“A collection of human beings does not become a society because each of them has an objectively determined or subjectively impelling life-content. It becomes a society only when the vitality of these contents attains the form of reciprocal influence; only when one individual has an effect, immediate or mediate, upon another, is mere spatial aggregation or temporal succession transformed into society. If, therefore, there is to be a science whose subject matter is society and nothing else, it must exclusively investigate these interactions, these kinds and forms of sociation.”

—Georg Simmel, “The Problem of Sociology” (1908)

What the course does not cover

Many topics are not treated in this course. If you came looking for a particular topic, look through the reading list to check whether it’s covered (or ask me). A copy of this reading list may be found on our course web page.

Course Description

Whereas much sociology is focused on the analysis of variables (such as education and income) abstracted from observable relations among individuals and institutions, social network analysis is the study of structures of social relations. This seminar treats methods for social network research, emphasizing a “how-to” approach to analyzing existing datasets or those collected by seminar participants in their own research.

Prerequisites

There are no formal prerequisites. As Degenne and Forsé (1999) write¹ (p. 12), “in some studies methodology goes straight to the Appendix, but not in network analysis. Most network analysts put methods at the heart of the analysis.” Of course I do not assume that you know about semigroup algebras, eigenvectors, or geodesic distances. My job is to get you comfortable with concepts such as these, by making them as concrete and research-relevant as possible. I am confident I can do this, but the “prerequisite” is motivation on your part to be interested in the practicalities of network analysis and its possible relevance to your research interests. This is a methods course with an attitude (see, e.g., the quotation above). It will help greatly if you have read widely in the social sciences, have conducted your own research or thought about doing so, and have some basic computer and internet skills.

Computer programs: In order to learn how to run and use computer programs for network analysis, I will introduce you to the most widely known program for doing network analysis (UCINET) as well as to another network-analysis program with some distinctive features (Pajek) and to a programming environment (R) that houses some of the most recent advances (and in which I have written many of my own programs that will be made available to you in this seminar). All the programs (and the R environment) may be downloaded from the course web page, and I ask you either to download them to your own computer if possible. Please read the small print in this footnote.2

This course will not “work” for you unless you play around with all the programs, and unless you do some of this “playing” after almost every class (beginning with class 5; see the reading list). The TA in this class is me, and I aim to be available for your questions and concerns (including those about getting programs to run properly) after every class meeting.

Books to purchase: We’ll make extensive use of the Wasserman and Faust text, Social Network Analysis, Methods and Applications (Cambridge Univ. Press 1994). I think you should purchase it. In addition, I think you should purchase the 2011 (second ed., revised and expanded) text by Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj, Exploratory Social Network Analysis with Pajek. (Cambridge Univ. Press). The other books ordered for this course at the bookstore are all great, but I don’t think you “need” to buy them; it’s up to you. The vast majority of other readings are available on the course web site. Take a look!

Other books: There is an explosion of new books on social network analysis. You do not need to purchase any of these; on the other hand, some seminar participants might wish to acquire /consult some of them. For those interested, I try to insert keys in the reading list to some relevant sections of these books.

David Easley & Jon Kleinberg 2010, Networks, Crowds, and Markets: Reasoning about an Interconnected World (Cambridge Univ. Press). The authors are an economist and a computer scientist. Good news: The full-text of the book is available online for free (though the pagination differs slightly from the published version):


Sean F. Everton 2012. Disrupting Dark Networks (Cambridge Univ. Press). The author, a sociologist on the faculty at the Naval Postgraduate School, focuses on how social network analysis can be used to craft strategies to track, destabilize, and disrupt covert and illegal networks. Methodologically the book is very

2 PAJEK and the R computing environment are entirely free of charge. UCINET is free for 90 days and then requires a one-time $40 fee for students—I think it’s well worth it.

Note to Mac users: R is available for PC, Mac, and Unix platforms. UCINET and PAJEK are inherently PC (Windows systems) programs. If you have a Mac, you can of course run PC programs by spending a lot of money on an emulator like VMware or Parallels. There is, however, an entirely free way to run PC programs on a Mac that may work for Mac users. This free solution involves the open-source programs Wine and Wine Bottler. The D2L course page has detailed instructions (on the Main Menu page, where downloading UCINET and Pajek are given). If you are a Mac user and concerned whether you can run UCINET and Pajek, I suggest that you try to download these programs as soon as possible. Depending on your success at downloading the programs, you may want to rethink whether you will stay in the class. I would be glad to consult with you on the downloading questions.
much in the style of de Nooy et al. (see above), featuring a “how-to-run-the-programs-by-clicking-where” approach to the UCINET and Pajek software (which we will be using) and also ORA (another suite of network analysis programs), with an applied-problem orientation. The running example (with open-source data supplied on the author’s website) is network analysis of a covert group believed to be behind several major bombings in Indonesia, 2003-09.


