

# Social Network Analysis

## 2-3: Social relationships, relational data, and research designs

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17-18 Jan, 2024

Network research

Mechanisms, processes, network

Research design

Socio-centric vs. ego-centric

Background

## Network research

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Socio-centric vs. ego-centric

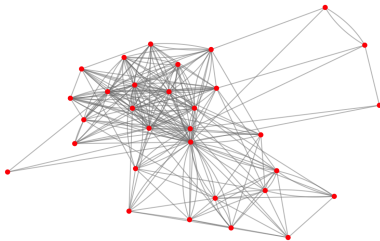
Background

# Network research

## Good models for good research

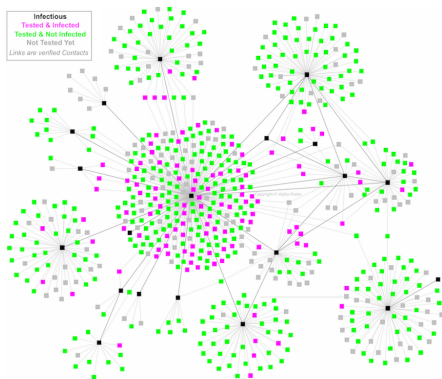
- ▶ Graph theory allows us to represent relationships between objects.
- ▶ Network science/research is the study of relational data (Brandes et al. 2013)
- ▶ In the social sciences we use it to model social relationships between social actors. *Social* networks are models of *social* relationships.
- ▶ Models are neither true nor false. They can be more or less useful as representations of what we aim to study.
- ▶ Beware of the assumptions!

# Social ties



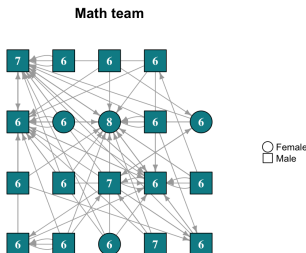
Friendship ties within a class of a Hungarian high school (Vit et al. 2023)

# Social contacts



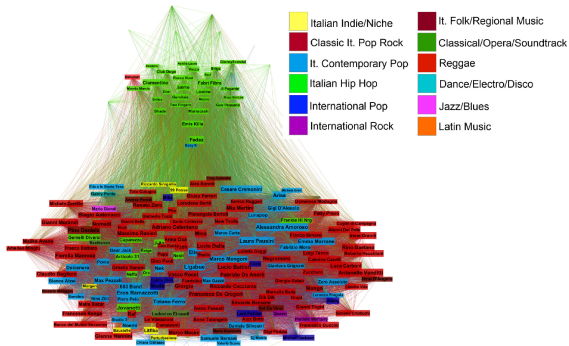
Contacts of a sample of tuberculosis-infected people in Southwest America, 2010 (Andre et al. 2007)

# Social perception



Nominations to represent a classroom (high school in Milan, 2019) in a math competition by gender (De Gioannis, Bianchi, and Squazzoni 2023)

# Social network?



Airoidi (2021)



Network research

Mechanisms, processes, network

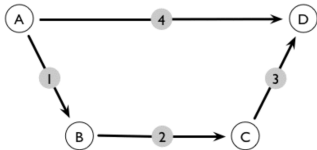
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# Mechanisms, processes, network

## Social mechanisms



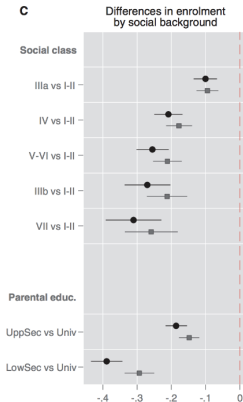
Coleman (1994)

- ▶ Social network research doesn't commit to any particular paradigm
- ▶ Basic assumption: actors' intentionality
- ▶ *Analytical* approach to sociology: Explaining macro-level social phenomena through micro-level causal mechanisms (Hedström and Bearman 2009)
- ▶ Network analysis: testing *relational* processes implied by hypothetical causal mechanisms
- ▶ Mechanisms > relational processes (behaviour)

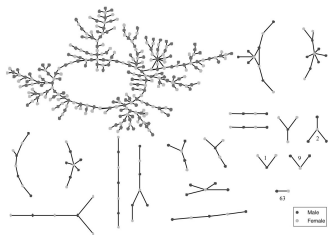
## Example 1

What mechanism (Barone, Triventi, and Assirelli 2018)?

