

VICKY CHUQIAO YANG

Omidyar Fellow and Peters Hurst Scholar, Santa Fe Institute

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Education

- Ph.D. Applied Mathematics** 2018
Northwestern University, Evanston, IL
Advised by: Daniel M. Abrams
Dissertation: Mathematical Models of Social Systems
with Applications to Urban Scaling Laws and Political Party Polarization
- M.S. Applied Mathematics** 2014
Northwestern University
- B.S. Mathematical Sciences; B.S. Physics** 2013
Worcester Polytechnic Institute (WPI), Worcester, MA
With high distinction

Academic Positions

- Santa Fe Institute** (SFI), Santa Fe, NM 2018–present
Omidyar Fellow and Peters Hurst Scholar
- Northwestern University**, Evanston, IL 2014–2018
Teaching and Research Assistant
- Argonne National Laboratory**, Lemont, IL 2012
Lee Teng Intern in Accelerator Physics
- Worcester Polytechnic Institute**, Worcester, MA 2010–2012
Research Assistant, Social Psychology Inquiry Lab

Industry Positions

- Airbnb Inc.**, San Francisco, CA 2017
Data Scientist Intern

Peer-reviewed Publications in Journals

- E.H. Mora*, C. Heine*, J.J. Jackson*, G.B. West, **V.C. Yang**, C.P. Kempes “Scaling of urban income inequality in the USA.” *Journal of the Royal Society Interface* (2021, forthcoming)
Preprint: arxiv.org/abs/2102.13150
- **V.C. Yang**, T. van der Does, H. Olsson, “Falling through the cracks: a dynamical model for the formation of social category boundaries,” *PLoS ONE* 16(3): e0247562 (2021)
- **V.C. Yang**, D.M. Abrams, G. Kernell, A.E. Motter, “Why are US parties so polarize? A ‘satisficing’ dynamical model,” *SIAM Review*, 62(3), 64665 (2020).
- L.M.A. Bettencourt, **V.C. Yang**, J. Lobo, C. Kempes, D. Rybski, M. Hamilton, “The interpretation of urban scaling analysis in time,” *Journal of the Royal Society Interface*, 17, 163 (2020).
- **V.C. Yang**, A.V. Papachristos, D.M. Abrams, “The origin of urban-productivity scaling laws,” *Physical Review E*, 100, 032306 (2019).

- L. Lee*, S. Zhang*, **V.C. Yang**, “Do two parties represent the US? Clustering analysis of US public ideology survey,” *SIAM Undergraduate Research Online*, vol. 12 (2019). DOI: 10.1137/17S016518.
- B.S. Tilley, **V.C. Yang**, J.C. Baiense, and S. Evans, “Frequency-dependent thermal resistance of vertical U-tube geothermal heat exchangers”, *Journal of Engineering Mathematics*, 102 131-150 (2017).
- E.M. Moon, **C. Yang**, and V.V. Yakovlev, “Microwave-induced temperature fields in cylindrical samples of graphite powder—experimental and modeling studies,” *International Journal of Heat and Mass Transfer*, vol. 87, No 8, pp. 359–368 (2015).
- **C. Yang** and V.V. Yakovlev, “An efficient empirical model for microwave-induced average temperature of liquid cylindrical reactants,” *Journal of Microwave Power and Electromagnetic Energy*, 47 (3), pp. 177-185 (2013).

Media Coverage of Research

- SIAM News article “Social learners impact outcome of group decision-making” 2021
reports on my research of collective decision making [article link]
- BigThink article “Math explains polarization, and it’s not just about politics” 2021
reports on my research of social categories.[article link]
- Forbes article “This is the reason American politics are so polarized” 2020
reported at length about my work on political party polarization [article link]
- Wall Street Journal article “Social media is so good at polarizing us” 2020
discussed my work on political party polarization [article link]
- Complexity podcast [audio link] 2020
- KTRC Talk Radio, The Richard Eeds Show. [audio link] 2020
- Santa Fe New Mexican article “Santa Fe Institute leads study on political polarization” 2020
- KSFR Santa Fe Public Radio. [audio link] 2020
- WCGO Radio Chicago, The Hard Question. [audio link] 2020

Manuscripts under Review

- **V.C. Yang**, M. Galesic, H. McGuinness*, A. Harutyunyan “When do Social Learners Affect Collective Performance Negatively? The Predictions of a Dynamical-System Model.” Preprint: arxiv.org/abs/2104.00770

Peer-reviewed Publications in Conference Proceedings

- E.M. Moon, **C. Yang**, M. Patel, H. He, and V.V. Yakovlev, Microwave-induced temperature fields in graphite powder heated in a waveguide reactor. In: *Microwave Symposium, IEEE Microwave Theory and Techniques Society International*, pp. 1-4, (2014).
- A.O. Holmes, **C. Yang**, M. Patel, K. Savaram, H. He, V.V. Yakovlev, and A.A. Zozulya, “Microwave-enabled production of solution-processable graphene: principles and techniques of macroscopic modeling,” In: *14th International AMPERE Conference on Microwave and High Frequency Heating*, Nottingham, UK (2013).
- A.O. Holmes, **C. Yang**, and V.V. Yakovlev, “Temperature modeling for process control in microwave-assisted chemistry,” In: *IEEE Microwave Theory and Techniques Society Microwave Symposium Digest*, Seattle, WA (2013).

