

# Personal Network Analysis

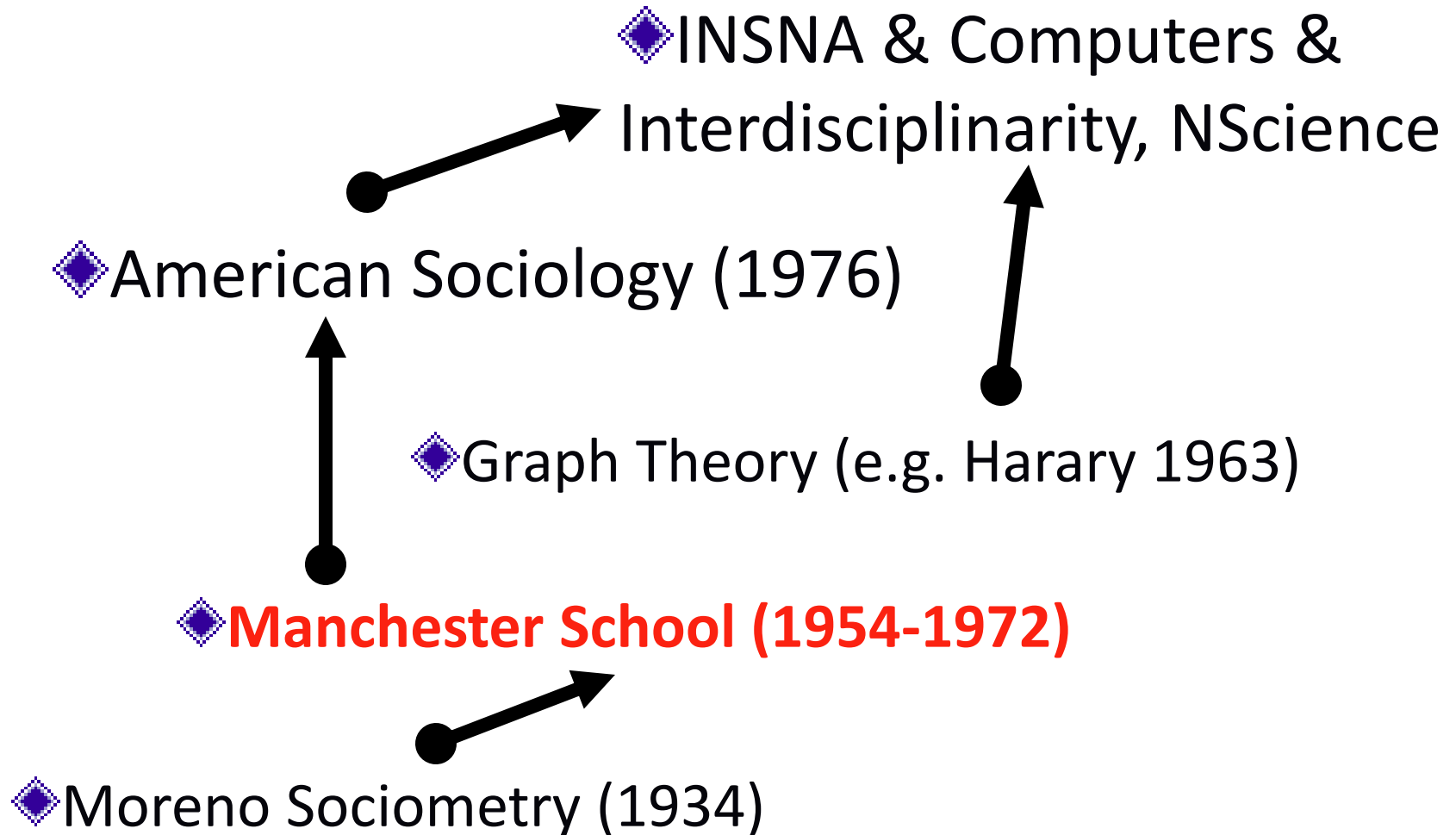
Christopher McCarty

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