippe Touffut and published by Albin Michel, 2007. PREPUBLICATION VERSION.

78. The Game-Theoretic Capital Asset Pricing Model (with Vladimir Vovk). *International Journal of Approximate Reasoning* **49**(1) 175-197. September 2008. Related Working Paper.
79. Game-Theoretic Probability and Defensive Forecasting. *Proceedings of the 2007 Winter Simulation Conference*, edited by S. G. Henderson, B. Biller, M.-H. Hsieh, J. Shortle, J. D. Tew, and R. R. Barton. PREPUBLICATION VERSION
80. Defensive forecasting: How to use similarity to make forecasts that pass statistical tests. Pp. 215-147 of *Preferences and Similarities*, edited by Giacomo Della Riccia, Didier Dubois, Rudolf Kruse, and Hans-Joachim Lenz, CISM Series, SpringerWienNewYork, 2008. RELATED WORKING PAPER
81. A Tutorial on Conformal Prediction (with Vladimir Vovk), *Journal of Machine Learning Research*. 9 (March) 371-421. 2008.
82. Portfolio Selection and Online Learning (with Tatsiana Levin). *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems* **16**(4) 437-473. August 2008.
83. The education of Jean André Ville, www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
84. On the history of martingales in the study of randomness (with Laurent Bienvenu and Alexander Shen) www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
85. How to base probability theory on perfect-information games (with Vladimir Vovk and Roman. Chychyla), *Bulletin of the European Association for Theoretical Computer Science*, Number 100, pp. 115-148, February 2010.
86. Predicting bond yields using defensive forecasting (with Sam Ring). Pp. 1257-1272 of *Handbook of Quantitative Finance and Risk Management,* edited by C. F. Lee, Alice C. Lee, and John Lee, Springer, 2010.
87. A betting interpretation for probabilities and Dempster-Shafer degrees of belief. *International Journal of Approximate Reasoning* **52** 127-136. 2011.
88. The generality of the zero-one laws (with Akimichi Takemura, Vladimir Vovk). *Annals of the Institute of Statistical Mathematics* **63** 873-885. 2011.
89. What does the arrest and release of Emile Borel and his colleagues in 1941 tell us about the German Occupation of France? (with Laurent Mazliak). *Science in Context* **24** 587-623. 2011. PREPUBLICATION VERSION. RELATED DOCUMENTS
90. Test martingales, Bayes factors, and p-values (with Alexander Shen, Nikolai Vereshchagin, and Vladimir Vovk). *Statistical Science* **26** 84-101. 2011.
91. Insuring against loss of evidence in game-theoretic probability (with A. Philip Dawid, Steven de Rooij, Alexander Shen, Nikolai Vereshchagin, and Vladimir Vovk). *Statistics and Probability Letters* **81** 157-162. 2011.
92. Lévy's zero-one law in game-theoretic probability (with Vladimir Vovk and Akimichi Takemura). *Journal of Theoretical Probability* 25(1):1-24. DOI: 10.1007/s10959-011-0390-3. 2012.
93. The historian as unifier of probability's diversity. www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **9**(1), December 2013.
94. Game-theoretic probability (with Vladimir Vovk). Pp. 113-134 of *Introduction to Imprecise Probabilities,* edited by Thomas Augustin, Frank P. A. Coolen, Gert de Cooman, and Matthias C. M. Troffaes, Wiley, 2014.
95. Dempster's rule of combination. *International Journal of Approximate Reasoning* **79** 26-40. December 2016. PREPUBLICATION VERSION.
96. Constructive decision theory. *International Journal of Approximate Reasoning* **79** 45-62. December 2016. PREPUBLICATION VERSION.
97. The problem of dependent evidence. *International Journal of Approximate Reasoning* **79** 41-44. December 2016. PREPUBLICATION VERSION.
98. *A Mathematical Theory of Evidence* turns 40. *International Journal of Approximate Reasoning* **79** 7-25. December 2016. PREPUBLICATION VERSION.
99. Marie-France Bru and Bernard Bru on dice games and contracts. *Statistical Science* **33** 277-284. 2018. PREPUBLICATION VERSON.
100. Reconciling betting and measure. *Prisme 36.* Centre Cournot, October 2018.
101. Pascal's and Huygens's game-theoretic foundations for probability. *Sartoniana* **32** 117-145. 2019
102. Comment: Illusions, Then and Now. *Statistical Science* **35**(2):173-174, 2020.
103. Comment: On the history and limitations of probability updating. *Statistical Science* **36**(2):191-195, 2021.
104. Testing by betting: a strategy for statistical and scientific communication, with discussion and response. *Journal of the Royal Statistics Society, Series A* **184**(2):407-478, 2021.
105. Causal interpretation of graphical models. *International Journal of Approximate Reasoning* **141** 179-182. 2022.
106. The notion of event in probability and causality: Situating myself relative to Bruno de Finetti. *International Journal of Approximate Reasoning* **141** 171-178. 2022.
107. "So much data. Who needs probability?" Have we been here before? *International Journal of Approximate Reasoning* **141** 183-189. 2022.
108. Martingales at the Casino. Pp. 15-50 of *The Splendors and Miseries of Martingales: Their History from the Casino to Mathematics,* edited by Laurent Mazliak and Glenn Shafer, Birkhäuser, September 2022.

