



SOCIAL NETWORK ANALYTICS

Egocentric Networks

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SOCIAL NETWORK ANALYTICS

Types of Social Network Analysis

➤ Egocentric Social Network Analysis

- **Focuses on the individual**
- Understands the structure, function, and composition of network ties around an individual.
- **Studies an individual's personal network and its affects on that individual.**



➤ Sociocentric Social Network Analysis

- **Focuses on whole group of people**
- **Quantifies relationships between people in a group**
- **Studies patterns of interactions and how these patterns affect the group as a whole**



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Types of Social Network Analysis

Sociocentric Social Network Analysis

- In Sociocentric Network Analysis, knowing the network boundary and knowing the list of all actors in the network is very important.
- Studies **how interactions, patterns of interactions, and network structure** affect
 - Concentration of power
 - Flow of information or resources
 - Spread of disease
 - Access to new ideas



An **egocentric network** consists of

- 1) a focal node/central actor ("ego"), +
- 2) the nodes they are directly connected to ego (termed "alters") +
- 3) the ties, if any, among the alters, as shown in Figure 1.

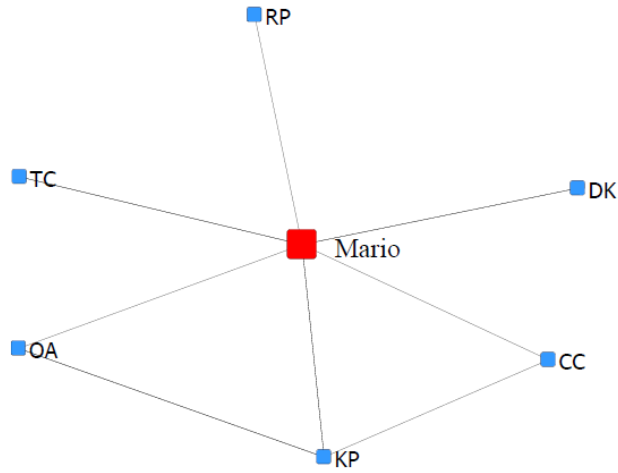


Figure . Ego network of Mario

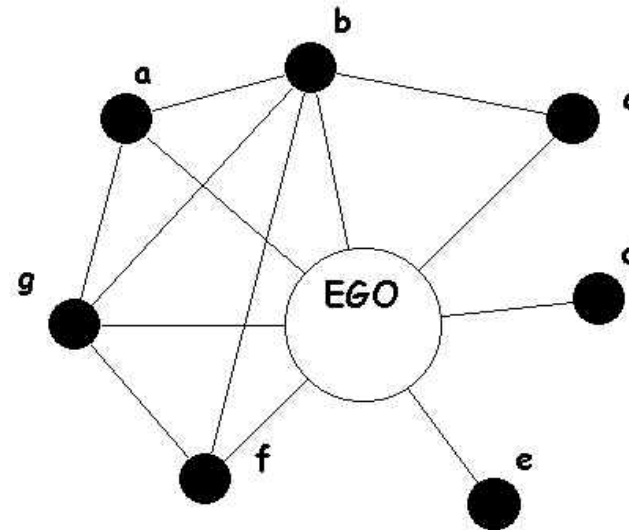


Figure . Ego network

The ego is the central actor of interest in a particular domain (e.g., an individual, a device, an organization or a synapse).

