



MASSACHUSETTS INSTITUTE OF TECHNOLOGY
SLOAN SCHOOL OF MANAGEMENT

15.992: Networks and Organization

Syllabus
Spring 2010

Instructor

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1. INTRODUCTION

This seminar is intended to provide students with an intermediate level of familiarity with methods used in the quantitative study of social networks and the role that they play in organizing society. The seminar is divided into two related modules. The first module focuses on the development of a set of tools and methods for assessing different kinds of relational structures in networks. In these sessions, we will focus on diving deep into the application of particular methods, and consider how these methods have been applied in the context of studying specific organizational phenomena. In the second module we will explore how a variety of network methods have been applied in the context of organizational research, with a focus on critical assessment of these applications.

2. PREREQUISITES

This seminar is open to any Ph.D. student at MIT. Other students are welcome to contact the instructor regarding participation in the course. While this is not an introductory course in social networks, there are no formal prerequisites. That said, some basic familiarity with social network methods and empirical research will be helpful to most students, as will some basic familiarity with quantitative statistical methods and linear algebra. While not necessary, concurrent enrollment in a graduate-level introductory social network analysis course should provide more than a sufficient background to students for whom this is new material.

3. READING MATERIALS

There are no required textbooks for this class—all readings should be available for download from on-line sources through the course website. However, there are several books that students may find useful as references:

Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*.

New York: Cambridge University Press.

de Nooy, Wouter, Mrvar, Andrej and Vladimir Batagelj. 2008. *Exploratory Social Network Analysis with Pajek*. New York: Cambridge University Press.

Scott, John. 2000. *Social Network Analysis: A Handbook*. Thousand Oaks: SAGE.

Doreian, Patrick, Batagelj, Vladimir and Anuška Ferligoj. 2005. *Generalized Blockmodeling*. New York: Cambridge University Press.

4. GRADING AND REQUIREMENTS

The class will be graded as follows:

Pre-class memos	25%
Class Participation	15%
Final Paper	60%

4.1. Pre-class memos

Unless otherwise noted, every student is required to submit a two-page memo critically discussing the assigned reading for the session. Well-written memos will address at least the following questions:

- What structural features of networks are addressed by all or most of these papers? Why are these features important to the study of networks and/or social organization?
- What mechanisms explain these features?
- For empirical work: how well do the network measures used match the theoretical constructs in the paper? Are there reasonable measures that would have been more useful?
- In what ways do these papers make claims that contradict one another? That support one another?

Memos for each week must be posted to the course website by **8:00am Tuesday** on the day of class. Students are allowed to miss a memo for one week with no grade penalty.

4.2. Class Participation

Students are expected to have read all of the required articles for class and be prepared to discuss them both constructively and critically. To this end, students are expected to read memos posted to the course website by their classmates before coming to class.

4.3. Final Paper

Each student is required to write a final paper in which they perform an empirical analysis in which social network analysis plays a central role. Students are encouraged to view this as an opportunity to produce a publication-quality paper. The paper should be approximately 15-20 double-spaced pages in length.

A two-page proposal describing the basic question to be addressed in the paper and potential data sources is due on Tuesday, April 6th, 2010. The final paper is due on Tuesday, May 11th, 2008.

5. SCHEDULE OF SESSIONS AND READINGS

Class 1: Introduction

February 2nd,
2010

Rushin, Steve. How Friends Make You Fat. *Time Magazine* – August 2, 2007.

Optional reading:

de Noor, et. al.: 1-57.

Class 2: Dyads in Networks: Symmetry and Asymmetry

February 9th,
2010

Emerson, Richard. 1961. Power-Dependence Relations. *American Sociological Review* 27(1): 31-40.

Cook, Karen S., Emerson, Richard M. and Mary R. Gilmore. 1983. The Distribution of Power in Exchange Networks: Theory and Experimental Results. *American Journal of Sociology* 89(2): 275-305

Manski, Charles F. 1993. Identification of Endogenous Social Effects: The Reflection Problem. *Review of Economics Studies* 60(3): 531-542.

McPherson, Miller, Smith-Lovin, Lynn, and James M. Cook. 2001. Birds of a Feather: Homophily in Social Networks. *Annual Review of Sociology* 27: 415-444.

Casciaro, Tiziana and Mikolaj Jan Piskorski. 2005. Power Imbalance, Mutual Dependence, and Constraint Absorption: A Closer Look at Resource Dependence Theory. *Administrative Science Quarterly* 50(2): 167-199.

