

Vicky Chuqiao Yang

Assistant Professor, System Dynamics
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EDUCATION

- 2018 **Ph.D. Engineering Sciences and 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
- 2014 **M.S. Engineering Sciences and Applied Mathematics**
Northwestern University
- 2013 **B.S. Mathematical Sciences; B.S. Physics** (with high distinction)
Worcester Polytechnic Institute (WPI), Worcester, MA

ACADEMIC APPOINTMENTS

- 2022–
present **MIT Sloan School of Management**, Cambridge, MA
Assistant Professor, System Dynamics
- 2018–2022 **Santa Fe Institute** (SFI), Santa Fe, NM
Omidyar Fellow and Peters Hurst Scholar

PUBLICATIONS

Peer-reviewed Publications

- 2023 **V.C. Yang**, A. Sandberg “Collective Intelligence as Infrastructure for Reducing Broad
Global Catastrophic Risks,” *Proceedings of the Stanford Existential Risks Conference
2023*, 194-206.
- 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.

* Undergraduate mentee

- 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.
- 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, 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**, 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**, 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.

Preprints and Other Non-peer-reviewed Articles

- 2023 J. Yoon, C. Kempes, **V.C. Yang**, G. West, H. Youn, “What makes Individual I's a Collective We; Coordination mechanisms & costs,” [arXiv:2306.02113](https://arxiv.org/abs/2306.02113)
- 2022 **V.C. Yang**, C.P. Kempes, H. Youn, S. Redner, G.B. West, “Scaling and the Universality of Function Diversity Across Human Organizations,” [arXiv:2208.06487](https://arxiv.org/abs/2208.06487)
- 2022 M. Lu, T. Marghetis, **V.C. Yang**, “Mathematical model bridges disparate timescales of lifelong learning,” [arXiv: 2206.03954](https://arxiv.org/abs/2206.03954).
- 2020 Lobo et. al., Urban science: Integrated theory from the first cities to sustainable metropolises. Report submitted to the NSF on the Present State and Future of Urban Science. [SSRN: 3526940](https://ssrn.com/abstract=3526940).
- 2020 L. Hebert-Dufresne, **V.C. Yang**, “Misinformation about an outbreak like COVID-19 is important public health data,” [STAT News](https://www.statnews.com/2020/05/27/covid-19-misinformation/).
- 2016 **V.C. Yang**, “Visualizing the US Congress,” interactive data visualization in d3, online at 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).

MAJOR MEDIA COVERAGE

- 2022 **Nautilus** article “What makes group decisions go wrong. And right” [[link](#)]
- 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

SELECTED INVITED PRESENTATIONS

- Nov 2023 Northwestern Institute on Complex Systems, Northwestern University, Evanston IL. Seminar Speaker
- Oct 2023 Workshop on Complexity Theory, Social Ontology, and Social Change, MIT, Cambridge MA. Keynote Speaker.
- Feb 2023 Department of Mathematical Sciences, Worcester Polytechnic Institute, Worcester MA. Colloquium Speaker.
- Dec 2022 Workshop: Innovation, Obsolescence, and the Space of the Possible, Complexity Science Hub Vienna, Vienna, Austria (virtual)
- Oct 2022 INFORMS Annual Meeting, Indianapolis, IN. Conference presentation.
- Oct 2022 Technological Innovation, Entrepreneurship & Strategic Management group, MIT Sloan School of Management, Cambridge MA. Seminar Speaker.
- March 2022 Political Decision-Making Research Cluster, Southern Methodist University (virtual). Seminar Speaker.
- Nov 2021 Mathematics of Democracy course, Harvey Mudd College (virtual). Guest Speaker.
- Oct 2021 Center for the Study of Complex Systems, University of Michigan (virtual). Seminar Speaker.
- Sept 2021 Dept. of Computer Science, University of New Mexico (virtual). Colloquium speaker.

- May 2021 SIAM Conference on the Application Dynamical Systems. Virtual presentation.
- 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

OTHER CONFERENCE PRESENTATIONS

- July 2021 Virtual presentation at International Conference on Computational Social Science
- 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 AND HONORS

- 2022 Sigma Xi, The Scientific Research Honor Society

- 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

- 2023 Instructor, Introduction to System Dynamics; System Dynamics for Business and Policy, MIT Sloan School of Management, Massachusetts Institute of Technology
- 2023 Instructor, Research Seminar in System Dynamics: Differential Equation and Agent-Based Modeling Methods, MIT Sloan School of Management, Massachusetts Institute of Technology
- 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
- 2014–2015, 2017 Teaching Assistant, Dept. of Mathematics, Northwestern University
Courses taught: Linear Algebra, Multivariable Calculus, Vector Calculus, Integral Calculus of One Variable
- 2011–2013 Teaching Assistant, Dept. of Mathematics, WPI
Courses taught: Differential Equations, Multivariable Calculus, Calculus of One Variable

LEADERSHIP

- 2023 Program Committee, “Collective Intelligence: Foundations and Radical Ideas,” Santa Fe Institute symposium and short course
- 2023 Co-organizer, “From Cells to Societies: Regulatory Mechanisms at Work,” working group at the Santa Fe Institute
- 2021 Co-organizer of minisymposium “Modeling Collective Behavior in Human Social Systems,” SIAM Conference on Dynamical Systems
- 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

For Journals

Nature Human Behaviour, Science Advances, Crime Science, Humanities and Social Sciences Communications, Chaos: An Interdisciplinary Journal of Nonlinear Science, PLOS ONE.

For Funding Agencies

NSF: Rule of Life: Emergent Networks
NSF: Human Networks and Data Science
NSF: Methodology, Measurement, and Statistics

For Conferences

SIAM Conference on Dynamical Systems, Red Sock Award for Best Poster Presentation