Homework 3

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```r
#Loading the packages I'll need
library(ggpubr)
library(ggraph)
library(dplyr)
library(igraph)
library(sna)
library(intergraph)
library(lme4)
library(lmerTest)
```

```r
#Importing the node and edge csv's
nodes <- read.csv('/Users/TomTheIntern/Desktop/Mendoza/Mod 4/Networks/Homework 3/msbr_70340_SP25_socioc
summary(nodes)
```

```
##      ego_id    ego_section
##  Min.   : 1   Length:69
##  1st Qu.:18   Class :character
##  Median :35   Mode  :character
##  Mean   :35
##  3rd Qu.:52
##  Max.   :69
```

```r
edges <- read.csv('/Users/TomTheIntern/Desktop/Mendoza/Mod 4/Networks/Homework 3/msbr_70340_SP25_socioc
summary(edges)
```

```
##      ego_id          alter_id       ego_section        alter_section
##  Min.   : 1.00   Min.   : 1.00   Length:1237        Length:1237
##  1st Qu.:20.00   1st Qu.:17.00   Class :character   Class :character
##  Median :34.00   Median :33.00   Mode  :character   Mode  :character
##  Mean   :34.11   Mean   :33.86
##  3rd Qu.:49.00   3rd Qu.:51.00
##  Max.   :69.00   Max.   :69.00
```

```r
# Create igraph and sna object and visualize the network
# first list the edgelist, whether the network is directed, and the vertex attributes.
net <- graph_from_data_frame(edges, directed = T, vertices = nodes)

#making the igraph object into an sna object
net_s <- igraph::simplify(net)
net_s_sna <- asNetwork(net_s)
```
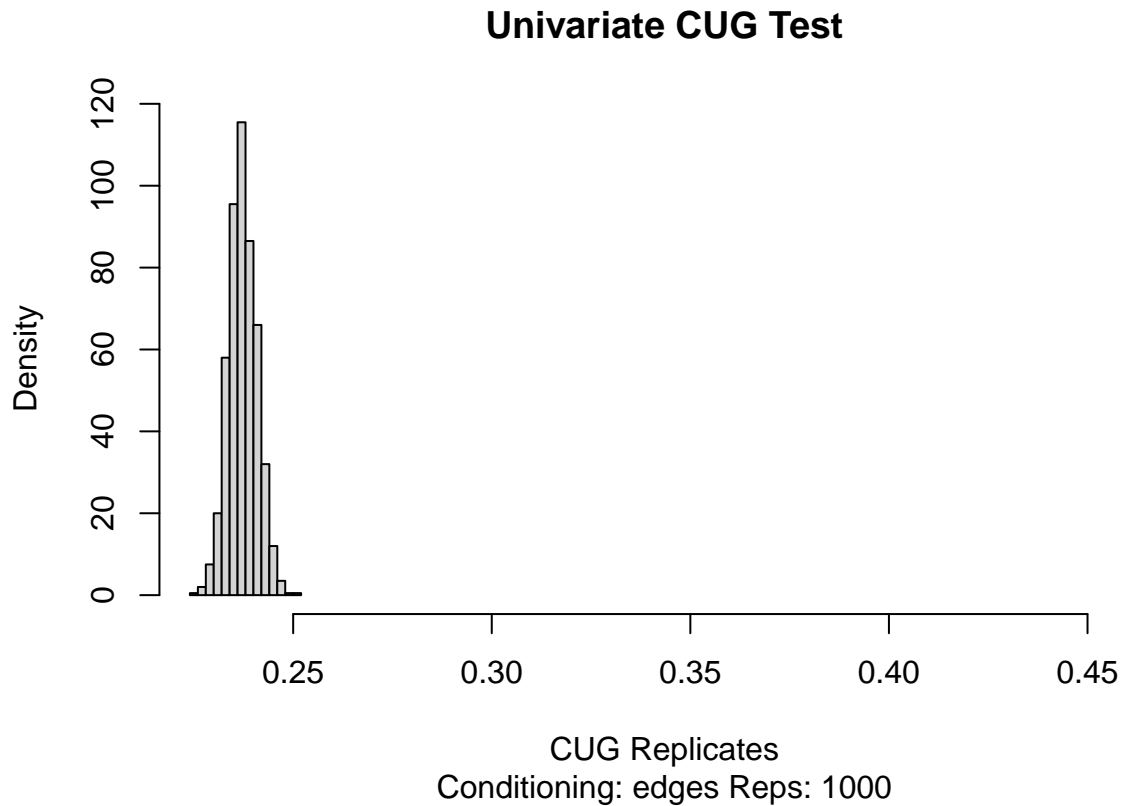
```
#Test transitivity vs density
Cug_Edges <- sna::cug.test(net_s_sna, gtrans, cmode="edges")