*Undergraduate mentee

- **C. Yang** and V.V. Yakovlev, “Computation of microwave-induced temperature in liquid cylindrical reactants,” In: *47th International Microwave Power Institute Microwave Power Symposium*, pp. 105-107, Providence, RI, (2013).
- **C. Yang** and V.V. Yakovlev, “A simple model of microwave-induced heat transfer in cylindrical reactants with strong convection,” In: *International Conference on Heating by Electromagnetic Sources*, Padua, Italy, (2013).

Other Reports and Articles

- L. Hebert-Dufresne, **V.C. Yang**, Misinformation about an outbreak like Covid-19 is important public health data, *STAT News* (2020). [link]
- **V.C. Yang**, Visualizing the US Congress, interactive visualization in d3 (2016), online at http://www.vcyang.com/vis_congress/.
- **C. Yang**, Thermal Modeling of Wire-coil Insert, project report submitted to Argonne National Laboratory (2012).
- **C. Yang**, J. L. Skorinko, Does having a foreign accent affect men and women differently? Effect of foreign accent and gender on employment decisions and negotiations, project report submitted to Worcester Polytechnic Institute (2012).

Grants and Fellowships

- Omidyar Fellowship, Santa Fe Institute 2018
- Terminal Year Fellowship, Northwestern University 2017
- Walter Murphy Fellowship, Northwestern University 2013
- WPI Presidential Scholarship 2009

Awards and Honors

- Grand Prize in Interactive Data Visualization, Northwestern University Computational Research Day 2018
- The Red Sock Award for Best Poster Presentation, SIAM Conference on Applications of Dynamical Systems 2017
- SIAM Student Chapter Certificate of Recognition 2017
- Integrated Data Science Traineeship, Northwestern University 2016
- Provost’s Major Qualifying Project Award, WPI 2013

Invited Presentations

- “Scaling of income inequality in the United States,” talk and panel discussion at the SFI Applied Complexity Network, virtual June 2021
- “Using mathematics to understand the American political landscape,” talk at the SFI Applied Complexity Network, virtual Sept 2020
- “Dynamical system modeling for the formation of social categories,” talk at University of Chicago, Dept. of Sociology, Chicago, IL Nov 2019
- “Dynamical system models applied to social phenomena,” lecture at the SFI Complex Systems Summer School, Santa Fe, NM June 2019
- “Collective decision making,” presentation and panel discussion at SFI Applied Complexity meeting on search and decisions at Google Ventures, Mountain View, CA April 2019

- “The search for simplicity in complex cities,” Transforming cities mini-course, Carnegie Mellon University and University of Pittsburg, Pittsburg, PA March 2019
- “A ‘satisficing’ dynamical model for political elections,” talk at the American Marketing Association Meeting, Austin, TX Feb 2019
- Guest lecture at the Northwestern University Undergraduate Math Society Nov 2016

Selected Contributed Presentations

- Virtual presentation at SIAM Conference on the Application Dynamical Systems May 2021
- Virtual presentation at the International Conference on Computational Social Science July 2020
- Virtual presentation at ACM Collective Intelligence Conference [Video] June 2020
- Talk at Dynamics Days US, Hartford CT Jan 2020
- Talk at Data Science Research Day, Northwestern University June 2018
- Poster at SIAM Conference on Applications of Dynamical Systems, Snowbird UT (The Red Sock Award for Best Poster Presentation) May 2017
- Talk at Chicago Area SIAM Student Conference, Evanston IL April 2017
- Talk at Seven Minutes of Science Symposium (science outreach), Evanston IL (Video: <https://youtu.be/Xs5ewFzNSYI>) April 2017
- Poster at International Conference on Computational Social Science, Evanston IL June 2016
- Poster at Dynamics Days US, Durham NC Jan 2016
- Talk at IEEE Microwave Theory and Technique International Symposium, Tampa FL June 2014
- Talk at International Microwave Power Institute Symposium, Providence RI. (First Place, Student Paper Competition) June 2013
- Talk at IEEE Student Conference, Cambridge MA (Second Place, IEEE Student Paper Competition) April 2013
- Poster at New England Psychological Association Annual Conference, Worcester MA Oct 2012

