

# Social Network Analysis: A Primer

Masterclass in Social Research



## Plan for the day

- ▶ Why social network analysis
- ▶ Investigating the social world with networks
- ▶ How do researchers study social networks
- ▶ Looking ahead and additional resources
- ▶ Exercise: Find a network for your research interest/agenda





*"No man is an island entire of itself; every man is a piece of the continent,  
a part of the main."*



# Why social networks?

- ▶ The social world is complex and involves a variety of interactive dynamics among individuals and organizations that together form the social "structure"
- ▶ Social network analysis (SNA) is both an approach and a method, and has received enormous scholarly attention
  - As an approach, SNA encourages us to adopt a "relational" approach to study (and perhaps theorize) the world
  - As a method, SNA requires us to move beyond the traditional disciplinary barriers so as to contextualize, describe/measure, analyze and explain/interpret how different relations shape the outcome of interest systematically
- ▶ Ultimately, SNA is part of the larger field of **network science** and aims to uncover the "principles" of "complex" social system (e.g., chaos theory)

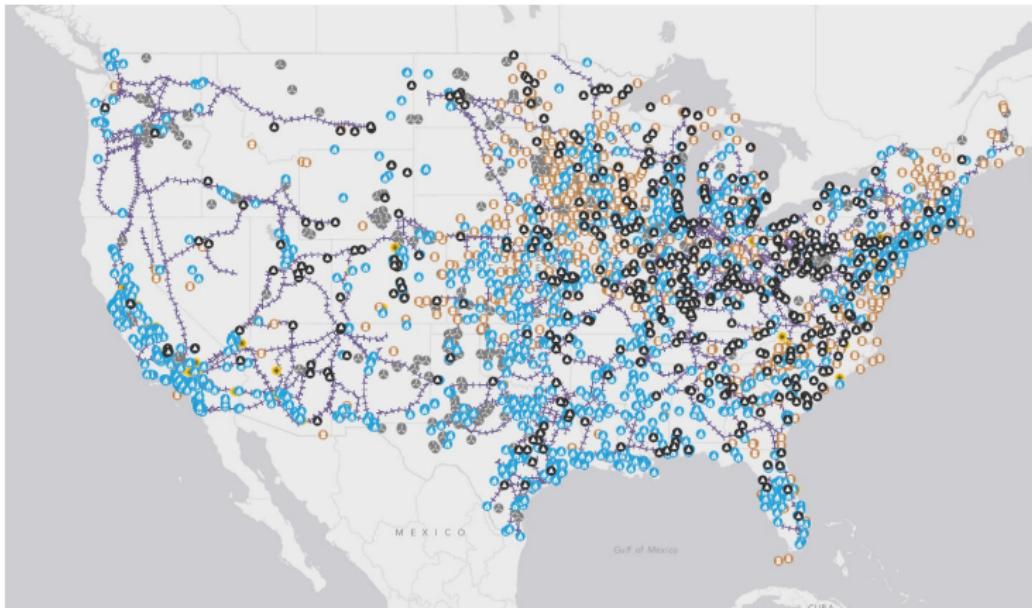


# Investigating the world with networks

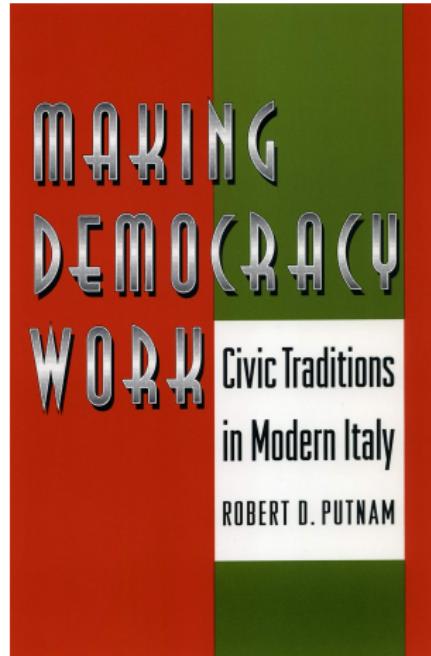
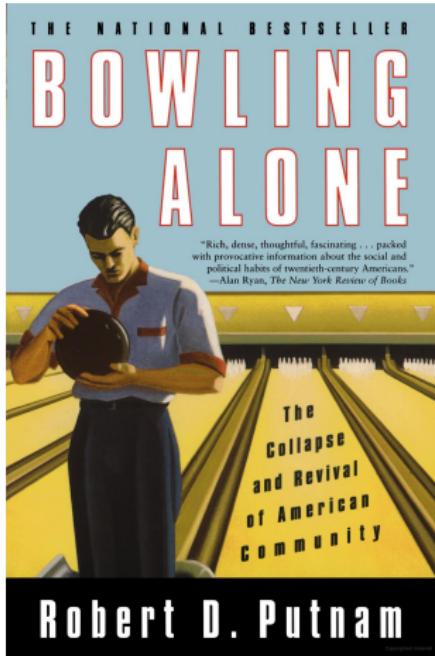
- ▶ Network for "more-than-human" worlds
- ▶ Social networks in politics
  - Social capital
  - Collective action
  - Party ID and vote choices
- ▶ Social networks and organizational behaviors
  - Structural holes
  - Weak ties
  - Community structure



