

# Vicky Chuqiao Yang

Omidyar Fellow and Peters Hurst Scholar, Santa Fe Institute, Santa Fe, NM 87501  
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## EDUCATION

- 2018      **Ph.D. Applied Mathematics**  
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  
Additional training: Integrated Data Science Traineeship
- 2014      **M.S. Applied Mathematics**  
Northwestern University
- 2013      **B.S. Mathematical Sciences; B.S. Physics** (with high distinction)  
Worcester Polytechnic Institute (WPI), Worcester, MA

## ACADEMIC APPOINTMENTS

- 2018–  
present      **Santa Fe Institute** (SFI), Santa Fe, NM  
Omidyar Fellow and Peters Hurst Scholar (independent research position)

## INDUSTRY APPOINTMENTS

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

## PUBLICATIONS

### Peer-reviewed Journal Articles

- 2021      **V.C. Yang**, M. Galesic, H. McGuinness\*, A. Harutyunyan “Dynamical-system model predicts when social learners impair collective performance,” *Proceedings of the National Academy of Sciences* 118(35). [[Video summary](#)]
- 2021      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* 18:20210223.
- 2021      **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.
- 2020      **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), 646–65.
- 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.

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\* Undergraduate mentee

- 2019 **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. DOI: 10.1137/17S016518.
- 2017 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.
- 2015 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.
- 2013 **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.

#### Other Reports and Articles

- 2021 **V.C. Yang**, “Collective intelligence as infrastructure for reducing broad existential risks,” *Effective Altruism Forum*. [[link](#)]
- 2020 L. Hebert-Dufresne, **V.C. Yang**, “Misinformation about an outbreak like COVID-19 is important public health data,” *STAT News*. [[link](#)]
- 2016 **V.C. Yang**, “Visualizing the US Congress,” interactive data visualization in d3, online at [www.vcyang.com/vis\\_congress/](http://www.vcyang.com/vis_congress/).

#### GRANTS

- 2021–2025 **National Science Foundation: Rule of Life: Emergent Networks**  
 “Towards a unified theory of regulatory functions and networks across biological and social systems.” \$2,199,383. H. Youn (PI, Northwestern Kellogg), **V.C. Yang** (co-PI), C.P. Kempes, S. Redner, G.B. West (co-PIs, SFI)
- 2021–2024 **National Science Foundation: Decision, Risk, and Management Sciences**  
 “Understanding the effect of individual decision-making strategies on collective decision outcomes.” \$476,231. **V.C. Yang** (PI), J.L. Skorinko (co-PI, WPI), A. Harutyunyan (co-PI, Sunwater Institute).

#### SELECTED MEDIA COVERAGE OF RESEARCH

- 2021 **PNAS News Feature** article “Modeling the power of polarization” [[link](#)]
- 2021 **SIAM News** article, “Social learners impact outcome of group decision-making” [[link](#)]
- 2021 **BigThink** article, “Math explains polarization, and it’s not just about politics” [[link](#)]
- 2020 **Forbes** article, “This is the reason American politics are so polarized” [[link](#)]
- 2020 **Wall Street Journal** article, “Social media is so good at polarizing us” [[link](#)]

- 2020            **Complexity Podcast** [[audio link](#)]
- 2020            **KTRC Talk Radio**, The Richard Eeds Show

**INVITED PRESENTATIONS**

- Nov 2021       Guest speaker, Mathematics of Democracy course, Harvey Mudd College
- Oct 2021       Seminar speaker, Center for the Study of Complex Systems, University of Michigan
- Sept 2021       Colloquium speaker, Dept. of Computer Science, University of New Mexico
- June 2021       “Scaling of income inequality in the United States,” talk and panel discussion, SFI Applied Complexity Network to corporate representatives
- Sept 2020       “Using mathematics to understand the American political landscape,” talk at SFI Applied Complexity Network to corporate representatives
- Nov 2019       “Dynamical-system modeling of the formation of social categories,” seminar at University of Chicago, Dept. of Sociology, Chicago, IL
- June 2019       “Dynamical system models applied to social phenomena,” guest lecture at SFI Complex Systems Summer School, Santa Fe, NM
- April 2019       “Collective decision-making,” presentation and panel discussion at SFI Applied Complexity meeting on search and decisions at Google Ventures, Mountain View, CA
- March 2019      “The search for simplicity in complex cities,” Transforming Cities mini-course, Carnegie Mellon University and University of Pittsburgh, Pittsburgh, PA
- Feb 2019       “A ‘satisficing’ dynamical model for political elections,” talk at the American Marketing Association Meeting, Austin, TX
- Nov 2016       Guest lecture at the Northwestern University Undergraduate Math Society