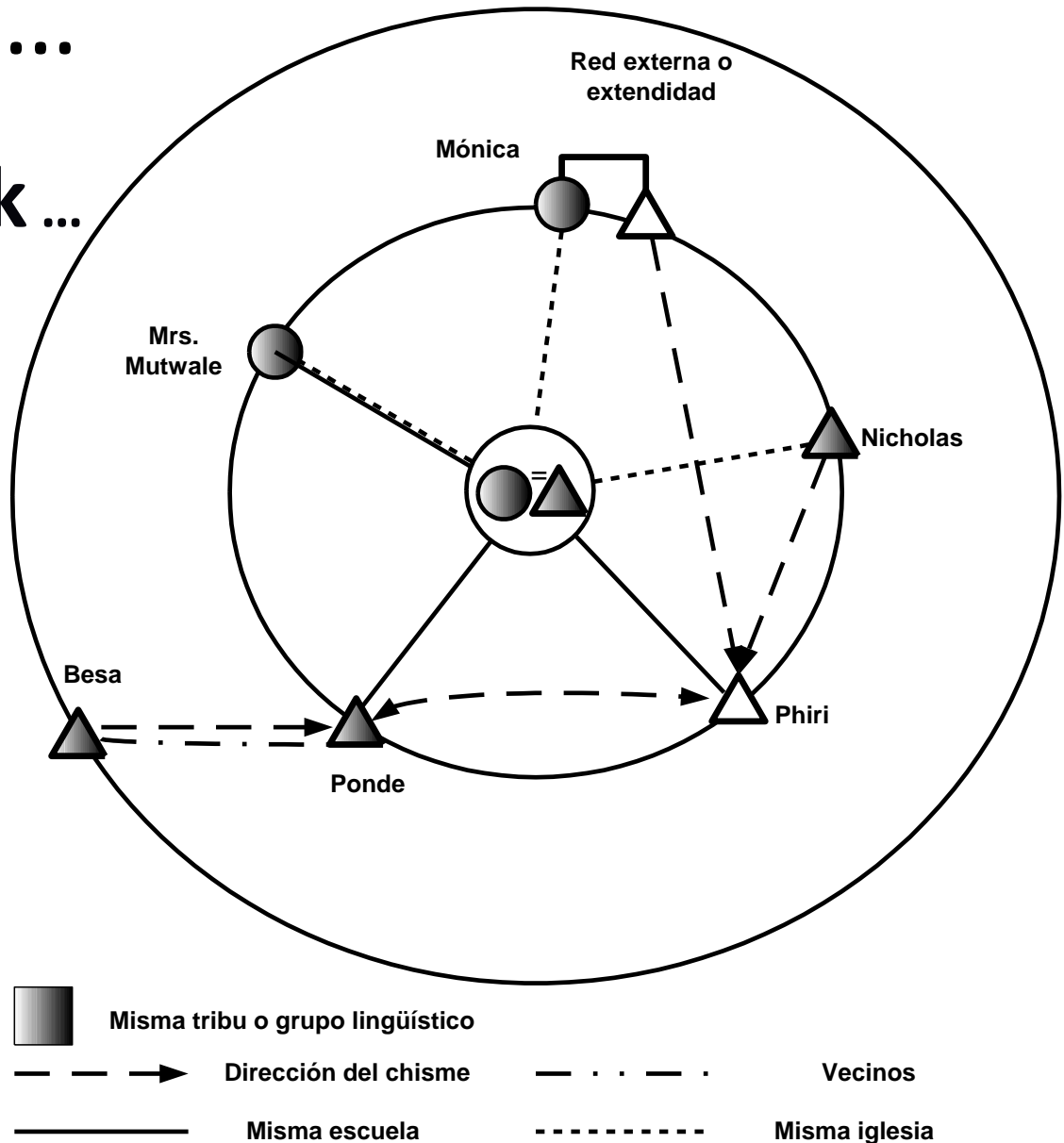
Universitat Autònoma de Barcelona

# A bit of History ...



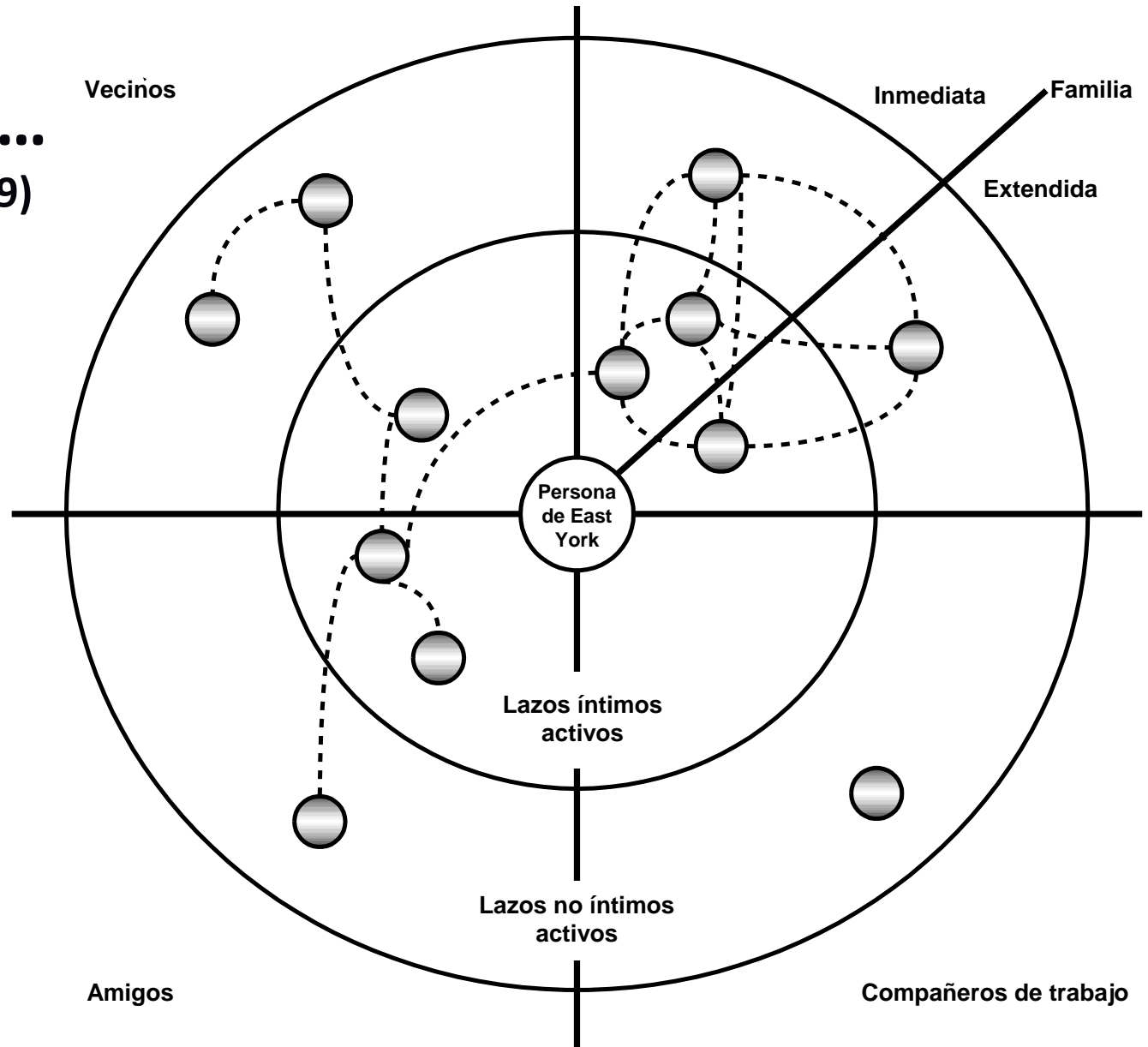
# Gossip network ...