M.E.J. Newman 2010. Networks, An Introduction (Oxford Univ. Press; 772 pages). → This is by far the most mathematical-technical of the books listed here, yet presents material in an elegantly simple way with great intuition. The author is a physicist / complexity theorist.

Course web page: I will make extensive use of a course web site, D2L, sponsored by the University of Arizona. You will find it helpful to “click” often on this site, probably doing so before every class meeting! The web address (url) is:

http://d2l.arizona.edu/

Please “bookmark” this location on your home computer, for easy future reference. Once at the above location, use the “NetID Login” option. If you have enrolled in the course, you should be recognized. (Otherwise, see me.)

Requirements

1. Full participation in a seminar of this type is desirable, and needs to be based on thorough preparation for each class. (Read the material and think about it before each class. Please note that the reading list is not as long as it seems—see the Note at the top of p. 4). Some of the readings are super-technical, so—not uncommonly—you won’t completely understand some readings. My goal however is to enable you to understand, criticize, and apply the major approaches we’ll be learning – through a combination of readings, class lectures, class discussion, handouts, using computer programs, and focusing on examples.

a) In addition to in-class participation, I am also asking everybody to participate at least once a week, on the “Discussions” page of our D2L web site. I will not in general be posing specific discussion questions. I will expect you to write each week something on the order of a page (200 – 250 words, just as a rough guide) concerning either the readings we have done during the past week or will be reading during the subsequent week, or an idea about how something we read might be used by you given your own Master’s thesis / doctoral dissertation / or other research interests. I would like you to post your comments to the whole class, to read each others’ posts, and to comment on them with respect and support. This will help us to come to class “in the middle of a discussion,” rather than “cold.” Participation: 30% of final seminar grade.
2. I will often assign homework, and occasionally collect it. All homework is ungraded. These assignments will usually involve repeating some analysis that we read about. The aim is to empower you as a network researcher who can conduct analyses and understand what you’re doing. Simply completing the homework will count in determining your final grade (20%).

3. There will be some sort of midterm exercise. I might give you a published article and the network data on which it is based, and ask you to discuss/criticize/extend the author’s analysis by means of playing around with the same data, by using the programs we will have discussed in class. This is an exercise, not a magnum opus. (20%)

4. A final paper, which will probably take one of three forms. Probably the most common form will be a data analysis paper, either analysis of data you’ve collected or a re-analysis of data made available through the course. But three other forms are also possible for the final paper: a research proposal; a conventional library-research term paper (“Social Network Imagery in the Novels of Balzac” and “Marketing Research [or the Sociology of Law, etc.] and Social Networks” are two among a very wide set of possible topics), or a critical essay (“What’s Wrong with Network Analysis” or “Bringing Together Social Networks, Rational Choice, Ethnemehodology, and Marxist Post-Structuralism” are possibilities). The paper will be due one week after the last class meeting. Please talk with me as the semester goes along about your ideas for the paper, outlines, and your progress in writing the paper. 30% of final course grade.
Reading List

Please note: (1) Titles abbreviated on the reading list are given in full on pp. 2-3 above. 
(2) I do not assume that we will read all items listed under each class. Some items are listed 
for the sake of (increased) completeness, or for participants who have special interests in 
certain topics. It should be clear ahead of time, class by class, which specific readings I 
assume you will do for the following class. (2) We may spend more than one class on a few 
of these topics, and we won’t get to all of them. (3) Many, in fact the vast majority, of the 
course readings (other than those in the Wasserman-Faust and de Nooy et al. textbooks, 
which I encourage you to purchase) are available on the D2L course web site.

PART 1. The Discovery of Social Networks

1. How do people acquire or construct useful information?

2. When can your “weak” connections to other people be “strong”?
   *Other books* (optional): Easley & Kleinberg, *Networks, Crowds, Markets*, Sects. 3.1 to 3.5 (esp. Sects. 3.1, 3.2, and 3.5 on strong and weak ties and on structural holes and social capital)

3. Social network research pragmatics: Data collection, measurement, design


4. **Some ethical issues**


Optional – However, please read several of the following (your choice, depending on your research interests):


5. An introduction to the UCINET and Pajek programs


Wasserman & Faust, *Social Network Analysis*, pp. 59-66 ("Datasets found in these pages").

