Cantor & Farine Final Report

Final Report: Reproducibility Project

The goal of this project was to reproduce Figure 3 from *Simple foraging rules in competitive environments can generate socially structured populations* {https://doi.org/10.1002/ece3.4061}, which a reproductive model repreenting evolution of pedigree, relatedness and social relationships between simulated individuals. This figure incorporates social networks into a more complex framework of random associations with the goal to investigate how foraging decisions can generate a structured network of foraging ties.

Data Availibility

All models, r scripts, and data are available at the online repository https://bitbucket.org/maucantor/coopgroup/src, which was specified under the "Materials and Methods" section of the paper. I was able to clone the original bitbucket repository into a new github project (https://github.com/sabrinatucci/Cantor-Farine-Repro-Project.git).

In summary, our simulation has only three steps. First, we initialize a random network of ties among the individuals. Second, we allocate the resource based on the distribution of group sizes and share each groups' allocation equally among its members (or share the resource equally among all foragers in groups, see Supporting Information). Finally, we allow individuals to update their propensity to engage with others in foraging together by adding or removing a directed tie at random. Steps 2 and 3 are repeated for 1,000 time steps in each simulation run.

Producing Figures

I was able to follow the instructions found in the READ.me file within the repository. I ran the "set-up.R", "functions.R" and "models.R" scripts in order. The "models.R" script took 48+ hours to run, but I decided against changing the parameters to reducing running time so that I could determine the true reproducibility of this paper. After the initial models had all been generated, I ran the code for figure 3 and it successfully reproduced the figure without any alterations. Since I had already ran the entire model, I decided to attempt to run the code for the 3 other figures, Figure 1, 2 and 4. Both figure 2 and 4 were reproduced successfully, but Figures 1 and 4 ran into some errors. Due to a lack of time, I was unable to troubleshoot for these additional figures.

Discussion

Despite the complexities of a model-based paper, Cantor & Farine's (2018) paper is very reproducible due to their organized repository, detailed commented code, and overall organization. With a little more time, I believe I would have been able to successfully reproduce the remaining figures, which would deem this paper 100% reproducible.
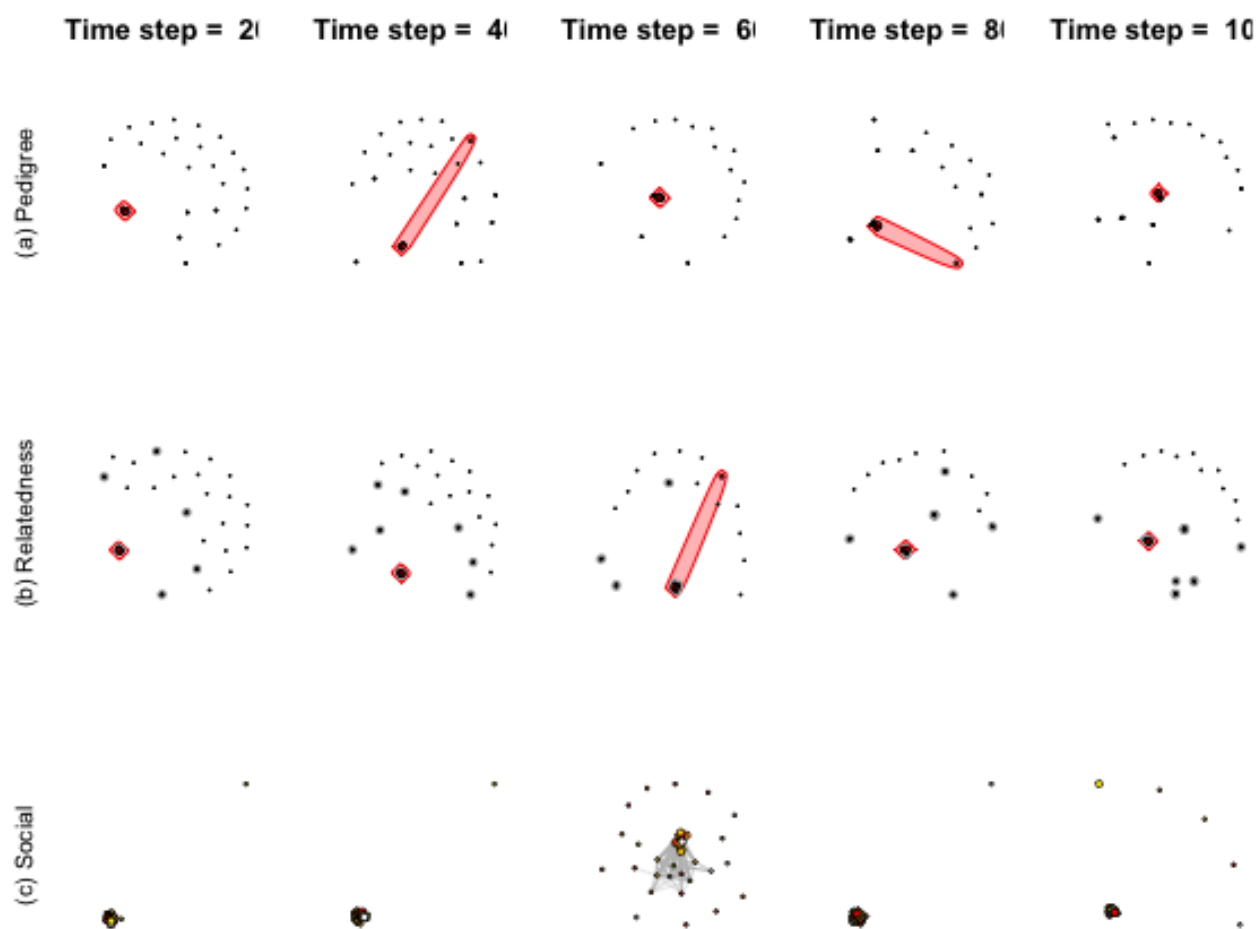
Figure 1: Figure 3: Evolution of pedigree, relatedness, and social relationships in the reproductive model