(Epstein, 1957)

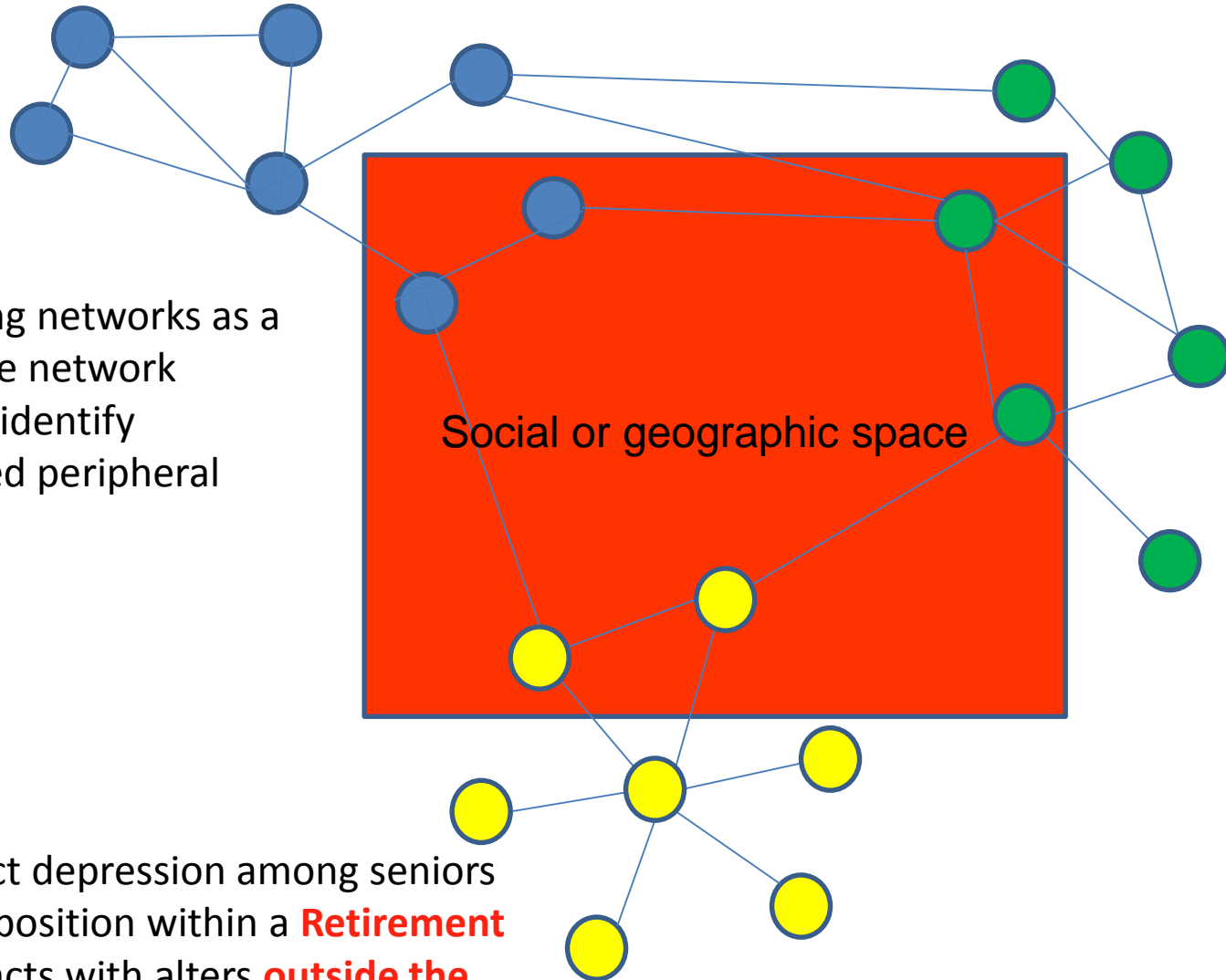


# East York ...

(Wellman, 1999)