# Energy supply Network in the US



# Social capital and democratic performance

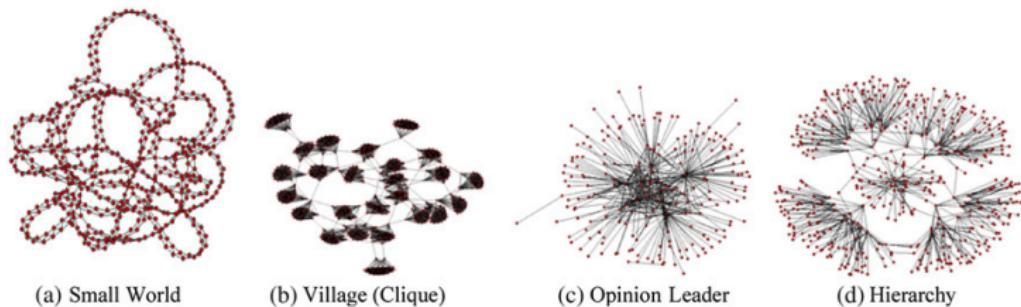


# Repression and social movements

WHEN DOES REPRESSION WORK?

997

FIGURE 1 Network Typology



Siegel, David A. 2011. "When Does Repression Work? Collective Action in Social Networks." *Journal of Politics* 73(4): 993-1010.



# Military coup and regime transition

## Social Origins of Dictatorships: Elite Networks and Political Transitions in Haiti

**Working Paper** Published on 1 November 2016

Authors [Suresh Naidu](#), [James Robinson](#), [Lauren Young](#)

### Abstract

Existing theories of coups against democracy emphasize that elite incentives to mount a coup depend on the threat that democracy represents to them and what they stand to gain from dictatorship. But holding interests constant, some potential plotters, by the nature of their social networks, have much more influence over whether or not a coup succeeds.

Naidu, Robinson and Young (2016) develop a model of elite social networks where coups generate rents for elites and show that the likelihood of an elite participating in a coup is increasing in their network centrality. They empirically explore the model using an original dataset of Haitian elite social networks which they linked to firm-level data on importing firms. By doing so, they show that highly central families are more likely to participate in the 1991 coup against the democratic Aristide government. They then find that the retail prices of the staple goods imported by coup participants differentially increase during subsequent periods of non-democracy. Finally, the authors find that urban children born during periods of non-democracy are more likely to experience adverse health outcomes.

Naidu, Suresh, James A. Robinson, and Lauren E. Young. 2021. "Social Origins of Dictatorships: Elite Networks and Political Transitions in Haiti." *American Political Science Review* 115(3): 900-916.



# Partisan preferences and vote choices in democracies



International Journal of Forecasting

Volume 34, Issue 2, April–June 2018, Pages 235–248



## Social networks and citizen election forecasting: The more friends the better

Debra Leiter<sup>a</sup>, Andreas Murr<sup>b</sup>, Ericka Rascón Ramírez<sup>c</sup>, Mary Stegmaier<sup>d</sup>

Show more

+ Add to Mendeley Share Cite

<https://doi.org/10.1016/j.ijforecast.2017.11.006>

[Get rights and content](#)

Leiter, Debra, Andreas Murr, Ericka Rascón Ramírez, and Mary Stegmaier. 2018. "Social Networks and Citizen Election Forecasting: The More Friends the Better." *International Journal of Forecasting* 34(2): 235–248.