**SELECTED CONTRIBUTED PRESENTATIONS**

- July 2021       Virtual presentation at International Conference on Computational Social Science
- May 2021       Virtual presentation at SIAM Conference on the Application Dynamical Systems
- June 2020       Virtual presentation at ACM Collective Intelligence Conference [[Video](#)]
- Jan 2020       Talk at Dynamics Days US, Hartford CT
- June 2018       Talk at Data Science Research Day, Northwestern University
- May 2017       Poster at SIAM Conference on Applications of Dynamical Systems, Snowbird UT (The Red Sock Award for Best Poster Presentation)
- April 2017       Talk at Chicago Area SIAM Student Conference, Evanston IL
- April 2017       Talk at Seven Minutes of Science Symposium (science outreach), Evanston IL
- June 2016       Poster at International Conference on Computational Social Science, Evanston IL

- Jan 2016      Poster at Dynamics Days US, Durham NC
- June 2013    Talk at International Microwave Power Institute Symposium, Providence RI  
(First Place, Student Paper Competition)
- April 2013    Talk at IEEE Student Conference, Cambridge MA  
(Second Place, IEEE Student Paper Competition)
- Oct 2012      Poster at New England Psychological Association Annual Conference, Worcester MA

**AWARDS, HONORS, AND FELLOWSHIPS**

- 2018            Omidyar Fellowship, Santa Fe Institute
- 2018            Grand Prize in Interactive Data Visualization,  
Northwestern University Computational Research Day
- 2017            The Red Sock Award for Best Poster Presentation,  
SIAM Conference on Applications of Dynamical Systems
- 2017            SIAM Student Chapter Certificate of Recognition
- 2017            Terminal Year Fellowship, Northwestern University
- 2013            Provost’s Major Qualifying Project Award, WPI
- 2009            WPI Presidential Scholarship

**TEACHING EXPERIENCE**

- 2021–  
present        Instructor, “Practical introduction to data science,” online open course,  
Complexity Explorer, SFI
- 2021            Lead instructor, Undergraduate Complexity Researcher Program, SFI
- 2019            Lecturer, Complex Systems Summer School, SFI
- 2019            Guest Lecturer, Transforming Cities Mini-course, Carnegie Mellon University and  
University of Pittsburgh
- 2016–2017    Teaching Certificate Program (teaching training), Northwestern University
- 2016            Invited guest lecturer, Northwestern University Undergraduate Math Society
- 2014–2015,  
2017            Teaching Assistant, Dept. of Mathematics, Northwestern University  
Courses taught: Linear Algebra, Multivariable Calculus, Vector Calculus,  
Integral Calculus of One Variable
- 2016            Argentine Tango Dance Instructor, Argentine Tango Club, Northwestern University
- 2011–2013    Teaching Assistant, Dept. of Mathematics, WPI  
Courses taught: Differential Equations, Multivariable Calculus, Calculus of One  
Variable

## **UNDERGRADUATE STUDENT MENTORING**

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

## **LEADERSHIP**

- 2021 Co-organizer of minisymposium “Modeling Collective Behavior in Human Social Systems,” SIAM Conference on Dynamical Systems
- 2020–2021 Founder and organizer, “Around Science” Discussion Group, SFI
- 2018 Organizer, Inaugural NICO Research Jam
- 2017 Chair of Organizing Committee, Chicago Area SIAM Student Conference
- 2016–2017 Chapter President, Society for Industrial and Applied Mathematics
- 2016–2017 Executive Board, Graduate Leadership and Advocacy Council, Northwestern University
- 2015–2017 Co-founder and President, Argentine Tango Club, Northwestern University
- 2012–2013 Chapter President, Pi Mu Epsilon US Honorary National Math Society

## **SCIENCE OUTREACH**

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

## **REFeree AND JUDGE SERVICE**

- 2021 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 journals  
Nature Human Behaviour  
Science Advances  
Crime Science  
Chaos: An Interdisciplinary Journal of Nonlinear Science
- 2020 Referee for journals  
PLOS ONE  
Chaos: An Interdisciplinary Journal of Nonlinear Science
- 2017 Referee for journal Chaos: An Interdisciplinary Journal of Nonlinear Science
- 2016 Referee for journal Chaos: An Interdisciplinary Journal of Nonlinear Science