# Overlapping personal networks: Bounded and Unbounded Social Phenomena



Use overlapping networks as a proxy for whole network structure, and identify mutually shared peripheral alters

**Example:** Predict depression among seniors based on social position within a **Retirement Home** and contacts with alters **outside the home**

# A note on the term “Egocentric”

- Egocentric means “focused on Ego”.
- You can do an egocentric analysis **within a whole network**
  - See much of Ron Burt’s work on structural holes
  - See the Ego Networks option in Ucinet
- **Personal networks are egocentric networks within the whole network of the World (but not within a typical whole network).**

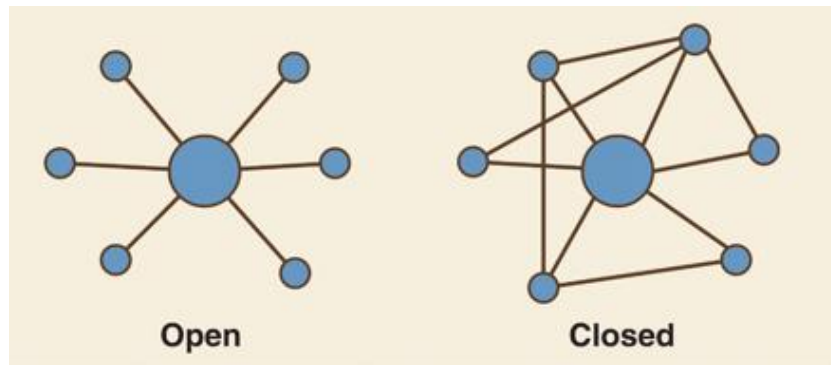
# Conceptual clarifications ...

| Ego centered networks | Ego                | Size | Alter-Alter                           | Nature of the data                  | Social settings |
|-----------------------|--------------------|------|---------------------------------------|-------------------------------------|-----------------|
| Egonets               | Typically included | -    | Absent or either directed /undirected | Cognitive/Intercognitive/behavioral | Single          |
| Egocentric Networks   | Typically included | ~<10 | Either directed /undirected           | Cognitive/Intercognitive/behavioral | Single          |
| Personal Networks     | Typically excluded | ~>20 | Typically undirected                  | Cognitive                           | Multiple        |

# Ego-nets

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SOCIAL NETWORK ANALYSIS FOR EGO-NETS



**Fig. 4.** Two illustrative ego networks.

The one on the left contains many structural holes; the

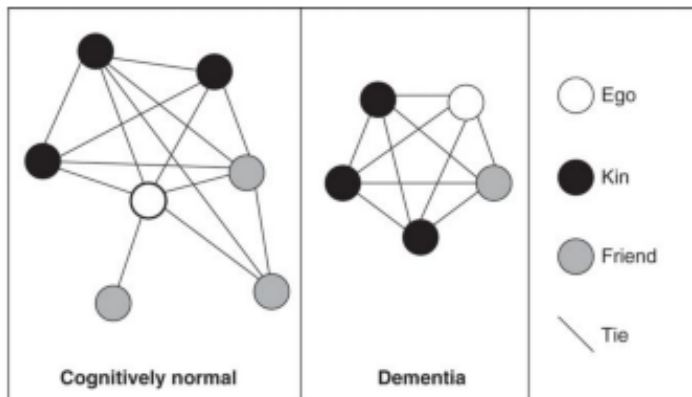
Borgatti, Stephen P, Ajay Mehra, Daniel J Brass, and Giuseppe Labianca. 2009.

“Network Analysis in the Social Sciences.” *Science* 323(5916): 892–96.

