**Introduction to Sociology**

Chapter 7 “Networks”: Assignments with answers

**7.1 The friendship paradox**

**Q1**

Q1a. How many connections do you have on Facebook? (if you’re not using Facebook, try using another platform).

Q1b. Select 5 of your connections from Facebook. Make sure that you select them randomly (so, not select only your best friends for example). How many connections do these 5 persons have on Facebook? Mention the numbers for each of them, and their average number.

Q1c. Does the “Friendship Paradox” apply to you?

**Q2**

Suppose, scientists have found a good-working and safe vaccine against a highly contagious and deadly virus. And let’s assume that, unfortunately, there is not enough capacity to use this vaccine for everyone in the population. So, hard and difficult choices need to be made. How can you use the Friendship Paradox to make a decision who should be vaccinated first?

Answer:

People who have many connections, who are central in the social network, will transmit the virus to many more people. An efficient strategy to combat the outbreak of the virus, can be to vaccinate people with many connections first. But how do you know who has many friends? For this, we can use the Friendship Paradox: Friends have more friends than the average person. So, the government can use this idea, i.e., to randomly draw a sample of the general population, ask people to list their 5 best friends, and then vaccinate those friends first.

**Q3.**

Suppose that Lisa likes to play tennis, and she is quite good at it. Assume that on a scale from 0 (complete beginner) to 10 (professional player), she is a 6. Every week she goes to her tennis club, and she enjoys playing with her friends -who are of similar strength (6). When she looks around, at the games on the other courts, she gets the impression that others are much better than her. She finds this surprising, because she believed that she was much better than the average club player -which is rated 4. Can you use the friendship paradox to explain what is happening here?

Answer:

The friendship paradox is that people have fewer friends on average than their friends have. This phenomenon arises because people tend to befriend those who have many connections. It is, therefore, a social reality which emerges because of selection: we befriend popular people more often than unpopular people. Similarly, a selection process occurs at the tennis club. Those tennis players who are very good tend to play a lot -perhaps 4 or 5 days a week-, which means that Lisa sees those talented players disproportionally more often than the less-talented players. Our social networks (friends, tennis players) are driven by selection processes.

**7.2 Personal networks**

**Q1**

Draw an *undirected graph* (*sociogram*) of the 5 connections (*alters*) you choose for question 1 above (7.1). There is a tie between those connection if you think they know each other. So, if A and B know each other according to you, then draw a line between them.

**Q2**

Consider the following graph of Tom’s friendship network (node A). Each directed tie represents a friendship nomination. Specify the following elements in this network:

* Ego
* Alters
* All nodes
* Tom’s indegree
* Outdegree of B
* The path length from C to D



Answer:

* Ego = A
* Alters = B, C, D & E
* Nodes = A, B, C, D & E
* Indegree = 2 (CA & DA)
* Outdegree = 2 (BC & BD)
* Path length = 2 (either through A or through B)

**Q3.**

You can present social networks in a matrix. Below you see the matrix with friendship nominations in a network of five persons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Receiver** |  |  |  |  |
| **Sender** | **A** | **B** | **C** | **D** | **E** |
| **A** | - | 1 | 0 | 0 | 1 |
| **B** | 1 | - | 0 | 1 | 0 |
| **C** | 0 | 1 | - | 0 | 0 |
| **D** | 1 | 1 | 0 | - | 0 |
| **E** | 0 | 0 | 1 | 0 | - |

Q3a. What is the ‘indegree’ of person E? Please explain.

Answer:

Indegree = incoming nominations. E receives 1 incoming nomination, from A.

Q3b. What is the ‘outdegree’ of person B? Please explain.

Answer:

Outdegree = outgoing nominations. B nominates A and D, so 2.

Q3c. Which person is most central in the network? Please explain.

Answer:

One measure of centrality is the total number of incoming + outgoing ties. B is then the most central actor in the network, with 5 ties in total.

Q3d. What is the density of the network. Please explain.

Answer:

Density= realized ties / possible ties =k/k(k-1)= 8/ (5X4)=8/20=0.4

**7.4 Network density and transitivity**

**Q1**

Look back at your answer to question 1 (on Facebook, see above 7.1) and answer the following questions:

Q1a. How high is the density of this network of five connections on Facebook?

Q1b. Now think about your five best friends (not necessarily on Facebook). How high is the density among this network of your closest friends?

Q1c. Is there a difference between the density of your Facebook network and your network of best friends? If so, how can you explain?

Q1d. Are there *forbidden triads* in your network of five best friends?

**Q2.**

Suppose you want to meet new people. Having recently read a chapter on social networks, you vaguely remember two strategies. 1) Hang out more with your friends, as via such strong ties you will likely meet new people. 2) Hang out more with acquaintances, as via such weak ties you will likely meet new people. Which of these strategies is the best one? Explain your answer.

