

## Contact Info.

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## Research Interests

**Mechanism and Market Design, Revenue and Pricing, Online Markets Optimization, Game Theory, Algorithms, Microeconomics, Probability**

## Education

Sep. 2010 – Jun. 2015 (prospective) **Stanford University, Stanford, California**  
**Computer Science Ph.D. Candidate**  
Dissertation: Simple and Robust Mechanism Design  
Advisor: Prof. Tim Roughgarden

2007 – 2009 **Weizmann Institute of Science, Rehovot, Israel**  
**Computer Science M.Sc.**  
*Summa cum laude*  
Dissertation: A Direct Reduction from  $k$ -Player to 2-Player Approximate Nash Equilibrium  
Advisor: Prof. Uriel Feige

2002 – 2006 **Tel-Aviv University, Tel-Aviv, Israel**  
**Computer Science B.Sc.**  
*Summa cum laude*

2002 – 2006 **Tel-Aviv University, Tel-Aviv Israel**  
**Law LL.B.**  
*Magna cum laude*

## Honors

Ph.D. **Stanford Interdisciplinary Graduate Fellowship (SIGF)**  
**Hsieh Family Fellow**  
A competitive university-wide program that awards three-year fellowships to outstanding doctoral students engaged in interdisciplinary research.  
<http://vpge.stanford.edu/SIGF/index.html>

**Academy of Achievement Student Delegate**  
Exceptional scholars from around the world are given the opportunity to interact with preeminent achievers.  
<http://www.achievement.org/>

**China Theory Week Invitee**  
Top computer science theory students from institutions worldwide meet and present their research.  
<http://conference.iis.tsinghua.edu.cn/CTW2013/>

Masters **The Google Anita Borg Memorial Scholarship (EMEA)**  
Awarded based on academic strength, passion for increasing the involvement of women in technology, and demonstrated leadership.  
<http://www.google.com/anitaborg>

Undergraduate

Tel-Aviv University Faculty of Exact Sciences **Dean's List Award**, 3-time recipient

Tel-Aviv University Faculty of Law **Dean's List Award**

Tel-Aviv University School of Computer Science **Academic Excellence Scholarship**

## Employment

Summer 2013

**Microsoft Research, Herzliya, Israel**  
**Research Intern**

Theoretical research on information acquisition in auctions, and on alternative notions of equilibrium in competitive markets where no Walrasian equilibrium exists.

Resulted in the paper "Welfare and Revenue Guarantees for Competitive Bundling Equilibrium".

Summer 2011

**Yahoo! Labs, Santa Clara, California**  
**Research Intern**

Theoretical research and big data analysis in the area of online ad auctions:

- Developed a model for incorporating seller information into an ad exchange and studied the guarantees of standard auction formats in this model.
- Studied the effect of multiple ad impressions on user conversion rate.

Resulted in the paper "Ad Auctions with Data".

2010

**Algorithms Group, Weizmann Institute of Science, Rehovot, Israel**  
**Algorithms Researcher**

Studied flow networks, and how they can be represented sparsely, via linear programming techniques.

Resulted in the paper "Vertex Sparsifiers: New Results from Old Techniques".

2006 – 2007

**Supreme Court of Israel, Jerusalem, Israel**  
**Legal Clerk to Honorable Justice Esther Hayut**

Law and economics research and implementation to statutory interpretation.

1998 – 2002

**Elite Technological Unit, Israel Defense Forces**  
**Programming Team Leader, First Lieutenant**

Managed the design and implementation of software systems for data processing in a database environment.

## Dissertation Papers

Paul Duetting, Tim Roughgarden and Inbal Talgam-Cohen. **Modularity and Greed in Double Auctions**. Submitted to Games and Economic Behavior.

A preliminary version appeared in Conference on Economics and Computation (EC), 2014.

Designing double auctions is a complex problem, especially when there are restrictions on the sets of buyers and sellers that may trade with one another. The goal of this paper is to develop "black-box reductions" from double auction design to the exhaustively-studied problem of designing single-sided mechanisms. We consider several desirable properties of a double auction: feasibility, dominant-strategy incentive compatibility, the still stronger incentive constraints offered by a deferred-acceptance implementation, exact and approximate welfare maximization, and budget-balance. For each of these properties, we identify sufficient conditions on the two single-sided mechanisms – one for the buyers, one for the sellers – and on the method of composition, that guarantee the desired property of the double auction. Our framework also offers new insights into classic double auction designs, such as the VCG and McAfee auctions with unit-demand buyers and unit-supply sellers.

