

Social Network Analysis*
SOCY-496/696 - Spring 2014
Batelle-Tomkins T30, M 5.30pm – 8.00pm
<http://tinyurl.com/AU-SNA14>

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Office Hours: M 1:30-4:30pm, or by appointment (schedule – <http://jimiadams.youcanbook.me>)

Course Description

"[A]s usually practiced, using random sampling of individuals, the survey is a sociological meatgrinder, tearing the individual from his social context and guaranteeing that nobody in the study interacts with anyone else in it... If our aim is to understand people's behavior rather than simply to record it, we want to know about primary groups, neighborhoods, organizations, social circles, and communities; about interaction, communication, role expectations and social control."
(Allen Barton 1968)

This course lays the groundwork of social network analysis (SNA) from a conceptual, mathematical and computational perspective. SNA differs from other analytic perspectives in requirements for data collection, storage, and descriptive/statistical analyses. The course will address these by sampling from the most commonly used classes of analytic concepts, demonstrating for each their implementation in primary data collection efforts, empirical basis and computational implementation (in R).

We will address these concepts around two organizing principles: (1) the two primary theoretical frameworks capturing reasons networks “matter”; and (2) how each class of measures can be applied across different units of analysis: individuals, groups and “whole” networks. While by no means exhaustive, this course will develop students' beginning toolkit for SNA. SNA is a rapidly advancing field, and these tools are intended to provide the orienting frameworks that can guide further study of SNA on your own. By the end of the course, participants will be able to:

- Understand the primary theoretical & analytic frameworks that underpin SNA;
- Grasp the primary strategies for gathering & storing social network data;
- Compute & interpret several primary classes of measures, for varying analytic levels;
- Describe & visualize some of the most common patterns in empirical networks;
- Run descriptive & statistical analyses (in R) to identify these patterns in real data.

Required Readings:

- Kadushin, Charles. 2012. *Understanding Social Networks: Theories, Concepts, and Findings*. Oxford University Press.
- Additional readings are listed on the course calendar and are either (a) readily available online (e.g., JSTOR, EBSCO, etc.) or (b) will be posted to Blackboard as noted (**BB**).

Course Structure & Requirements

This is a seminar that will be approximately equal parts conceptual, empirical, mathematical and computational. As such, it will be a healthy mix of lecture, discussion and tutorial. To make the most of this structure, you need should show up to each class fully prepared to participate. The course requirements are composed of in-class participation, a series of homework assignments and a final paper. Additional details for each follow below.

* This course benefited from syllabi/materials for similar courses taught by Jim Moody (Duke University), Ryan Light (University of Oregon), David Schaefer (Arizona State University), Omar Lizardo (University of Notre Dame), Ann McCranie and Bernice Pescosolido (Indiana University). I gratefully acknowledge their influence in developing the course.

Course Calendar Overview

13 Jan - Introduction
 20 Jan - NO Class - Martin Luther King Jr. Holiday
 27 Jan - Theoretical Perspectives, Data Structures & Basics of Visualization
 03 Feb - Collecting Social Network Data
 10 Feb - Network Composition
 17 Feb - Small & Other Worlds
 24 Feb - Social Balance
 03 Mar - Centralities
 10 Mar - NO Class - Spring Break
 17 Mar - Two-Mode Networks
 24 Mar - Cohesion & Clustering
 31 Mar - Equivalence & Roles
 07 Apr - Network Dynamics
 14 Apr - Project Presentations &/or Influence, Diffusion & Statistical Methods in SNA
 21 Apr - Project Presentations
 28 Apr - Statistical Models - Exponential Random Graph Models & Stochastic Actor Based Models
 05 May - Final Paper Due

Requirements:

I - Participation:

The seminar structure of this course requires that you contribute to class meetings. Doing so will require keeping up with the assigned readings and homework assignments. As *part of* this, you may be asked at times to introduce the key ideas from one (or more) of the assigned readings for a given class meeting.

II - Homework Assignments (10 total):

A series of homework problem sets are designed to develop familiarity with the concepts introduced in class, and your capacity to use available software to apply analytic techniques to estimate their computation. Homework assignments are due before the class meeting following the day they are assigned (e.g., the "Visualization" assignment is due Jan 27th). Problem sets will only be graded for completion, with solutions to be posted to Blackboard *after* they are due. Two homework assignments can be dropped/missed with no penalty.

III - Final Paper:

The primary product of this course will be a research paper that applies SNA to a question of your choosing. This can be a new idea or a revision of a previous paper, but any revisions must demonstrate how SNA alters the papers central idea(s). For this paper, you can collaborate with one additional student. You should plan to meet with the instructor to confirm your topic and to devise an appropriate project for your skills/interests/background.