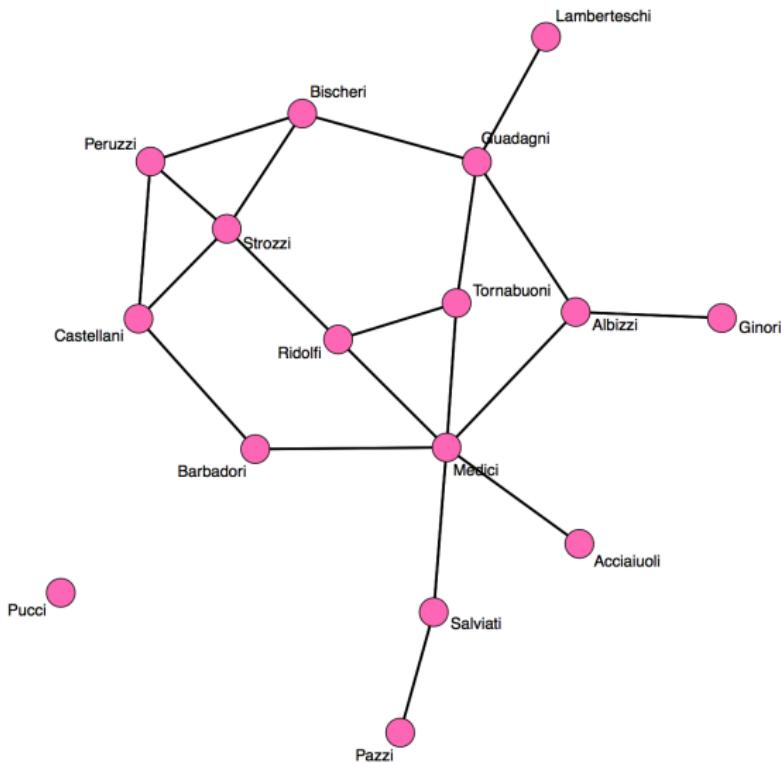


# How do researchers study social networks

- ▶ A **network (graph)** consists of a set of **nodes** (or **vertices**) with certain pairs of these nodes connected by **edges** (i.e., **link**).
  - A node can be an individual or an organization or a country.
  - An edge can be weighted (e.g., trade) and/or directed (e.g., friendship) to represent information exchanges, emotional connections, and financial transactions
- ▶ Two nodes are **neighbors** if they are connected by an edge.



# Example: Inter-marriages between big families in Renaissance Florentine (Padgett and Ansell 1993)



# How do researchers study social networks

- ▶ **Descriptive** SNA: Various qualitative and quantitative summary measures of a network's connectivity
  - Nodes and edges in a network
  - Structural features of a network (e.g., community detection)
- ▶ **Inferential** (generative) SNA, such as quantitative analysis on the underlying dynamic process of network formation and computer-assisted data analysis and simulation (e.g., ERGM)



## Nodes and edges in a network

- ▶ Degree: The number of edges for a node (i.e., how connected a node is in a network)
- ▶ Density: The number of edges out of the max possible of edges of a graph
- ▶ Centrality: The importance (?) of a node in a network
  - Degree centrality: A node is important if it connects to many others in the network
  - Eigenvector centrality: A node is important if it connects to other nodes that connect to many other nodes in the network
  - Closeness centrality: A node is important if it is on average close to many other nodes in the network
  - Betweenness centrality: A node is important if it is on the paths between many other nodes in the graph



# Taking the structure seriously: Community fragmentation and local governance in Global South



American Political  
Science Review

## Article contents

Abstract

Footnotes

References

## Social Network Structures and the Politics of Public Goods Provision: Evidence from the Philippines

Published online by Cambridge University Press: 27 January 2020

CESI CRUZ JULIEN LABBONE and PABLO QUERUBÍN

Show author details ▾

Article Supplementary materials Metrics

Get access

Share

66 Cite

Rights & Permissions

### Abstract

We study the relationship between social structure and political incentives for public goods provision. We argue that when politicians—rather than communities—are responsible for the provision of public goods, social fractionalization may decrease the risk of elite capture and lead to increased public goods provision and electoral competition. We test this using large-scale data on family networks from over 20 million individuals in 15,000 villages of the Philippines. We take advantage of naming conventions to assess intermarriage links between families and use community detection algorithms to identify the relevant clans in those villages. We show that there is more public goods provision and political competition in villages with more fragmented social networks, a result that is robust to controlling for a large number of village characteristics and to alternative estimation techniques.

