

# Philip S. Chodrow

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Human Mobility and Networks Lab

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I am an applied mathematician developing methods and models for studying complex human systems. I use probability, information theory, network science, and dynamical systems theory to learn about inequality, segregation, and modernity. I am also passionate about teaching, and putting powerful tools in the hands of those who aim to change the world for the better. I make regular contributions to the Boston nonprofit community, and organize a by-students-for-students course in statistical computing at MIT.

## Education

2015-	<b>Ph.D. Candidate</b> in Operations Research, MIT. Coursework GPA: 5.0. Expected graduation May, 2020.
2008-12	<b>B.A. with High Honors</b> in Pure Mathematics and Philosophy, Swarthmore College. Coursework GPA: 3.95.

## Recognitions and Honors

2017-20	<b>NSF Graduate Research Fellowship</b> supporting research in modeling difference, disparity, and group dynamics in cities.
2018	<b>Goodwin Award Nominee</b> by MIT Operations Research Center for “conspicuously effective teaching.”
2012	<b>Fulbright Scholarship</b> supporting a year of research in Oslo, Norway. <b>Ivy Award</b> “recognizing the man of the graduating class who is outstanding in leadership, scholarship, and contributions to the college community.” <b>Brinkmann Award</b> recognizing “the best student paper on a mathematical subject.” <b>Phi Beta Kappa</b> inducted member.
2010	<b>Eugene Lang Summer Initiative Grant</b> , supporting a summer of undergraduate research.

## Papers

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| 2018 | Chodrow, P. S. and Mucha, P. J. (2018). Markovian approximations for binary-state coevolving opinion networks. <i>Working Paper</i>  |
|      | Strano, E., Chodrow, P. S., and González, M. C. (2018). Multiscale growth of human settlements. <i>Working Paper</i>   |
| 2017 | Chodrow, P. S. (2017b). Structure and information in spatial segregation. <i>Proceedings of the National Academy of Sciences</i> , 114(44):1–6                               |
|      | Chodrow, P. S. (2017a). Divergence, Entropy, Information: An Opinionated Introduction to Information Theory. <i>arXiv: 1708.07459</i> , pages 1–18                           |
|      | Morse, S. and Chodrow, P. S. (2017). Parameter Estimation for Persistent Communication Cascades. <i>Working paper</i> , pages 1–14. Appeared in Morse’s SM thesis, May 2017. |
| 2016 | Chodrow, P. S., Awwad, Z., Jiang, S., and González, M. C. (2016a). Demand and Congestion in Multiplex Transportation Networks. <i>PLoS ONE</i> , 11(9):1–10                  |
|      | Chodrow, P. S., Mannherz, W., and Michaelson, J. (2016b). How We Grow. <i>Working Paper</i>  |

## Selected Talks

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| 2018 | Equilibrium Community Structure in Binary-State Adaptive Voter Models. SIAM Workshop on Network Science, Portland, Oregon, USA.          |
|      | Community Formation in an Adaptive Voter Model. Conference on Complex Networks, Northeastern University, Boston, USA.                    |
|      | What’s the Fuss about Power Laws? ORC Student Seminar, MIT, Cambridge, USA.  |
| 2017 | The Structure of Spatial Segregation. Growth Lab Seminar, Harvard Kennedy School, Cambridge, USA.  |
|      | Information-Geometric Methods for Coarse-Graining Annotated Spatial Networks, Network Science Conference, Indianapolis, USA.             |
| 2016 | An Information Theoretic Lens on Urban Diversity. Conference on Complex Systems, Amsterdam, The Netherlands.                             |
|      | Demand and Congestion in Multiplex Transportation Networks. Conference on Complex Systems, Amsterdam, The Netherlands.                   |
| 2013 | Relativism, Cooperation, and the Practice of Inquiry. Conference on the Metaphysics of Culture, Helsinki, Finland.                       |
|      | The Right Way to Care About the Truth. Filosofisk Supplement, the student philosophical society at the University of Oslo, Oslo, Norway. |

## Teaching

2018	<b>Head Teaching Assistant:</b> MIT Course 6.268, “Network Science and Models.”
2017-18	<b>Instructor:</b> “Advanced Topics in Data Science,” 3-hour workshop session at MIT. <b>Organizer:</b> “Computing in Optimization and Statistics”, student-taught January term course at MIT.
2017	<b>Teaching Assistant:</b> MIT Course 6.431, “Introduction to Probability.” <b>Recitation Leader:</b> MIT Course 1.204, “Computer Modeling: From Individual Mobility to Networks”
2016	<b>Group Co-Leader:</b> Workshop in Predictive Policing, ICERM, Providence, RI. <b>Instructor:</b> “Data Wrangling in R” at MIT’s January course “Software Tools in Statistics and Optimization.”
2012	<b>Teaching Assistant</b> for an advanced undergraduate course in the philosophy of action with Professor Bjørn Ramberg at Universitet i Oslo.
2010-12	<b>Mathematics Academic Support</b> at Swarthmore College, Swarthmore PA.
2009-12	<b>Writing Mentor</b> at Swarthmore College, Swarthmore PA. Paper areas including philosophy, mathematics, English, sociology, and anthropology. Worked in-depth over a full year with two students writing senior theses.
2012	<b>Teaching Assistant</b> for intermediate-level course on the philosophy of Plato with Professor Grace Ledbetter at Swarthmore College, Swarthmore PA.

## Academic Service

2017-	<b>Program Committee Member.</b> Conference on Complex Systems.
2016	<b>Reviewer.</b> <i>PLoS ONE</i> , <i>International Journal of Geographic Information Systems</i> .

## Research &amp; Professional Experience

2013-15	<b>Analyst</b> , Health Leads, Boston MA
2012-14	<b>Research Assistant</b> , Laboratory for Quantitative Medicine
2012-13	<b>Visiting Researcher</b> , Center for the Study of Mind in Nature, Oslo, Norway
2011-12	<b>Senior Honors Thesis</b> in philosophy, entitled <i>Perception and Moral Goodness</i> , Swarthmore College.
2010	<b>REU Fellow</b> in matrix analysis, College of William and Mary, Williamsburg VA.
2009	<b>Research Assistant</b> in theoretical plasma physics, James Madison University, Harrisonburg VA.

## Community Service

2017 -	<b>Junior Instructor</b> , Harvard Aikikai, Cambridge MA
2017 -	<b>Board Member</b> , Aikido Tekkojuku of Boston, Somerville MA
2015 -	<b>Analytics Consultant</b> , Health Leads, Boston MA
2014	<b>Analytics Consultant</b> , Tech Networks of Boston Pro Bono Consulting
2010-12	<b>Cofounder and Director</b> , NinjaGram Charities, Swarthmore College, Swarthmore MA
2011-12	<b>Assistant Children's Instructor</b> , Aikido Kokikai of Swarthmore, Swarthmore PA
2008-12	<b>Cofounder and Director</b> , Swarthmore Martial Arts Club, Swarthmore PA

## Skills

**Languages:** English (native), German (reading and listening), Norwegian Bokmal (reading)

**Software:** R, Python, Maple, L<sup>A</sup>T<sub>E</sub>X, Linux, Jekyll, Matlab

## Other Activities

**Aikido (Aikikai).** Current rank: 1st Kyu.

**Taekwondo (ITF).** Current rank: 1st Dan.

**Chess.** Current Elo: 1937. Virginia High School co-Champion, 2008.