Answer:

Strong ties are likely to know one another (transitivity), which means that when you hang around with your friends, you will not be introduced to new people so much. Weak ties are more likely to provide connections to others that you do not know, they are more often community-bridging ties, creating links to entirely new clusters of ties. It is therefore likely to be easier to meet new people by hanging out more with weak ties. Student’s reflection may also include arguments of willingness to help (likely higher for strong ties).

**Q3.**

Consider the following network



Q3a. Calculate the density, give both steps of the calculation process

Answer:

Density = (realized ties / possible ties) = realized ties / (k(k-1)/2) = 12 / 45 = 0.26 (See 7.4 for elaborate explanation).

Q3b. What does density mean?

Answer:

The interpretation is that, within the network, there is a 26% chance that two randomly selected actors are connected or, in other words, 26% of the possible number of ties is realized.

Q3c. Based on the structure of this network, do you think this is *more likely* to be a network of strong ties or a network of weak ties? Explain your answer.

Answer:

If it would be a strong ties network, you would expect to see high levels of transitivity. In many cases, however, there are ‘forbidden triads’, such as ACG and BDE. It therefore seems more likely to represent a weak ties network, but there is no rigid cut-off (for transitivity or density) that determines whether this is a strong tie or weak tie network.

**Q4**

In which layer of the network do you think the network density is higher: in the sympathy network or the active network? Explain your answer.

Answer:

Density is likely higher in the sympathy network than in the active network. Due to processes of meeting opportunities, homophily, and structural balance, one’s friends are likely to be friends as well. The active network includes not only this sympathy network, but also other people we know less well. With respect to weaker ties, transitivity is less strong, and therefore, the network density is lower.

**7.5 The Small World Phenomenon**

**Q1**

Q1a. What is the “*small world phenomenon*”? Explain in your own words.

Answer:

The fact that if you randomly take 2 persons in the world, that they are connected to each other in just 4-5 steps.

Q1b. What has the *small world phenomenon* to do with the concept of “*community*”? Explain in your own words.

Answer:

Community=clustering of relations, web of ties (community bonding ties), few ties to other people outside the community (community bridging ties). It’s remarkable that despite the fact that people live in communities (locally), they are connected to people far away -small world phenomenon.

Q1c. What has the *small world phenomenon* to do with the Granovetter saying that ‘*No strong tie is a bridge*.’ Explain in your own words, and illustrate with personal experiences.

Answer:

Community= community bonding ties; strong ties. Weaker ties are often community bridging ties. Via these weaker ties people connect to others, from communities far away.

Q1d. What does Granovetter mean with his “*strength-of-weak ties*” proposition? Explain.

Answer:

The strength of these weak ties is that the create links between people from different communities.

**7.6 Network change: loss-of-community?**

**Q1.**

The loss-of-community proposition is a topic of research in sociology. Do you think the proposition is confirmed when looking at trends in social connections in your country? Which empirical data do you consider relevant?

Answer:

The loss-of-community proposition states that increasingly people have weaker ties rather than stronger ties, and that one’s (direct and indirect) connections are less often related to each other –at least less so than it used to be. This proposition can be examined empirically, by considering trends in, for example, the number of friends people have, how often people see their friends, in ties to family members, and so forth.

**7.7 Networks and social cohesion**

**Q1.**

Consider the interest of sociologists in personal network cohesion. Given the network parameters we’ve learned about so far (see 7.2 and 7.4 for a refresher), which measure (or combination of measures) might best reflect the personal network cohesion of an individual? And what about the cohesion of a community?

Answer:

Open to discussion. Possible answers may include (in/out)degree of positive relations as a measure of personal network cohesion. This would flow from the argument that personal network cohesion reflects a large number of positive relationships. For community cohesion, one might consider the density of the positive relations network. Alternatively, one might consider a ratio of positive ties and negative ties to capture not only the positive connectivity, but also the general relative atmosphere within a group.

**7.8 Networks and Social Capital**

**Q1.**

The link between network structure (personal and local) and social capital is ambivalent, if not for the various interpretations and dimensions of social capital alone. Having seen several avenues of contemporary literature throughout the chapter, you have hopefully been inspired as well. Consider a societally relevant outcome that you find interesting. What might the effect of network structure be on this phenomenon? What type of network structure would produce more desirable outcomes?

Answer:

Open to discussion. The answer should carefully state the relevance of network structure in explaining the phenomenon of interest. The study might go beyond hypotheses of social support and consider effects of the network as a whole. The hypothesis should be testable with the concepts covered in the chapter.

**Q2.**

According to Durkheim, Coleman and other sociologists conformity to social norms depends on the structure of the social network (e.g., friendship network). In this context, Coleman coined the concept of network closure. Use the *network closure and norms* proposition (p.248) to derive a new hypothesis. Use a theory schema to do so.