Cruz, Cesi, Julien Labbone, and Pablo Querubin. 2020. "Social Network Structures and the Politics of Public Goods Provision: Evidence from the Philippines." *American Political Science Review* 114(2): 486-501.



# Taking the structure seriously: Weak ties between two densely connected networks

## The Strength of Weak Ties<sup>1</sup>

Mark S. Granovetter

*Johns Hopkins University*

Analysis of social networks is suggested as a tool for linking micro and macro levels of sociological theory. The procedure is illustrated by elaboration of the macro implications of one aspect of small-scale interaction: the strength of dyadic ties. It is argued that the degree of overlap of two individuals' friendship networks varies directly with the strength of their tie to one another. The impact of this principle on diffusion of influence and information, mobility opportunity, and community organization is explored. Stress is laid on the cohesive power of weak ties. Most network models deal, implicitly, with strong ties, thus confining their applicability to small, well-defined groups. Emphasis on weak ties lends itself to discussion of relations *between* groups and to analysis of segments of social structure not easily defined in terms of primary groups.

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



# Taking the structure seriously: Structural holes and brokers between two densely connected networks

## Structural Holes and Good Ideas<sup>1</sup>

Ronald S. Burt  
*University of Chicago*

This article outlines the mechanism by which brokerage provides social capital. Opinion and behavior are more homogeneous within than between groups, so people connected across groups are more familiar with alternative ways of thinking and behaving. Brokerage across the structural holes between groups provides a vision of options otherwise unseen, which is the mechanism by which brokerage becomes social capital. I review evidence consistent with the hypothesis, then look at the networks around managers in a large American electronics company. The organization is rife with structural holes, and brokerage has its expected correlates. Compensation, positive performance evaluations, promotions, and good ideas are disproportionately in the hands of people whose networks span structural holes. The between-group brokers are more likely to express ideas, less likely to have ideas dismissed, and more likely to have ideas evaluated as valuable. I close with implications for creativity and structural change.

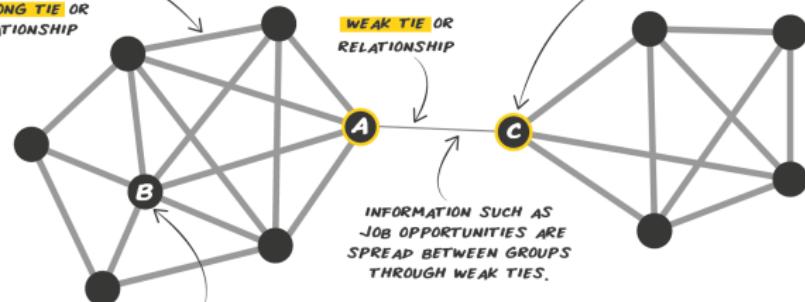


## GRANOVETTER'S STRENGTH OF WEAK TIES

IT'S VALUABLE TO HAVE  
A COMBINATION OF STRONG  
AND WEAK TIES

STRONG TIE OR  
RELATIONSHIP

WEAK TIE OR  
RELATIONSHIP



INFORMATION SUCH AS  
JOB OPPORTUNITIES ARE  
SPREAD BETWEEN GROUPS  
THROUGH WEAK TIES.

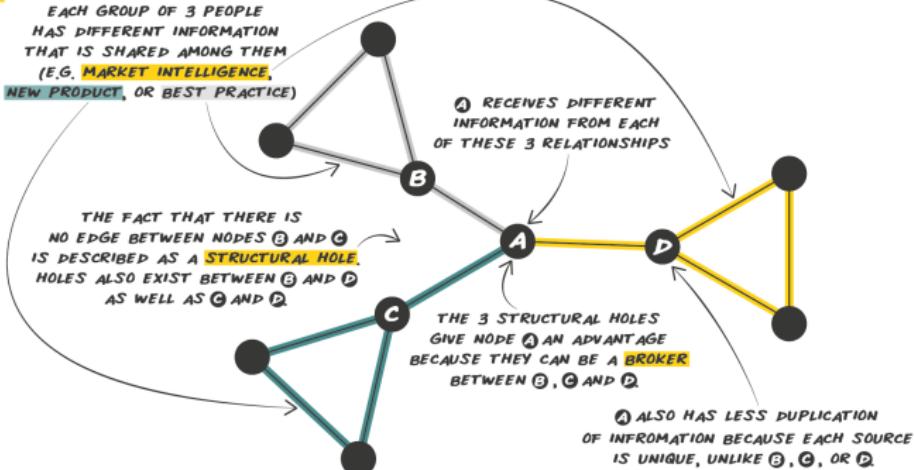
EVEN THOUGH **B** HAS MORE  
TIES THAN **A**, ALL THOSE TIES  
LIKELY HAVE THE SAME INFORMATION  
BECAUSE THEY ALL KNOW EACH OTHER WELL

FOR EXAMPLE, **A** CAN SHARE INFORMATION  
WITH **C** THAT **B** WOULDN'T GET FROM ANYONE  
ELSE IN THEIR GROUP, AND VICE VERSA.