Christakis, Nicholas A. and James H. Fowler. 2007. The Spread of Obesity in a Large Social Network. *New England Journal of Medicine* 357(4): 370-379.

Optional reading:

Wasserman & Faust: 505-555.

Class 3: Triads: Building Blocks of Group Structure

February
23rd, 2010

- Holland, Paul W. and Samuel Leinhardt. 1976. Local Structure in Social Networks. *Sociological Methodology* 7: 1-45.
- Burt, Ronald S. 1987. Social Contagion and Innovation: Cohesion Versus Structural Equivalence. *American Journal of Sociology* 92(6): 1287-1355.
- Gould, Roger V. and Roberto M. Fernandez. 1989. Structures of Mediation: A Formal Approach to Brokerage in Transaction Networks. *Sociological Methodology* 19: 89-126.
- Krackhardt, David. 1999. The Ties that Torture: Simmelian Tie Analysis in Organizations. *Research in the Sociology of Organizations* 16: 183-210.
- Obstfeld, David. 2005. Social Networks: The *Tertius Iungens* Orientation, and Involvement in Innovation. *Administrative Science Quarterly* 50(1): 100-130.

Optional reading:

- Wasserman & Faust: 556-602.
- Frank, Kenneth A. and Jeffrey Y. Yasumoto. 1998. Linking Action to Social Structure Within a System. Social Capital Within and Between Subgroups. *American Journal of Sociology* 104(3): 642-686.

Class 4: Complete Networks: Non-Local Structure

March 2nd,
2008

- Travers, Jeffrey and Stanley Milgram. 1969. An Experimental Study of the Small World Problem. *Sociometry* 32(4): 425-443.
- Bonacich, Phillip. 1987. Power and Centrality: A Family of Measures. *American Journal of Sociology* 92(5): 1170-1182.
- Robins, Gary, Pattison, Philippa, and Jodie Woolcock. 2005. Small and Other Worlds: Global Network Structures from Local Processes. *American Journal of Sociology* 110(4): 894-936.
- Uzzi, Brian and Jarrett Spiro. 2005. Collaboration and Creativity: The Small World Problem. *American Journal of Sociology* 111(2): 447-504.
- Centola, Damon and Michael W. Macy. 2005. Complex Contagion and the Weakness of Long Ties. *American Journal of Sociology* 113(3): 702-734.

Optional reading:

- de Noor, et. al.: 138-160

Class 5:
March 9th,
2010

Networks and Role Structures

- White, Harrison C., Boorman, Scott A., and Ronald L. Breiger. 1976. Social Structure from Multiple Networks. I. Blockmodels of Roles and Positions. *American Journal of Sociology* 81(4): 730-780.
- Winship, Christopher and Michael Mandel. 1983. Roles and Positions: A Critique and Extension of the Blockmodeling Approach. *Sociological Methodology* 14: 314-344.
- Gerlach, Michael L. 1992. The Japanese Corporate Network: A Blockmodel Analysis. *Administrative Science Quarterly* 37(1): 105-139.
- Padgett, J. F. and C. K. Ansell. 1993. Robust Action and the Rise of the Medici, 1400-1434. *American Journal of Sociology* 98(6): 1259-1319.
- Borgatti, S. P. and M. G. Everett. 1993. Two Algorithms for Computing Regular Equivalence. *Social Networks* 15: 361-376.

Optional reading:

- de Nooy, et. al.: 259-291.
- Boorman, Scott A. and Harrison C. White. 1976. Social Structure from Multiple Networks. II. Role Structures. *American Journal of Sociology* 81(6): 1384-1446.
- Boyd, John P. 2002. Finding and Testing Regular Equivalence. *Social Networks* 24(4): 315-331.

Class 6:
March 30th,
2010

Network Dynamics

- Wasserman, Stanley. 1980. Analyzing Social Networks as Stochastic Processes. *Journal of the American Statistical Association* 75(370): 280-294.
- Galaskiewicz, Joseph and Stanley Wasserman. 1981. A Dynamic Study of Change in a Regional Corporate Network. *American Sociological Review* 46(4): 475-484.
- Hummon, Norman P. 2000. Utility and Dynamic Social Networks. *Social Networks* 22(3): 221-249.
- Snijders, Tom A. B. 2001. The Statistical Evaluation of Social Network Dynamics. *Sociological Methodology* 31: 361-395.
- Jackson, Matthew O. and Allison Watts. 2002. The Evolution of Social and Economic Networks. *Journal of Economic Theory* 106(2): 265-295.
- Kossinets, Gueorgi and Duncan J. Watts. 2006. Empirical Analysis of an Evolving Social Network. *Science* 311 (5757): 88-90.