Two notes on reading:

- 1- Occasionally in this class, the assigned readings will constitute more than you can reasonably complete in the time allotted. As you continue in your career, you will find that this is often the case. Again, this course is not meant to comprehensively cover any of the covered topics, but to be an introduction to each. As such, you should develop a strategy for extracting the key elements of each reading *as it pertains to the aims of this class*. For students enrolled in 496, cover *at least* the required readings marked with an asterisk (*); if enrolled in 696, cover *all* required readings.
- 2- There is no assigned textbook for this class. If you find something more comprehensive helpful, I recommend the following:
 - Scott, John & Peter Carrington. 2011. *The SAGE Handbook of Social Network Analysis*. SAGE.
 - Wasserman, Stanley & Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. Cambridge. (This book is available via e-Reserve on Blackboard.)

from your personal accounts (e.g., Yahoo!, Hotmail, etc). Please consider e-mail as subject to the same standards of communication as you would all other forms written material in this course (i.e., you should use complete sentences, proper punctuation, etc.). I will typically respond to email within **48 hours**. I will **NOT, under any circumstances** discuss grades over email.

- **Office Hours** are available to add to your experience in this course. Please make use of them. These are meant to supplement required course work and in-class elements. As such, while I am happy to discuss course materials or other aspects of sociology/academia in general with you during this time, they should not be viewed as an opportunity to ask, “What did I miss in class?” (You should find peers in the class with whom you can share notes for that purpose.)

Academic Integrity and Conduct:

All students are expected to follow the policies of American University with respect to academic conduct and integrity. For more information on academic integrity at AU, please go to <http://www.american.edu/academics/integrity/code.cfm>. Your registration in this course assumes your familiarity with these standards. Any violations of this policy will be referred to the AIC administrator.

Request for Academic Adjustment or Accommodation:

Please notify the instructor at the beginning of the class if you are a student with a documented disability who may require appropriate accommodations so we can make arrangements to ensure your needs are addressed in this course. If you need university assistance with documentation or with services, please see Disability Support Services (206 Mary Graydon, 885-3315), or visit their website at: <http://www.american.edu/ocl/dss/For-Students-Services-Provided.cfm>

University Services:

Students are encouraged to seek out appropriate university services that support student learning and success. Among those, where appropriate, please consider making use of the Academic Support Center (243 Mary Graydon Center, www.american.edu/ocl/asc/index1.html); the computer services/technology help (<http://www.american.edu/oit/index.cfm>), the Writing Center (228 Battelle-Tompkins Hall, <http://www.american.edu/cas/writing>), and Library Research Help (<http://www.american.edu/library/ask/index.cfm>).

Emergency Preparedness: In the event of a declared pandemic (influenza or other communicable disease), American University will implement a plan for meeting the needs of all members of the university community. Should the university be required to close for a period of time, we are committed to ensuring that all aspects of our educational programs will be delivered to our students. These may include altering and extending the duration of the traditional term schedule to complete essential instruction in the traditional format and/or use of distance instructional methods. Specific strategies will vary from class to class, depending on the format of the course and the timing of the emergency. Faculty will communicate class-specific information to students via AU e-mail and Blackboard, while students must inform their faculty immediately of any absence due to illness. Students are responsible for checking their AU e-mail regularly and keeping themselves informed of emergencies. In the event of a declared pandemic or other emergency, students should refer to the AU Web site (www.prepared.american.edu) and the AU information line at (202) 885-1100 for general university-wide information, as well as contact their faculty and/or respective dean’s office for course and school/ college-specific information.

Tentative Course Schedule

Please Note, this schedule is subject to change – all changes will be announced in class.

13 Jan - Introduction

Required Readings

- *Borgatti, Stephen P. 1994. "A Quorum of Graph Theoretic Concepts." *Connections* 17:47-49.
- *Kadushin, chapter 1

Assignment

- None

Additional/Background Readings

- Butts CT. "Social Network Analysis: A Methodological Introduction." *Asian Journal of Social Psychology* 2008;11:13-41.
- Christakis, Nicholas A. & James H Fowler. 2009. *Connected: The Surprising Power of Our Social Networks and How they Shape Our Lives*. Little, Brown & Co.
- Freeman, Linton C. 2004. *The Development of Social Network Analysis: A Study in the Sociology of Science*. Vancouver, BC: Empirical Press.
- Hanneman, Robert, and Mark Riddle. 2005. "Introduction to Social Network Methods." Riverside, CA. Available for download from: http://faculty.ucr.edu/~hanneman/nettext/Introduction_to_Social_Network_Methods.pdf.
- Knoke David & Song Yang. 2007. *Social Network Analysis* Volume 2. (Quantitative Applications in the Social Sciences Series #154). Sage.
- Scott, John. 2000. *Social Network Analysis: A Handbook*. Sage.
- Valente, Thomas W. 2010. *Social Networks and Health: Models, Methods and Applications*. Oxford University Press.