Other books [optional]: Everton, *Disrupting*, ch. 3 ("Getting Started with UCINET, NetDraw, Pajek, and ORA")

6. Centrality and structure (and an introduction to the UCINET program)

Wasserman & Faust, *Social Network Analysis*, p. 110 (definition of "geodesic") and pp. 177-192 (on three types of centrality measure).


Optional


7. Positive and negative eigenvector centrality: Different measures are needed for distinctive models of networks
8. **An introduction to R for social network analysis**

Butts, Carter T., et al. "Network Analysis with statnet for Individual, Organizational, and International Relations Applications." Handout, Duke Political Networks Conference, Durham, NC, May 2010. → Read Section 1 (pp. 3-6), Section 3 (pp. 9-13), and Section 2 (pp. 7-8) in that order.


9. **Structural Holes and Clustering Coefficients: Examples of local transitivity**


PART 2. Structural Equivalence, Blockmodels and Community Detection


Esp. pp. **81-89** in de Nooy et al., *Pajek* (2nd ed.), ch. 3 ("Cohesive Subgroups")

Esp. pp. **161-172** in de Nooy et al., *Pajek* (2nd ed.), ch. 7 ("Brokers and Bridges")


11. Finding community structure via iterative correlations


Chen, Chun-Houh . 2002. "Generalized Association Plots: Information Visualization Via Iteratively Generated Correlation Matrices." *Statistica Sinica* 12 (1):7-29. → In particular, read the Abstract and look at Fig. 1!


12. Blockmodels of roles and positions


Esp. pp. **34-50** in de Nooy et al., *Pajek* (2nd ed.), ch. 2 → We will focus on Section 2.4 ("Reduction of a Network"), but you need to read the previous sections of ch. 2 to work up to Sect. 2.4.


*Optional*: Wasserman & Faust on blockmodels, pp. 394-424. [Also pp. 679-88, on goodness of fit].


13. Applications


Optional


14. Finding community structure via (a) eigenvectors and (b) link removal


Optional


Other books (optional): Newman, Networks, An Intro, ch. 11.

PART 3: Dualities

15. Duality and affiliation networks


Optional:

Georg Simmel, "How is Society Possible?" (pp. 6-22), “The Problem of Sociology” (pp. 23-35), and “Group Expansion and the Development of Individuality” (pp. 251-93) in Donald Levine (ed.), Georg Simmel on Individuality and Social Forms (University of Chicago Press, 1972).


Other books (optional): Easley & Klienberg, Networks, Crowds, Markets, Section 4.3; Everton, Disrupting, 102-07 and ch. 8.5; Hennig, Studying Social Networks, 159-62.

16. **Linked design for “big fish” and structural folds (clique percolation) for entrepreneurs**


Other books (optional): Newman, Networks, An Intro, ch. 16 (percolation and network resistance).

17. **Tripartite and multimode networks**


18. **Ecologies of affiliation**


PART 4: Generalized equivalences: Abstract Roles and Positions

19. Balance and clusterability


Esp. pp. 97-107 in de Nooy et al., Pajek (2nd ed.), ch. 4 ("Sentiments and Friendship")


Other books (optional): Easley & Kleinberg, Networks, Crowds, and Markets, ch. 5 (esp. the early sections); Hennig, Studying Social Networks, 41 (balance theory); Newman, Networks, An Intro, Sect. 7.11 (signed edges, structural balance, clusterability).

20. Blockmodels from balance for two relations, and Generalized blockmodeling


21. Automorphic Equivalence


Other books: Everton, Disrupting, 289-94 (automorphic equivalence, regular equivalence); Hennig, Studying Social Networks, 136-37 (regular equivalence).

22. Relational algebras for multiple networks


PART 5. Some Statistical Models for Networks

23. Assessing Correlation and Regression Coefficients for Networks (Quadratic Assignment Procedure)


Other books (optional): Everton, Disrupting, 349-59 (multivariate regression for networks).

24. Stochastic blockmodels


25. Random graph models (classic uniform, small-world, preferential attachment) and Monte Carlo simulation

de Nooy et al., Pajek (2nd ed.), ch. 13 (pp. 336-362).


Other books (optional): Newman, Networks, An Intro, Part IV (pp. 397-565).

26. ERGM models (exponential random graph models): a bare introduction

Pp. 514-517 of Breiger, "Social Network Analysis"


Optional:


**PART 6. Further topics (as time permits and as interests dictate)**

27. **Cognitive Social Structure**


28. **Networks and stories**


Optional:


29. **Congressional committee structure: Duality and community**
