

Ian A. Kash

Microsoft Research Cambridge
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- Research Interests** Market design, mechanism design, auction theory, scoring rules, sponsored search, cloud economics, online currencies, algorithmic game theory, multi-agent systems, incentive engineering for networks and systems, social computing.
- Education**
- ◇ 2004–2009 Cornell University
Ph.D. in Computer Science
Thesis Title: Robustness and Optimization of Scrip Systems
Advisors: Dr. Eric Friedman and Dr. Joseph Halpern
 - ◇ 2000–2004 Carnegie Mellon University
B.S. in Computer Science with additional majors in Mathematics and Philosophy
- Appointments**
- ◇ Researcher 2011–present
Microsoft Research Cambridge
Researcher in Networks, Economics, and Algorithms group.
 - ◇ Postdoctoral Fellow 2009–2011
Center for Research on Computation and Society, School of Engineering and Applied Sciences, Harvard University
Advisor: Dr. David Parkes
 - ◇ Instructor Summer 2006, Summer 2009
Cornell University
Taught undergraduate theory of computation course.
- Honors**
- ◇ Best Paper Award at AAMAS 2012 for “Predicting Your Own Effort.” 1 award given out of 137 accepted papers and 671 submissions.
 - ◇ Invited to special issue of ACM-TEAC on selected papers from EC 2013 for “Ranking and Tradeoffs in Sponsored Search Auctions.”
 - ◇ Invited to special issue of ACM-TEAC on selected papers from EC 2013 for “Truthful Mechanisms for Agents that Value Privacy.”
 - ◇ Invited to special issue of GEB on selected papers from EC 2010 and 2011 for “Mix and Match.”
 - ◇ Invited to special issue of IEEE-JSAC on selected papers from EC 2006 for “Efficiency and Nash Equilibria in a Scrip System for P2P Networks.”
 - ◇ Thesis nominated by department for 2009 ACM Doctoral Dissertation Award
- Teaching**
- ◇ Summer 2009, Summer 2006: Instructor for Cornell CS381, Introduction to Theory of Computing
 - ◇ Fall 2008, Fall 2006: Teaching Assistant for Cornell Econ676, Decision Theory I
 - ◇ Spring 2003: Teaching Assistant for Carnegie Mellon 15-451, Algorithm Design and Analysis

- ◇ Spring 2002: Teaching Assistant for Carnegie Mellon 15-241, Great Theoretical Ideas in Computer Science I
- ◇ Guest Lectures: Harvard CS285, Multi-agent Systems (Fall 2010), Cornell CS2800, Discrete Structures (Spring 2009)

Service

- ◇ CO-ORGANIZER 2013 Advertising Auctions Workshop at ACM EC 2013
- ◇ JOURNAL REVIEWING Comm. of the ACM, J. of the ACM, Artificial Intelligence, J. of Artificial Intelligence Research, J. of Autonomous Agents and Multi-Agent Systems, ACM Trans. on Economics and Computation, Games and Economic Behavior, Information Systems Research, ACM Trans. on Internet Technology IEEE Trans. on Mobile Computing, IEEE/ACM Trans. on Networking, Operations Research, IEEE Trans. on Parallel and Distributed Systems, IEEE J. on Selected Areas in Communications, IEEE Trans. on Systems, Man, and Cybernetics—Part C: Applications and Reviews, IEEE Trans. on Wireless Communications
- ◇ PROGRAM COMMITTEE AAAI 2010, 2012–2017; AAMAS 2012–2016, 2017 (SPC); AMMA 2011, 2015; AdAuctions 2012, 2015; EC 2011–2015, 2016–2017 (SPC); ECAI 2010; IJCAI 2011, 2013, 2015–2016 (SPC); NetEcon 2011–2016; WINE 2012–2013; WWW 2017
- ◇ OUTSIDE REVIEWER AAAI 2011; AAMAS 2011; ASPLOS 2014; COMSOC 2010; CCS 2012; DySPAN 2012; EuroSys 2013; PODC 2008; SAGT 2011, 2015; SODA 2015, 2016; SPAA 2011; STACS 2012; WINE 2007,2015; WWW 2008
- ◇ GRANT REVIEWING Israel Science Foundation, Swiss National Science Foundation

Book Chapters

- [1] Ian A. Kash, Rohan Murty, and David C. Parkes. Enabling sharing in auctions for short-term spectrum licenses. In Tansu Alpacan, Holger Boche, Michael Honig, and H. Vincent Poor, editors, *Mechanisms and Games for Dynamic Spectrum Allocation*, pages 467–496. Cambridge University Press, 2013.