Figure 1.1 Visualising an ego-net



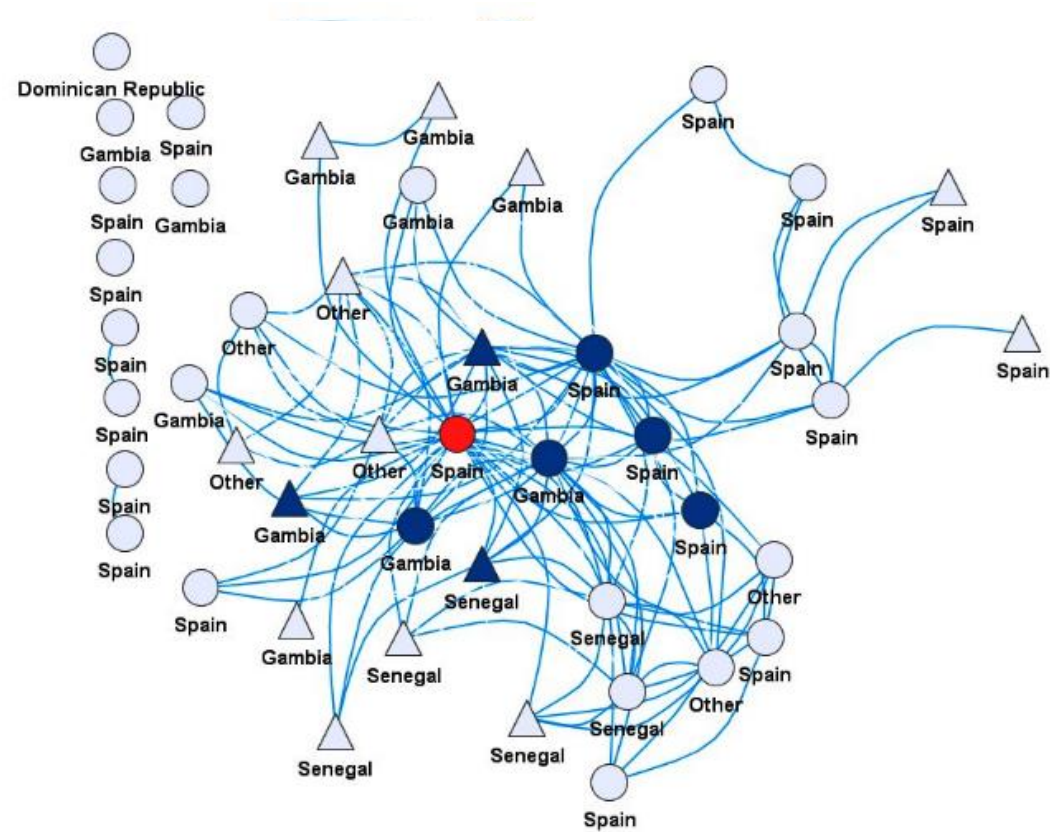
# Egocentric networks



**Figure 2.3** Egocentric social networks of patients with and without dementia

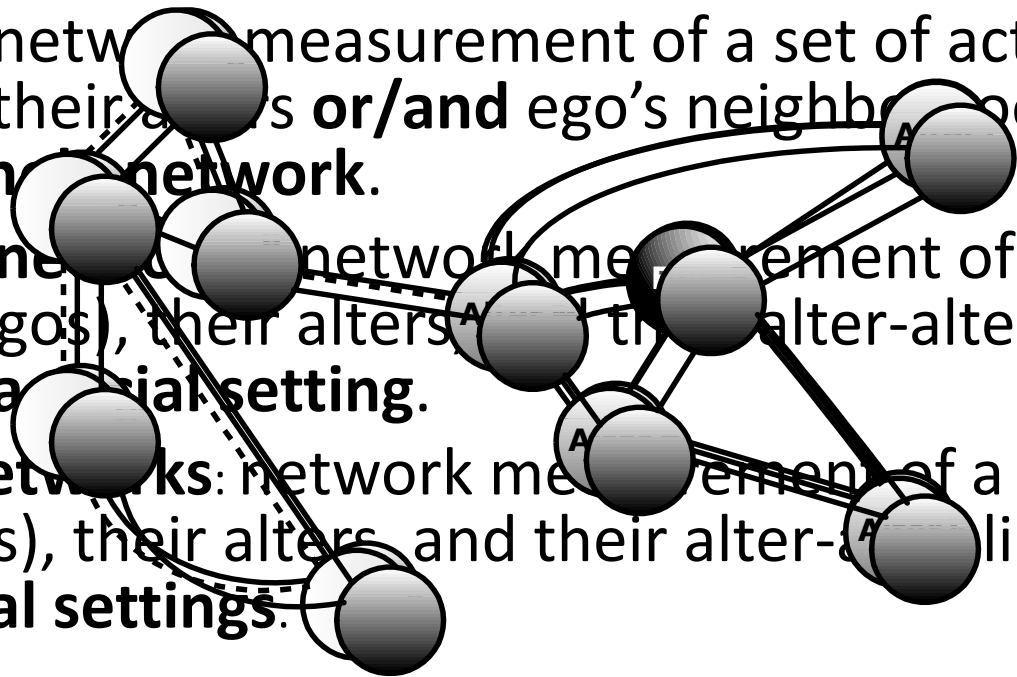
*Reference:* Perry et al. ([2017](#))

# Personal Networks



# Suggested definitions ...

- **Sociocentric approach:** network measurements **among** a set of actors in a given social setting. Whole network.
- **Egocentered approach:** network measurements **of** a set of actors (egos):
  - ~ **Egonets:** network measurement of a set of actors (egos) and their alters **or/and** ego's neighborhood **within a whole network**.
  - **Egocentric networks:** network measurement of a set of actors (egos), their alters, and their alter-alter links **focused in a social setting**.
  - **Personal networks:** network measurement of a set of actors (egos), their alters, and their alter-alter links **across social settings**.