From the Reliants Project: <https://www.reliantsproject.com/>.

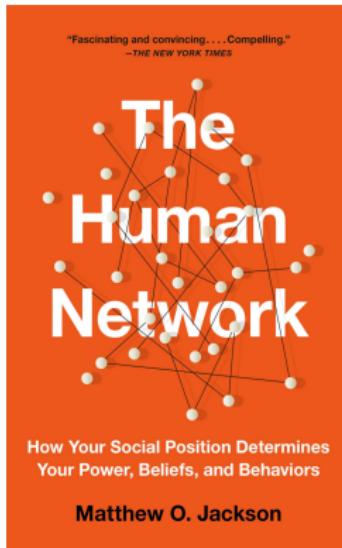
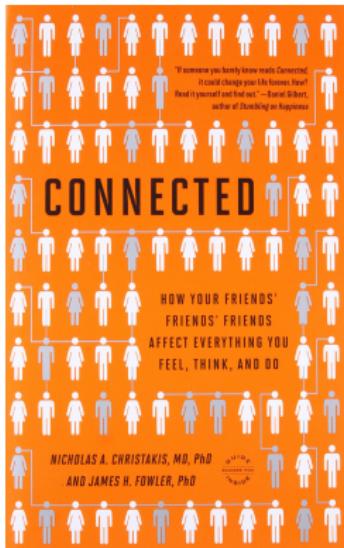


## BURT'S STRUCTURAL HOLES



From the Reliants Project: <https://www.reliantsproject.com/>.





MATTI NELIMARKKA

# COMPUTATIONAL THINKING AND SOCIAL SCIENCE

Combining Programming, Methodologies  
and Fundamental Concepts



Stephen P. Borgatti • Martin G. Everett  
Jeffrey C. Johnson • Filip Agneessens

# Analyzing Social Networks Using R





**"The Santa Fe Institute** is an independent, nonprofit theoretical research institute located in **Santa Fe, New Mexico, United States** and dedicated to the **multidisciplinary study of the fundamental principles of complex adaptive systems**, including **physical, computational, biological** (or ecological), and **social** systems."



## Looking ahead

- ▶ Social network analysis encourages us to study the social world and human behaviors through the lens of "relations"
  - The nodes or vertices of interest can be human (e.g., voters) and/or non-human (e.g., firms and countries)
  - The ties or edges of interest need to be defined and thought through carefully



## Looking ahead

- ▶ Social network analysis (or network science) demands expertise from a variety theoretical knowledge and empirical approaches
  - Theoretical knowledge: Mathematics, physics, engineering, anthropology, sociology, economics, political science and more (the list can go on)
  - Empirical approaches: Qualitative (e.g., archives, ethnography and interviews), quantitative (e.g., surveys and descriptive/inferential SNA), and computational (e.g., agent-based modeling and machine learning)
- ▶ Choose any combinations that suit your research agenda and analytical goals; find the right collaborators.



## Looking ahead

- ▶ Social network analysis remains challenging
  - Training across and collaboration among different subject areas can be difficult and rare
  - Theory-building and data analysis (measurement/operationalization', collection, and analysis) can be daunting
  - Understanding (mechanisms) and interpreting (meanings) findings produced by (inductive and descriptive) data-driven research may contested (e.g., what it means to say a node is important)





Thank you!



## Exercise: Find a network you can study

- ▶ Reflect on your area(s) of substantive interest
- ▶ Pick a particular structure, phenomenon and/or pattern of relations and describe how it might be represented using networks
  - What would the nodes represent? Are the nodes of interest human or non-human?
  - What would the edges represent? Are the edges weighted? Are the edges directed?
- ▶ Reflect on the advantages and disadvantages of your chosen representation – what important features do you capture by using networks?
- ▶ How do you collect the data? Any concerns with respect to logistics and/or ethics?