109. Did Jean Ville Invent Martingales? Pp. 107-122 of *The Splendors and Miseries of Martingales: Their History from the Casino to Mathematics,* edited by Laurent Mazliak and Glenn Shafer, Birkhäuser, September 2022.
110. Martingales in the Study of Randomness (with Laurent Bienvenu and Alexander Shen). Pp. 225-264 of *The Splendors and Miseries of Martingales: Their History from the Casino to Mathematics,* edited by Laurent Mazliak and Glenn Shafer, Birkhäuser, September 2022.
111. Andrei Kolmogorov and Leonid Levin on Randomness (with Laurent Bienvenu and Alexander Shen). Pp. 405-414 of *The Splendors and Miseries of Martingales: Their History from the Casino to Mathematics,* edited by Laurent Mazliak and Glenn Shafer, Birkhäuser, September 2022.
112. Game-Theoretic Statistics and Safe Anytime-Valid Inference (with Aaditya Ramdas, Peter Grünwald, and Vladimir Vovk), Statistical Science, 38(4):576–601, 2023.
113. Improving data analysis by testing by betting: Optional continuation and descriptive statistics. *The New England Journal of Statistics in Data Science.* 2(2):215-228. 2024. Prepublication version.
114. How the game-theoretic foundation for probability resolves the Bayesian vs. frequentist standoff. *Handbook on Bayesian, Fiducial and Frequentist (BFF) Inferences,* edited by Jim Berger, Xiao-Li Meng, Nancy Reid and Min-ge Xie, Chapman & Hall, pp. 264–275. 2024. Prepublication version.
115. A Conversation with A. Philip Dawid, with Vladimir Vovk. *Statistical Science.* 40(1):148-166. 2025. Extended version.
116. The martingale index: A measure of self-deception in betting and finance (with Valentin Dimitrov). *Judgment and Decision Making.* 20(e26):1-23. 2025.
117. On testing by imaginary betting. *ERCIM News,* July 2026 (No. 145), pp. 8-9.

back to top

Book Reviews

1. Review of *The Emergence of Probability*, by Ian Hacking. *Journal of the American Statistical Association* **71** 519-521. 1976.
2. Review of *I. J. Bienaymé: Statistical Theory Anticipated*, by C. C. Heyde and E. Seneta, *ISIS* **70** 329. 1979.
3. Review of *The Enterprise of Knowledge*, by Isaac Levi. *Technometrics* **24** 164-165. 1982.
4. Review of *Statistical Decision Theory*, by James O. Berger. *Psychometrika* **47** 119. 1982.
5. Review of *Judgment Under Uncertainty: Heuristics and Biases*, edited by D. Kahneman, P. Slovic, and A. Tversky. *Journal of the American Statistical Association* **79** 223-224. 1984.
6. Review of *Expected Utility Hypotheses and the Allais Paradox*, edited by M. Allais and O. Hagen. *Journal of the American Statistical Association* **79** 224-225. 1984.
7. Review of *Faces of Science*, by V. V. Nalimov. *Technometrics* **26** 292. 1984.
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9. Review of *The Empire of Chance*, by Gerd Gigerenzer et al. *Science* **247** 225. 1990. PREPUBLICATION VERSION
10. Review of *The Rise of Statistical Thinking, 1820-1900*, by Theodore M. Porter. *Annals of Science* **47** 207-209. 1990. PREPUBLICATION VERSION
11. Review of *Influence Diagrams, Belief Nets, and Decision Analysis*, edited by R. M. Oliver and J. Q. Smith. *Journal of the American Statistical Association* **87** 585-586. 1992.
12. Review of *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*, by Judea Pearl, *Representing and Reasoning with Probabilistic Knowledge: A Logical Approach to Probabilities*, by Fahiem Bacchus, and *Causation, Prediction, and Search*, by Peter Spirtes, Clark Glymour, and Richard Scheines. *Synthese* **104** 161-176. 1995. PREPUBLICATION VERSION
13. Review of *Creating Modern Probability*, by Jan von Plato. *Annals of Probability*. **26** 416-424. 1998. PREPUBLICATION VERSION
14. Review of *Operational Subjective Statistical Methods: A Mathematical, Philosophical, and Historical Introduction*, by Frank Lad. *Journal of the American Statistical Association* **94** 648-649. 1999. PREPUBLICATION VERSION
15. Review of *Scientific Reasoning: The Bayesian Approach*, by Colin Howson and Peter Urbach. *Journal of the American Statistical Association* **102** 387. 2007. PREPUBLICATION VERSION

back to top

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1. Comment on "Scoring rules and the inevitability of probability," by D. V. Lindley. *International Statistical Review* **50** 18-19. 1982.