20 Jan - NO Class - MLK Jr. Holiday

27 Jan - Theoretical Perspectives, Data Structures & Basics of Visualization

Required Readings

- *Emirbayer, Mustafa. 1997. "Manifesto for a Relational Sociology." *American Journal of Sociology* 103(2): 281-317.
- *Borgatti, Stephen P., Ajay Mehra, Daniel J. Brass, and Giuseppe Labianca. 2009. "Network Analysis in the Social Sciences." *Science* 323:892-895.
- *Bender-deMoll, Skye & Daniel A. McFarland. 2006. "The Art and Science of Dynamic Network Visualization." *Journal of Social Structure* 7(2).
- Erikson, Emily. 2013. "Formalist and Relationalist Theory in Social Network Analysis." *Sociological Theory* 31(3):219-42.
- Coleman, James S. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology* 94:S95-S120.

Assignment

- 1- [Visualization](#)

Additional/Background Readings

- Freeman LC. Visualizing Social Networks. *Journal of Social Structure* 2000;1(1).
- Freeman, Linton C. 1972. "Segregation in Social Networks." *Sociological Methods and Research* 6:411-30.
- Handcock, Mark S., David R. Hunter, Carter T. Butts, Steven M. Goodreau, and Martina Morris. 2008. "statnet: Software Tools for the Representation, Visualization, Analysis and Simulation of Network Data." *Journal of Statistical Software* 24(1):1-11.
- Krempel L. Network Visualization. In: Carrington, Peter and John Scott (ed) *Handbook of Social Network Analysis*. London: Sage; 2011.
- Moody, James, Daniel A. McFarland, and Skye Bender-DeMoll. 2005. "Dynamic network visualization." *American Journal of Sociology* 110(4):1206-41.
- Wellman, Barry. "Structural Analysis: From method and metaphor to theory and substance." Chapter 2 in Barry Wellman, and S. D. Berkowitz (eds). 1988. *Social Structures: A Network Approach*. Cambridge: Cambridge University Press.

03 Feb - Collecting Social Network Data

Required Readings

- * **(BB)** Marsden, Peter V. 2011. "Survey Methods for Network Data." Chapter 25 in John Scott and Peter J. Carrington (Eds.). *The Sage Handbook of Social Network Analysis*. Sage
- * Kadushin, chapter 11
- * Hogan, Bernie, Juan Antonio Carrasco, and Barry Wellman. 2007. "Visualizing Personal Networks: Working with Participant-Aided Sociograms." *Field Methods* 19(2):116-44.
- **(BB)** Morris, Martina. 2004. "Editor's Introduction" and "Overview of Network Survey Designs." Pp. 1-21 in *Network Epidemiology: A Handbook for Survey Design and Data Collection*. Oxford University Press.
- Bearman, Peter and Paolo Parigi. 2004. "Cloning Headless Frogs and Other Important Matters: Conversation Topics and Network Structure." *Social Forces* 83:535-557.

