

## Network Analysis Homework 3: ERGM

**Please type your answers and turn in your final assignment either by email (attach a .pdf) or in class by 2:00pm on Thur. Dec. 10. Please include your R script with your assignment.** The ERGM Examples R script on ICON should be helpful in executing this homework in R. All the commands you need are in the code we looked at today (Nov. 19).

Select a network dataset to study using ERGM, or use the copy of Berardo and Scholz's (2010)<sup>1</sup> data provided on ICON. Note, the data provided are from a single estuary and aggregated over the two waves of network survey. The estuary provided is Cape Fear. In addition to the edges, the dataset you use should have at least one vertex attribute of interest. The dataset provided includes 3 nodal attributes (descriptions can be found in the article). Using the dataset chosen, complete the following:

1. Describe the dataset.
  - a. What is the relationship measured? Is the network directed? Weighted? Etc.
  - b. Provide enough context that the reader (aka the instructor) understands the data you are working with (Do this even if you use the provided data!)
2. Generate hypotheses.
  - a. Develop and explain at least 2 hypotheses.
  - b. At least one hypothesis should relate to a vertex attribute and at least one should discuss interdependence among the ties (network structure).
3. Specify a Model.
  - a. Select a model that you believe
    - i. is appropriate for your data,
    - ii. capable of testing your hypotheses, and
    - iii. adequately fits your data.
  - b. Briefly explain your selections. Why did you pick the statistics you did to test your hypotheses? (?ergm.terms will provide you that list of possibilities)
4. Present the estimates of your final model in a graph or table,
5. Check your model for convergence and degeneracy
  - a. Provide evidence that the MCMC chain has converged and that the ERGM fits your model adequately. Interpret the diagnostics explaining to your reader how you know your chain has converged and there is not degeneracy.
  - b. If you cannot find a well-fitting model (after several tries)
    - i. include the models you tried and a brief discussion of how you tried to fix the convergence/degeneracy problems you faced.
    - ii. include the diagnostics from your final model and interpret them.
6. Interpret your results.
  - a. Do you find statistical support for your hypotheses?
  - b. Do you find substantive support for your hypotheses? Interpret your results at the network and dyad levels.

---

<sup>1</sup> Berardo, Ramiro, and John T. Scholz. 2010. "Self-Organizing Policy Networks: Risk, Partner Selection, and Cooperation in Estuaries." *American Journal of Political Science* 54 (3): 632–49.