2. Comment on "Can human irrationality be experimentally demonstrated?" by L. J. Cohen. *The Behavioral and Brain Sciences* **6** 508-509. 1983.
3. Comment on "Combining probability distributions," by C. Genest and J. V. Zidek. *Statistical Science* **1** 135-137. 1986.
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5. Comment on "An inquiry into computer understanding," by Peter Cheeseman. *Computational Intelligence* **4** 121-124. 1988.
6. Comment on "Integration of Two Kinds of Expertise," by B. Chandrasekaran and Jesse Dillard. *Auditor Productivity in the Year 2000; 1987 Proceedings of the Arthur Young Professors' Roundtable*. Andrew Bailey, ed., pp. 121-128. 1988.
7. Comment on "Local computation with probabilities on graphical structures and their application to expert systems," by S. L. Lauritzen and D. J. Spiegelhalter. *Journal of the Royal Statistical Society, Series B* **50** 214. 1988.
8. Rejoinder to comments on "Perspectives on the theory and practice of belief functions." *International Journal of Approximate Reasoning* **6** 445-480. 1992. PREPUBLICATION VERSION
9. Foreword to *Advances in the Dempster-Shafer Theory of Evidence*, edited by Ronald R. Yager, Janusz Kacprzyk, and Mario Fedrizzi. Wiley, 1993. PREPUBLICATION VERSION
10. Comment on "A logic of probability, with applications to the foundations of statistics," by V. G. Vovk, *Journal of the Royal Statistics Society, Series B* **55.** 1993. PREPUBLICATION VERSION
11. Advances in the understanding and use of conditional independence. (Introduction to a collection of articles.) *Annals of Mathematics and Artificial Intelligence* **21** 1-11. 1998. PREPUBLICATION VERSION
12. Comment on "Causal inference without counterfactuals", by A. P. Dawid. *Journal of the American Statistical Association* **95** 438-442. 2000. PREPUBLICATION VERSION
13. Comment on "Estimating causal effects," by George Maldonado and Sander Greenland. *International Journal of Epidemiology*. **31**(2) 434-5. 2002. PREPUBLICATION VERSION
14. Comments on "Constructing a Logic of Plausible Inference: A Guide to Cox's Theorem", by Kevin S. Van Horn. *International Journal of Approximate Reasoning* **35** 97-105. 2004. PREPUBLICATION VERSION
15. Comments on "A foundational justification for a weighted likelihood approach to inference", by R.J. Bowater. International Statistical Review **72** 331-334. 2004. PREPUBLICATION VERSION
16. Poisson, the Probability Calculus, and Public Education, by Bernard Bru. *Electronic Journal for History of Probability and Statistics* **1**(2). November 2005. (This is a translation into English by Glenn Shafer of "Poisson, le calcul des probabilités et l'instruction publique," on pp. 51-94 of Siméon Denis Poisson et la science de son temps, Michel Métivier, Pierre Costabel, and Pierre Dugac, eds., Editions de l'Ecole Polytechnique, Palaiseau, 1981.)
17. Comments on "Hedging Predictions in Machine Learning", by Alexander Gammerman and Vladimir Vovk. *The Computer Journal.* Volume 50, March, 2007 168-169. PREPUBLICATION VERSION
18. Foreword (with A. P. Dempster) on pp. ix-x of *Classic Works of the Dempster-Shafer Theory of Belief Functions*, Ronald Yager and Liping Liu (eds.), Springer 2008.
19. Comments on Harman and Kulkarni's "Reliable Reasoning", Abstracta, Special Issue III, pp. 10-17, 2009.
20. Introduction to special issue on the history of martingales: The Splendors and Miseries of Martingales (with Laurent Mazliak), www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
21. List of Jean Ville's publications, www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.22. Summary of the scientific work of Mr. Jean Ville (1955), translation into English and notes by Glenn Shafer, www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
22. Jean Ville's 1956 cv, translation into English and notes by Glenn Shafer, www.jehps.net (Electronic *Journal for History of Probability and Statistics*) **5**(2), June 2009.
23. Jean A. Ville : Game theory, duality, economic growth (1983), by Jean A. Ville, translation into English and notes by Glenn Shafer, www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
24. Jean Ville's recollections about martingales (1984-85), reported by P.Crepel, translation into English and notes by Glenn Shafer, www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
25. Bernard d'Orgeval's obituary of Jean Ville (1992), translation into English and notes by Glenn Shafer, www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
26. A letter of Paul Lévy to T. Hida, translation into English and notes by Glenn Shafer, www.jehps.net (*Electronic Journal for History of Probability and Statistics*) **5**(2), June 2009.
27. Dice Games, by Marie-France Bru and Bernard Bru. Translation from the French by Glenn Shafer. *Statistical Science* **33** 285-297. 2018.
28. Comment: On the History and Limitations of Probability Updating. *Statistical Science* **36**(2) 191-195, May 2021.

back to top

Selected Unpublished Papers

1. An Axiomatic Study of Computation in Hypertrees, Working Paper 232. School of Business, University of Kansas. Oct. 16, 1991.
2. On the Puzzle Presented by Richard Gill (unpublished memorandum written following a workshop on causality at Santa Fe in 1997).
3. The Notion of Event in Probability and Causality: Situating Myself Relative to Bruno de Finetti (unpublished paper presented in Bologna and Pisa in March 2001).
4. Using GMAT/GRE scores for doctoral admissions. July 1, 2007. [gmat-gre_recommendations.pdf]
5. How to invent game-theoretic statistics yourself, in 16 mostly easy steps. Feb. 25, 2021

See also Game-Theoretic Working Papers and Papers on Causality

back to top

Presentations Since Joining Rutgers in 1992

1. *Axioms for Uncertain Reasoning.* Keynote address at the Fourth International Conference on Computing and Information. Toronto. May 28, 1992.
2. *Uncertainty in Expert Systems.* Ten lectures as the principal lecturer at an NSF-CBMS Regional Research Conference. University of North Dakota. June 1-5, 1992.
3. *The Handling of Uncertainty in Expert Systems.* Keynote address at the 1992 Conference on Artificial Intelligence in Petroleum Exploration and Production. Houston. July 22, 1992.
4. *Axioms for Computation in Join Trees.* Department of Statistics, Temple University. October 13, 1992.
5. *Decision Making with Generalizations of Probability.* Presentation for the panel (with Kenneth Arrow and Peter Fishburn) on epistemic uncertainty in rational decision at the 34th Joint National Meeting of ORSA/TIMS. San Francisco. November 4, 1992.
6. *Probabilistic Expert Systems.* Tutorial at the Rutgers Conference on Information Systems. Newark. November 20, 1992.
7. *The Language of Causation in Event Trees.* Fourth International Workshop in Artificial Intelligence and Statistics. Fort Lauderdale. January 6, 1993.
8. *Probabilistic Causation.* Department of Civil Engineering. Princeton University. February 26, 1993.
9. *Causal Explanations for Structural Models.* Organization Management Seminar. Rutgers University. Newark. March 6, 1993.
10. *Probabilistic Causation.* Rutgers Center for Operations Research. New Brunswick. March 31, 1993.
11. *Probabilistic Causation. Department of Computer Science.* Carnegie-Mellon University. April 22, 1993.
12. *The Significance of Jacob Bernoulli's Ars Conjectandi for the Philosophy of Probability Today.* Bayesian Statistics and Econometrics Conference, Basel, Switzerland. April 29, 1993.
13. *Understanding Causation Probabilistically.* Department of Philosophy. London School of Economics. June 12, 1993.
14. *Causality in Event Trees.* Psychology Department Workshop. Princeton University. September 15, 1993.
15. *An Abstract Theory of Probability.* Rutgers Center for Operations Research. October 21, 1993.
16. *An Abstract Theory of Probability.* Department of Statistics. Harvard University. October 27, 1993.
17. *The Tetrad Representation Theorem.* Statistics Seminar Series. Princeton. November 4, 1993.
18. *The Causal Interpretation of Bayes Nets.* Decision Sciences Department, Fuqua School of Business, Duke University. February 17, 1994.
19. *The Causal Interpretation of Structural Equations Models.* Marketing Seminar. Columbia Business School. March 3, 1994.
20. *Conditional Independence and its Cousins.* Information Sciences Seminar, Department of Electrical Engineering. Princeton University. April 21, 1994.
21. *The Causal Interpretation of Bayesian Expert Systems.* Fourth Workshop on Normative Systems. Aalborg, Denmark. May 9, 1994.
22. *Probability and Causality.* Kolmogorov Seminar, Department of Mathematical Logic, Moscow State University. May 16, 1994.
23. *The Representation of Causation.* Plenary Lecture, International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, Paris, July 4, 1994.
24. *The Art of Causal Conjecture.* Department of Statistical Science, University College London. October 25, 1994.
25. *Moivrean and Humean Events.* Center for the Philosophy of Science, London School of Economics. October 27, 1994.
26. *The Relevance of Trees.* Symposium on Relevance, American Association for Artificial Intelligence, New Orleans. November 5, 1994.
27. *A New Probabilistic Foundation for Causal Inference.* Department of Statistics. Rutgers University. December 7, 1994.
28. *Tutorial on Causal Models.* Biennial Meeting on Artificial Intelligence and Statistics, Fort Lauderdale. January