Assignment

- None

Additional/Background Readings

- adams, jimi, and James Moody. 2007. "To Tell the Truth? Measuring Concordance in Multiply-Reported Network Data." *Social Networks* 29:44-58.
- adams, jimi, James Moody, Stephen Q. Muth, and Martina Morris. 2012. "Quantifying the Benefits of Link-Tracing Designs for Partnership Network Studies." *Field Methods* 24(2):175-93.
- Brashears, Matthew E. 2013. "Humans use Compression Heuristics to Improve the Recall of Social Networks." *Nature Scientific Reports*, 3: 1513. [doi:10.1038/srep01513](https://doi.org/10.1038/srep01513)
- Breiger, Ronald L. (Ed.). 2005. Special Issue on Ethical Dilemmas in Social Network Research. *Social Networks* 27(2).
- Eagle, Nathan, Alex (Sandy) Pentland, and David Lazer. 2009. "Inferring Friendship Network Structure by Using Mobile Phone Data." *Proceedings of the National Academy of Science* 106(36):15274-78.
- Gile, Krista J., and Mark S. Handcock. 2010. "Respondent Driven Sampling: An Assessment of Current Methodology." *Sociological Methodology* 40:285-327.
- Goel, Sharad, and Matthew Salganik. 2010. "Assessing Respondent-Driven Sampling." *Proceedings of the National Academy of Science* 107(15):6743-47.
- Handcock, Mark S., and Krista Gile. 2010. "Modeling Social Networks with Sampled Data." *Annals of Applied Statistics* 4:5-25.
- Heckathorn, Douglas D. 1997. "Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations." *Social Problems* 44(2):174-99.
- Krackhardt, David. 1987. "Cognitive Social Structures." *Social Networks* 9:109-34.
- Laumann, Edward O., Peter V. Marsden, and David Prensky. 1994. "The Boundary Specification Problem in Network Analysis." in *Research Methods in Social Network Analysis*, edited by Linton C. Freeman, Douglas R. White, and A. Kimball Romney. New Brunswick, NJ: Transaction Publishers.
- Marin, Alexandra. 2004. "Are respondents more likely to list alters with certain characteristics?: Implications for name generator data." *Social Networks* 26:289-307.
- Marin, Alexandra, and Keith N. Hampton. 2007. "Simplifying the Personal Network Name Generator: Alternatives to Traditional Multiple and Single Name Generators." *Field Methods* 19(2):163-93.
- Matzat, Uwe, and Chris Snijders. 2010. "Does the Online Collection of Ego-Centered Network Data Reduce Data-Quality? An Experimental Comparison." *Social Networks* 32(2):105-111.
- McCarty, Christopher, Peter D. Killworth, and James Rennell. 2007. "Impact of methods for reducing respondent burden on personal network structural measures." *Social Networks* 29:300-315.
- McCarty, Christopher, and Amber Wutich. 2005. "Conceptual and Empirical Arguments for Including or Excluding Ego from Structural Analyses of Personal Networks." *Connections* 26(2):82-88.
- Mikolajczyk RT, Kretzchmar M. Collecting Social Contact Data in the Context of Disease Transmission: Prospective and Retrospective Study Designs. *Social Networks* 2008;30(3):127-135.
- Morris, Martina. 2004. *Network Epidemiology: A Handbook for survey design and Data Collection*. London: Oxford University Press.
- Salganik, Matthew J., and Douglas D. Heckathorn. 2004. "Sampling and Estimation in Hidden Populations using Respondent Driven Sampling." *Sociological Methodology* 34:193-240.

10 Feb - Network Composition

Required Readings

- *McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. 2001. "Birds of a Feather: Homophily in Social Networks." *Annual Review of Sociology* 27:415-44.
- *DiPrete, Thomas A., Andrew Gelman, Tyler McCormick, Julien Teitler, and T. Zheng. 2011. "Segregation in Social Networks based on Acquaintanceship and Trust." *American Journal of Sociology* 116(4):1234-83.
- *Kohler, Hans-Peter, Jere R. Behrman, and Susan C. Watkins. 2001. "The Density of Social Networks and Fertility Decisions: Evidence from South Nyanza District, Kenya." *Demography* 38(1):43-58.
- Feld, Scott L. 1991. "Why Your Friends have More Friends than you do." *American Journal of Sociology* 96:1464-1477.
- Marsden, Peter V. 1987. "Core Discussion Networks of Americans." *American Sociological Review* 52:122-31.

Assignment

2- Local Network Composition

Additional/Background Readings

- Amaral, L. A. N., A. Scala, M. Barthelemy, and H. E. Stanley. 2000. "Classes of Small World Networks." *Proceedings of the National Academy of Science* 97(21):11149-52.
- Bailey, Stefanie, and Peter V. Marsden. 1999. "Interpretation and interview context: examining the General Social Survey name generator using cognitive methods." *Social Networks* 21:287-309.
- Barabasi, Albert-Laszlo. 2009. "Scale-Free Networks: A Decade and Beyond." *Science* 325:412-13.
- Fischer, Claude S. 1982. *To Dwell Among Friends: Personal Networks in Town and City*. Chicago: University of Chicago Press.
- Haynie, Dana. 2001. "Delinquent peers Revisited: Does Network Structure Matter?" *American Journal of Sociology* 106:1013-57.
- HELLERINGER, Stephane, Hans-Peter Kohler, Linda Kalilani-Phiri, James Mkandawire, and Benjamin Armbruster. 2011. "The Reliability of Sexual Partnership Histories: Implications for the Measurement of Partnership Concurrency During Surveys." *AIDS* 25(4):503-11.
- Kalmijn, Matthijs. 2003. "Shared Friendship Networks and the Life Course: An Analysis of Survey Data on Married and Cohabiting Couples." *Social Networks* 25:231-49.
- Kandel, D. B. 1978. "Homophily, Selection, and Socialization in Adolescent Friendships." *American Journal of Sociology* 84:427-36.
- McPherson, Miller, Lynn Smith-Lovin, and Matthew E. Brashears. 2006. "Social Isolation in America: Changes in Core Discussion Networks over Two Decades." *American Sociological Review* 71:353-75. (see discussion in *ASR* - 74(4): 657-9, 670-81)
- Moody, James. 2001. "Race, school integration, and friendship segregation in America." *American Journal of Sociology* 107(3):679-716.
- Moore, Gwen. 1990. "Structural Determinants of Men's and Women's Personal Networks." *American Sociological Review* 55:726-35.
- Morris, Martina, Ann E. Kurth, Deven T. Hamilton, James Moody, and Steve Wakefield. 2009. "Concurrent Partnerships and HIV Prevalence Disparities by Race: Linking Science and Public Health Practice." *American Journal of Public Health* 99:1023-31.
- Wellman, Barry, and S. Wortley. 1990. "Different Strokes from Different Folks: Community Ties and Social Support." *American Journal of Sociology* 96:558-88.
- Zheng, Tian, Matthew J. Salganik, and Andrew Gelman. 2006. "How Many People do You Know in Prison?: Using Overdispersion in Count Data to Estimate Social Structure in Networks." *Journal of the American Statistical Association* 101(474):409-23.

