



WELCOME!

Math Alumni, Friends of SoM

Where I grew up

- Born and brought up in Visakhapatnam, India



Who I am

- *Prasad Tetali*
- *1987-1991:* Ph.D. '91, NYU
- *1994-present:* School of Math, Georgia Tech
- *2000-present:* Joint with the College of Computing
- *Affiliated with the Ph.D. program in ACO - algorithms, combinatorics and optimization (joint between CS, Math and ISYE).*

Research Interests

- *Discrete Math and Theory of Computing:* combinatorics, probability, computational number theory, and algorithms
- *Focus:* Probabilistic Methods, Markov chain theory and applications

ACO program

- *Interdisciplinary Ph.D. program spanning three colleges on campus*
- *Separate core courses, qualifying exams*
- *Flexibility to choose a thesis advisor from across disciplines*
- *In operation since 1992 or so*
- *About 40 graduates went on to Industry + Academia*

ACO Alumni

- Richa Agarwal, Transportation and logistics research group, Amazon.com
- [Nayantara Bhatnagar](#), University of California, Berkeley
- [Sam Burer](#), University of Iowa
- [Gruia Calinescu](#), Illinois Institute of Technology
- Dasong Cao, Delta Technology
- Deeparnab Chakrabarty, University of Waterloo
- Nikhil Devanur, Microsoft Research
- [Ismael de Farias, Jr.](#), Texas Tech University
- [Cristina Fernandes](#), University of São Paulo
- Tom Fowler, Palm Beach Atlantic University
- [Ricardo Fukasawa](#), University of Waterloo
- [Gagan Goel](#), Georgia Institute of Technology
- Parikshit Gopalan, University of Texas, Austin
- Balaji Gopalakrishnan, SAS

ACO alumni (contd.)

- Sam Greenberg, US Govt, Applied Research Mathematician
- Jill Hardin, Virginia Commonwealth University
- [Christopher Carl Heckman](#), Arizona State University
- Rajneesh Hegde, Microsoft
- [Petr Hlinený](#), Masaryk University in Brno, Czech Republic
- Brady Hunsaker, University of Pittsburgh
- Torsten Inkmann, [INFORM](#)
- Kamal Jain, Microsoft Research
- Diego Klabjan, University of Illinois at Urbana-Champaign
- Dmitry Kreslavskiy, Bloomberg LP
- [Adam Marcus](#), Gibbs Assistant Professor, Yale University
- Evangelos Markakis, Cornell/CWI
- Aranyak Mehta, Toronto
- Serguei Norine, D. E. Shaw and Company

ACO alumni (contd.)

- Ashok Kumar Ponnuswami
- Jean-Philippe Richard, Purdue University
- Amin Saberi, Stanford
- [Rishi Saket](#), Carnegie-Mellon University
- [Daniel P. Sanders](#), Renaissance Technologies Corporation
- [Dylan Shepardson](#), Mount Holyoke College
- Zixia Song, University of Central Florida
- Jan Thomson, University of Utah (part-time)
- Nisheeth Vishnoi, IBM (India)
- Paul Wollan, University of Waterloo
- [Stephen Young](#), University of San Diego

Other ACO Facts

- ``*Father*'' of ACO: **Richard Duke** (retired)
- *Current Director:* **Robin Thomas** (SoM)
- *Affiliated faculty:* around 10 from each unit
- *Award winning faculty, Editors-in-Chief of journals, Endowed Chair Professors (in ISYE and CoC)*

ARC center thinktank

- **Algorithms Randomness and Complexity center**
- *housed in the School of CS, CoC*
- *a research center providing algorithmic solutions to problems from Computing, Engineering, and the Sciences*
- *Director: S. Vempala; affiliate members from CS, SoM, and ISYE*

Mentoring

- *Past:* 6 or so undergraduates, 4 graduates, and 1 postdoc (NSF VIGRE)
- *Current:* Antonio Blanca and Harrison Brown (undergrads), Ricardo Restrepo (grad), Kevin Costello (NSF postdoc)

Counseling Awareness

- [http://www.counseling.gatech.edu/
plugins/content/index.php?id=30](http://www.counseling.gatech.edu/plugins/content/index.php?id=30)

Professional Service

- Editor-in-Chief, *SIAM J. on Discrete Math*, 2009 - current
- ``*Mathematical Aspects of Mixing Times of Markov Chains*,'' co-authored with R. Montenegro (NOW Publishers, 2006).