- ▶ fewer resources to finance tertiary education fees?
- ▶ acquisition of high cultural capital perceived as less important?
- ▶ higher risk aversion?
- ▶ lower-track secondary schools?

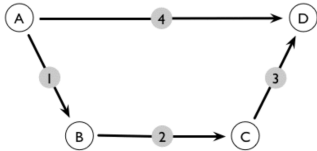


## Example 2



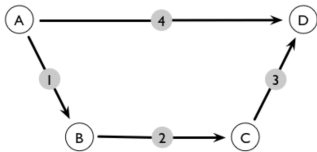
Romantic/sexual relationships in a US high school (Bearman, Moody, and Stovel 2004)

## Social influence



Actors' relationships shape their opportunities to: \* interact with others \* access resources controlled by others (e.g., material goods, information), inc. being exposed to others' behaviour, opinions, beliefs, values (culture)

## Social selection

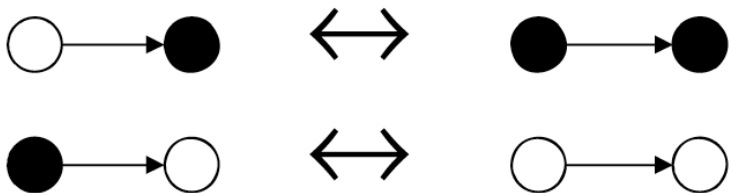


Actors choose interaction partners among those available according to the latter's and their own:

- ▶ beliefs
- ▶ desires
- ▶ preferences
- ▶ ...

# Research design

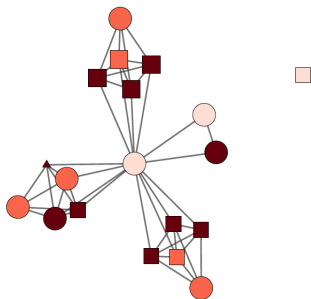
## Network as *explanans*



- ▶ Social networks can be studied as predictors ( $X$ ) of certain outcomes ( $Y$ )
- ▶ Estimating the effect of actors' social network positions ( $X_i$ ) on other individual properties ( $Y_i$ )



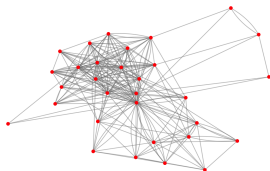
## Complexity of personal networks on cognitive decline



Bianchi et al. (2023)

- ▶ Research question: Does complexity of personal networks ( $X$ ) mitigate older adults' cognitive decline ( $Y$ )?
- ▶ Mechanism: Interacting with people of different clusters implies behaving within different normative and cultural frames, which keeps the brain active and mitigates older adults' neurophysiological ageing
- ▶ Hypothesis: Negative effect of number of clusters on MMSE (Mini-Mental State Examination)

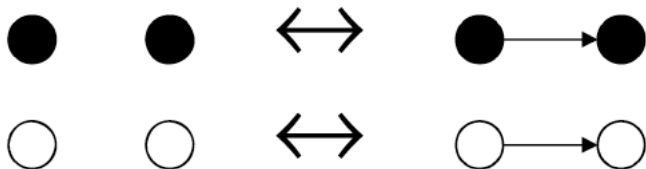
## Peers' influence on academic aspirations



Vit et al. (2023)

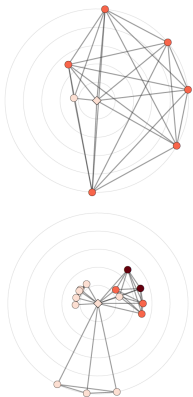
- ▶ Research question: Do high-school students adjust their academic aspirations to their school friends'?
- ▶ Mechanism: Teenagers are especially sensitive to peer pressure from their classmates, which pushes them towards conformity to avoid psychological stress and the risk of being ostracized, which then brings them to adapt their aspirations to their peers
- ▶ Hypothesis: Positive effect of average aspiration level in reading and maths of one's school friends on own aspirations over time