17 Feb - Small & Other Worlds

Required Readings

- *Kadushin, chapter 8
- *Granovetter, Mark. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78(6):1360-80.
- * **(BB)** Burt, Ronald S. 2001. "Structural Holes versus Network Closure as Social Capital." Pp. 31-56 in N. Lin, K. Cook and R. S. Burt. *Social Capital: Theory and Research*. Sociology and Economics: Controversy and Integration series. New York: Aldine de Gruyter. Accessed from <http://faculty.chicagobooth.edu/ronald.burt/research/SHNC.pdf> on 27Dec2009.

- Watts, Duncan J. 1999. "Networks, Dynamics, and the Small-World phenomenon." *American Journal of Sociology* 105:493-527.
- Killworth, Peter D., Christopher McCarty, H. Russel Bernard, and Mark House. 2006. "The Accuracy of Small World Chains in Social Networks." *Social Networks* 28:85-96.

Assignment

3- Distance & Density

Additional/Background Readings

- Adamic, Lada, and Eytan Adar. 2005. "How to search a social network." *Social Networks* 27(3):187-203.
- Aral, Sinan, and Marshall Van Alstyne. 2011. "The Diversity-Bandwidth Tradeoff." *American Journal of Sociology* 117(1):90-171.
- Burt, Ronald S. 1992. *Structural Holes: The social structure of competition*. Cambridge, Massachusetts: Harvard University Press.
- Grannis, Rick. 2010. "Six Degrees of "Who Cares?"". *American Journal of Sociology* 115(4):991-1017.
- Milgram, Stanley. 1967. "The Small World Problem." *Psychology Today* 1:61-67.
- Robins, Garry, Philippa Pattison, and Jodie Woolcock. 2005. "Small and Other Worlds: Global Network Structures from Local Processes." *American Journal of Sociology* 110(4):894-936.
- Rodan, Simon. 2010. "Structural Holes and Managerial Performance: Identifying the Underlying Mechanisms." *Social Networks* 32:168-79.
- Schnettler, Sebastian. 2009. "A Structured Overview of 50 Years of Small-World Research." *Social Networks* 31(3):165-78.
- Stoebenau K, Valente TW. Using Network Analysis to Understand Community-Based Programs: A Case Study from Highland Madagascar. *International Family Planning Perspectives* 2003;29(4):167-173.
- Uzzi, Brian, and Spiro. 2005. "Collaboration and Creativity: The Small World Problem." *American Journal of Sociology* 111(2):447-504.
- Watts, Duncan J., and Steven H. Strogatz. 1998. "Collective Dynamics of 'Small-World' Networks." *Nature* 393:440-42.

24 Feb - Social Balance

Required Readings

- *Kadushin, chapter 2
- *Chase, Ivan D. 1980. "Social Process and Hierarchy Formation in Small Groups: A Comparative Perspective." *American Sociological Review* 45:905-24.
- *Bearman, Peter S., James Moody, and Katherine Stovel. 2004. "Chains of affection: The structure of adolescent romantic and sexual networks." *American Journal of Sociology* 110:44-91.
- Gould, Rodger. 2002. "The Origins of Status Hierarchies: A formal theory and Empirical Test." *American Journal of Sociology* 107:1143-78.
- Faust, Katherine. 2007. "Very Local Structure In Social Networks." *Sociological Methodology* 37(1):209-56.

