Vicky Chuqiao Yang

Assistant Professor, System Dynamics
MIT Sloan School of Management
vcyang@mit.edu | www.vcyang.com

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
     Additional training: Integrated Data Science Traineeship

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 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.

---

[*] 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, 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 Articles

2022   M. Lu, T. Marghetis, **V.C. Yang**, Mathematical model bridges disparate timescales of lifelong learning. *arXiv*: 2206.03954**.**

2022   **V.C. Yang,** A Sandberg, Collective Intelligence as Infrastructure for Reducing Broad Global Catastrophic Risks. *arXiv*: 2205.03300.

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).

SELECTED MEDIA COVERAGE OF RESEARCH

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

INVITED PRESENTATIONS

March 2022	Seminar Speaker, Political Decision-Making Research Cluster, Southern Methodist University
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	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	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

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

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

For Conferences

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