Journal Articles

- [2] Ian A. Kash and Peter B. Key. Pricing the cloud. *IEEE Internet Computing*, 2016. In Press.
- [3] Ben Roberts, Dinan Gunawardena, Ian A. Kash, and Peter Key. Ranking and tradeoffs in sponsored search auctions. *ACM Transactions on Economics and Computation*, 2015. In Press.
- [4] Yiling Chen, Stephen Chong, Ian A. Kash, Tal Moran, and Salil Vadhan. Truthful mechanisms for agents that value privacy. *ACM Transactions on Economics and Computation*, 2015. In Press.
- [5] Ian A. Kash, Ariel D. Procaccia, and Nisarg Shah. No agent left behind: Dynamic fair division of multiple resources. *Journal of Artificial Intelligence Research*, 51:579–603, 2014.
- [6] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. An equilibrium analysis of scrip systems. *ACM Transactions on Economics and Computation*, 3(3):13:1–13:32, June 2015.
- [7] Yiling Chen, Xi Alice Gao, Rick Goldstein, and Ian A. Kash. Market manipulation with outside incentives. *Autonomous Agents and Multi-Agent Systems*, pages 1–36, 2014.
- [8] Yiling Chen, Ian A. Kash, Michael Ruberry, and Victor Shnayder. Eliciting predictions and recommendations for decision making. *ACM Transactions on Economics and Computation*, 2(2):6:1–6:27, June 2014.
- [9] Itai Ashlagi, Felix Fischer, Ian A. Kash, and Ariel Procaccia. Mix and match. *Games and Economic Behavior*, 91:284–296, May 2015.
- [10] Ian A. Kash, Rohan Murty, and David C. Parkes. Enabling spectrum sharing in secondary market auctions. *IEEE Transactions on Mobile Computing*, 13(3):556–568, 2014.
- [11] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. Optimizing scrip systems: crashes, altruists, hoarders, sybils and collusion. *Distributed Computing*, 25(5):335–357, 2012.
- [12] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. Multiagent learning in large anonymous games. *Journal of Artificial Intelligence Research*, 40:571–589, 2011.

