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–   **MIT Sloan School of Management,** Cambridge, MA
present   Richard S. Leghorn (1939) Career Development Assistant Professor
     in Management of Technological Innovation
     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.

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[*] Undergraduate mentee

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.
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*
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*
2022	M. Lu, T. Marghetis, **V.C. Yang**, "Mathematical model bridges disparate timescales of lifelong learning," *arXiv: 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*.
2020	L. Hebert-Dufresne, **V.C. Yang**, "Misinformation about an outbreak like COVID-19 is important public health data," *STAT News*.
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

Jan 2024   Joint Mathematics Meetings, San Francisco, CA. Invited Speaker.

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 prestentation.

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, 15.871/873 Introduction to System Dynamics; System Dynamics for Business and Policy, MIT Sloan School of Management, Massachusetts Institute of Technology
2023	Instructor, 15.879 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