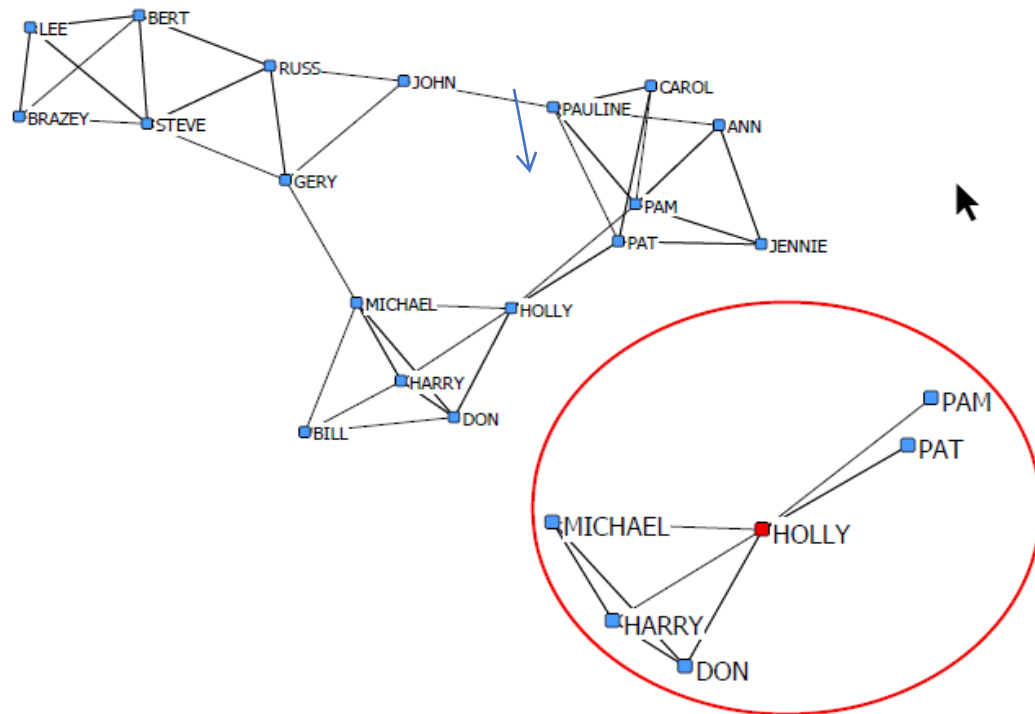
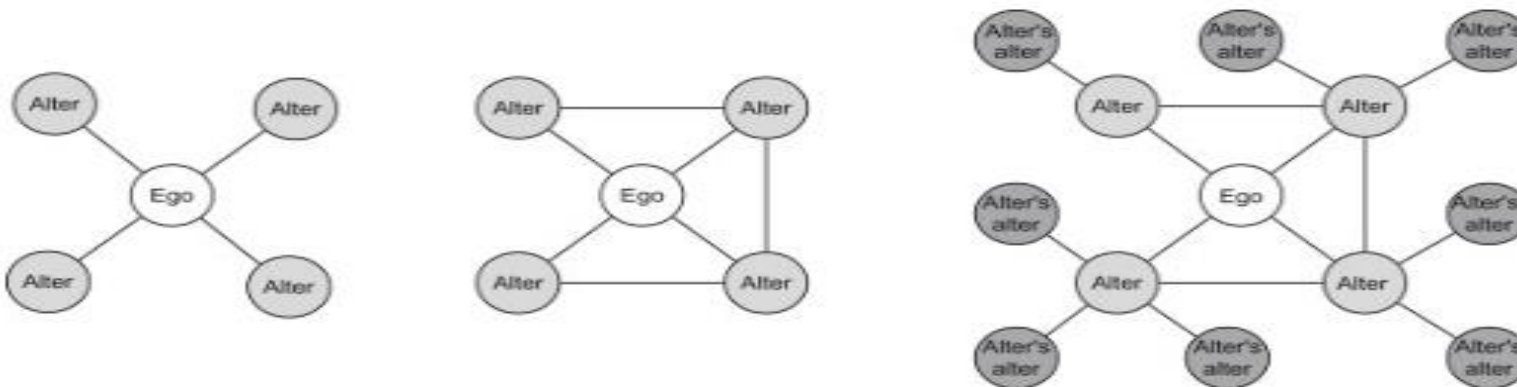


Figure 2. Extraction of Holly's ego network from a full network

The Ego-network and its boundary is defined in terms of levels:

- **Level 1.0 network:** It is a star network that shows ego and all of ego's alters.
- **Level 1.5 network:** It includes alters and any ties between these alters. (i.e., Level 1.0 network + ties between alters)
- **Level 2.0 network:** It includes all of alter's other connections, and not just to alters that ego knows. (i.e., Level 1.5 network + all alter's alters)



Examples of a 1.0, 1.5, and 2.0 network.

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Egocentric Network

- What Kind of Network is your Facebook Friendship Network?



- What Kind of Network is your Facebook Friendship Network?

Answer: Egocentric Network

Facebook allows an individual to discover his or her 1.5-degree/level egocentric network, but it does not allow people to discover their 2.0 degree egocentric network.

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Egocentric Network



Simple Homework/assignment:

- In your facebook account explore how to find how many of my friends know each other.

