Different Impacts of Gender Homophily between Men and Women in an Advice Network

MINT 311 Social Networking Theories and Methods | Ayaka Ogawa | December 15th, 2024

Introduction

Gender homophily, the tendency to network with people of the same gender is universal among networks. This study examines the different impacts of gender homophily on tie formation between men and women using ERGM. I use the ison_lawfirm dataset, which records ties among attorneys and their partners in the British law firm, SG&R; the data has been transformed to a 1-mode, simplex, directed network by extracting ties that represent exchange of advices.

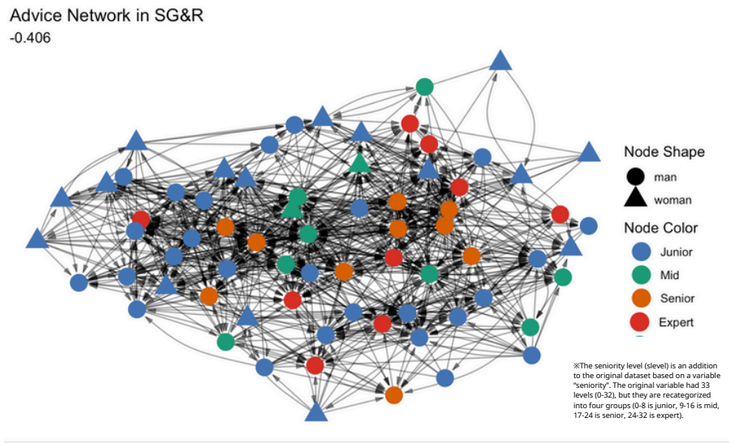
Hypothesis

I propose the following hypothesis:

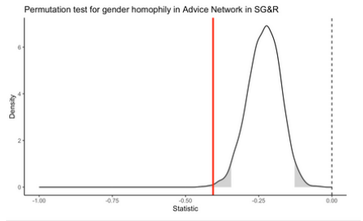
H: Male-Male gender homophily increases the probability of a tie formation more than female-female gender homophily (nodematch.gender.man > nodematch.gender woman)

This is driven by both choice and induced homophily. Previous literature found that men prefer male advisors more than women want female advisors (Ibarra, 1992; Stolper & Walter, 2018). Thus, gender homophily may be a better predictor for tie formation for male nodes. Moreover, it is difficult to find female senior attroneys to ask for advice, because as seniority increases the number of female attroneys decreases. Thus, it may induce both men and women to connect with men if they want advice from senior attorneys. Therefore, the male-male gender homophily would be more significant in constructing the network.

Visualization



The network includes 71 nodes and 892 edges, and is highly transitive and have two major clusters at the center. However, all female nodes are either junior or mid levels, and they tend to be less connected than male nodes. The net gender heterophily value of this network is -0.406, indicating gender homophily. The homophily is further tested using the permutation, as it can compute the expected value of gender homophily without altering structure of the network. E-I index (red) confirms that the network is more gender homophilous than the expected values.



Modelling

The main independent variables of this model are male gender homophily (nodematch.gender.man) and female gender homophily (nodematch.gender.woman). The model includes structural variables that may affect the probability, such as intransitive triads and indegree distribution to control popularity of nodes. Relevant attribute variables are also added to account for their potential impacts on tie formation.