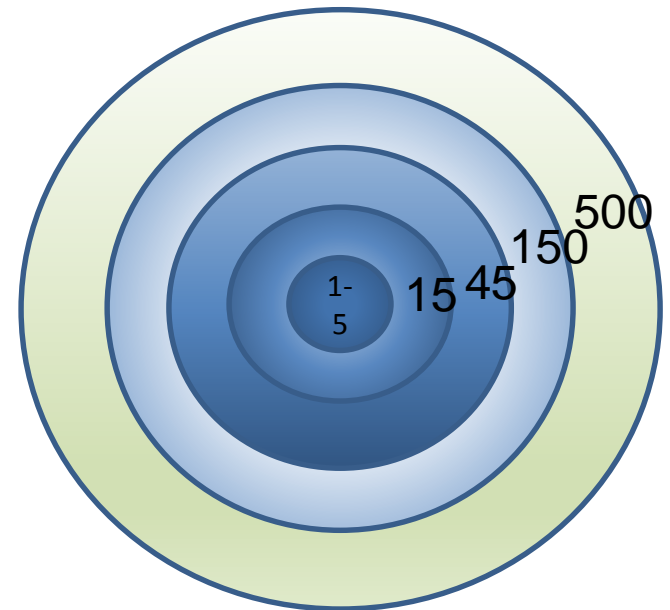


# In sum: what we do know about personal networks?

- Personal Network Size: maybe Dunbar's number is not so bad.
- Cognitive reports are accurate.
- Personal networks add explanatory power to a variety of substantive phenomena.
- Personal network dynamics: life-course, instability and "Lampedusa effect".
- **Personal networks as a way to measure EMERGENT SOCIAL STRUCTURES.**

# Dunbar's number

- Robin Dunbar (1993) hypothesized that the number of people a person can know as individuals and with whom he can maintain contact is related to the size of the neocortex, the part of the brain most involved in social interaction.
- On the basis of this finding, he suggested that the human brain capacity limits the number of personalized, reciprocated relationships to about 150, organized in layers \*3.
- $150 * 3 = 450/500$  (extended network).

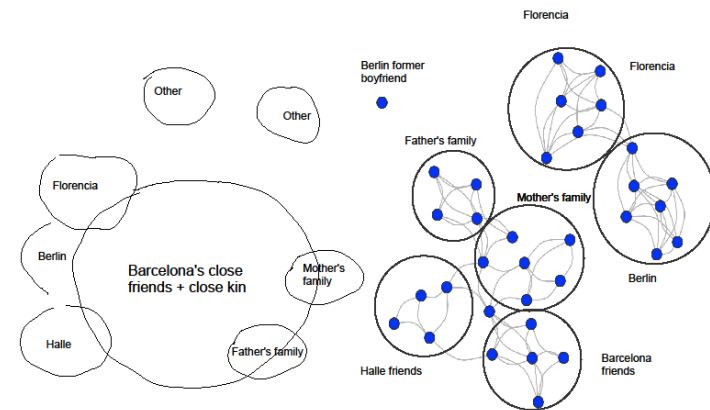


# Cognitive reports about own personal networks are reliable

- Research shows that most of ego-alter ties (75-95%) reported by ego were confirmed or reliable. **BKS** studies are not applicable here (50% of reports are inaccurate).
  - Green Jr., H. D., Hoover, M. A., Wagner, G. J., Ryan, G. W., & Ssegujja, E. (2014). Measuring Agreement between Egos and Alters: Understanding Informant Accuracy in Personal Network Studies. *Field Methods*, 26(2), 126–140.  
<https://doi.org/10.1177/1525822X13492676>
  - Phillips, G., Janulis, P., Mustanski, B., & Birkett, M. (2017). Validation of tie corroboration and reported alter characteristics among a sample of young men who have sex with men. *Social Networks*, 48, 250–255.  
<https://doi.org/10.1016/j.socnet.2016.10.001>
  - Bearman, P. S., Moody, J., & Stovel, K. (2004). Chains of Affection: The Structure of Adolescent Romantic and Sexual Networks. *American Journal of Sociology*, 110(1), 44–91.
- Within the Acculturation project (2004-2007, NSF, BCS-0417429), data collected with EgoNet (N=450) about 45 alters were confirmed during the ex-post visualization and interview.

# Face-to-face data collection: a nightmare and a boon all-in-one

- Web-based questionnaires are good for egocentric networks but still not for personal networks.
- EgoNet, Vennmaker, the forthcoming NetCanvas are useful tools that allow visualizations and interactive or ex-post qualitative interviews.
- Co-discovery process with particip
- Reliability.
- Social Media is not a substitute but a complement.



# Personal networks add explanatory power to a variety of substantive phenomena

- **Social integration** into the mainstream society → proportion of Nationals in the network, average closeness with Nationals, density of relationship among Nationals ...  
Vacca, Raffaele, Giacomo Solano, Miranda Jessica Lubbers, José Luis Molina, and Christopher McCarty. (2017) . "A Personal Network Approach to the Study of Immigrant Structural Assimilation and Transnationalism." *Social Networks*.  
doi:<http://dx.doi.org/10.1016/j.socnet.2016.08.007>.
- **Ethnic identification:** dense network of compatriots is associated with essential identities whereas diverse networks exhibit plural identities.  
Lubbers, Miranda; Molina, José Luis y Chris McCarty (2007). "Personal Networks and Ethnic Identifications: The Case of Migrants in Spain", *International Sociology*, Vol. 22, 6 (720-740)
- **Ethnic entrepreneurship /social entrepreneurship:** mixed embeddedness, balance between co-ethnics and Nationals / strong and weak ties.  
Molina, JL et al. (2015). Looking Inside the Ethnic Enclave: Inequality, Social Capital and Transnationalism. In: Louise Ryan, Umut Erel, Alessio D'Angelo (eds), *Migrant Capital. Networks, Identities and Strategies*. London: Palgrave Mcmillan.
- **Health:** balance between dense networks and different social circles are associated with higher levels of specialized social support, and wellbeing ... Loneliness kills ... see Lisa Berkman, Tom Valente studies ...