6, 1995.
29. *The Art of Causal Conjecture.* Department of Statistics. Yale University. January 23, 1995.
30. *Foundations of Probability and Causality: Nine Lectures.* Research Seminar on Probability and Causality. Department of Mathematics and Computer Science, Aalborg University, Denmark. June 12-30, 1995.
31. *Alternative Causal Interpretations of Bayes Nets.* International Research Seminar on Statistics and Expert Systems. Oberwolfach, Germany. July 4, 1995.
32. *The Multiple Causal Interpretations of Bayes Nets.* Invited lecture followed by panel discussion. Eleventh Annual International Conference on Uncertainty in Artificial Intelligence. Montreal. August 20, 1995.
33. *Lord's Paradox.* Department of Biostatistics. Columbia University. September 14, 1995.
34. *Two Frameworks for Causality.* Department of Mathematical Statistics. Columbia University. September 18, 1995.
35. *Combining Statistical and Computational Ideas of Causality.* Department of Computer Science. Rutgers University. October 16, 1995.
36. *Lord's Paradox.* Department of Operations Research. University of Delaware. October 27, 1995.
37. *Semantics for Computational Representations of Causality.* Department of Computer Information Systems. New Jersey Institute of Technology. Newark, New Jersey. November 29, 1995.
38. *New Foundations of Causal Inference.* International Conference on Uncertainty in Robotics. Amsterdam, Holland. December 4, 1995.
39. *Evidence, Causality, and Possibility.* International Atomic Energy Agency. Vienna, Austria. December 7, 1995.
40. *Mathematical Foundations for Causal Reasoning.* International Workshop on Mathematics and Artificial Intelligence. Fort Lauderdale, Florida. January 4, 1996.
41. *Foundations for Causality and Probability.* Tutorial for the American Mathematical Society. Orlando, Florida. January 9, 1996.
42. *Huygens, Bernoulli, and Hume: The Art of Causal Conjecture.* Harrisburg Chapter of the American Statistical Association. May 3, 1996.
43. *Lord's Paradox.* Educational Testing Service. May 20, 1996.
44. *Humean and Moivrean Events.* International Conference on the Notion of Event in Probabilistic Epistemology. University of Trieste. May 28, 1996.
45. *Causal Explanation of Statistical Observations.* Séminaire Risque, Incertitude, et Décision, University of Pierre and Marie Curie (Paris 6). November 4, 1996.
46. *Causal Logic.* Séminaire Intelligence Artificielle et Processus de Décision, University of Pierre and Marie Curie (Paris 6). November 11, 1996.
47. *Causal Logic.* Department of Computer Science, University of Rheims, France. November 14, 1996.
48. *Causal Explanation of Statistical Observations.* Séminaire Risque, Incertitude, et Décision, University of Pierre and Marie Curie (Paris 6). November 18, 1996.
49. *Causal Logic.* Department of Computer Science, University of Fribourg, Switzerland. December 7, 1996.
50. *Combining Artificial Intelligence and Logic.* Department of Computer Science, University of Pierre and Marie Curie (Paris 6). December 16, 1996.
51. *Causal Logic.* Department of Computer Science, University of Grenada, Spain. December 19, 1996.
52. *The Mathematical Representation of Causality.* Département d'Economie et Gestion, Ecole Normale Superieure de Cachan. January 16, 1997.
53. *Causality in Econometrics.* Département d'Economie et Gestion, Ecole Normale Superieure de Cachan. January 23, 1997.
54. *The Mathematical Representation of Probability.* Département d'Economie et Gestion, Ecole Normale Supérieure de Cachan. January 30, 1997.
55. *The Meaning of Probability in Game Theory and Finance.* Département d'Economie et Gestion, Ecole Normale Supérieure de Cachan. February 6, 1997.
56. *Causality is not Counterfactual.* Center for the Philosophy of the Natural and Social Sciences, London School of Economics. February 10, 1997.
57. *Causality and Statistics.* Department of Statistical Science, University College London. February 11, 1997.
58. *Causal Reasoning.* Department of Computer Science, University of Toulouse. March 12, 1997.
59. *Causal Explanation and Causal Reasoning.* UNICOM Research Seminar, London. March 17, 1997.
60. *Causal Explanation in Statistics.* University of René Descartes (Paris 5). March 24, 1997.
61. *Fondement de la probabilité sur la théorie des jeux.* Department of Economics, University of Paris 1. March 25, 1997.
62. *The Causal Explanation of Statistical Observations.* Institut National de la Statistique et des Etudes Economiques, Paris. April 21, 1997.
63. *Advances in Graphical Models.* Séminaire sur les Réseaux Probabilistes. Department of Computer Science, University of Pierre and Marie Curie (Paris 6). April 28, 1997.
64. *Causal Explanation of Statistical Observations.* Laboratory of Intelligent Sytems. University of Econcomics, Prague. May 5, 1997.
65. *How to Combine Probability and Logic.* Svoboda Lecture for 1997. Academy of Sciences of the Czech Republic, Prague. May 5, 1997.
66. *The Causal Explanation of Statistical Observations.* Institut Supérieur de Gestion, Tunis. May 19, 1997.
67. *Causal Logic.* Institut des Hautes Etudes Commerciales, Carthage. May 20, 1997.