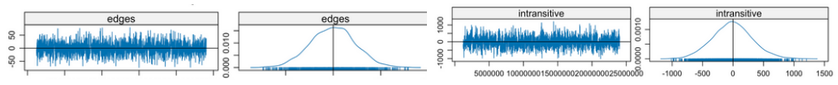
Results

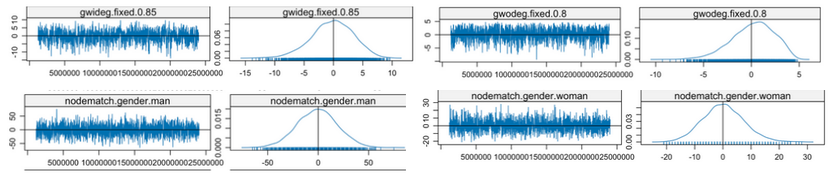
	Estimate	Std. Error	Pr(> | z |)	Significance
edges	-8.481	0.825	0	* * *
mutual	1.132	0.142	0	* * *
gwideg.fixed.0.85	-0.948	0.366	0.01	*
gwodeg.fixed.0.8	-0.314	0.591	0.595	
gwesp.OTP.fixed.0.3	1.252	0.173	0	* * *
intransitive	-0.112	0.005	0	* * *
nodeofactor.gender.woman	0.054	0.085	0.529	
nodematch.gender.man	0.379	0.096	0	* * *
nodematch.gender.woman	0.316	0.15	0.035	*
nodematch.school	0.184	0.078	0.019	*
nodematch.office	0.803	0.068	0	* * *
nodeifactor.slevel.Junior	2.089	0.315	0	* * *
nodeifactor.slevel.Mid	1.774	0.222	0	* * *
nodeifactor.slevel.Senior	1.306	0.144	0	* * *
nodeofactor.slevel.Junior	2.686	0.341	0	* * *
nodeofactor.slevel.Mid	2.241	0.261	0	* * *
nodeofactor.slevel.Senior	1.737	0.194	0	* * *
nodematch.practice	0.665	0.058	0	* * *
nodecov.seniority	0.094	0.013	0	* * *
nodecov.age	-0.008	0.004	0.076	

> #AIC: 3356, BIC: 3486

The ERGM shows both gender homophilies are significant; however, male homophily has a higher z-value and a larger coefficient. For a unit increase in male-male homophily, the probability of tie formation increases by 0.594; for female-female homophily, the probability increases by 0.578. Thus, the gender homophily increases the tie formation more for men than women. However, the model does not prove that the difference between two is statistically significant. Additionally, AIC and BIC are large, suggesting that the model needs improvement.

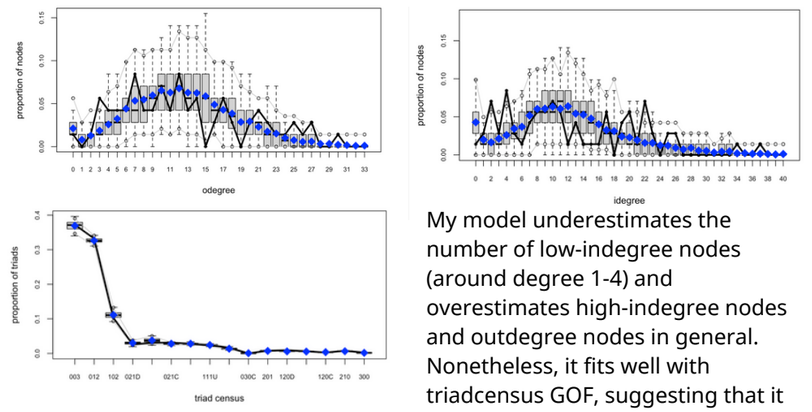
MCMC diagnostics





Most terms in my model converged, as the iteration plots show balanced numbers of positive and negative values and most density plots have bell shapes with its center at 0. The exceptions are outdegree distribution (gwodeg), as there are more negative values than positive ones. The model may need to include more terms related to outdegree.

Goodness of Fit (GOF)



My model underestimates the number of low-indegree nodes (around degree 1-4) and overestimates high-indegree nodes and outdegree nodes in general. Nonetheless, it fits well with triadcensus GOF, suggesting that it predicts correct tie combinations in triads. Since gender homophily is based on dyadic and triadic tie patterns, a good GOF on triadcensus indicates the model may effectively capture relevant network structures.

Conclusion

This study examined gender homophily differences between men and women. The ERGM model shows that male-male gender homophily increases the probability of tie formation more than female-female ones. This can exacerbate gender inequality in the firm, as male junior attorneys may have a better access to senior attorneys, which can further increase their chances for promotion. However, the model needs to improve its indegree and outdegree GOF. This may be due to the lack of structural variables like transitivity or k-star to account for path dependency in popularity. Although the model did not converge with these variables, future research should explore ways to incorporate them to enhance model accuracy.

References

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