# Lessons learned

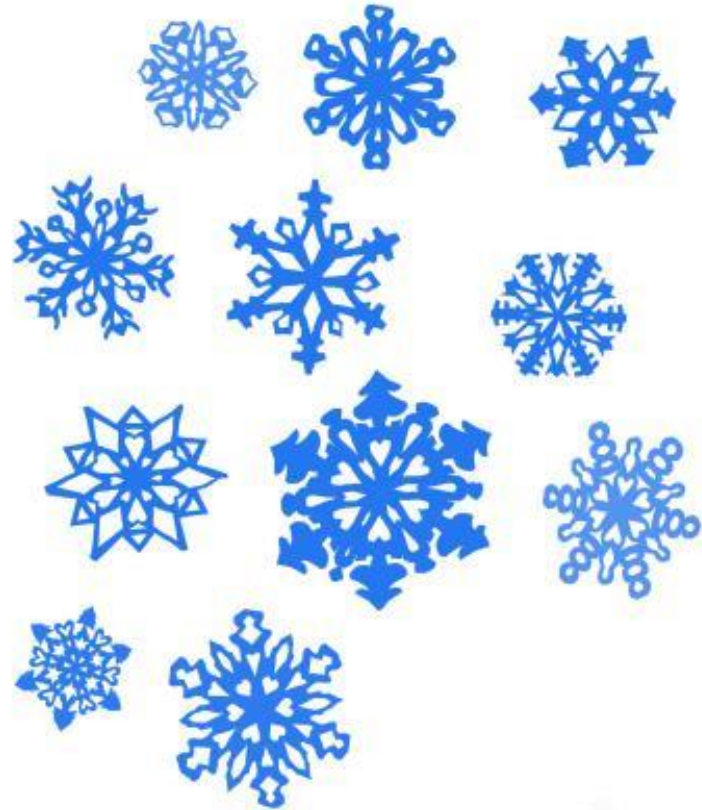
- **Size** matters.
- **Structure** matters: several dense social circles are good indicators of many dimensions (social integration, social capital, wellbeing, performance).
- Ego-alter **closeness** matters ... (influence/selection processes)
- (Ego) **Betweenness** matters the most!
- **Homophily** (both in strong and weak ties).
- **Affiliation** to institutions/organizations matters!!!

# **1. Introduction to Personal Networks (ii).**

**What are we measuring?**

# Personal networks are unique

- Like snowflakes, no two personal networks are exactly alike
- Social contexts may share attributes, but the combinations of attributes are each different
- We assume that the differences across respondents influences attitudes, behaviors and conditions



# The content and shape of a personal network may be influenced by many variables

- **Ascribed** characteristics
  - Sex
  - Age
  - Race
  - Place of birth
  - Family ties
  - Genetic attributes
- **Chosen** characteristics
  - Income
  - Occupation
  - Hobbies
  - Religion
  - Location of home
  - Amount of travel

# Many variables of interest to social scientists are thought to be influenced by social context

## – Social outcomes

- Personality
- Acculturation
- Well-being
- Social capital
- Social support

## – Health outcomes

- Smoking
- Depression
- Fertility
- Obesity



# **1. Introduction to Personal Networks (iii).**

**Types of personal network data**

# Types of personal network data

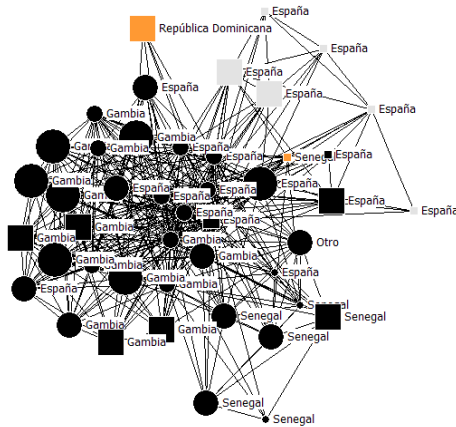
- **Composition:** Variables that summarize the attributes of alters in a network.
  - Average age of alters.
  - Proportion of alters who are women.
  - Proportion of alters that provide emotional support.
- **Structure:** Metrics that summarize structure.
  - Number of components.
  - Betweenness centralization.
  - Subgroups.
- **Composition and Structure:** Variables that capture both.
  - E-I Index