Optional reading:

- Burt, Ronald S. 1988. The Stability of American Markets. *American Journal of Sociology* 94(2): 356-395.

Class 7:
April 6th,
2010

Cognitive Networks

- Bernard, H. Russell, Killworth, Peter, Kronenfeld, David, and Lee Sailer. 1984. The Problem of Informant Accuracy: The Validity of Retrospective Data. *Annual Review of Anthropology* 13: 495-517.
- Krackhardt, David. 1987. Cognitive Social Structures. *Social Networks* 9: 109-134.
- Freeman, Linton. Romney, A. Kimball, and Sue C. Freeman. 1987. Cognitive Structure and Informant Accuracy. *American Anthropologist* 89(2): 310-325.
- Freeman, Linton. 1992. Filling in the Blanks. A Theory of Cognitive Categories and the Structure of Social Affiliation. *Social Psychology Quarterly* 55(2): 118-127.
- Casciaro, Tiziana. 1998. Seeing Things Clearly: Social Structure, Personality and Accuracy in Social Network Perception. *Social Networks* 20: 331-351.

Class 8:
April 13th,
2010

Inference and Network Structure

- Holland, Paul W. and Samuel Leinhardt. 1981. An Exponential Family of Probability Distributions for Directed Graphs. *Journal of the American Statistical Association* 76(373): 33-50.
- Wang, Yuchung J. and George Y. Wong. 1987. Stochastic Blockmodels for Directed Graphs. *Journal of the American Statistical Association* 82(397): 8-19.
- Van den Bulte, Christophe and Rudy K. Moenaert. 1998. The Effects of R&D Team Co-Location on Communication Patterns among R&D, Marketing, and Manufacturing. *Management Science* 44(11, Part 2 of 22): S1-S18.
- Anderson, Carolyn J., Wasserman, Stanley and Bradley Crouch. 1999. A p^* Primer: Logit Models for Social Networks. *Social Networks* 21(1): 37-66.
- Lazega, Emmanuel and Philippa E. Pattison. 1999. Multiplexity, Generalized Exchange and Cooperation in Organizations: A Case Study. *Social Networks* 21(1): 67-90.

Optional reading:

- Galaskiewicz, Joseph, Wasserman, Stanley, Rasuchanbach, Barbara, Bielefeld, Wolfgang, and Patti Mullaney. 1985. The Influence of Corporate Power, Social Status, and Market Position on Corporate Interlocks in a Regional Network. *Social Forces* 64(2): 403-431.
- Wheat, Christopher O. 2008. Multimodel Identification of Group Structure in Network Data. *Working Paper*.

Class 9: **Networks and Labor Markets**

April 27th,
2010

- Rees, Albert. 1966. Information Networks in Labor Markets. *American Economic Review* 56(1/2): 559-566.
- Granovetter, Mark S. 1973. The Strength of Weak Ties. *American Journal of Sociology* 78(6): 1360-1380.
- Fernandez, Roberto M., Castilla, Emilio J. and Paul Moore. 2000. Social Capital at Work: Networks and Employment at a Phone Center. *American Journal of Sociology* 105(5):1288-1356.
- Calvó-Armengol, Antoni and Matthew O. Jackson. 2004. The Effects of Social Networks on Employment and Inequality. *American Economic Review* 94(3): 426-454.
- Smith, Sandra Susan. 2005. "Don't Put My Name on it": Social Capital Activation and Job-Finding Assistance among the Black Urban Poor. *American Journal of Sociology* 111(1): 1-57.

Optional reading:

- Montgomery, James D. 1991. Social Networks and Labor-Market Outcomes: Toward an Economic Analysis. *American Economic Review* 81(5): 1408-1418.
- Fernandez, Roberto M. and M. Lourdes Sosa. 2005. Gendering the Job: Networks and Recruitment at a Call Center. *American Journal of Sociology* 111(3): 859-904.