**Peer-Reviewed
Conference
Publications**

- [13] Natasha Alechina, Joseph Y. Halpern, Ian A. Kash, and Brian Logan. Incentivising monitoring in open normative systems. In *29th AAAI Conference on Artificial Intelligence (AAAI)*, 2017.
- [14] Ian A. Kash and Rafael M. Frongillo. Optimal auctions with restricted allocations. In *Seventeenth ACM Conference on Economics and Computation (EC)*, 2016.
- [15] Yoram Bachrach, Sofia Ceppi, Ian A. Kash, Peter Key, and Mohammad Reza Khani. Mechanism design for mixed ads. In *Proceedings of the 25th International World Wide Web Conference (WWW)*, 2016.
- [16] Rafael Frongillo and Ian A. Kash. On elicitation complexity. In *29th Annual Conference on Neural Information Processing Systems (NIPS)*, 2015.
- [17] Paolo Costa, Hitesh Ballani, Kaveh Razavi, and Ian A. Kash. R2C2: A network stack for rack-scale computers. In *2015 ACM Conference on Special Interest Group on Data Communication (SIGCOMM)*, pages 551–564, 2015.
- [18] Rafael M. Frongillo, Yiling Chen, and Ian A. Kash. Elicitation for aggregation. In *29th AAAI Conference on Artificial Intelligence (AAAI)*, pages 900–906, 2015.
- [19] Rafael M. Frongillo and Ian A. Kash. Vector-valued property elicitation. In *28th Conference on Learning Theory (COLT)*, pages 710–727, 2015.
- [20] Yair Zick, Yoram Bachrach, Ian A. Kash, and Peter Key. Non myopic negotiators see what’s best. In *24th International Conference on Artificial Intelligence (IJCAI)*, pages 2047–2053, 2015.
- [21] Rafael M. Frongillo and Ian A. Kash. General truthfulness characterizations via convex analysis. In *10th Conference on Web and Internet Economics (WINE)*, pages 354–370, 2014.
- [22] Yoram Bachrach, Sofia Ceppi, Ian A. Kash, Peter Key, and David Kurokawa. Optimising trade-offs among stakeholders in ad auctions. In *Fifteenth ACM Conference on Economics and Computation (EC)*, pages 75–92, 2014.
- [23] Ben Roberts, Dinan Gunawardena, Ian A. Kash, and Peter Key. Ranking and tradeoffs in sponsored search auctions. In *14th ACM Conference on Electronic Commerce (EC)*, pages 751–766, 2013.
- [24] Yiling Chen, Stephen Chong, Ian A. Kash, Tal Moran, and Salil Vadhan. Truthful mechanisms for agents that value privacy. In *14th ACM Conference on Electronic Commerce (EC)*, pages 215–232, 2013.
- [25] Ian A. Kash, Ariel D. Procaccia, and Nisarg Shah. No agent left behind: Dynamic fair division of multiple resources. In *12th International Conference on Autonomous Agents And Multiagent Systems (AAMAS)*, pages 351–358, 2013.
- [26] Yoram Bachrach, Ian Kash, and Nisarg Shah. Agent failures in totally balanced games and convex games. In *Internet and Network Economics - 8th International Workshop (WINE)*, pages 15–29, 2012.
- [27] David F. Bacon, David C. Parkes, Yiling Chen, Malvika Rao, Ian Kash, and Manu Sridharan. Predicting your own effort. In *11th International Conference on Autonomous Agents and Multiagent Systems - Volume 2 (AAMAS)*, pages 695–702, 2012. BEST PAPER AWARD.
- [28] Ian A. Kash, John K. Lai, Haoqi Zhang, and Aviv Zohar. Economics of BitTorrent communities. In *21st international conference on World Wide Web (WWW)*, pages 221–230, New York, NY, USA, 2012. ACM.
- [29] Yiling Chen, Ian A. Kash, Mike Ruberry, and Victor Shnayder. Decision markets with good incentives. In *Internet and Network Economics - 7th International Workshop (WINE)*, pages 72–83, 2011.

- [30] Yiling Chen, Xi Alice Gao, Rick Goldstein, and Ian A. Kash. Market manipulation with outside incentives. In *Twenty-Fifth AAAI Conference on Artificial Intelligence (AAAI)*, pages 614–619, 2011.
- [31] Yiling Chen and Ian A. Kash. Information elicitation for decision making. In *Tenth International Conference on Autonomous Agents And Multiagent Systems (AAMAS)*, pages 175–182, 2011.
- [32] Itai Ashlagi, Felix Fischer, Ian A. Kash, and Ariel Procaccia. Mix and match. In *Eleventh ACM Conference on Electronic Commerce (EC)*, pages 305–314, 2010.
- [33] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. Multiagent learning in large anonymous games. In *Eighth International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 765–772, 2009.
- [34] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. Optimizing scrip systems: Efficiency, crashes, hoarders and altruists. In *Eighth ACM Conference on Electronic Commerce (EC)*, pages 305–315, 2007.
- [35] Eric J. Friedman, Joseph Y. Halpern, and Ian A. Kash. Efficiency and Nash equilibria in a scrip system for P2P networks. In *Seventh ACM Conference on Electronic Commerce (EC)*, pages 140–149, 2006.
- [36] Daniel K. Blandford, Guy E. Blelloch, and Ian A. Kash. Compact representations of separable graphs. In *Fourteenth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 679–688, 2003.
- [37] Ian A. Kash, Qin Jia, Zhiming Shen, Weijia Song, Robert van Renesse, and Hakim Weatherspoon. Economics of a supercloud. In *Cross Cloud Workshop*, 2016.
- [38] Rafael Frongillo, Ian A. Kash, and Stephen Becker. Open problems in property elicitation. In *COLT Open Problems Session*, 2016.
- [39] Yoad Lewenberg, Yoram Bachrach, Ian A. Kash, and Peter Key. Using convolutional neural networks to determine properties of mathematical functions from an image of their graph representation (demonstration). In *30th AAAI Conference on Artificial Intelligence (AAAI)*, 2016.
- [40] Natasha Alechina, Joseph Y. Halpern, Ian A. Kash, and Brian Logan. Decentralised norm monitoring in open multi-agent systems (extended abstract). In *15th International Conference on Autonomous Agents And Multiagent Systems (AAMAS)*, 2016.
- [41] Yoram Bachrach, Sofia Ceppi, Ian A. Kash, Peter Key, and Mohammad Reza Khani. Mechanism design for mixed ads. In *Ad Auctions Workshop*, 2015.
- [42] Sofia Ceppi and Ian A. Kash. Personalized payments for storage-as-a-service. In *10th Workshop on the Economics of Networks, Systems, and Computation (NetEcon)*, 2015.
- [43] Yoram Bachrach, Sofia Ceppi, Ian A. Kash, Peter Key, Filip Radlinski, Ely Porat, Michael Armstrong, and Vijay Sharma. Building a personalized tourist attraction recommender system using crowdsourcing (demonstration). In *13th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 1631–1632, 2014.
- [44] Vineet Abhishek, Ian A. Kash, and Peter Key. Fixed and market pricing for cloud services. In *7th Workshop on the Economics of Networks, Systems, and Computation (NetEcon)*, pages 157–162, 2012.
- [45] Ian A. Kash, John K. Lai, Haoqi Zhang, and Aviv Zohar. The economy of a BitTorrent community. In *6th Workshop on the Economics of Networks, Systems, and Computation (NetEcon)*, 2011.
- [46] Ian A. Kash, Rohan Murty, and David C. Parkes. Enabling spectrum sharing in secondary market auctions. In *6th Workshop on the Economics of Networks, Systems, and Computation (NetEcon)*, 2011.