Tim Roughgarden and Inbal Talgam-Cohen. **Optimal and Robust Mechanism Design with Interdependent Values**. Invited to Transactions on Economics and Computation (TEAC).

A preliminary version appeared in Conference on Economics and Computation (EC), 2013.

We study interdependent value settings [Milgrom and Weber, 1982], and extend several fundamental results from the well-studied independent private values model to these settings. For revenue-optimal mechanism design, we give conditions under which Myerson's virtual value-based mechanism remains optimal with interdependent values. One of these conditions is robustness of the truthfulness and individual rationality guarantees, in the sense that they are required to hold ex post. We then consider an even more robust class of mechanisms called "prior independent" (a.k.a. "detail free"), and show that by simply using one of the bidders to set a reserve price, it is possible to extract near-optimal revenue in an interdependent values setting. This shows that a considerable level of robustness is achievable for interdependent values in single-parameter environments.

Tim Roughgarden, Inbal Talgam-Cohen and Qiqi Yan. **Supply-Limiting Mechanisms**. In preparation for submission to Operations Research.

A preliminary version appeared in Conference on Economics and Computation (EC), 2012.

Most results in revenue-maximizing auction design hinge on "getting the price right" – offering goods to bidders at a price low enough to encourage a sale, but high enough to garner non-trivial revenue. Getting the price right can be hard work, especially when the seller has little or no a priori information about bidders' valuations. A simple alternative approach is to "let the market do the work", and have prices emerge from competition for scarce goods. The simplest-imaginable implementation of this idea is the following: first, if necessary, impose an artificial limit on the number of goods that can be sold; second, run the welfare-maximizing VCG mechanism subject to this limit. We prove that such "supply-limiting mechanisms" achieve near-optimal expected revenue in a range of single- and multi-parameter Bayesian settings. Indeed, despite their simplicity, we prove that they essentially match the state-of-the-art in prior-independent mechanism design.

## Other Papers

Shahar Dobzinski, Michal Feldman, Inbal Talgam-Cohen and Omri Weinstein. **Welfare and Revenue Guarantees for Competitive Bundling Equilibrium**. Working paper, 2014. <http://arxiv.org/abs/1406.0576>

Matthias Englert, Anupam Gupta, Robert Krauthgamer, Harald Raecke, Inbal Talgam-Cohen and Kunal Talwar. **Vertex Sparsifiers: New Results from Old Techniques**. SIAM Journal on Computing 43(3), 2014.

A preliminary version appeared in International Workshop on Approximation Algorithms for Combinatorial Optimization (APPROX), 2010.

Mukund Sundararajan and Inbal Talgam-Cohen. **Prediction and Welfare in Ad Auctions**. In International Symposium on Algorithmic Game Theory (SAGT), 2014.

A preliminary version appeared in Ad Auctions Workshop (AAW), 2013.

Hu Fu, Patrick Jordan, Mohammad Mahdian, Uri Nadav, Inbal Talgam-Cohen and Sergei Vassilvitskii. **Ad Auctions with Data**. In International Symposium on Algorithmic Game Theory (SAGT), 2012.

Preliminary versions appeared in Workshop on Pricing and Incentives in Networks and Systems (W-PIN+NetEcon), 2012 and Ad Auctions Workshop (AAW), 2012.

Uriel Feige and Inbal Talgam-Cohen. **A Direct Reduction from  $k$ -Player to 2-Player Approximate Nash Equilibrium**. In International Symposium on Algorithmic Game Theory (SAGT), 2010.

## Invited Talks

### **Robust Market Design**

Joint Microeconomics and Computer Science Workshop, Cornell University, NY, Nov. 2014 (planned).

Social and Information Sciences Laboratory Seminar Series, Caltech, CA, Nov. 2014.

INFORMS Annual Meeting, Cluster on Matching and Market Design in honor of Al Roth, CA, Nov. 2014.

### **Modularity and Greed in Double Auctions.**

Poster presentation at 25<sup>th</sup> Jerusalem School in Economic Theory: Matching and Market Design, Israel, Jun. 2014.

Conference on Economics and Computation (EC), CA, Jun. 2014.

Microeconomic Theory Lunch, Stanford University, CA, Apr. 2014.

### **Welfare and Revenue Guarantees for Competitive Bundling Equilibrium.**

Game Theory and Computation Seminar, Microsoft Research New England, MA, Mar. 2014.

