Vicky Chuqiao Yang

Assistant Professor, System Dynamics
MIT Sloan School of Management, Massachusetts Institute of Technology
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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
Richard S. Leghorn (1939) Career Development Assistant Professor in Management of Technological Innovation
Assistant Professor, System Dynamics

2023–present Affiliated faculty, MIT Institute for Data, Systems, and Society

2018–2022 **Santa Fe Institute** (SFI), Santa Fe, NM
Omidyar Fellow and Peters Hurst Scholar

PUBLICATIONS

Peer-reviewed Journal Articles

2024 **V.C. Yang**, J.J. Jackson*, C.P. Kempes, "Inter-city firm connections and the scaling of urban economic indicators," *PNAS Nexus*, 3:11.

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]

* Undergraduate mentee

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.

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.

Book Chapters

2024 **V. C. Yang**, "Mathematical model explaining variations in urban scaling exponents," in L.S. D'Acci (Eds.), *Urban Scaling: Allometry in Urban Studies and Spatial Science*. Routledge.

2024 E.H. Mora, **V.C. Yang**, C.P. Kempes, "Scaling of urban income inequality in the USA," in L.S. D'Acci (Eds.), *Urban Scaling: Allometry in Urban Studies and Spatial Science*. Routledge.

Working Papers, Preprints and Other Non-peer-reviewed Articles

2024 **V.C. Yang**, L. Grenier, "How social influence shapes collective intelligence in binary choices: Reconciling disparate findings with a mathematical model," *SSRN: 5040323*

2024 **V.C. Yang**, L. Grenier, "What leads to administrative bloat? Modeling the dynamics of administrative cost and waste," *SSRN: 4840789*

2024 **V.C. Yang**, C.P. Kempes, S. Redner, G.B. West, H. Youn, "Regulatory functions from cells to society," *arXiv: 2409.02884*

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

Oct 2024 Graduate School of Business, Stanford University

April 2024	Department of Mathematics, University of Massachusetts Amherst
Jan 2024	Special Session on Complex Social Systems, Joint Mathematics Meetings, San Francisco, CA
Nov 2023	Northwestern Institute on Complex Systems, Northwestern University, Evanston IL
Oct 2023	Workshop on Complexity Theory, Social Ontology, and Social Change, MIT, Cambridge MA
Feb 2023	Department of Mathematical Sciences, Worcester Polytechnic Institute, Worcester MA
Dec 2022	Workshop: Innovation, Obsolescence, and the Space of the Possible, Complexity Science Hub Vienna, Vienna, Austria
Oct 2022	INFORMS Annual Meeting, Indianapolis, IN
Oct 2022	Technological Innovation, Entrepreneurship & Strategic Management group, MIT Sloan School of Management, Cambridge MA
March 2022	Political Decision-Making Research Cluster, Southern Methodist University
Nov 2021	Mathematics of Democracy course, Harvey Mudd College
Oct 2021	Center for the Study of Complex Systems, University of Michigan
Sept 2021	Dept. of Computer Science, University of New Mexico
May 2021	SIAM Conference on the Application Dynamical Systems
Nov 2019	University of Chicago, Dept. of Sociology, Chicago, IL
June 2019	SFI Complex Systems Summer School, Santa Fe, NM
April 2019	Santa Fe Institute Applied Complexity meeting on search and decisions, Google Ventures, Mountain View, CA
March 2019	Transforming Cities mini-course, Carnegie Mellon University and University of Pittsburgh, Pittsburgh, PA
Feb 2019	American Marketing Association Meeting, Austin, TX
Nov 2016	Northwestern University Undergraduate Math Society

SELECTED OTHER CONFERENCE PRESENTATIONS

Aug 2024	Academy of Management Annual Meeting, Chicago, IL
Aug 2024	The International System Dynamics Conference, Bergen Norway
July 2024	International Conference for Computational Social Science, Philadelphia, PA

June 2024 ACM Collective Intelligence Conference, Boston MA

July 2021 International Conference on Computational Social Science

June 2020 ACM Collective Intelligence Conference [Video]

Jan 2020 Dynamics Days US, Hartford CT

May 2017 SIAM Conference on Applications of Dynamical Systems, Snowbird UT
(The Red Sock Award for Best Poster Presentation)

April 2017 Talk at Seven Minutes of Science Symposium (science outreach), Evanston IL

June 2013 International Microwave Power Institute Symposium, Providence RI
(First Place, Student Paper Competition)

April 2013 IEEE Student Conference, Cambridge MA
(Second Place, IEEE Student Paper Competition)

Oct 2012 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

2024 Instructor, 15.879 Research Seminar in System Dynamics: A guided tour of complex social systems, MIT Sloan School of Management

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

2023 Instructor, 15.879 Research Seminar in System Dynamics: Differential Equation and Agent-Based Modeling Methods, MIT Sloan School of Management

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 & SERVICE

2024 Program Committee, Collective Intelligence Conference, Boston MA

2024 Organizer, "Possibilities for Developing an Ontology of Collective Intelligence" workshop, Collective Intelligence Conference, Boston MA

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

Proceedings of the National Academy of Sciences, 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
The International System Dynamics Conference