**Workshops,
Short Papers,
Demos, and
Other Lightly
Reviewed
Publications**

- [47] Ian A. Kash, Michael Mitzenmacher, Justin Thaler, and John Ullman. On the zero-error capacity threshold for deletion channels. In *Information Theory and Applications Workshop (ITA)*, pages 1–5, 2011.
- [48] Ian A. Kash and David C. Parkes. Impersonation strategies in auctions. In *Sixth Workshop on Internet and Network Economics (WINE)*, pages 492–495, 2010. Short Paper.
- [49] David F. Bacon, Eric Bokelberg, Yiling Chen, Ian A. Kash, David C. Parkes, Malvika Rao, and Manu Sridharan. Software economies. In *Workshop on the Future of Software Engineering Research (FoSER)*, pages 7–12, 2010.
- [50] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. Manipulating scrip systems: Sybils and collusion. In *First Conference on Auctions, Market Mechanisms and Their Applications (AMMA)*, 2009.
- [51] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. Brief announcement: The lotus-eater attack. In *27th Annual ACM Symposium on Principles of Distributed Computing (PODC)*, page 455, 2008.
- [52] Daniel K. Blandford, Guy E. Blelloch, and Ian A. Kash. An experimental analysis of a compact graph representation. In *Sixth Workshop on Algorithm Engineering and Experiments (ALENEX)*, pages 49–61, 2004.
- [53] Sina Dehghani, Ian A. Kash, and Peter Key. Online stochastic scheduling and pricing the cloud. Working Paper, 2016.
- [54] Felix Fischer, Ian A. Kash, Peter Key, and Junxing Wang. Approximately efficient cost sharing via double auctions. Working Paper, 2016.
- [55] Sofia Ceppi, Rafael Frongillo, and Ian A. Kash. Truthful mechanisms without money: what you do not need to worry about. Working Paper, 2016.
- [56] Yoram Bachrach, Sofia Ceppi, Ian A. Kash, Peter Key, Filip Radlinski, and Paolo Serafino. Analysis of auction mechanisms for shared services. Working Paper, 2015.
- [57] Natasha Alechina, Joseph Y. Halpern, Ian A. Kash, and Brian Logan. Decentralised norm monitoring in open multi-agent systems. Working Paper, 2015.
- [58] Yoad Lewenberg, Yoram Bachrach, Ian A. Kash, and Peter Key. Using convolutional neural networks to determine properties of mathematical functions from an image of their graph representation. Working Paper, 2015.
- [59] Douglas Fearing, Ian A. Kash, and Prateek Srivastava. Managing air traffic disruptions through strategic prioritization. Working Paper, 2015.
- [60] Sofia Ceppi and Ian A. Kash. Personalized payments for storage-as-a-service. Working Paper, 2014.
- [61] Allen Lavoie, Yoram Bachrach, Ian A. Kash, and Peter Key. Influence, utility, and diversity in social recommender systems. Working Paper, 2014.
- [62] Joel Oren, Yoram Bachrach, Ian A. Kash, and Peter Key. An empirical study of human strategic behavior and learning in all-pay auctions and crowdsourcing contests. Working Paper, 2013.
- [63] Vineet Abhishek, Ian A. Kash, and Peter Key. Fixed and market pricing for cloud services. Working Paper, 2012.
- [64] Ian A. Kash and David C. Parkes. Impersonation strategies in auctions. 2011. Working paper.
- [65] Ian A. Kash and Yee Jiun Song. One-step k-set agreement. Working Paper, 2009.
- [66] Ian A. Kash, Eric J. Friedman, and Joseph Y. Halpern. The lotus-eater attack. arXiv:0806.1711.