Assignment

4- Balance

Additional/Background Readings

- Brewer, Devon D. 2000. "Forgetting in the Recall-Based Elicitation of Person and Social Networks." *Social Networks* 22:29-43.
- Davis, James A. 1963. "Structural Balance, Mechanical Solidarity, and Interpersonal Relations." *American Journal of Sociology* 68:444-62.
- Doreian, Patrick, Roman Kapuscinski, David Krackhardt, and Janusz Szczypula. 1996. "A Brief History of Balance Through Time." *Journal of Mathematical Sociology* 21(1-2):113-31.
- Faust, Katherine. 2008. "Triadic configurations in limited choice sociometric networks: Empirical and theoretical results." *Social Networks* 30(4):273-82.
- Heider, Fritz. 1946. "Attitudes and Cognitive Organization." *Journal of Psychology* 21:107-12.
- Holland, Paul W., and Samuel Leinhardt. 1970. "A Method for Detecting Structure in Sociometric data." *American Journal of Sociology* 70:492-513.
- Hummon, Norman P., and Patrick Doreian. 2003. "Some Dynamics of Social Balance Processes: Bringing Heider Back Into Balance Theory." *Social Networks* 25:17-49.

- Moody, James. 1998. "Matrix methods for calculating the triad census." *Social Networks* 20(4):291-99.
- Verbrugge, Lois M. 1979. "Multiplexity in Adult Friendships." *Social Forces* 57: 1286-1309

03 Mar - Centralities

Required Readings

- *Kadushin, chapter 3
- Borgatti, Stephen P., and Martin G. Everett. 2006. "A Graph-theoretic perspective on centrality." *Social Networks* 28:466-84.
- *Rossman, Gabriel, Nicole Esparza, and Phillip Bonacich. 2010. "I'd Like to Thank the Academy: Team Spillovers and Network Centrality." *American Sociological Review* 75:31-51.
- *Bell, David C., John S. Atkinson, and Jerry W. Carlson. 1999. "Centrality measures for disease transmission networks." *Social Networks* 21:1-21.
- Friedkin, Noah E. 1991. "Theoretical Foundations for Centrality Measures." *American Journal of Sociology* 96:1478-504.

Assignment

5- Centralities

Additional/Background Readings

- Barabasi, Albert-Laszlo, and Reka Albert. 1999. "Emergence of Scaling in Random Networks." *Science* 286:509-12.
- Bolland, John M. 1988. "Sorting out centrality: An analysis of the performance of four centrality models in real and simulated networks." *Social Networks* 10:233-53.
- Bonacich, Phillip. 1987. "Power and Centrality: A Family of Measures." *American Journal of Sociology* 92:1170-82.
- Cornwell, Benjamin. 2005. "A complement-derived centrality index for disconnected graphs." *Connections* 26(2):70-81.
- Costenbader, Elizabeth, and Thomas W. Valente. 2003. "The Stability of Centrality Measures when Networks are Sampled." *Social Networks* 25:283-307.
- Faust, Katherine. 1997. "Centrality in Affiliation Networks." *Social Networks* 19:157-91.
- Freeman, Linton C. 1979. "Centrality in social networks: Conceptual Clarification." *Social Networks* 1:215-39.
- Freeman, Linton C., Stephen P. Borgatti, and Douglas R. White. 1991. "Centrality In Valued Graphs - A Measure Of Betweenness Based On Network Flow." *Social Networks* 13(2):141-54.
- Marsden, Peter V. 2002. "Egocentric and Sociocentric Measures of Network Centrality." *Social Networks* 24:407-22.
- Rothenberg, R. B., J. J. Potterat, D. E. Woodhouse, W. W. Darrow, S. Q. Muth, and A. S. Klovdahl. 1995. "Choosing a Centrality Measure: Epidemiologic Correlates in the Colorado Springs Study of Social Networks." *Social Networks* 17:273-97.
- Zemljic, Barbara, and Valentina Hlebec. 2005. "Reliability of Measures of Centrality and Prominence." *Social Networks* 27(1):73-88.

10 Mar - NO Class - Spring Break

17 Mar - Two-Mode Networks

Required Readings

- *Breiger, Ronald L. 1974. "The Duality of Persons and Groups." *Social Forces* 53:181-90.
- *Kadushin, chapter 6
- *Latapy, Matthieu, Clemence Magnien, and Nathalie Del Vecchio. 2008. "Basic Notions for the Analysis of Large Two-mode Networks." *Social Networks* 30:31-48.
- Borgatti, Stephen P., and Martin G. Everett. 1997. "Network Analysis of 2-Mode Data." *Social Networks* 19(243-269).
- Feld, Scott L. 1981. "The Focused Organization of Social Ties." *American Journal of Sociology* 86:1015-35.