Undergraduate Student Mentoring

- Kate Tanha (Minerva Schools at KGI) 2020
Computational text analysis for immigration narratives in minority newspapers
- Bronwynn Woodsworth (St Olaf College) 2020
Computational text analysis of metaphor use on Mexican immigrants in US newspapers
- Harvey McGuinness (Johns Hopkins University/Santa Fe Highschool) 2019–2021
Modeling opinion dynamics in a population of mixed decision-making types
- Elisa Heinrich Mora (Minerva Schools at KGI) 2019–2021
Computational modeling of income inequality in urban areas
- Jacob Jackson (Brown University) 2019–2020
Studying the effect of global connectivity on socio-economic outputs of cities
- Andria Tattersfield (Claremont McKenna College) 2019
Detecting urban community structures using Yelp data
- Louisa Lee and Siyu Zhang (Northwestern University) 2016
Machine learning analysis of US political ideology surveys
Publication “Do the two parties represent the US? Clustering political ideology of the US public,” in *SIAM Undergraduate Research Online*

Teaching

- Lead instructor, Undergraduate Complexity Researcher program, Santa Fe Institute 2021
Design and conduct a weekly course for undergraduate research students, including inviting and organizing guest instructors. The goal of the course is for students to gain tacit knowledge for doing research. Also contribute to the design of the undergraduate research program as a whole.
- Lecturer, Complex Systems Summer School, Santa Fe Institute 2019
Design and conduct lecture for interdisciplinary student body, including graduate students, post-docs, faculty, and industry representatives from a wide range of disciplines.
- Guest Lecturer, Transforming Cities Mini-course, 2019
Carnegie Mellon University and University of Pittsburgh
Design and conduct lecture for interdisciplinary course for graduate and undergraduate students from broad range of majors.
- Teaching Certificate Program, Northwestern University 2016–2017
Complete semester-long program for learning good teaching practices
- Invited lecturer, Northwestern University Undergraduate Math Society 2016
Invited by undergraduate student club. Design and conduct lecture. Students are undergraduate math majors or prospective math majors.
- Teaching Assistant, Dept. of Mathematics, Northwestern University 2014–2015, 2017
Design and lead recitation sessions for undergraduate math courses, including calculus and linear algebra. Courses taught include calculus and linear algebra.
- Argentine Tango Instructor, NuTango, Northwestern University 2016
Design and lead weekly dance classes, with focus of relaxing gender norms.
- Teaching Assistant, Dept. of Mathematics, WPI 2011–2013
Design and lead recitation sessions for undergraduate math courses, including calculus and differential equations.

Leadership

- Co-organizer of Minisymposium, SIAM Conference on Dynamical Systems 2021
- Founder and organizer, Around Science Discussion Group, SFI 2020
Organize discussion groups focused on big questions facing academic life. Topics include how to promote work-life balance in academia, and scientists' role in society.
- Organizer, Inaugural NICO Research Jam 2018
Organize event for seeding new interdisciplinary research collaborations at Northwestern Institute for Complex Systems
- Chair of Organizing Committee, Chicago Area SIAM Student Conference 2017
Lead team from 3 universities to organize and raise funds for conference of around 100 participants. Goal is to of bridge the lack of communication among students using similar math techniques in different fields.
- Chapter President, Society for Industrial and Applied Mathematics 2016–2017
- Executive Board, Graduate Leadership and Advocacy Council, Northwestern University 2016–2017
- Co-founder and President, NuTango Northwestern 2015–2017
Found student group for inclusive community through Argentine Tango dance, focus on relaxing gender norms in partner dance.
- Chapter President, Pi Mu Epsilon US Honorary National Math Society 2012–2013

Science Outreach

- Activity leader, Julia Robinson Mathematics Festival, Santa Fe, NM 2020
- Volunteer, InterPlanetary Festival, Santa Fe, NM 2019
- Volunteer, Brave Initiatives, Chicago IL 2018
- Judge, Northwestern University High School Project Showcase, Evanston IL 2017–2018
- Speaker, Seven Minutes of Science Symposium, Evanston IL 2017
- Volunteer, Grand Prix Challenges, Evanston 5th Ward Middle School, Evanston IL 2016

Referee and Judge Service

- Judge for the Red Sock Award for Best Poster Presentation, SIAM Conference on Dynamical Systems 2021
- Referee for grant proposal, NSF Human Networks and Data Science 2021
- Referee for journal *Crime Science* 2021
- Referee for journal *Chaos: An Interdisciplinary Journal of Nonlinear Science* 2016, 2017, 2020
- Referee for journal *PLOS ONE* 2020