68. *The Philosophy of Causality.* Séminaire conditionnels et rationalité, CREA, Paris. May 30, 1997.
69. *Conditionnement et Combinaison.* Central Research Laboratory, Thompson-CSF. Orsay, France. June 3, 1997.
70. *The Situation of Causality.* Séminaire du Centre d'Analyse et de Mathématique Sociale, Ecole des Hautes Etudes en Sciences Sociales, Paris. June 10, 1997.
71. *Game-Theoretic Foundations for Non-Additive Probability.* Workshop on Risk, Uncertainty, and Decision Making. Chantilly, France. June 12, 1997.
72. *La Règle de Dempster.* Séminaire Intelligence Artificielle et Processus de Décision, University of Pierre and Marie Curie (Paris 6). June 19, 1997.
73. *How to Think about Causality.* Conference on Inferential Problems in the Analysis of Treatment Effects. Santa Fe Institute. July 26, 1997.
74. *A Causal Action Logic.* Symposium on Prospects for a Commonsense Theory of Causation, Spring Symposium Series, American Association for Artificial Intelligence, Stanford University. March 24, 1998.
75. *How to Combine Probability and Logic.* Invited Address. European Conference on Artificial Intelligence. Brighton, England. August 28, 1998.
76. *A Game-Theoretic Foundation for Probability.* Invited Paper, Third Conference on Logic and the foundations of Game and Decision Theory. International Center for Economic Research. Torino, Italy. December 17-20, 1998.
77. *Causality and Responsibility.* Cardozo Law School, Yeshiva University, New York City. March 1, 1999.
78. *Black-Scholes Without Probability.* Financial Research Seminar, Chase Bank, Manhattan. July 27, 1999.
79. *Foundations for Causal Reasoning.* Invited Tutorial. Fifteenth Conference on Uncertainty in Artificial Intelligence. Stockholm. July 29, 1999.
80. *A Game-Theoretic Foundation for Probability.* Keynote Lecture. Conference on Probability Theory: Philosophy, Recent History, and Relations to Science. Sponsored by the Danish Network for the History and Philosophy of Science and the Danish Natural Science Research Council. University of Roskilde, Denmark. September 16, 1999.
81. *The Predictive and Counterfactual Understandings of Causality.* Closing Lecture. Conference on Probability Theory: Philosophy, Recent History, and Relations to Science. Sponsored by the Danish Network for the History and Philosophy of Science and the Danish Natural Science Research Council. University of Roskilde, Denmark. September 18, 1999.
82. *Beyond Bayes Nets.* Workshop on Conditional Independence Structures and Graphical Models. The Fields Institute for Research in Mathematical Sciences. Toronto. September 27, 1999.
83. *Axioms for Event Spaces.* Seminar on Causal Interpretation of Graphical Models. The Fields Institute for Research in Mathematical Sciences. Toronto. October 4, 1999.
84. *The Language of Causality. I:* Causal Interpretation of Statistical Structure. Sewall Wright Lecture. Program in the Causal Interpretation and Identification of Conditional Independence Structures. The Fields Institute for Research in Mathematical Sciences. Toronto. November 4, 1999.
85. *The Language of Causality: II: Causality and Responsibility.* Sewall Wright Lecture. Program in the Causal Interpretation and Identification of Conditional Independence Structures. The Fields Institute for Research in Mathematical Sciences. Toronto. November 9, 1999.
86. *Causality and Responsibility.* Symposium on Artificial Intelligence and Judicial Proof. Benjamin N. Cardozo School of Law. New York City. April 30, 2000.
87. *Causal Modular Logic.* Berlin Graduate School of Computer Science. Germany. February 21, 2001.
88. *The Notion of Event in Probability and Causality: Situating Myself Relative to Bruno de Finetti.* Scuola Normale Superiore. Pisa, Italy. March 14, 2001.
89. *Dynamic Events and Game-Theoretic Probability.* Dipartimento di Scienze Statistiche Paolo Fortunati, Università degli Studi di Bologna. Italy. March 15, 2001.
90. *The Probability Game.* Berlin Fulbright Seminar, Berlin, Germany. March 28, 2001.
91. *Game-Theoretic Foundations for Probability.* Joint Seminar of the Department of Economics, University of Leipzig and the Handelschochschule Leipzig. Germany. April 24, 2001.
92. *Weak Causal Structures and the Central Limit Theorem.* Fachbereich Wirtschaftswissenschaft, Frei Universität. Berlin, Germany. April 26, 2001.
93. *Replacing Measure Theory with Game Theory as a Foundation for Probability.* Department of Statistics, University of Munich. Germany. May 28, 2001.
94. *The Probability Game.* Internationales Begegnungszentrum der Wissenschaft. Berlin, Germany. May 30, 2001.
95. *A Game-Theoretic Capital Asset Pricing Model.* School of Business. University of Kansas. September 29, 2001.
96. *Lectures on Probability and Finance.* Rutgers University - Newark. January-April, 2002.
97. *Game-Theoretic Probability.* Seminar über Statistik. ETH and University of Zurich. Zurich, Switzerland. January 11, 2002.
98. *Probability and Finance as a Game.* Applied Mathematics Seminar. Cornell University. January 25, 2002.
99. *A Game-Theoretic Capital Asset Pricing Model.* Washington Area Finance Association Semi-Annual Meeting. George Washington University. April 31, 2002.
100. *The Sources of Kolmogorov's Grundbegriffe.* International Conference on Kolmogorov and Contemporary Mathematics. Moscow State University. June 18, 2003.