Current Research

- *Scaling limits for combinatorial quantities in random graphs:* joint work with M. Bayati (Stanford) and D. Gamarnik (MIT)
- *Approximations for Spectral and Isoperimetric Profiles of Graphs:* joint with D. Steurer (Princeton) and P. Raghavendra (Microsoft Research)
- *Markov decision processes and ICU sedation dose control:* joint with B. Gholami and W. Haddad (AE, GaTech) **** At Tech, applied problems knock on your door! ****

Recent Research

- Rigorous optimal *analysis of J.M. Pollard's algorithms (from 1979) to solve the Discrete Logarithm problem in cyclic groups*
- *Computationally hard problem to solve*
- *Applications in cryptography: digital signatures, secure communication*

Pollard's Rho and Kangaroo

- *Two algorithms based on a heuristic appeal to the Birthday Paradox.*
- *Analyzed rigorously and optimally resulting in :*
 - ``*A birthday paradox for Markov chains, with an optimal bound for collision in Pollard's Rho algorithm for Discrete Logarithm,*” JH. Kim, R. Montenegro, Y. Peres, and P.T., *Ann. Appl. Probab.* (2010)
 - ``***How long does it take to catch a wild kangaroo,***” R. Montenegro and P.T., *Proc. STOC* (2009)

Catching a wild kangaroo

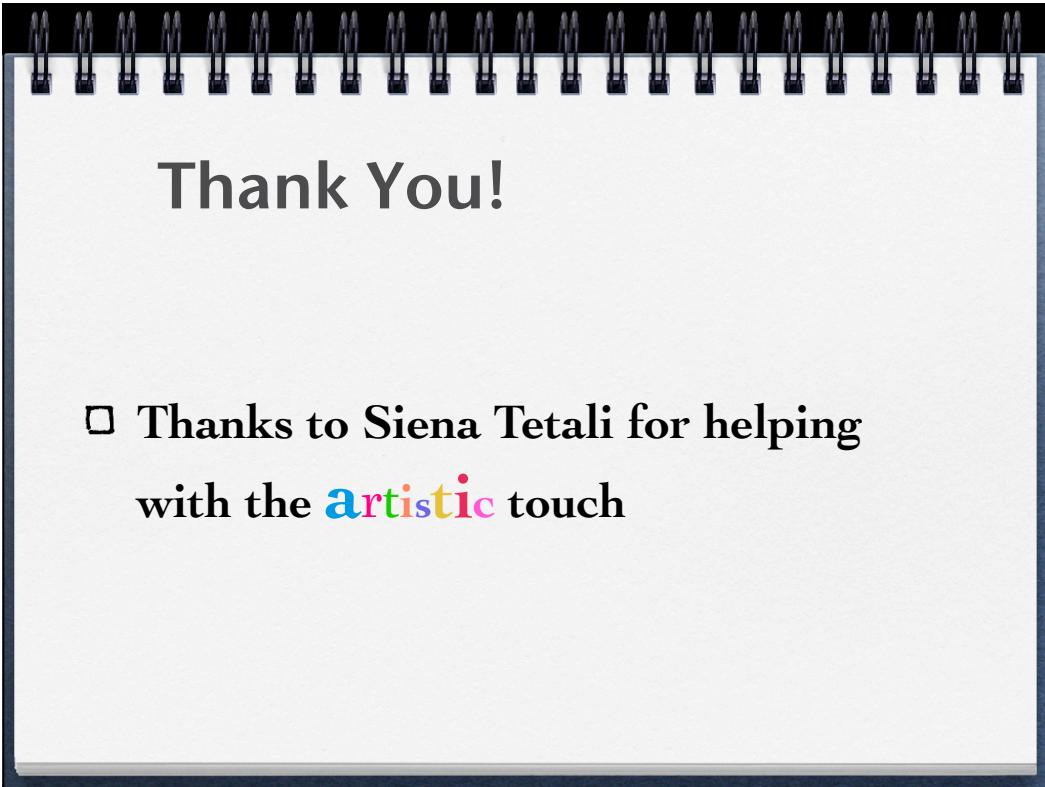




THANK YOU!

Discrete Log Problem

- G : finite cyclic group of size p (prime), with generator g . (So $G = \{g, g^2, g^3, \dots, g^p\}$)
- Given $g, h = g^x$ and p
- Find x in polynomial in $(\log p)$ time!



Thank You!

- Thanks to Siena Tetali for helping
with the **artistictic** touch