(Harris 2014)

Harris, Jenine K. 2014. *An Introduction to Exponential Random Graph Modeling*. Edited by John Fox. Vol. 173. Los Angeles: Sage Publications.

GWD:

GWD accounts for the degree distribution (p 71). Adding geometric terms accounts for structures that, in early statistical network modeling, often resulted in degenerate models. GWD, GWDSP, GWESP are part of what is being modeled (p 71). "Once GW terms are added to the model, predicting the probability of a tie between any two network members becomes more complex due to the calculations and interpretation challenges of the change statistic for each geometric term" (p 81). "The GWD network statistic weights higher degrees more, resulting in a larger value of the statistic for networks with more high-degree nodes" (p 83).

"Generally speaking, interpretation of the GWD, GWDSP, and GWESP coefficients are consistent with interpretation of other model coefficients. A positive and significant coefficient for a geometric term indicates that the likelihood of adding a tie between i and j is greater than would happen by chance, all else held constant. Likewise, a negative and significant coefficient indicates that the likelihood of adding a tie between any given i and j is less than would happen by chance, and a nonsignificant coefficient would be interpreted as no significant difference from chance in the probability of adding a tie between i and j, all else held constant" (p 85). "Although the coefficients appear straightforward, the change statistics can complicate deeper interpretation" (p 85). " The change statistic aims to capture the change in the value of the network statistic if a tie were added to the network between nodes i and j. Given the influence of a single tie on the shared partner distribution across the network, caution should be taken in overinterpreting the coefficients for the GWESP and GWDSP terms in particular" (p 85).

Edgewise shared partners (ESP)

“There is more complexity in how overall network structures change for GWESP, since adding a tie will change the number of ESP not just for the two incident nodes but also for the other nodes across the network” (p.83). “The change statistics for GWESP indicates the log-odds of a tie would increase the most when adding an edge between me and j when I and j bot have 0 degrees; the increase in log-odds of a tie would shrink as I and j have more connections” (p 83-85). “The decreased log-odds with increases in degree and ESP in the GW terms could be considered antipreferential attachment” (p 85). "Generally speaking, interpretation of the GWD, GWDSP, and GWESP coefficients are consistent with interpretation of other model coefficients. A positive and significant coefficient for a geometric term indicates that the likelihood of adding a tie between i and j is greater than would happen by chance, all else held constant. Likewise, a negative and significant coefficient indicates that the likelihood of adding a tie between any given i and j is less than would happen by chance, and a nonsignificant coefficient would be interpreted as no significant difference from chance in the probability of adding a tie between i and j, all else held constant" (p 85). "Although the coefficients appear straightforward, the change statistics can complicate deeper interpretation" (p 85). " The change statistic aims to capture the change in the value of the network statistic if a tie were added to the network between nodes i and j. Given the influence of a single tie on the shared partner distribution across the network, caution should be taken in overinterpreting the coefficients for the GWESP and GWDSP terms in particular" (p 85). “Interpretations of the GWESP coefficients are made “assuming nothing else changes and all other model effects have been accounted for (Hunter 2007)” (p. 85)

“Finally, because DSP measures share partners for each dyad, connected or not, and ESP measures share partners for only connected dyads, it is important to consider the geometric terms accounting for these distributions added to the model alone and together. If GWESP is added to the model without GWDSP, it will account only for the distribution of shared partners in connected dyads” (p 85-85).

Goodness of fit:

The Akaike information criterion (AIC) and Bayesian information criterion (BIC) are used to examine model fit by accounting for deviance as additional parameters are added to the model by penalizing models with more parameters (p. 63). [Based on the AIC values,