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Egocentric Network

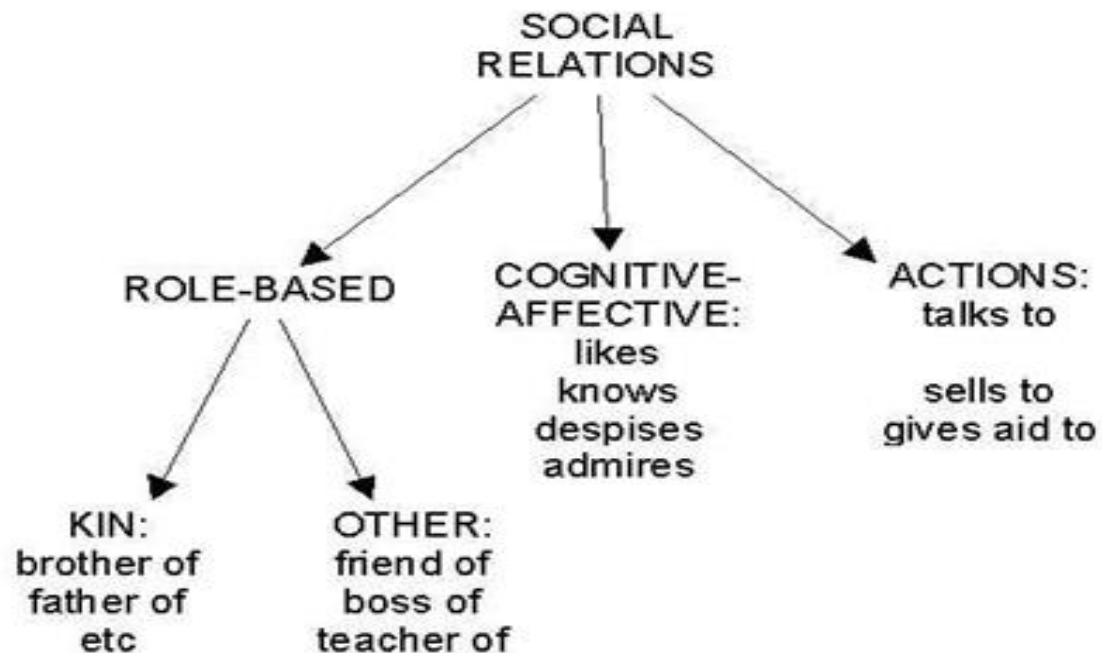
- What Kind of Network is your Twitter account Network?



➤ Social Relations

- Egos and alters are tied to each other by social relations.

There are various kinds of social relations, including:



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Egocentric Network: Why Study Ego Networks?



➤ Ego's network is a source of:

- **Information** - If all of my alters are homophilic in nature information overlaps, If all my alters are heterophilic in nature, there is more chance of getting the novel information.
- **Social support** - A person having more friends and relatives is very important in a society, Because Social support enhances quality of life and provides a buffer against adverse life events.
- **Access to resources** - If ego is an entrepreneur having many contacts, Using those contacts, the Entrepreneur may get the clients and employees and consultants they need.
- **Sense-making** - The process through which individuals work to understand novel, unexpected, or confusing events.
- **Influence** - If majority of my alters are having good habits, there is a more chance that ego is also having good habits.
- etc.

All of which can influence Ego's behavior

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Egocentric Network: Data Collection



- In the field of social science, Egocentric Network Data Collection relies on surveys.
- Survey researchers commonly use
 1. *Name generators* to generate a list of ego's closest confidants (i.e., alters) and
 2. *Name interpreters* to collect alters characteristics.
- **Name generator:**
 - A name generator is a survey item that asks **ego(respondent)** to name a certain number of other actors with whom they share a particular type of social relation.
 - The ego may name anyone from any sphere of life: neighbors, kin, friends, coworkers, etc.
 - End result is a list of unique names (i.e., alters).

- **Example of Name Generator**

Multiple name generator strategy from the Social Factors and COVID-19 Project

The name generator question for COVID-19 patient is

In the past 1-week/2-weeks, who are the people who you ...

1. live with
2. travelled with
3. worked with or hustled with
4. met socially or hung out with
such as going out to lunch, dinner, drinks, films, visiting one another's homes, and so on
5. ...

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Egocentric Network: Data Collection

- After obtaining a list of alters, the GSS proceeds with a series of **name interpreter questions**, which **collects information on the characteristics of people named**.
- **Name interpreter:** For each alter generated by the name generator ask sets of questions to ego:
 - **Nature of the relationship with that alter** (what social relation ?
- Friends? Coworkers? Kin? How long known? Frequency of communication?) and
 - **Attributes of each alter** (age, gender, race, income, etc.).



