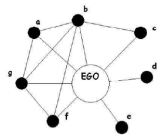
Module2_EGOMeasures

EGO Network

- An ego network is defined as a network consisting of a single node (ego) together with the nodes it is connected to (the alters) and all the links among those alters.
- The diameter of an ego network is 2 and, therefore, the computation of node centrality in a network requires to compute paths up to a length 2.

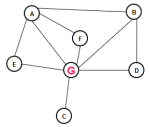
Measures of EGO

- Size –> The number of contacts an EGO has.
- Example : Size = Degree of Ego = 7
  - Degree = 7



Measures of EGO

- **Effective Size = Number of EGO's alters – Sum of Redundancy of EGO's alters**
- **Redundancy=No. of EGO's alter's alter/Size of EGO**



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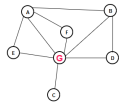


Adapted from Burt (1992:34)

Node "G" is EGO	A	B	C	D	E	F	Total
Redundancy with EGO's other Alters:	3/6	2/6	0/6	1/6	1/6	1/6	1.33

Effective Size of G = Number of G's Alters – Sum of Redundancy of G's alters
= 6 – 1.33 = 4.67

Measures of EGO

- Efficiency :
  - Efficiency = (Effective Size) / (Actual Size)

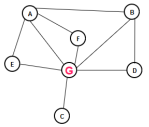
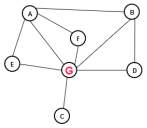


Figure 1. Adapted from Burt (1992:34)

Actual Size = 6
Effective Size of G = 4.67
Efficiency = 4.67/6 = ~0.78

Example

- Considering A as the EGO in the network given below:
- Efficiency = (Size – Redundancy) / 4 = (4 – (1/4+1/4+1/4+3/4)) / 4
  = 2.5/4= 0.625



EGO Network

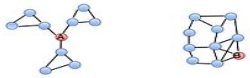
- Weak components: A weak component is the largest number of actors who are connected, disregarding the direction of the ties (a strong component pays attention to the direction of the ties for directed data).
  - If ego is connected to A and B (who are connected to one another), and ego is connected to C and D (who are connected to one another), but A and B are not connected in any way to C and D (except by way of everyone being connected to ego) then there would be two "weak components" in ego's neighborhood.

EGO Network

- Structural Hole: A concept from social network research, originally developed by Ronald Stuart Burt.
  - Burt introduced this concept in an attempt to explain the origin of differences in social capital.
  - Burt's theory suggests that individuals hold certain positional advantages/disadvantages from how they are embedded in neighborhoods or other social structures.
  - A structural hole is a gap between two individuals who have complementary sources to information.
  - **A structural hole separates non-redundant sources of information.**
  - The position of a bridge between distinct groups allows him or her to transfer or gatekeep valuable information from one group to another.
  - The individual can combine all the ideas he or she receives from different sources and come up with the most innovative idea among all.
  - A broker occupies a precarious position, as ties with disparate groups can be fragile and time consuming to maintain.

EGO Network

- If we compare two nodes(in the diagram given below), node A is more likely to get novel information than node B, even though they have the same number of links.
  - Because nodes connected to B are also highly connected between each other.
  - Therefore, any information that any of them could get from B, it could easily get from other nodes as well.
  - The information, which B gets from different connections, is likely to be overlapping, so connections involving node B are said to be redundant.
- The position of node A makes it serve as a bridge or a 'broker' between three different clusters. Thus, node A is likely to receive some non-redundant information from its contacts. The term 'structural holes' is used for the separation between non-redundant contacts. As a result of the hole between two contacts, they provide network benefits to the third party (to node A).



EGO Network

- Ego can be a
  - Coordinator
  - Consultant
  - Gate keeper
  - Representative
  - Liaison

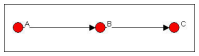
EGO Network

Brokerage

- Burt's approach to understanding how the way that an actor is embedded in its neighborhood is very useful in understanding power, influence, and dependency effects. Burt's underlying approach is that of the rational individual actor who may be attempting to maximize profit or advantage by modifying the way in which they are embedded.
- Fernandez and Gould focus on the roles that ego plays in connecting groups. Fernandez and Gould's "brokerage" notions examine ego's relations with its neighborhood from the perspective of ego acting as an agent in relations among groups.
  - To examine the brokerage roles played by a given actor, find every instance where that actor lies on the directed path between two others. So, each actor may have many opportunities to act as a "broker." For each one of the instances where ego is a "broker," we examine which *kinds* of actors are involved. That is, what are the group memberships of each of the three actors? There are five possible combinations.
    - Coordinator
    - Consultant
    - Gate keeper
    - Representative
    - Liaison

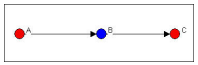
EGO Network

- The ego who is "brokering" (node B), and both the source and destination nodes (A and C) are all members of the same group. In this case, B is acting as a "coordinator" of actors within the same group as itself.
- Ego B as "coordinator"



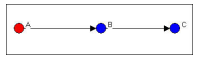
EGO Network

- Ego B is brokering a relation between two members of the same group, but is not itself a member of that group. This is called a "consulting" brokerage role.
- Ego B as "consultant"



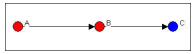
EGO Network

- Ego B is acting as a gatekeeper. B is a member of a group who is at its boundary, and controls access of outsiders (A) to the group.
- Ego B as "gatekeeper"



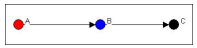
EGO Network

- Ego B is in the same group as A, and acts as the contact point or representative of the red group to the blue.
- Ego B as "representative"



EGO Network

- Ego B is brokering a relation between two groups, and is not part of either. This relation is called acting as a "liaison."
- Ego B as "liaison"



Other References

- https://faculty.ucr.edu/~hanneman/nettext/C9_Ego_networks.html