



**QUEEN'S  
UNIVERSITY  
BELFAST**

# **Complex Systems in Public Health**

**Further Resources**

# General complex systems reading



- ❑ Rutter H et al. The need for a complex systems model of evidence for public health. Lancet. 2017;390(10112):2602-4. <https://spiral.imperial.ac.uk/handle/10044/1/52213>.
- ❑ Stearman J. Learning from evidence in a complex world. Am J Public Health. 2006;96(3):505-14. <https://dx.doi.org/10.2105%2FAJPH.2005.066043>.
- ❑ UK HM Treasury. Magenta Book 2020. Handling complexity in policy evaluation. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/879437/Magenta Book supplementary guide. Handling Complexity in policy evaluation.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879437/Magenta_Book_supplementary_guide_Handling_Complexity_in_policy_evaluation.pdf).
- ❑ Ladyman J, Wiesner K. What is a Complex System? New Haven: Yale University Press; 2020.
- ❑ Sterman J. Business Dynamics: Systems Thinking and Modeling for a Complex World. Boston: Irwin McGraw-Hill; 2000.
- ❑ Hovmand P. Community Based Systems Dynamics. New York: Springer; 2014.
- ❑ Meadows DH. Thinking in Systems. A Primer. 2008. <https://research.fit.edu/media/site-specific/researchfitedu/coast-climate-adaptation-library/climate-communications/psychology-amp-behavior/Meadows-2008.-Thinking-in-Systems.pdf>
- ❑ Hawe P, Shiell A, Riley T. Theorising interventions as events in systems. Am J Community Psychol. 2009 Jun;43(3-4):267-76. doi: 10.1007/s10464-009-9229-9. PMID: 19390961.

# Social Network Analysis



## Core texts for Social Network Analysis:

- Hanneman, Robert A. and Mark Riddle. 2005. Introduction to social network methods. Riverside, CA: University of California, Riverside (<http://faculty.ucr.edu/~hanneman/> )
- Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2013). *Analyzing social networks*. SAGE.
- Thomas W. Valente. *Social Networks and Health. Models, Methods, and Applications*

## Core texts for network interventions:

- Valente TW. Network interventions. *Science*. 2012 Jul 6;337(6090):49-53.
- Valente TW, Pitts SR. An Appraisal of Social Network Theory and Analysis as Applied to Public Health: Challenges and Opportunities. *Annu Rev Public Health*. 2017 Mar 20;38:103-118.
- Latkin CA, Knowlton AR. Social Network Assessments and Interventions for Health Behavior Change: A Critical Review. *Behav Med*. 2015;41(3):90-7.

# Social Network Analysis



QUEEN'S  
UNIVERSITY  
BELFAST

## Societies:

**INSNA: International Network for Social Network Analysis:** <http://www.insna.org/>

**EUSN: European Social Network:**

<http://www.esn-eu.org/home/index.html>

## Courses:

**Methods@Manchester:** <http://www.methods.manchester.ac.uk/events/summer-school-2016/courses/social-network-analysis/>

**LINKS Centre for SNA, Kentucky:** <https://sites.google.com/site/uklinkscenter/>

**Duke Network Analysis Centre, Social networks and health workshop:**

<https://csde.washington.edu/news-events/social-networks-and-health-workshop/>

# Social network analysis: software packages



QUEEN'S  
UNIVERSITY  
BELFAST



## UCINET



# Agent-based Modelling (ABM)



## **Core text books:**

- ❑ Wilensky, U. and W. Rand (2015). An Introduction to Agent-Based Modeling: Modeling natural, social and engineered complex systems with NetLogo. Cambridge, MA: MIT Press.
- ❑ Railsback, S. F. and V. Grimm (2011). Agent-based and Individual-based Modeling: A Practical Introduction. New Jersey: Princeton University Press.
- ❑ Gilbert, N. (2008). Agent-Based Models. Quantitative Applications in the Social Sciences. Los Angeles: Sage Publications.

## **Training**

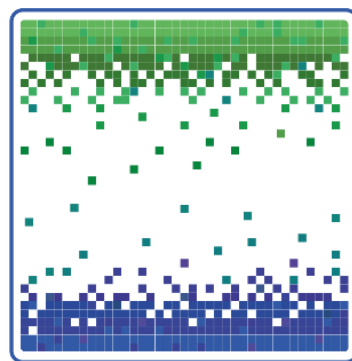
- ❑ ABM for the self-learner (free resource):  
<http://www.research.criticalconnections.com.au/ABMBook/>
- ❑ Santa Fe Institute Complexity Explorer:  
<https://www.complexityexplorer.org/courses/101-introduction-to-agent-based-modeling-spring-2020>
- ❑ Santa Fe Institute Fundamentals of Netlogo:  
<https://www.complexityexplorer.org/courses/84-fundamentals-of-netlogo>

# Agent-based Modelling (ABM)



## Support networks:

- ❑ UKPRP PHASE network
- ❑ A range of useful reading material on ABMs:  
<http://phasenetwork.org/abm-resources/>



**PHASE**  
Population Health  
Agent-based Simulation  
nEtwork

[www.phasenetwork.org](http://www.phasenetwork.org)

@phase\_network



# Systems Dynamics



- ❑ Sterman J. Business Dynamics: Systems Thinking and Modeling for a Complex World. Boston: Irwin McGraw-Hill; 2000.
- ❑ Bala B, Arshad F, Noh K. System dynamics: modelling and simulation. Singapore: Springer Nature; 2017.
- ❑ Hovmand P. Community Based Systems Dynamics. New York: Springer; 2014
- ❑ Scott R. Group Model Building: Using Systems Dynamics to Achieve Enduring Agreement. Singapore: Springer; 2018.

## Support networks:

- ❑ Systems Dynamics Society (SDS): <https://systemdynamics.org/what-is-system-dynamics/>

## Courses:

- ❑ SDS online course catalog: <https://systemdynamics.org/online-course-catalog/#online-course-list>