## Personal network composition variables

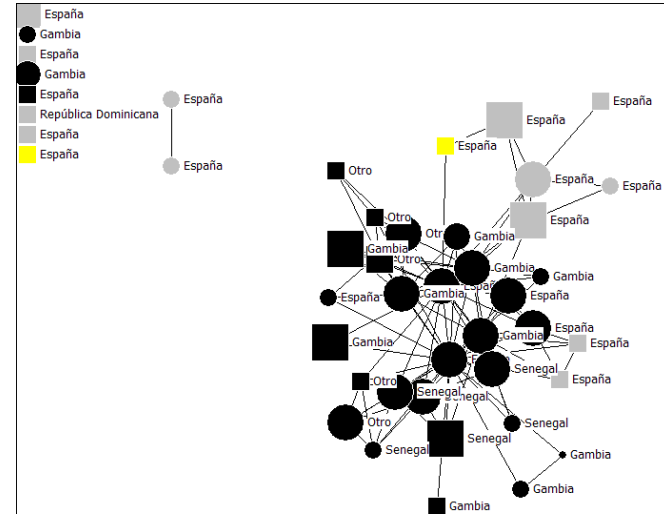
- \* Proportion of personal network that are women ...
- \* Average age of network alters ...
- \* Proportion of strong ties ...
- \* Average number of years knowing alters ...



# Percent of alters from host country



36 Percent Host Country



44 Percent Host Country

- Percent from host country captures composition
- Does not capture structure

# Personal Network Structure

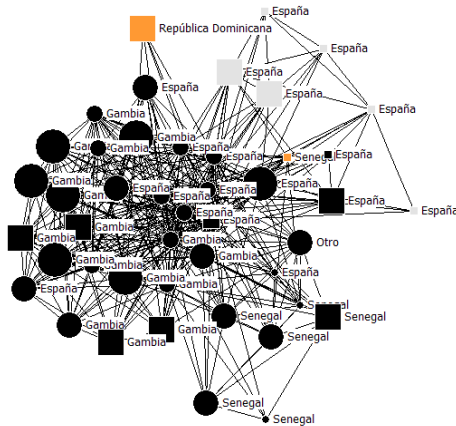
## Alter adjacency matrix

[illegible]

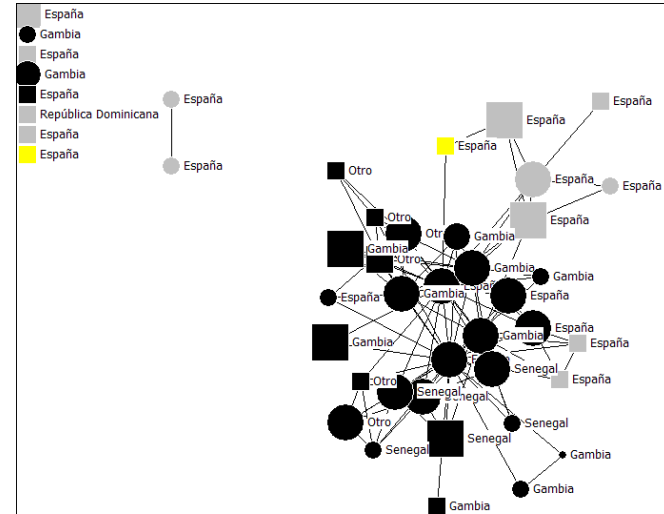
# Personal network structural variables

- Average degree centrality (density)
- Average closeness centrality
- Average betweenness centrality
- Core/periphery
- Number of components
- Number of isolates

# Components



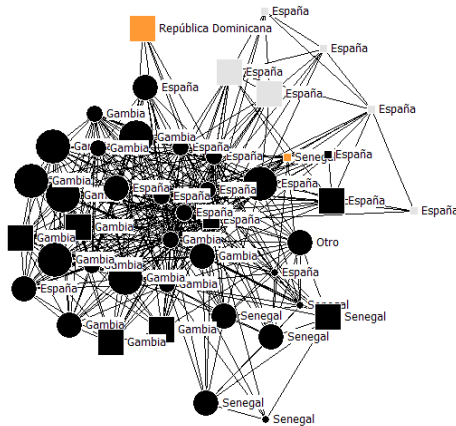
Components 1



Components 10

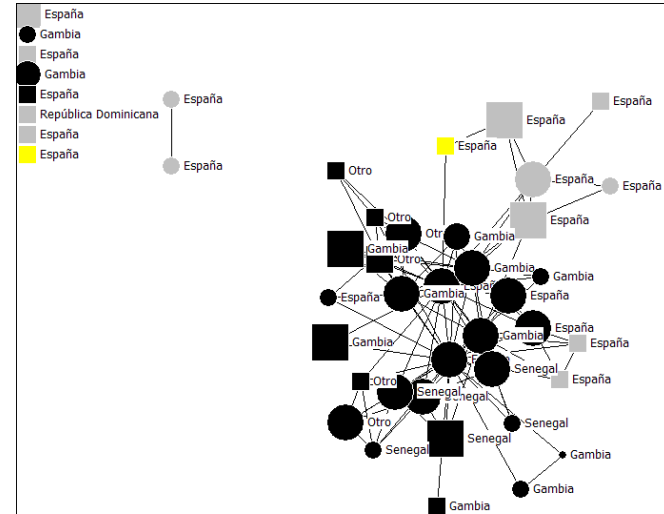
- Components captures separately maintained groups (network structure)
- It does not capture type of groups (network composition)

# Average Betweenness Centrality



Average Betweenness 12.7

SD 26.5



Average Betweenness 14.6

SD 40.5

- Betweenness centrality captures bridging between groups
- It does not capture the types of groups that are bridged