Creating Networks

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## The goal

The goal of this assignment is very simple - learn how to create a network in R.

We will talk about two main ways to do this, but we will start with the hardest first.

## Networks from two spreadsheets

I think it’s really useful to think of networks as two spreadsheets. The first spreadsheet is a list of edges and their attributes (a.k.a. an edgelist) and the second is a list of nodes and their attributes.

We’ll start by creating a simple edgelist, using made up names.

## Exercise

In Excel (or LibreOffice or Google Sheets) open a new spreadsheet, and create a spreadsheet that looks like this:

| From | To |
| --- | --- |
| John | Ida |
| Elwyn | Ida |
| Okan | Axelle |
| John | Axelle |
| Axelle | Ida |

Save the spreadsheet to your computer as a .xlsx file and then:

1. Click File > Import Dataset > Excel
2. Browse to the file
3. Under Import options, change the name to edgelist
4. Copy and paste the code in the “Code Preview” window here (delete my code which is given as an example).
5. \*If you are using a Mac or Linux, you may have to add ‘~/’ to the beginning of the file path.

library(readxl)  
#edgelist <- read\_excel("~/Teaching/communication\_and\_networks/week\_4/edgaelist.xlsx")  
#View(edgelist)

You might get an error here that says something like there is no package called 'readxl'. If you get that, then you need to run install.packages('tidyverse') in the console (this is the bottom left window). It will take a while to install, but if it works correctly your code above should work.

To test if everything worked right, uncomment and this code to print out all of the edges in R.

(Note: the “#” symbol “comments out” code - this means that anything after the # will be ignored by R)

#print(edgelist)

## Excercise

Next, we will create a table of attributes for the people in our network, and import that, too.

Do the same thing again - open a new spreadsheet, and this time make it look like this:

| Name | Age | Gender | Major |
| --- | --- | --- | --- |
| John | 22 | M | COM |
| Elwyn | 23 | M | SOC |
| Okan | 25 | F | COM |
| Ida | 19 | F | SOC |
| Axelle | 20 | T | COM |

Make sure that the spelling (including capitalization) is the same as in your edgelist file.

Again, save it and import it. This time, import it as node\_atts.

Here is my import code, which you should delete and replace with your own code:

#library(readxl)  
#node\_atts <- read\_excel("~/Teaching/communication\_and\_networks/week\_4/node\_atts.xlsx")  
#View(node\_atts)

Uncomment and run the following code to check that it worked.

#print(node\_atts)

## Importing into R

Finally, we’ll create a network “object” using these files. Right now it’s just two “dataframes” (what R calls spreadsheets). Creating a network objects tells R that these represent a network, so that it can create visualizations, get network statistics, etc.

We do this by running graph\_from\_data\_frame. This is a [function](https://www.tutorialspoint.com/r/r_functions.htm) that takes in the arguments d, vertices, and directed.

d is the edgelist vertices is the node attributes directed is whether this is a directed or undirected graph. G <- saves the network to the variable G and then plot(G) makes a basic plot of it.

If you’ve done everything right, then when you uncomment the code below, it should produce a network plot.

#G <- graph\_from\_data\_frame(d = edgelist,   
# vertices = node\_atts, directed = T)  
#plot(G)

Finally, to make things even more confusing, for lots of the cool things we’ll be doing in future lessons, we need to take one more step, and turn this from a normal network object into a tidygraph network object.

To do this, we take G (the network object we just created) and run as\_tbl\_graph() on it.

Uncomment the code below and run it. If it worked, then you should see a text output with two tables:

Node Data and Edge Data

#G <- as\_tbl\_graph(G)  
  
#G

## Exercise

See if you can figure out how to add another person to the network (hint: the easiest way to do this is in Excel). Give them node attributes and at least one edge. Use graph\_from\_data\_frame to create a newtwork object and as\_tbl\_graph to change it into a tidygraph network object.

Finally, create a new network plot with the new person.

## YOUR CODE HERE