What is social network analysis?

Individuals are connected to one another in numerous ways. These patterns of connection form a *social space*. Social network analysis maps and analyzes this social space.
Social network analysis identifies the *relational structure* of a social network.
Why social network analysis?

A *huge* advantage of social network analysis is moving beyond individual perception.

Who are the friends of your friends’ friends?
A **social network** is a set of actors and the relations among them.
Network Components

- **Nodes** (i.e. dots) are the actors in the network
  - **Content**
    - individuals, organizations, groups, etc.
  - Provide an explicit boundary for the population of nodes
Network Components

- **Lines** are the relations or ties between nodes
  - **Content:** some form of social interaction
    - *Multiplex:* department members, center affiliates, collaborators, play golf together, watch sports together, friends, sought advice, received help from or gave help to, etc.
  - **Strength:** weak $\leftrightarrow$ strong
  - **Direction**
    - non-directional
    - directional
Principles of the Network Approach

- The focus is on the relations between actors rather than attributes of actors
  - Relational ties are transfer points for flow of resources (material and non-material)
- Actors are assumed to be interdependent rather than independent, autonomous units
- An actor’s location in the network presents opportunities and imposes constraints on their behavior

(Barry Wellman 1988; Wasserman and Faust 1994)
Principles of the Network Approach

- Understanding a social network requires knowledge of all actors and all relations within the network.
- Networks are emergent and dynamic:
  - Networks arise through social interaction among actors and change over time.
- Networks are comprised of numerous overlapping groups.

(Barry Wellman 1988; Wasserman and Faust 1994)
Common Research Questions

- How does network structure influence actor behaviors and outcomes?
  - Individual productivity, advancement, satisfaction and well-being
  - Group dynamics and productivity

- How does network structure or actor location within the network vary across actor attributes?

- What is the effect of an intervention on network structure?
Conceptual Levels

- The entire network
  - actor subsets (2 or more actors)
    - dyads, groups, etc.
- The location of an actor within the entire network or within a subset of actors
Network Concepts

- **Connectivity**: the degree to which actors in one part of the network are connected to actors in another part of the network

  - **Reachability**
    - Can actor A reach actor B?

  - **Distance**
    - If reachable, how far away?

  - **Independent paths**
    - If reachable, how many different ways?
actor H and I cannot reach one another

distance between actor A and F = 3

distance between actor B and E = 1
independent paths between C and F = 2
What is the probability a resource will pass from one actor to another?

- actors must be *reachable*
  - direct or indirect connection

- the probability *declines* as the *distance* between actors increases
  - one, two, three or four steps away

- the probability *increases* as the number of *independent paths* between actors increase
  - one, two, three or four independent paths
Who has more access to resources?

- actors with a larger number of reachable actors in their network
- actors with a shorter average distance to all reachable actors
- actors with a higher average number of independent paths to all reachable actors

Who are you connected to?
Network Concepts

- **Cohesion**: the degree to which actors are interconnected within the network

  - **Density**
    - the number of possible ties that are actual ties within the entire network or a subset of actors in the network
Department A
Density = 25%

mistrust and instability

Department B
Density = 40%

trust and cooperation

actor conformity to norms and the groups' ability to regulate/enforce norms
Network Concepts

- **Clustering**: the degree to which a network is segmented into partitions or subgroups based on actor commonalities
  - **Actor attribute based partitions**
    - relations are higher among actors with similar attributes
  - **Cohesive subgroups**
    - a set of actors with more relations occurring inside the group than outside the group
The Social Structure of “Countryside” School District

Points Colored by Race

Source: James Moody
Cohesive Subgroups

factions
Network Concept

◆ **Bridge**
  
  - two actors form a bridge when the tie between them connects two disconnected groups
Network Concept

- **Hierarchy**: the degree to which the network mimics a formal hierarchy
  - identifies the status or ranking of individuals or groups within the network
  - informal leaders
Formal Organizational Ties

SOURCE: Brandes, Raab and Wagner (2001)
Advice Seeking Network

SOURCE: Brandes, Raab and Wagner (2001)
The "Real" Hierarchy!

SOURCE: Brandes, Raab and Wagner (2001)