Computer Science Theory Lunch, Stanford University, CA, Mar. 2014.

### **Optimal and Robust Mechanisms for Interdependent Values.**

EconCS Seminar, University of California, Berkeley, CA, Dec. 2013.

Theory Seminar, Northwestern University, IL, Oct. 2013.

EconCS Seminar, Harvard University, MA, Oct. 2013.

China Theory Week, Aarhus University, Denmark, Aug. 2013.

Conference on Economics and Computation (EC), PA, Jun. 2013.

### **Supply-Limiting Mechanisms.**

Microeconomic Theory Lunch, Stanford University, CA, Apr. 2013.

Computer Science Theory Lunch, Stanford University, CA, Feb. 2012.

### **Prediction and Welfare in Ad Auctions.**

International Symposium on Algorithmic Game Theory (SAGT), Greece, Oct. 2014.

EconCS Seminar, University of California, Berkeley, CA, Mar. 2013.

Computer Science Theory Lunch, Stanford University, CA, Feb. 2013.

### **Adding Data to an Ad Exchange.**

Yahoo! Labs, CA, Sep. 2011.

### **A Direct Reduction from $k$ -Player to 2-Player Approximate Nash Equilibrium.**

International Symposium on Algorithmic Game Theory (SAGT), Greece, Oct. 2010.

Algorithms Seminar, University of Warwick, UK, Feb. 2010.

### **Hardness in Games.**

Computer Science Graduate Seminar, Ben-Gurion University, Israel, Dec. 2009.

## Teaching

2012-13

### **Optimization and Algorithmic Paradigms, Teaching Assistant**

Graduate-level course taught by Prof. Serge Plotkin at Stanford University.

2011-12

### **Advanced Algorithms, Teaching Assistant**

Graduate-level course taught by Prof. Serge Plotkin at Stanford University.

2008-09

### **Algorithmic Game Theory, Teaching Assistant**

Graduate-level course taught by Prof. Uriel Feige, Dr. Robert Krauthgamer and Prof. Moni Naor at Weizmann Institute of Science.

### **Volunteer Math Tutor**

Masters

Volunteer of Push nonprofit organization, Rehovot, Israel.

Undergraduate

Volunteer at Bialik-Rogozin high school, Tel-Aviv, Israel.

2001	<p><b>Teacher</b> 6-month programming boot camp, Israel Defense Forces.</p>
<p><b>Service &amp; Leadership</b> Ph.D.</p>	<p><b>ACM XRDS Magazine</b> <b>Editor-in-Chief</b> XRDS <a href="http://xrds.acm.org/">http://xrds.acm.org/</a> is ACM's flagship publication for students in computing, a sister-publication to Communications of the ACM.</p> <p><b>Journal and Conference Reviewer</b> Games and Economic Behavior (GEB) Journal Transactions on Economics and Computation (TEAC) Journal Innovations in Theoretical Computer Science (ITCS) 2015 Symposium on Discrete Algorithms (SODA) 2013, 2014, 2015 Autonomous Agents and Multi-Agent Systems (AAMAS) 2014 International Symposium on Algorithmic Game Theory (SAGT) 2013, 2014 Conference on Internet Economics (WINE) 2013</p>
Undergraduate	<p><b>CGAL Open Source Library Programmer</b> Computational geometry algorithms with arbitrary-precision computation. C++ development in the generic programming paradigm. <a href="http://www.cgal.org/">http://www.cgal.org/</a></p>
Law School	<p><b>Tel-Aviv Law Review Editor</b></p> <p><b>Pro-bono Volunteer</b> Legal Clinic for Environmental Justice Halev Bamishpat nonprofit for overcoming poverty in Israel</p>
<p><b>Patent Applications</b></p>	<p><b>Method of Second Price Auction with Monopoly Reserve Price and Apparatus Conducting the Same.</b> United States Patent Application 13/629,968 filed September 28, 2012. Inventors: Sergei Vassilvitskii, Patrick Jordan, Uri Nadav, Mohammad Mahdian, Inbal Talgam-Cohen and Hu Fu.</p>
<p><b>References</b></p>	<p><b>Tim Roughgarden</b>, Professor of Computer Science and (by courtesy) Management Science and Engineering, Stanford University</p> <p><b>Paul Milgrom</b>, Professor of Economics and (by courtesy) Business, Stanford University</p> <p><b>Michal Feldman</b>, Professor of Computer Science, Tel-Aviv University, previously Professor of Business and Rationality, Hebrew University of Jerusalem</p>