#making the plot
plot(Cug_Edges)
```

Univariate CUG Test

CUG Replicates
Conditioning: edges Reps: 1000

```
#our network
Cug_Edges$obs.stat
```

```
## [1] 0.4611865
```

```
# simulated networks
summary(Cug_Edges$rep.stat)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.2257  0.2349  0.2371  0.2373  0.2397  0.2505
```

```
un_net <- graph_from_data_frame(edges, directed = F, vertices = nodes)

set.seed(1)
clv <- cluster_louvain(un_net, resolution = 3)
modularity(clv)
```

```
## [1] 0.05148516
```

```
communities(clv)
```

```
## $`1`
## [1] "1"  "28" "31" "53" "56"
##
## $`2`
## [1] "2"  "45" "60" "62"
##
## $`3`
## [1] "3"  "7"  "32" "39"
##
## $`4`
## [1] "4"  "6"  "26" "66"
##
## $`5`
## [1] "5"  "10" "12" "34" "44" "51"
##
## $`6`
##  [1] "8"  "11" "17" "23" "36" "37" "38" "49" "50" "68"
##
## $`7`
## [1] "9"  "24" "46" "54" "57"
##
## $`8`
## [1] "13" "15" "18" "35" "48" "63"
##
## $`9`
## [1] "14"
##
## $`10`
## [1] "16"
##
## $`11`
## [1] "19"
##
## $`12`
## [1] "20"
##
## $`13`
## [1] "21" "25" "52" "65"
##
## $`14`
## [1] "22"
##
## $`15`
## [1] "27" "40" "43" "58" "64"
##
## $`16`
## [1] "29"
##
## $`17`
## [1] "30" "42" "59" "67" "69"
##
```

```
## $'18'
## [1] "33"
##
## $'19'
## [1] "41" "55"
##
## $'20'
## [1] "47"
##
## $'21'
## [1] "61"
```

```r
edges_nodes <- read.csv('/Users/TomTheIntern/Desktop/Mendoza/Mod 4/Networks/Homework 3/egocentric_netwo

edges_nodes$type <- as.factor(edges_nodes$type)
edges_nodes$ego_gender <- as.factor(edges_nodes$ego_gender)
edges_nodes$alter_gender <- as.factor(edges_nodes$alter_gender)

edges_nodes$ego_age <- as.numeric(edges_nodes$ego_age)
edges_nodes$alter_age <- as.numeric(edges_nodes$alter_age)

model1 <- lmer(strength ~ type + ego_age + alter_age + ego_gender + alter_gender + (1 | ego_id), data =

summary(model1)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: strength ~ type + ego_age + alter_age + ego_gender + alter_gender +
##     (1 | ego_id)
##    Data: edges_nodes
##
## REML criterion at convergence: 7450.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.1894 -0.7550  0.3067  0.4597  2.7593
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ego_id   (Intercept) 0.009021 0.09498
##  Residual             0.750826 0.86650
## Number of obs: 2900, groups:  ego_id, 18
##
## Fixed effects:
##                 Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)    3.590e+00  7.719e-02  4.792e+02  46.509   <2e-16 ***
## typefriend    -8.363e-01  4.358e-02  2.894e+03 -19.189   <2e-16 ***
## ego_age       -9.249e-05  1.481e-03  2.860e+03  -0.062    0.950
## alter_age     -2.035e-03  1.451e-03  2.890e+03  -1.403    0.161
## ego_genderm    4.891e-04  3.493e-02  2.878e+03   0.014    0.989
## alter_genderm  3.616e-02  3.472e-02  2.891e+03   1.042    0.298
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Correlation of Fixed Effects:
##              (Intr) typfrn ego_ag alter_g eg_gnd
## typefriend  -0.615
## ego_age     -0.520  0.219
## alter_age   -0.500  0.216 -0.121
## ego_genderm -0.145 -0.075  0.030 -0.030
## alter_gndrm -0.148 -0.094 -0.027  0.035  -0.293
```