

A Guide for the Methodology Workshop of Social Network Analysis

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In this workshop, I introduce our workshop participants to social network analysis from three different angles, namely, **theory**, **visualization**, and **modeling**. Particularly, I have designed the workshop as a **research-focused** one. After the workshop, the participants are expected to be able to conduct their own research using relevant network theories and methods.

1 Schedule and Topics

10:00-12:30 May/04 Introduction and Network Theories

13:30-16:00 May/04 Network Data and Visualization

10:00-12:30 May/06 Research Route 1: Network Metrics and Traditional Statistical Analysis

10:00-12:30 May/06 Research Route 2: Modeling Network Formation and Evolution

2 Meetings

Zoom <https://us02web.zoom.us/j/86578094746?pwd=QU9KWE55cWQxakw5Yjk2T0ZTL1RZQT09>

PIN **383785**

3 Softwares

There are many available tools and softwares for social network analysis, ranging from Pajek to Python. These softwares serve for different research purposes. For example, if you are interested in simulating network diffusions, NetLogo or Java could be a better choice.

For most academic research, I think **R** is the best choice. With support of numerous libraries, we can conduct various network analysis using **R**. Starting from the second session (i.e., 13:30-16:00 May/04), we are going to use **R** to import and manage network data, visualize complex networks, calculate various network metrics, and model network formation. I thus recommend all workshop participants download and install **R** before our sessions. To make our analysis in **R** easier, I also recommend RStudio, a popular IDE (integrated development environment) for **R** (you can treat RStudio as a “companion” of **R**). Both softwares are under open license agreements. You can find them in the following links:

R, <https://cran.rediris.es/>; and

RStudio, <https://www.rstudio.com/products/rstudio/>
(note, please select the version of “RStudio Desktop”).

It should be noted that I do not assume any prior knowledge about **R**. So no worries if you have not used **R** before.

4 Recommended Readings

Network analysis is highly interdisciplinary. You can find myriads of writings and research of physicists, mathematicians, economists, sociologists, and political scientists. Despite their distinct interests, there are some common threads and themes. My introduction of network theories cover these common threads, with a focus of social science research. I recommend the following readings and I also highlight how these readings fit into certain theoretical perspectives. I will discuss these readings in our sessions. So, no worries if you feel a bit overwhelmed. A list of **further readings** will be provided after the workshop.

- **General overview:**

Ward, Michael D., Katherine Stovel, and Audrey Sacks. 2011. “Network Analysis and Political Science.” *Annual Review of Political Science* 14: 245–264.

Burt, Ronald S., Martin Kilduff, and Stefano Tasselli. 2013. "Social Network Analysis: Foundations and Frontiers on Advantage." *Annual Review of Psychology* 64: 527–547.

- **Reciprocity:**

Axelrod, Robert. 1984. *The Evolution of Cooperation*. New York, NY: Basic Books.

Ostrom, Elinor. 2000. "Collective Action and the Evolution of Social Norms." *The Journal of Economic Perspectives* 14(3): 137–58.

- **Popularity effects:**

Barabási, Albert-László, and Réka Albert. 1999. "Emergence of Scaling in Random Networks." *Science* 286(5439): 509–512.

Cederman, Lars-Erik. 2003. "Modeling the Size of Wars: From Billiard Balls to Sandpiles." *American Political Science Review* 97(1): 135–150.

- **Transitivity effects:**

Granovetter, Mark S. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78(6): 1360–1380.

Putnam, Robert D. 1993. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, NJ: Princeton University Press.

Watts, Duncan J. 1999. "Networks, Dynamics, and the Small-World Phenomenon." *American Journal of Sociology* 105(2): 493–527.

- **Homophily effects:**

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

Melamed, David et al. 2020. "Homophily and Segregation in Cooperative Networks." *American Journal of Sociology* 125(4): 1084–1127.

- **Network metrics:**

Burt, Ronald S. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.

Borgatti, Stephen P. 2005. "Centrality and Network Flow." *Social Networks* 27(1): 55–71.