Assignment

6- Bipartite Transformation

Additional/Background Readings

- Burris, Val. 2005. "Interlocking Directorates and Political Cohesion among Corporate Elites." *American Journal of Sociology* 111(249-283).
- Field, Sam, Kenneth A. Frank, Kathryn Schiller, and Catherine Riegler-Crumb. 2006. "Identifying Positions from Affiliation Networks: Preserving the Duality of People and Events." *Social Networks* 28(2):97-123.
- Frank, Kenneth A., Chandra Muller, Kathryn Schiller, Catherine Riegler-Crumb, Ann Strassmann Mueller, Robert Crosnoe, and Jennifer Pearson. 2008. "The Social Dynamics of Mathematics Coursetaking in High School." *American Journal of Sociology* 113(6):1645-96.
- Freeman, L. C., and Douglas R. White. 1993. "Using Galois Lattices To Represent Network Data." *Sociological Methodology* 23(1):127-46.
- Mizuruchi, Mark S. 1996. "What Do Interlocks Do? An Analysis, Critique, and Assessment of Research on Interlocking Directorates." *Annual Review of Sociology* 22:271-98.
- Moody, James. 2004. "The structure of a social science collaboration network: Disciplinary cohesion from 1963 to 1999." *American Sociological Review* 69(2):213-38.
- Opsahl, Tore. 2013. "Triadic Closure in Two-mode Networks: Redefining the Global and Local Clustering Coefficients." *Social Networks* 35:159-67.
- Pescosolido, Bernice A., and Beth A. Rubin. 2000. "The Web of Group Affiliations Revisited: Social Life, Postmodernism, and Sociology." *American Sociological Review* 65:52-76.

24 Mar - Cohesion & Clustering**Required Readings**

- *Kadushin, chapter 4
- *Moody, James, and Douglas R. White. 2003. "Structural cohesion and embeddedness: A hierarchical concept of social groups." *American Sociological Review* 68(1):103-27.
- *Salathe, Marcel, and James H. Jones. 2010. "Dynamics and Control of Diseases in Networks with Community Structure." *PLoS Computational Biology* 6(4):e1000736.
- Freeman, L. C. 1992. "The Sociological Concept Of Group - An Empirical-Test Of 2 Models." *American Journal of Sociology* 98(1):152-66.
- Shwed, Uri, and Peter S. Bearman. 2010. "The Temporal Structure of Scientific Consensus Formation." *American Sociological Review* 75(6):817-40.

Assignment**7- Group Identification***Additional/Background Readings*

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- Borgatti, Stephen P., Martin G. Everett, and Paul R. Shirey. 1990. "LS Sets, Lambda Sets, and Other Cohesive Subsets." *Social Networks* 12:337-57.
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31 Mar - Equivalence & Roles

Required Readings

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07 Apr - Network Dynamics

Required Readings

- * **(BB)** Moody, James. 2009. "Network Dynamics." in *The Oxford Handbook of Analytical Sociology*, edited by Peter Hedstrom and Peter S. Bearman. New York: Oxford University Press.
- * Kossinets, Gueorgi, and Duncan J. Watts. 2006. "Empirical Analysis of an Evolving Social Network." *Science* 311:88-90.
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Assignment

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14 Apr - Influence, Diffusion & an Introduction to Statistical Methods in SNA

Required Readings

- * Kadushin, chapter 9
- * Christakis, Nicholas A. and James H. Fowler. 2007. "The Spread of Obesity in a Large Social Network over 32 Years." *New England Journal of Medicine* 357(4):370-379.
- * **(BB)** Friedkin, Noah E. and Karen S. Cook. 1990. "Peer Group Influence." *Sociological Methods & Research* 19: 122-143
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- Snijders, Tom A. B. 2011. "Statistical Models for Social Networks." *Annual Review of Sociology* 37:129-51.

Assignment

- [9- Peer Influence Model](#)

Additional/Background Readings

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21 Apr - Project Presentations

