Homework 3 – A phonological network, exploring hubs
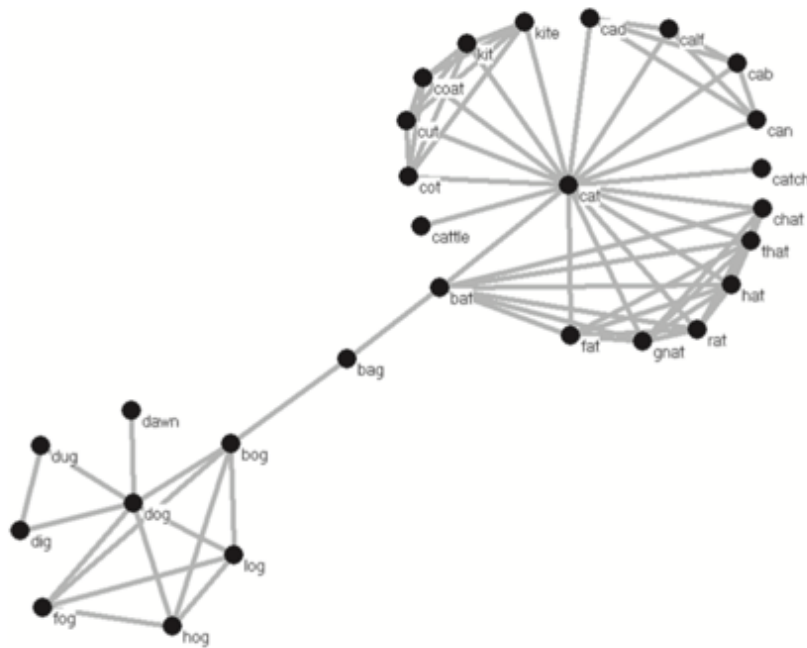John Alderete, Language Network Science, Simon Fraser University

Setup. Create an undirected network for the Vitevitch phonological network shown below. This network is encoded with the adjacency list <vitevitch.adjlist> in the Data sets folder (also given at the end of this document). Once you have a path to this file, you can quickly create the network with the variable assignment: `G = nx.read_adjlist('vitevitch.adjlist')`

Larger question. Does the Vitevitch network have hubs? Answer this question by exploring the centrality measures of the nodes of the network, and comparing maximum values with the mean values. In particular, find the maximum values for degree, betweenness, and closeness centrality. Then find the mean value for each of these measures in the entire network. Is the maximum value far higher than the mean, on the order of three or four times larger, and most other nodes are far lower? If so, you can think of this as a hub relative to that measure, at least in this small-scale network. See the Chapter 3 Tutorial for First Course in Network Science on how to find max and mean values (i.e., our tutorial 3). Note that closeness centrality can be explored with nx.closeness_centrality(G, node).

Try also to connect your conclusions to other facts about phonological networks in larger networks, in particular the robustness of language networks (see the extended case study on five languages in the Foundations lecture slides and the Arbesman et al. 2014 article in Files > Readings).

Adjacent list in <vitevitch.adjlist>

bog dog fog log hog bag
log bog dog fog hog
hog log bog dog fog
fog dog bog log hog
dig dog dug
dug dog dig
dawn dog
dog dawn dug dig fog hog log bog
bag bog bat
cattle cat
cot cat kite kit coat cut
cut cot cat kite kit coat
coat cut cot cat kite kit
kit kite cat cot cut coat
kite cat cot cut coat kit
cad cat calf cab can
calf cad cat cab can
cab calf cad cat can
can cat cab calf cad
catch cat
chat cat that hat rat gnat fat
that chat cat hat rat gnat fat
hat rat gnat fat cat chat that
rat gnat fat cat chat that hat
gnat fat cat chat that hat rat
fat cat chat that hat rat gnat
cat chat that hat rat gnat fat bat cattle cot cut coat kit kite cad calf cab calf cab can catch