Answer:

Example:

P. The degree of closure in a certain network has a positive effect on the conformity to the social norms of that network (network closure and norms).

C. In the Netherlands in the year 2020, the social networks of girls have higher degree of closure than the networks of boys.

H. In the Netherlands in the year 2020, girls have higher levels of conformity to the social norms in their network than boys.

**Chapter generic questions**

**Q1**

We’re going to let you play with a series of simulations using social networks. Follow this hyperlink <https://ncase.me/crowds/> to the website. The program will take you through several phases. Try to solve the puzzles and answer the following questions.

Q1a. What does it mean for a contagion to be “complex”?

Answer:

Complex contagion means that you need to see/hear the behavior/idea from several of your friends before you change your own behavior. See Chapter 5.

Q1b. Which of these require complex contagions do you think? And which are simple?

* Adopting fashion trends
* Behavioral norm changes
* Buying a new innovative product (under $50)
* Going to a protest
* Information about who won the school election.

Answer:

Open to discussion. Generally, ideas and changes with low potential social sanctions/low cost to change require simple contagion whereas changes that have high costs (or require real behavior) generally require complex contagion.

Q1c. In which network would complex contagion spread faster: a network with high or with low network density?

Answer:

Networks with higher density tend to facilitate the spread of complex contagion better than networks with low levels of density.

Q1d. In which network would simple contagion be faster, a network with one central actor to which everyone is connected, or a network where everyone has more ties but is only connected only to their neighbors (an ordered network)?

Answer:

Simple contagion would be fastest in a level with one central actor. The contagion would affect the whole network in 1 step if the central actor became infected, and since everyone is connected to him/her, a maximum of two steps are required by infection anyone randomly. In the ordered network, the contagion could only travel from local cluster to local cluster very gradually, causing it to require many more steps (long characteristic path length).

**Q2.**

Read the article ‘How your college friends help you – or don’t’, published in *The Conversation*. The article can be found here: <https://theconversation.com/how-your-college-friendships-help-you-or-dont-68413>. Answer the following questions.

Q2a. The article describes three example of college students with very different friendship networks: Alberto, who has a tight-knit network, Mary, a “compartmentalizer”, and Steve, a “sampler”. Which of them do you expect to have the higher density in his personal network?

Answer:

Network density is operationalized as the ratio of all realized ties in a network to the number of all possible ties. If we consider the personal networks of the examples in the article, then we expect Alberto, the student with a tight-knit network, to have the higher network density. As a matter of fact, nearly all the nodes (friends) in his network knows each other and hence have ties between themselves: almost all possible ties are realized. The sampler’s network instead is made only by ties between ego and alters, but the alters don’t have a tie with each other: compared to the number of possible ties, those that are actually realized are much fewer.

Q2b. Which type of network do you need to answer the previous question: a 1.0 degree network or a 1.5 degree network?

Answer:

In order to answer the previous question, a 1.5 degree network is necessary. Whereas 1.0 degree networks show only the connections between ego and alters, the 1.5 ego network also contains the ties between the alters to whom the ego is connected.

Q2c. In the article, when describing Steve, the author says: “Despite having many friends and being involved on campus through a range of student organizations, Steve felt alone socially and academically at MU”. Why do you think Steve feels lonely? Think about the type of his ties.

Answer:

Steve has friends from various places hence his ties are bridging ties among different communities. Bridging ties tend to be weak ties, i.e. more often superficial, instrumental relationships, fewer face-to-face social interactions and emotional closeness. Steve probably feels lonely because he is missing a support core network made of strong ties.

**Q3.**

Sociologists argue that networks can boost generalized trust.

Q3a. Represent the *social ties and generalized trust* proposition in a conceptual model.

Answer:

See Chapter 2 for ‘conceptual models’.

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Generalized trust

Social ties

Q3b. What type of relationship is this? (e.g., moderation effect, direct effect, etc.?)

Answer:

Depends on how you conceptualized the relationship. The original propositions, mentioned in the book, are direct effects.

Q3c. Suppose a scholar argues that when people develop more generalized trust, they will have more social interactions with community members (e.g., friends, family) as a result. Can you represent this idea together with the *social ties and generalized trust* proposition in a conceptual model?

Answer:

This idea introduces the notion of bi-directional effects. So the arrows go in both directions.

Social ties

Generalized trust

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Q3d. Another sociologist claims that *social ties-generalized trust* proposition needs to be modified, namely that the presumed impact of social interactions on generalized trust is stronger for people without college education. Can you represent this idea in a conceptual model?

Answer:

Because the relationship depends on another variable, this is a moderation (interaction) effect. It can be visualized like this:

No college education

+

+

Social ties

Generalized trust