**Unpublished
Work**

**Postdoc
Mentoring**

- ◇ Sofia Ceppi

2013-2015

First Position: Postdoc at University of Edinburgh

**Intern (Co-)
Mentoring**

- ◇ Warut Suksompong
Summer 2016
Project: Cloud Pricing
- ◇ Joanna Drummond
Summer 2016
Project: Pricing Cloud Reservations
- ◇ Shreyas Sekar
Spring 2016
Project: Effective Bandwidth for Cloud Pricing
- ◇ Junxing Wang
Summer 2015
Project: Cloud Pricing and Double Auctions
- ◇ Sina Dehghani
Summer 2015
Project: Online Cloud Pricing
- ◇ Paolo Serafino
Summer 2015
Project: Location Auctions
- ◇ Mohammad Reza Khani
Autumn 2014
Project: Mechanism Design for Mixed Ads (WWW16 [15])
- ◇ Bowei Chen
Summer 2014
Project: Information Revelation in GSP Auctions
- ◇ Allen Lavoie
Summer 2014
Project: Social Recommender Systems
- ◇ Yair Zick
Summer 2013
Project: Iterated Fair Division (IJCAI15 [20])
- ◇ David Kurokawa
Summer 2013
Project: Optimizing Tradeoffs in Ad Auctions (EC14 [22])
- ◇ Joel Oren
Winter 2013
Project: Behavior in All-Pay Auctions
- ◇ Rafael Frongillo
Autumn 2012
Project: General Truthfulness Characterizations Via Convex Analysis (WINE14 [21])

- ◇ Nisarg Shah
Summer 2012
Project: Agent Failures in Totally Balanced Games and Convex Games (WINE12 [26])
- ◇ Ben Roberts
Winter 2012
Project: Ranking and Tradeoffs in Sponsored Search Auctions (EC13 [23])
- ◇ Vineet Abhishek
Autumn 2011
Project: Fixed and Market Pricing for Cloud Services (NetEcon12 [44])

