

Assignment 7: Network scale-up method for studying hard-to-count populations
Sociology 204 (Social Networks)
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Due: April 8, 2015

Remember to write your name and precept on your assignment and staple it!

Short answer questions

Imagine that you take a random sample of Princeton students. Then, imagine that each of these students refers you to one of their friends. You will end up with two sets of people “random” and “referred.”

1) Imagine that you calculated the average number of friends for people in both of these groups. Which do you think will be higher? [10 points]

- A. random group
- B. referred group
- C. no systematic difference

2) Now imagine that there is an outbreak of a new strain of swine flu here on campus. In which group do you think people will tend to get sick earlier? [10 points]

- A. random group
- B. referred group
- C. no systematic difference

3) What is a question or issue that you would like to discuss in precept? [10 points]

Network scale-up study

The network scale-up method has been used to estimate the size of hard-to-count populations all over the world, especially the groups most-at-risk for HIV/AIDS. In this assignment we are going to use it to estimate the sizes of two non-stigmatized groups at Princeton, and we are going to extend the design used in a recent network scale-up study in Rwanda (my colleagues at UNAIDS are excited to see the results). Finally, we will collect some additional data in this assignment to test the idea that the average number of friends of individuals is less than the average number of friends of friends.

Interview 3 of your friends using the survey form available from the class website. Remember that we are doing a **survey experiment** so please be sure to use the version of the form that has been randomly assigned to you.

1) After doing your interviews, put your data into a format like Table 1 and Table 2 so that another scientist (e.g., your preceptor) can review it. [10 points]

2) Using your survey data, the information in Table 3, and the fact that there 5,230 undergraduates¹, estimate the personal network size of each of your respondents using the following formula:

$$\hat{d}_i = \frac{N}{\sum N_k} \times \sum_k y_{ik}$$

where N is the number of Princeton students, N_k is the number of people in group k , and y_{ik} is the number of people that person i reports knowing in group k . Be sure to show your work clearly enough that another scientist (e.g., your preceptor) can figure out how you made the calculation. [10 points]

3) Using your estimates of personal network size, the responses to questions about connections to groups of unknown size, and the fact that there 5,230 undergraduates, estimate the size of the unknown groups using the following formula:

$$\hat{N}_k = \frac{\sum_{i=1}^3 y_{ik}}{\sum_{i=1}^3 \hat{d}_i} \times N$$

where N is the number of Princeton students, N_k is the number of people in group k , and y_{ik} is the number of people that person i reports knowing in group k . Be sure to show your work clearly enough that another scientist (e.g., your preceptor) can figure out how you made the calculation. [10 points]

4) Does completing this activity change how you think about the network scale-up method? If so, how? [5 points]

5) If you were going to compare your personal network size the average personal network size of your friends, what would you expect to find? Why? [5 points]

¹ <http://www.princeton.edu/pub/profile/admission/undergraduate/>

6) Now we are going to test your prediction above. Interview yourself using the same survey and add your data to Table 1. [10 points]

7) Estimate your personal network size using the equation in question 2. [10 points]

8) Compare your estimated personal network size to the average of your respondents. What did you find? How does this compare to your prediction above? Be specific and cite data. [10 points]

9) Upload all of your survey data so that we can aggregate the results of the class. We will post the link on Piazza.

Table 1: Responses to questions used for network scale-up estimator

Group	Resp. 1	Resp. 2	Resp. 3	You
Born in another country				
Football team				
Field hockey team				
Women's lacrosse team				
Men's lacrosse team				
Senior sociology majors				
Senior computer science majors				
People have taken SOC 101 in Fall 2014				
Princeton University Orchestra				
Dating someone from their high school				
Dating someone from Rutgers				

Table 2: Responses to questions used for direct estimation

Group	Resp 1	Resp 2	Resp 3	You
Dating someone from high school				
Dating someone from Rutgers				

Table 3: Sizes of known populations

Born in another country	592	http://www.princeton.edu/pub/profile/admission/undergraduate/
Football team	99	http://www.goprincetontigers.com/SportSelect.dbml?DB_OEM_ID=10600&SPID=4263&SPSID=46863
Field hockey team	21	http://www.goprincetontigers.com/SportSelect.dbml?SPID=4274&SPSID=46912&DB_OEM_ID=10600

Women's lacrosse team	27	http://www.goprincetontigers.com/SportSelect.dbml?&DB_OEM_ID=10600&SPID=4276&SPSID=46904
Men's lacrosse team	37	http://www.goprincetontigers.com/SportSelect.dbml?&DB_OEM_ID=10600&SPID=4265&SPSID=46874
Senior sociology majors	27	Cindy Gibson, SOC undergraduate administrator
Senior computer science majors	237	https://www.cs.princeton.edu/people/ugrad?program=all&year=2015
People have taken SOC 101 in Fall 2014	170	http://registrar.princeton.edu/course-offerings/course_details.xml?courseid=006393&term=1152
Princeton University Orchestra	112	http://www.puorchestra.org/about_orchestra.php