Class 10: **Networks, Performance and Competition**

May 4th, 2010

- Burt, Ronald S. 1980. Autonomy in a Social Topology. *American Journal of Sociology* 85(4): 892-925.
- Podolny, Joel. 1993. A Status-Based Model of Market Competition. *American Journal of Sociology* 98(4): 829-872.
- Gulati, Ranjay. 1995. Social Structure and Alliance Formation Patterns: A Longitudinal Analysis. *Administrative Science Quarterly* 40(4): 619-652.
- Uzzi, Brian. 1997. Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness. *Administrative Science Quarterly* 42(1): 35-67.
- Chung, Seungwha (Andy), Singh, Harbir, and Kyungmook Lee. 2000. Complementarity, Status Similarity and Social Capital as Drivers of Alliance Formation. *Strategic Management Journal* 21(1): 1-22.

Class 11: **Networks, Technology and Innovation**

May 11th,
2010

- Coleman, James, Katz, Elihu and Herbert Menzel. 1957. The Diffusion of an Innovation Among Physicians. *Sociometry* 20(4): 253-270.
- Podolny, Joel M., Stuart, Toby E. and Michael T. Hannan. 1996. Networks, Knowledge and Niches: Competition in the Worldwide Semiconductor Industry, 1984-1991. *American Journal of Sociology* 102(3): 659-689.
- Powell, Walter W., Kopu, Kenneth W., and Laurel Smith-Doerr. 1996. Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly* 41(1): 116-145.
- Ahuja, Gautam. 2000. Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study. *Administrative Science Quarterly* 45(3): 425-455.
- Stuart, Toby E. and Waverly W. Ding. 2006. When Do Scientists Become Entrepreneurs? The Structural Antecedents of Commercial Activity in the Academic Life Sciences. *American Journal of Sociology* 112(1): 97-144.

Optional Material to Consider?

Option One **Networks and the Global Economy**

- Smith, Tony. 1979. The Underdevelopment of Development Literature: The Case of Dependency Theory. *World Politics* 31(2): 247-288.
- Smith, David A. and Douglas R. White. 1992. Structure and Dynamics of the Global Economy: Network Analysis of International Trade: 1965-1980. *Social Forces* 70(4): 857-893.
- Van Rossem, Ronan. 1996. The World System Paradigm as General Theory of Development: A Cross-National Test. *American Sociological Review* 61(3): 508-527.
- Bandelj, Nina. 2002. Embedded Economies: Social Relations as Determinants of Foreign Direct Investment in Central and Eastern Europe. *Social Forces* 81(2): 411-444.
- Alderson, Arthur S. and Jason Beckfield. 2004. Power and Position in the World City System. *American Journal of Sociology* 109(4): 811-851.
- Flandreau, Marc and Clemens Jobst. 2005. The Ties that Divide: A Network Analysis of the International Monetary System, 1890-1910. *Journal of Economic History* 65: 977-1007.

Optional reading:

- Rauch, James E. 2001. Business and Social Networks in International Trade. *Journal of Economic Literature* 39(4): 1177-1203.
- Ingram, Paul, Robinson, Jeffrey, and Marc L. Busch. 2005. The Intergovernmental Network of World Trade: IGO Connectedness, Governance, and Embeddedness. *American Journal of Sociology* 111(3): 824-858.
- Wheat, Christopher O. 2008. The Continuing Significance of Place: Producer Location and Exchange in International Markets, 1962-1998. *Working Paper*.

Option Two **Networks and Group Process**

- Ibarra, Herminia. 1992. Homophily and Differential Returns: Sex Difference in Network Structure and Access in an Advertising Firm. *Administrative Science Quarterly* 37(3): 422-447.
- Brass, Daniel J., Butterfield, Kenneth D. and Bruce C. Skaggs. 1998. Relationships and Unethical Behavior: A Social Network Perspective. *Academy of Management Review* 23(1): 14-31.
- Reagans, Ray, Zuckerman, Ezra, and Bill McEvily. 2004. How to Make the Team: Social Networks vs. Demography as Criteria for Designing Effective Teams. *Administrative Science Quarterly* 49(1): 101-133.
- Burt, Ronald S. 2004. Structural Holes and Good Ideas. *American Journal of Sociology* 110(2): 349-399.
- Lawrence, Barbara S. 2006. Organizational Reference Groups: A Missing Perspective on Social Context. *Organization Science* 17(1): 80-100.

Option Three **Wrap Up**