101. *Causal Interpretation of Graphical Models.* 54th Session of the International Statistical Institute. Berlin. August 14, 2003.
102. *Putting Finance Theory at the Heart of Probability Theory.* Research Colloquium, LeBow College of Business, Drexel University, Philadelphia. November 14, 2003.
103. *Foundations for Finance and Probability.* Statistics Seminar, Department of Mathematical Sciences, New Jersey Institute of Technology. December 3, 2003.
104. *The Empirical Aspect of Probability: From Jacob Bernoulli to the Efficient Market Hypothesis.* Gorenstein Lecture, Rutgers University. New Brunswick, New Jersey. April 21, 2004.
105. *The Empirical Aspect of Probability.* Department of Mathematical Informatics, University of Tokyo, Hongo Campus. May 26, 2004.
106. *Conformal Prediction.* Department of Mathematics, University of Tokyo, Komaba Campus. May 27, 2004.
107. *Contributions to Machine Learning.* Department of International Studies, Meiji Gakuin University, Tokyo. May 31, 2004.
108. *Why do Price Series Look Like Ito Processes?* Statistics Seminar, Department of Economics, University of Tokyo, Hongo Campus. June 1, 2004.
109. *Is Everything Stochastic?* Statistics Seminar, Department of Mathematics and Computing Science, Tokyo Institute of Technology. June 2, 2004.
110. *Implications of Cournot's Principle for Machine Learning and Finance.* Department of Computer Science, Royal Holloway College. June 29, 2004.
111. *Dynamic Hedging Without Probability.* Conference on Financial Innovation, sponsored by the Rutgers University Whitcomb Center for Research in Financial Services and held at Verizon Headquarters, New York City. November 12, 2004.
112. *Defensive Forecasting.* 10th International Workshop on Artificial Intelligence and Statistics, Barbados. January 7, 2005.
113. *The Game-Theoretic Framework for Managing Uncertainty.* Three-hour tutorial. 8th International Conference on Information Fusion (FUSION 2005). Philadelphia. July 29, 2005.
114. *From Cournot's Principle to the Efficient Market Hypothesis.* Cournot Centre for Economic Studies, Paris. 8th International Conference: Augustin Cournot; Economic Models and Rationality. Paris. December 1, 2005.
115. *Game-Theoretic Probability and the History of the Philosophy of Probability.* Keynote. Workshop on Game-Theoretic Probability and Related Topics. University of Tokyo. March 17, 2006.
116. *The implications of Cournot's principle for market prices.* Ecole des Hautes Etudes en Sciences Sociales, Paris. May 16, 2006.
117. *Defensive Forecasting.* Séminaire Données et Apprentissage Artificiel. Laboratoire d'Informatique de Paris 6. May 18, 2006.
118. *Why did Cournot's principle disappear?* Ecole des Hautes Etudes en Sciences Sociales, Paris. May 19, 2006.
119. *Philosophical implications of defensive forecasting.* Institut d'histoire et de philosophie des sciences et des techniques. Paris. May 19, 2006.
120. *Introduction to Dempster-Shafer Theory.* Workshop on recent developments in the Dempster-Shafer theory. Rutgers-Newark. June 30, 2006.
121. *The Game-Theoretic Framework for Probability.* Plenary Lecture, International Conference on Information Processing and Management of Uncertainty (IPMU 2006). Paris. July 5, 2006.
122. *Defensive Forecasting.* ISSEK Invitational Workshop on Preferences and Similiarities, International Centre for Mechanical Sciences, Udine, Italy. October 6, 2006.
123. *Moving the Dempster-Shafer Theory Forward.* Department of Computer Science, Royal Holloway, University of London. October 20, 2006.
124. *The Betting Interpretation of Dempster-Shafer Degrees of Belief.* School of Computational Science, Florida State University. February 27, 2007.
125. *Circling Back to Dempster-Shafer: A Personal Trajectory.* Office of Naval Research, Washington, D.C. February 23, 2007.
126. *Tutorial on Conformal Prediction.* Workshop on Information Theory and Applications, University of California at San Diego. February 1, 2007. RELATED PAPER
127. *Is There a Useful Way to Deal Formally with Multiple Sources of Uncertainty?* Department of Environmental Sciences, Rutgers University. March 2, 2007.
128. *What is risk? What is probability?* Plenary Talk at the 2007 Risk Symposium: Risk Analysis for Homeland Security and Defense, sponsored by Los Alamos National Laboratories, Santa Fe, New Mexico. March 27, 2007
129. *Game Theoretic Probability and its Applications.* Department of Mathematics, Imperial College, London. April 27, 2007.
130. *What is risk? What is probability?* Tutorial, Fusion 2007, Quebec City. July 9, 2007.
131. *Game-Theoretic Probability: Theory and Applications.* ISIPTA'07 – Fifth International Symposium on Imprecise Probability: Theories and Applications, Charles University, Faculty of Mathematics and Physics, Prague, Czech Republic. July 17, 2007.
132. *Probability vs Evidence. Army Research Office Workshop on Abductive Reasoning.* University of Maryland. August 23, 2007.
133. *Game-theoretic probability, with applications to finance and prediction*. Bank of America, New York. October 19, 2007.