	Ed	Sue	Jim	Bob
Ed	-	1	0	0
Sue	0	-	1	1
Jim	0	0	-	0
Bob	1	0	0	-

Relational Data

	Gender	Education	Salary
Ed	0	14	50000
Sue	1	15	99000
Jim	0	12	65000
Bob	0	8	15000

Attribute Data

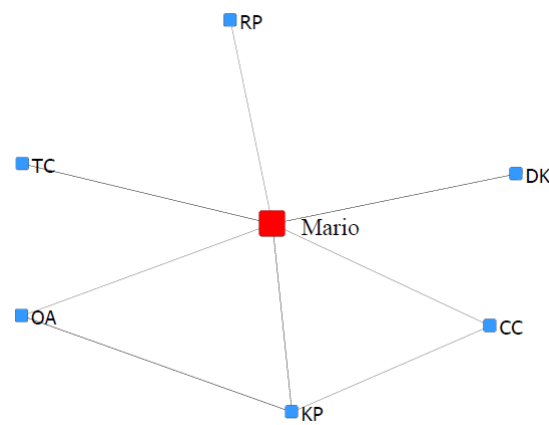
➤ Example of Name Interpreter

Questions that deal with ego's relationship with [or perception of] each alter

- What social relation?
- How close are you with <alter>?
- How frequently do you interact with <alter>?
- How long have you known <alter>?
- What is the age, gender, race, income, etc of <alter>?

All of these questions will be asked for each alter named in the previous section

- Name interpreter questions elicit additional information about ego's perceptions of the attributes of each alter (e.g., sex, race, income, etc.) and the shared relationship (e.g., duration, intensity, frequency, etc.).



Ego ID	Alter ID	Alter Age	Alter Gender	Alter Religion	Alter Income	Alter frequency of contact
Mario	RP	32	Male	Muslim	55000	4
Mario	CC	18	Female	Catholic	23000	1
Mario	OA	28	Female	Catholic	64000	4
Mario	TC	56	Male	Protestant	43000	2
Mario	KP	31	Male	Muslim	17000	2

Figure 3, Name interpreter grid for Ego Mario

➤ The researcher might also ask *name interrelator questions* that require the ego to indicate whether the nominated alters themselves are connected.

➤ Sample Alter-Alter Relationship Questions

- Think about the relationship between <alter1> and <alter2>. **Would you say that they are strangers, just friends, or especially close?**
- **Note: this question is asked for each unique alter-alter pair.**
 - E.g., if there are 20 alters, there are 190 alter-alter relationship questions!
 - Typically, we only ask one alter-alter relationship question (Adapted from Burt, 1998)

➤ Characteristics of Ego Networks

- **A standing hypothesis about ego networks is that strong ties are homophilous.**

That is, people have the strongest ties with people who similar to themselves on key attributes, such as social class, age, sex, race, political views, etc.

- **Another standing hypothesis or guiding principle is that people with heterogeneous networks are "better off".**

The greater the diversity of their network, the more chance that someone in the network has something ego needs. This is particularly relevant for entrepreneurs.

➤ Characteristics of Ego Networks

- According to Granovetter, the stronger the tie between Ego and two of her alters, the greater the likelihood that the alters enjoy at least a weak tie.
- Granovetter also believes that weak ties provide people with access to novel information, whereas your strong ties tend to know the same things you do.

Hence, the denser the ties in an ego network, the stronger the ties, and the more insular the ego network and also the more homogeneous.

❑ Ego network measures are based on

1. Ego-alter ties
2. Alter attributes
3. Alter-alter ties

❑ Ego network measures are based on

1. Ego-alter ties

➤ **Tie multiplexity** (E.g. coworker as well as friend)

- Ties with higher multiplexity are stronger and less likely to dissolve over time.
- High multiplexity ties have more motivation to maintain.

➤ **Tie strength** (captures intensity, duration, affective qualities)

- Presence of strong ties – integration
- Presence of weak ties – access to novel resources

❑ Ego network measures are based on

2. Alter attributes

- **Reflects content/character** – knowledge, behaviors and cultural characteristics (i.e. ideas, attitudes, values)
 - The kind of person we are reflects on the people we're friends with.
 - You tend to talk like the people you talk to. You become aware of choices -- from clothing options to brands of cars to ways of talking and behaving -- from the people in your ego network
- **Social influence**
 - Eg. Obesity, smoking, drinking and happiness are contagious.

❑ Ego network measures are based on

2. Alter attributes cont....

- **Access to social capital**
 - E.g. People are more likely to get a job in IT if they know someone in the tech industry.
- **Broader patterns of interaction in society**
 - E.g. People with more education have more educated networks.

❑ Ego network measures are based on

3. Alter-alter ties

- Ties may be binary or valued.
- Info about ties (or lack of ties) between alters is essential for computing all good measures of network structure.
- Characteristics of structural holes
 - The absence of a tie between two alters.

- **Typical Ego network measures:**

- **Homophily**

- Provide various measures of each ego's homophily with its alters based on a specified attribute.
 - Homophily refers to correlation between ego attributes and alter attributes.
 - For example, we might measure the extent to which egos tend to have ties with alters of the same gender as themselves.