Invited Talks

- ◇ “Optimal Auctions with Restricted Allocations.” INFORMS Annual Meeting 2016 Invited Cluster on Auctions. November 14, 2016
- ◇ “Cloud Pricing.” University of Zurich Department of Informatics Computation and Economics Research Group Seminar. June 06, 2016
- ◇ “Ranking and Optimal Tradeoffs in Ad Auctions.” University of Toronto CS Department AI, Theory, Economics Seminar. November 04, 2015
- ◇ “Mechanism Design for Mixed Ads.” INFORMS Annual Meeting 2015 Invited Cluster on Auctions. November 03, 2015
- ◇ “General Truthfulness Characterizations Via Convex Analysis.” INFORMS Annual Meeting 2015 Invited Cluster on Auctions. November 03, 2015
- ◇ “Elicitation for Aggregation.” Cambridge University Statistical Laboratory Optimization and Incentives Seminar. November 11, 2014.
- ◇ “Proper Scores for Property Elicitation.” Microsoft Research Workshop on Games, Learning and Markets 2014 June 20, 2014
- ◇ “General Truthfulness Characterizations Via Convex Analysis.” Workshop on Propriety and Elicibility at Heidelberg Institute for Theoretical Studies June 18, 2014
- ◇ “General Truthfulness Characterizations Via Convex Analysis.” 2nd Southampton Winter Workshop in Economic Theory. January 21, 2014.
- ◇ “Ranking and Tradeoffs in Sponsored Search Auctions.” INFORMS Annual Meeting 2013 Invited Cluster on Auctions. October 7, 2013.
- ◇ “General Truthfulness Characterizations Via Convex Analysis.” Microsoft Research Workshop on Games, Networks and Markets 2012 June 07, 2013
- ◇ “General Truthfulness Characterizations Via Convex Analysis.” University of Southampton Agents, Interaction, and Complexity Seminar. May 21, 2013.
- ◇ “Dynamic Fair Division of Multiple Resources.” COST Action IC1205 on Computational Social Choice: Oxford Meeting. April 15, 2013.
- ◇ “General Truthfulness Characterizations Via Convex Analysis.” Cambridge University Statistical Laboratory Optimization and Incentives Seminar. November 26, 2012.
- ◇ “Managing Air Traffic Disruptions Through Strategic Prioritization.” INFORMS Annual Meeting 2012 Invited Cluster on Auctions. October 15, 2012.
- ◇ “Fixed and Market Pricing for Cloud Services.” INFORMS Annual Meeting 2012 Invited Cluster on Auctions. October 15, 2012.
- ◇ “Managing Air Traffic Disruptions Through Strategic Prioritization.” Microsoft Research Workshop on Games, Networks and Markets 2012 June 28, 2012
- ◇ “Motivating Richer Models of Sponsored Search.” Invited talk at Ad Auctions Workshop 2012 at EC 2012. June 8, 2012.

- ◇ “Economics of BitTorrent Communities.” Cambridge University Computing Laboratory Systems Research Group Seminar. May 24, 2012
- ◇ “Managing Air Traffic Disruptions Through Strategic Prioritization.” Cambridge University Statistical Laboratory Optimization and Incentives Seminar. May 21, 2012
- ◇ “Economics of BitTorrent Communities.” Duke University CS. November 17, 2011
- ◇ “Enabling Spectrum Sharing in Secondary Market Auctions.” INFORMS Annual Meeting 2011 Invited Cluster on Auctions. November 13, 2011.
- ◇ “Algorithmic Market Design: Spectrum Sales and BitTorrent Communities.” Microsoft Research Cambridge. April 26, 2011.
- ◇ “Algorithmic Market Design: Spectrum Sales and Hiding Hospitals.” Columbia Business School Decision, Risk, and Operations Division. February 17, 2011.
- ◇ “Algorithmic Market Design: Spectrum Sales and Hiding Hospitals.” Boston University CS Colloquium. December 1, 2010.
- ◇ “Enabling Spectrum Sharing in Secondary Market Auctions.” Boston College. Seminar co-sponsored by CS and economics departments. October 25, 2010.
- ◇ “Impersonation Strategies in Auctions.” Rensselaer Polytechnic Institute CS Theory Seminar. October 6, 2010.
- ◇ “Impersonation Strategies in Auctions.” Brown University CS Theory Seminar. September 27, 2010.
- ◇ “Enabling Spectrum Sharing in Secondary Market Auctions.” Harvard Business School Market Design Workshop. May 14, 2010.
- ◇ “Algorithmic Market Design: Currency Crashes, Spectrum Sales, and Lying Hospitals.” University of Rochester CS Colloquium. April 5, 2010.
- ◇ “Robustness and Optimization of Scrip Systems.” China Theory Week. September 23, 2009.
- ◇ “Optimizing Scrip Systems: Efficiency, Crashes, Altruists, and Learning.” Carnegie Mellon University. March 18, 2009.
- ◇ “Optimizing Scrip Systems: Efficiency, Crashes, Altruists, and Learning.” Northwestern University. March 4, 2009.
- ◇ “Optimizing Scrip Systems: Efficiency, Crashes, Hoarders, and Altruists.” Harvard University EconCS Seminar. November 20, 2007.