134. *Dempster-Shafer judgements*. Workshop commemorating the 50th anniversary of the Harvard Statistics Department, Cambridge. October 27, 2007.
135. *Game-Theoretic Probability and Defensive Forecasting,* Winter Simulation Conference '07, Washington, D.C. December 11, 2007. RELATED PAPER
136. *The use of game-theoretic probability for probability judgment*. Workshop on Game-Theoretic Probability and Related Topics, Department of Mathematical Informatics, University of Tokyo. February 28, 2008.
137. *Game-theoretic probability and defensive forecasting.* Japan Statistical Society, Tokyo. March 1, 2008.
138. *Game-theoretic probability*. Rutgers Experimental Mathematics Seminar, New Brunswick, New Jersey. March 6, 2006.
139. *Game-theoretic probability*. Decision Sciences Research Seminar, INSEAD, Fontainebleau, France. April 11, 2008.
140. *Was Jean Ville a statistician?* Royal Statistical Society North Eastern Local Group, Durham, England. May 8, 2008.
141. *Putting online prediction online*. Workshop on Principles and Methods of Statistical Inference with Interval Probability. Department of Mathematical Sciences, Durham, England. May 12, 2008.
142. *Game-theoretic probability*. Applied Mathematics Colloquium, Columbia University. May 20, 2008.
143. *Why was Jean Ville's work on game-theoretic probability forgotten?* NAFIPS 2008, New York. May 21, 2008.
144. *Game-theoretic probability*. SIPTA School 08. Montpellier, France. July 8, 2008.
145. *Game-theoretic probability and its applications*. Microsoft Research, Redmond, Washington. October 15, 2008.
146. *Cournot's principle: A unifying interpretation of probability.* Prague International Colloquium on Foundations of Uncertainty: Probability and Its Rivals. September 2, 2009.
147. *Three betting interpretations of probability.* Department of Statistics, University of North Carolina, Chapel Hill. October 26, 2009
148. *The meaning of independence in Dempster-Shafer theory.* Department of Statistics, Purdue University. November 5, 2009.
149. *Game-theoretic probability and its applications.* Subjective Bayes Workshop, Center for Research in Statistical Methodology, University of Warwick. December 14, 2009.
150. *A betting interpretation for probabilities and Dempster-Shafer degrees of belief.* Workshop on the Theory of Belief Functions. Ecole Nationale Supérieure d'Ingénieurs, Brest. April 2, 2010.
151. *Betting interpretations of probability.* Third Workshop on Game-Theoretic Probability and Related Topics. Computer Learning Research Centre, Royal Holloway University of London. June 21, 2010.
152. *Game-theoretic probability and its applications.* PIMS Distinguished Seminar Series in Bayesian Methodologies. Departments of Computer Science, University of Saskatchewan and University of Regina. September 23, 2010.
153. *Is everything stochastic?* Cournot Centre for Economic Studies, Paris. October 13, 2010.
154. *The implications of defensive forecasting for probability judgement.* Probabilités juridiques et statistiques judiciaires. Université de Franche-Comté, Besançon. October 14, 2010.
155. *Interpreting game-theoretic probability.* Philosophy of Science Association, Montreal. November 6, 2010.
156. *Basics and interpretation of game-theoretic probability.* Keynote to Fourth Workshop on Game-Theoretic Probability and Related Topics, University of Tokyo. November 12, 2012.
157. *Testing with non-negative martingales, measure-theoretically and game-theoretically.* Department of Statistics, University of Michigan, February 1, 2013, and Center for Research in Mathematics, Guanajuato, Mexico, March 21, 2013.
158. *Introduction to game-theoretic probability.* Keynote to Workshop on Games and Decisions, Centro de Ricerca Matematica Ennio De Giorgi, Scuola Normale Superiore, Pisa, Italy. July 8, 2013.
159. *The eternal debate between Bernoulli and Leibniz.* Keynote to 29th European Meeting of Statisticians, Budapest, Hungary. July 21, 2013.
160. *Introduction to the Fifth Workshop on Game-Theoretic Probability and Related Topics.* Centro de Investigación en Matemáticas, Guanajuato, Mexico. November 13, 2014.
161. *Game-theoretic prediction without exogenous probabilities.* Distinguished Lecture on Complex Systems. Sandia National Laboratories. Albuquerque, New Mexico. September 1, 2015.
162. *Game-theoretic prediction without exogenous probabilities.* Department of Electrical and Computer Engineering, Temple University. September 23, 2015.
163. *Whither Kiyosi Itô's reconciliation of Lévy (betting) and Doob (measure)?* Keynote for the Cournot Center's Conference celebrating the centennial of the birth of Kiyosi Itô: KIYOSI ITÔ'S LEGACY FROM A FRANCO-JAPANESE PERSPECTIVE, French Embassy, Tokyo, November 26, 2015.
164. *Munich lectures on Game-Theoretic Probability.* Ten lectures, given at the Munich Center for Mathematical Philosophy, Ludwig Maximilian University of Munich, Germany. March 15-21, 2016.
165. *The invention of random variables: concept and name*. Workshop on History of Statistics, Department of Statistics, Ludwig Maximilian University of Munich, Germany. March 22-23, 2016.
166. *Probability Judgement*. Munich-Sydney-Tilburg Conference 9: Evidence, Inference, and Risk. Munich Center for Mathematical Philosophy, Germany. March 31, 2016.
167. *What does "frequentist" mean?* Workshop on Fusion Learning, BFF inferences and Statistical Foundations. Department of Statistics, Rutgers University - New Brunswick, New Jersey. April 11, 2016.
168. *How speculation can explain the equity premium.* Department of Accounting and Information Systems.

Rutgers Business School. October 14, 2016.