## Networks as *outcomes*



- ▶ Social networks can be explained as outcomes (*explanandum*) ( $Y$ ) of certain individual-level predictors ( $X$ )
- ▶ Estimating the effect of actors' properties (e.g., physical traits, beliefs, preferences, behaviour, etc.) ( $X_i$ ) on their network position ( $Y_i$ )

## Age and intergenerational contact



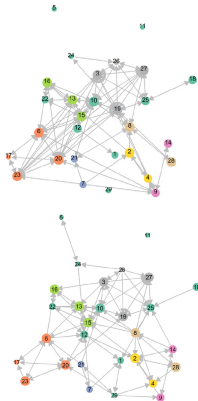
Vacca et al. (2023)

- ▶ Research question: Does age increase the likelihood of intergenerational contacts?
- ▶ Mechanism: High mortality of same-age friends and acquaintances increase the relative degree of opportunities to physically interact with younger-generation individuals.
- ▶ Hypothesis: Positive effect of age on the proportion of younger contact partners in older adults' personal networks

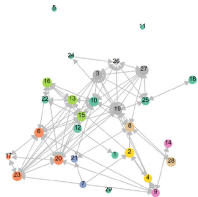


## More complex design?

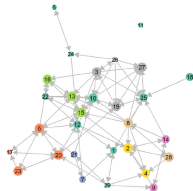
- ▶ Bianchi, Casnici, and Squazzoni (2018)



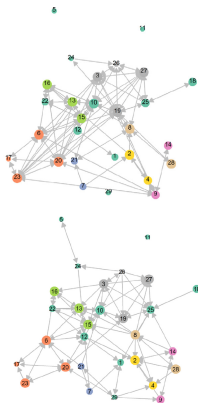
## More complex design?



- ▶ Bianchi, Casnici, and Squazzoni (2018)
- ▶ Can support expectations emerge from professional collaboration relationships?



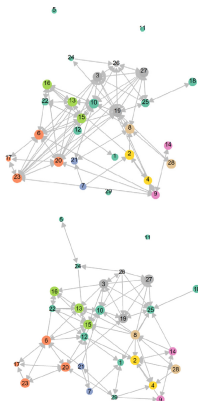
## More complex design?



- ▶ Bianchi, Casnici, and Squazzoni (2018)
- ▶ Can support expectations emerge from professional collaboration relationships?
- ▶ Are networks predictors or outcomes? Is there anything as a purely structural process?



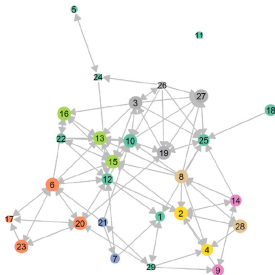
## More complex design?



- ▶ Bianchi, Casnici, and Squazzoni (2018)
- ▶ Can support expectations emerge from professional collaboration relationships?
- ▶ Are networks predictors or outcomes? Is there anything as a purely structural process?
- ▶ Mechanism: Risky, informal economic exchange allows actors to learn each other's trustworthiness, which eventually generates expectations of receiving social support (Molm, Collett, and Schaefer 2007)

## Socio-centric vs. ego-centric

## Full-network design



- ▶ Synonyms: *full-network* or *sociocentric* design
- ▶ Studying the set of links among all pairs of nodes in a given set
- ▶ Problem: network boundaries!

Bianchi, Casnici, and  
Squazzoni (2018)

## Personal-network design

Ego



Alter



Ego-alter tie



Alter-alter tie



- ▶ Synonyms: *ego-centred* or *egocentric* design or *ego-network*
- ▶ *Personal network*: the set of links that a focal actor has with a set of other actors
- ▶ A *personal-network study* is the study of the personal networks of a **sample** of *egos*

Vacca et al. (2023)

## (Difficult) decisions

- ▶ Research question: Do friends' gender-based stereotypes affect female secondary school students' decisions on university career paths?
- ▶ Ego-network or whole-network?

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## Reading

Borgatti, Everett, and Johnson (2013), Ch. 1

Robins (2015), Ch. 3

## References I

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Andre, McKenzie, Kashef Ijaz, Jon D Tillinghast, Valdis E Krebs, Lois A Diem, Beverly Metchock, Theresa Crisp, and Peter D McElroy. 2007. 'Transmission Network Analysis to Complement Routine Tuberculosis Contact Investigations'. *American Journal of Public Health* 97 (3): 470–77.

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