- **Size** (Same as degree)

- How many contacts does Ego have?
 - More alters represents more popularity.

- Typical Ego network measures:

- **Strength of ties :**

- The "strength" of an interpersonal tie is a linear combination of
 - the amount of time(duration),
 - the emotional intensity,
 - the intimacy and
 - the reciprocal services which characterize each tie.
- **A strong tie is someone who you know well.**
 - Friends, Family members and Relatives,
- **A weak tie is a more tenuous relationship**
 - Acquaintance – (ಪರಿಚಯ) a person one knows slightly, but who is not a close friend.

- Typical Ego network measures:

➤ Composition

- How many of X kind of alters are in ego's network neighborhood
 - e.g., % women, %whites, % officials, etc.
- **If composition is homogeneity - Similarity Between Alters**
 - Are ego's alters all alike?
 - Overlap in information (access to a larger set of redundant social resources)
- **If composition is heterogeneity - Dissimilarity Between Alters**
 - Provides access to a larger set of non redundant social resources.

Structural Analyses:

➤ Structural Holes – The absence of ties between alters

- This concept was developed by sociologist Ronald Burt.
- Finding and exploiting a structural hole can give an entrepreneur a competitive advantage.

➤ **Alters are non-redundant when they have no direct connection with one another** (Figure 1: Ego A), creating a structural hole. Because the two alters are unconnected, network benefits to ego become more additive (e.g., covering two types of social support: emotional support and tangle support) than overlapping.

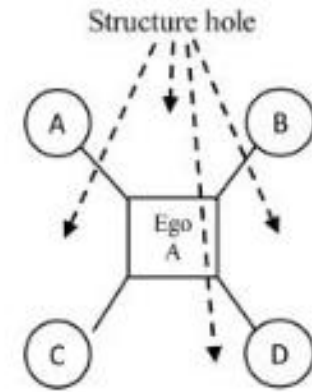


Figure 1

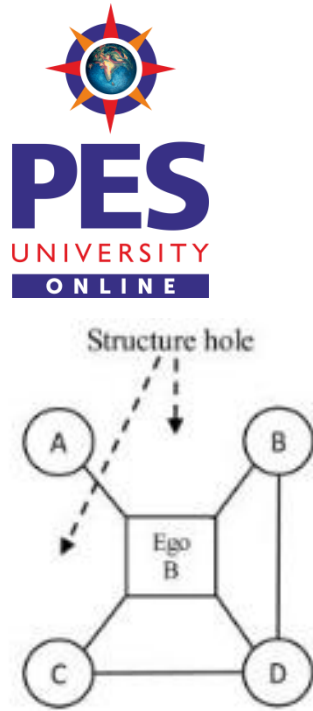


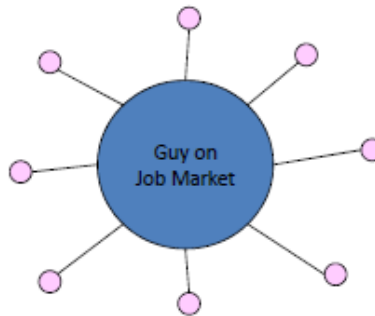
Figure 2

- **Structural Analyses:**

Basic idea: Lack of ties among alters may benefit ego

- **Benefits**

- Autonomy
- Control
- Information



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Egocentric Network Analysis



Assignment – Paper Reading:

- Tie Strength and Ego Network Structure in Facebook
- The Structure of Ego Networks in Twitter

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References

- Social Network Analysis: **Lada Adamic**, University of Michigan.
- Jure Leskovec, Stanford CS224W: Social and Information Network Analysis.
- Wikipedia – current literature





THANK YOU

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Egocentric Network



- **Functions Served by Ego Networks**

- **Social support.** Emotional and material aid. Companionship
Information. <https://www.takingcharge.csh.umn.edu/social-support>
- **Sense-making.** How to interpret the world.
- **Social control.** Ensuring that egos behave according to norms.
- **Access to resources.** Entrepreneurs draw on their contacts to get the clients and employees and consultants they need.
- **Behavioral models.** You tend to talk like the people you talk to. You become aware of choices -- from clothing options to brands of cars to ways of talking and behaving -- from the people in your ego network.

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Sociocentric Network Analysis



- Whole network analysis aims to understand the connections between all actors in a network.
- Whole network analysis is done
 - when the network boundaries are known and
 - when it is possible to collect a list of all actors in the network.
- **Methodology:**
 - In a whole network analysis, a list of actors is surveyed about their relationships with all other actors in the network.