169. *How speculation can explain the equity premium.* Department of Economics, Rutgers University - Newark. November 16, 2016.
170. *Dempster-Shafer is fiducial and so are you.* Fourth Bayesian, Fiducial, and Frequentist Conference (BFF4), Department of Statistics, Harvard University. May 1, 2017.
171. *What is accomplished by successful non-stationary stochastic prediction?* ICERM, Brown University. June 19, 2017.
172. *Three principles for using probability.* School of Business, University of Kansas. October 20, 2017.
173. *Hypothesis Testing as a Game.* Second Journal of Accounting, Auditing and Finance Symposium, Indian Institute of Management Ahmedabad. January 9, 2018.
174. *Hypothesis Testing as a Game.* Department of Biostatistics, Columbia University Mailman School of Public Health. March 8, 2018.
175. *So Much Data. Have We Been Here Before?* Banquet talk for the Fifth Bayesian, Fiducial, and Frequentist (BFF5) Conference: Foundations of Data Science, Ann Arbor, Michigan. May 7, 2018.
176. *Hypothesis Testing as a Game.* Keynote, 17th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, Cádiz (Spain), June 11, 2018
177. *When Data is a Science, Who Needs Probability?* Banquet talk for the International Chinese Statistics Association's 2018 Applied Statistics Symposium, New Brunswick, New Jersey. June 15, 2018.
178. *Hypothesis Testing as a Game.* 12th International Vilnius Conference on Probability Theory and Mathematical Statistics and 2018 IMS Annual Meeting on Probability and Statistics, Vilnius, Lithuania. July 5, 2018.
179. *Pascal's and Huygens's game-theoretic foundations for probability.* Sarton Lecture, School of Architecture and Engineering, University of Ghent. December 13, 2018.
180. *Game-theoretic statistics.* Centrum Wiskunde & Informatica, Amsterdam. December 17, 2018.
181. *Reviving Pascal's and Huygens's game-theoretic foundations for probability.* Department of Philosophy, University of Utrecht. December 19, 2018.
182. *The language of betting as a strategy for scientific communication.* Rutgers Experimental Mathematics Seminar. February 14, 2019.
183. *The language of betting as a strategy for communicating statistical results.* Rutgers Department of Statistics and Biostatistics. February 27, 2019.
184. *The language of betting as a strategy for communicating statistical and scientific results.* Rutgers Foundations of Probability Seminar. March 4, 2019.
185. *Evidence and the language of betting.* Computer Science Colloquium, CUNY Graduate Center. March 7, 2019.
186. *The language of betting as a strategy for scientific communication.* LIP6, Université Pierre et Marie Curie. March 20, 2019.
187. *Pascal's and Huygens's game-theoretic foundations for probability.* Teachers College, Columbia University. March 25, 2019.
188. *Let's replace p-values with betting outcomes!* 12th MuST and 3rd PSE: Statistical Reasoning and Scientific Error, Munich. July 1, 2019.
189. *Let's replace p-values with betting outcomes!* ISIPTA 2019, Ghent. July 4, 2019.
190. *Let's replace p-values with betting outcomes!* PROGIC 2019, Frankfurt. July 9, 2019.
191. *Let's replace p-values with betting scores.* Association for Mathematics Applied to Social and Economic Sciences. Perugia, September 11, 2019.
192. *The 19th century origins of confidence intervals, significance tests, and p-hacking.* Rutgers Foundations of Probability Seminar. March 4, 2019.
193. *The history of significance testing.* College of Education, Florida State University, Tallahassee. December 6, 2019.
194. *Using game theory to reunify subjective and objective probability.* Seminar in Logic, Games and Language, CUNY Graduate Center. December 13, 2019.
195. *Let's replace p-values with betting scores.* 4th JAAF India Symposium, IIM Bangalore. January 12, 2020.
196. *Let's replace p-values with betting scores.* Finance & Risk Engineering Lecture, NYU Tandon School of Engineering. April 2, 2020. YouTube video, as recorded by NYU Tandon School of Engineering as part of the Brooklyn Quant Experience (BQE) Lecture Series.
197. *Testing by betting.* Royal Statistical Society Discussion Meeting. September 9, 2020. Paper (pre-print), slides, video.
198. *Testing by betting and the randomness of risk.* Mathematics Department, University of Kansas. October 8, 2020.
199. *Testing by betting and the randomness of risk.* Statistics Seminar, Durham University. October 19, 2020.
200. *Game-theoretic foundations for statistical testing and imprecise probabilities.* Four lectures for SIPTA school at Liverpool University, December 9 and 10, 2020.
201. *Let's replace (p-value + power) with (betting outcome + betting target).* North Carolina State Department of Statistics. February 5, 2021.
202. *Event trees, situation spaces, chain event graphs, martingale spaces.* Conference on Reasoning with Asymmetric and Context-Specific Graphs, Baylor University. July 19, 2021.
203. *Bringing betting games back to the center of probability and statistics.* Session on testing and estimation

using betting, e-values and martingales, 2021 Joint Statistical Meetings. August 9, 2021.

204. *Dempster's simplicial model and the larger Dempster-Shafer theory.* 2021 Joint Statistical Meetings. August 9, 2021.
205. *How game-theoretic probability can reform theoretical statistics.* Eurandom, Eindhoven, the Netherlands. May 31, 2022.
206. *One way testing by betting can improve data analysis: Statistical testing with optional continuation.* Department of Civil & Environmental Engineering, University of Maryland. September 13, 2023.
207. *Maurice Fréchet named Cournot's principle. What did he name?* International Conference on Maurice Fréchet: Mathematics, the abstract and the concrete. Institut Henri Poincaré, Paris. October 10 2023.
208. *Statistical testing with optional continuation.* Statistics Seminar, Department of Decision Sciences, Bocconi University. October 13, 2023.
209. *Kelly betting with imprecise probabilities.* Foundations Lab, Department of Electronics and Information Systems, Ghent University. October 16, 2023.
210. *When are probabilities predictions?* Philog (Seminar in Philosophy, Logic and Games). January 31, 2024.
211. *Modernizing Cournot's Principle.* Department of Statistics and Data Science, Carnegie Mellon University. March 25, 2024.
212. *Game-theoretic statistical modelling.* Mathematisches Forschungsinstitut Oberwolfach, May 9, 2024. (See pp. 35-39 of this report on an Oberwolfach workshop for an abstract.)
213. *How game-theoretic probability makes sense of Cournot's principle.* Institut für Statistik, Ludwig-Maximilians-Universität München. November 20, 2024.
214. *How game-theoretic probability makes sense of Cournot's principle.* Mathematisches Kolloquium, Katholische Universität Eichstätt - Ingolstadt. November 21, 2024.
215. *Mathematical probability: Why a game-theoretic approach?* Institut für Mathematik, Universität Potsdam. December 4, 2024.
216. *Richard von Mises, the forgotten Bayesian.* Keynote for the History Section, German Probability and Statistics Days, TU Dresden. March 14, 2025.
217. *Testing by betting in statistical inference.* Analytics, Information, and Operations Seminar, University of Kansas Business School. April 18, 2025.
218. Coherently using AI forecasting in statistical estimation, International Conference on Information Technology and Quantitative Management, Rouen, France, July 9, 2026.
219. Memories of Art Dempster, Joint Statistical Meetings, Boston, August 2, 2026.