Required Readings

- None

Assignment

- None

28 Apr - Statistical Models - Overview of ERGM & SAB

Required Readings

- ***Any one of the following:**
- Goodreau, Steven M., James A. Kitts, and Martina Morris. 2009. "Birds of a Feather or Friend of a Friend? Using Exponential Random Graph Models to Investigate Adolescent Social Networks." *Demography* 46(1):103-25.
- Schaefer, David R., John M. Light, Richard A. Fabes, Laura D. Hanish, and Carol L. Martin. 2010. "Fundamental Principles of Network Formation Among Preschool Children." *Social Networks* 32:61-71.
- ***Any one of the following:**
- Schaefer, David R., Olga Kornienko, and Andrew M. Fox. 2011. "Misery Does Not Love Company: Network Selection Mechanisms and Depression Homophily." *American Sociological Review* 75(5):764-85.
- de la Haye, Kayla, Garry Robins, Philip Mohr, and Carlene Wilson. 2011. "How Physical Activity Shapes and is Shaped by, Adolescent Friendships." *Social Science and Medicine* 73(5):719-28.
- **Any one of the following:**
- Robins, Garry, Philippa Pattison, Yuval Kalish, and Dean Lusher. 2007. "An Introduction to Exponential Random Graph (p*) Models for Social Networks." *Social Networks* 29(2):173-91.
- Snijders, Tom A. B., Gerhard van de Bunt, and Christian E. G. Steglich. 2010. "Introduction to Stochastic Actor-Based Models for Network Dynamics." *Social Networks* 32:44-60.
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Assignment

- None

Additional/Background Readings

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- Dijkstra, Jan Cornelis, Scott D. Gest, Siegwart Lindenberg, Rene Veenstra, and Antonius H. N. Cillessen. 2012. "Testing Three Explanations of the Emergence of Weapon Carrying in Peer Context: The Roles of Aggression, Victimization, and the Social Network." *Journal of Adolescent Health* 50(4):371-76.
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- Robins, Garry, Philippa Pattison, and Stanley Wasserman. 1999. "Logit Models and Logistic Regressions for Social Networks: III. Valued Relations." *Psychometrika* 64(3):371-94.
- Robins, Garry, Tom A. B. Snijders, Peng Wang, Mark S. Handcock, and Philippa Pattison. 2007. "Recent Developments in Exponential Random Graph (p*) Models for Social Networks." *Social Networks* 29:192-215.
- Schaefer, David R., Sandra R. Simpkins, Andrea E. Vest, and Chara D. Price. 2011. "The Contribution of Extracurricular Activities to Adolescent Friendships: New Insights through Social Network Analysis." *Developmental Psychology* 47(4):1141-52.
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- Shalizi, Cosma Rohilla, and Andrew C. Thomas. 2011. "Homophily and Contagion Are Generically Confounded in Observational Social Network Studies." *Sociological Methods & Research* 40(2):211-39.

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05 May Final Paper Due by 8pm

07 Apr - Moving Beyond Descriptives

- * Kadushin, chapter 9
- **(BB)** Friedkin, Noah E. and Karen S. Cook. 1990. "Peer Group Influence." *Sociological Methods & Research* 19: 122-143
- * Snijders, Tom A. B. 2011. "Statistical Models for Social Networks." *Annual Review of Sociology* 37:129-51.
- * Christakis, Nicholas A. and James H. Fowler. 2007. "The Spread of Obesity in a Large Social Network over 32 Years." *New England Journal of Medicine* 357(4):370-379.

14 Apr - Exponential Random Graph Models

- * Robins, Garry, Philippa Pattison, Yuval Kalish, and Dean Lusher. 2007. "An Introduction to Exponential Random Graph (p*) Models for Social Networks." *Social Networks* 29(2):173-91.
- * Goodreau, Steven M., Mark S. Handcock, David R. Hunter, Carter T. Butts, and Martina Morris. 2008. "A statnet Tutorial." *Journal of Statistical Software* 24(9):1-26.
- Goodreau, Steven M., James A. Kitts, and Martina Morris. 2009. "Birds of a Feather or Friend of a Friend? Using Exponential Random Graph Models to Investigate Adolescent Social Networks." *Demography* 46(1):103-25.
- Schaefer, David R., John M. Light, Richard A. Fabes, Laura D. Hanish, and Carol L. Martin. 2010. "Fundamental Principles of Network Formation Among Preschool Children." *Social Networks* 32:61-71.

21 Apr - Project Presentations

Required Readings

- None

Assignment

- None

28 Apr - Dynamic Network Models

- * **(BB)** Moody, James. 2009. "Network Dynamics." in *The Oxford Handbook of Analytical Sociology*, edited by Peter Hedstrom and Peter S. Bearman. New York: Oxford University Press.
- **(BB)** Hallinan, Maureen T. 1978. "The process of friendship formation." *Social Networks* 1: 193-210.
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*Any one of the following:

- Schaefer, David R., Olga Kornienko, and Andrew M. Fox. 2011. "Misery Does Not Love Company: Network Selection Mechanisms and Depression Homophily." *American Sociological Review* 75(5):764-85.
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- de la Haye, Kayla, Garry Robins, Philip Mohr, and Carlene Wilson. 2011. "How Physical Activity Shapes and is Shaped by, Adolescent Friendships." *Social Science and Medicine* 73(5):719-28.