Hierarchy in networks–Measures

| Measure	Undirected	Weighted	Global	Local
Landau's h		X	X	
Kendall's K	X	X		X
Reach Degree	X	X		X
Reach Closeness	X	X		X
GRC	X	X	X	X
Rooted Depth			X	
Degree	X	X	X	X
Closeness	X	X	X	X
Betweenness	X	X	X	X
Eigenvector	X	X	X	X

Hierarchy in Networks–Simulated Datasets

- 7500 Barabasi-Albert (BA) Datasets with node size $50, 200$, or 500 and preferential attachment parameter $0.5, 1, 2, 5$, or 10.
- 6000 Tree-Structured (TR) Datasets with node size $50, 200$, or 500 and children parameter $2, 5, 10$, or 50.
- 4500 Erdos-Renyi (ER) Datasets with node size $50, 200$, or 500 and parameter size $0.05, 0.1$, or 0.2.

BA and TR	Node	Edge	Density
	50	49	0.02
	200	199	0.005
	500	499	0.002

ER	Node	Parameter	Edge	Density	Cluster Coefficient
	50	0.05	122.524	0.050	0.0956
	50	0.1	244.768	0.100	0.188
	50	0.2	490.050	0.200	0.359
	200	0.05	1989.242	0.050	0.098
	200	0.1	3980.776	0.100	0.190
	200	0.2	7952.138	0.120	0.360
	500	0.05	12473.270	0.050	0.097
	500	0.1	24932.824	0.100	0.190
	500	0.2	49892.784	0.200	0.360

Hierarchy in Networks – BA
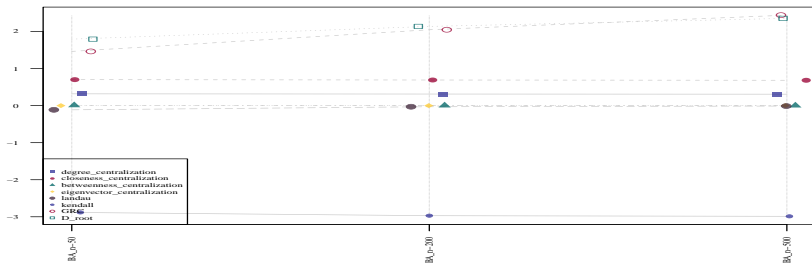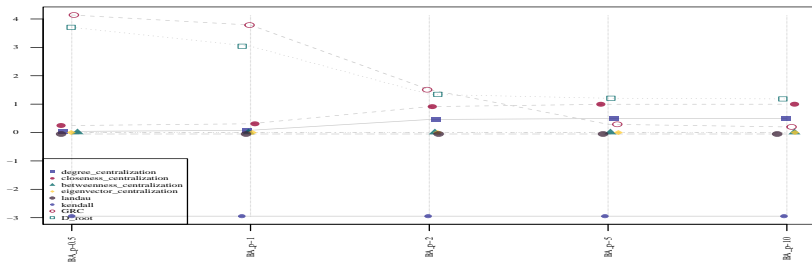
Hierarchy in Networks – BA PCA

Principle Component Variances (left plot)
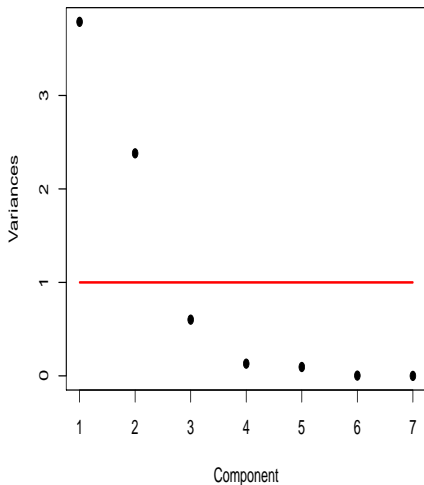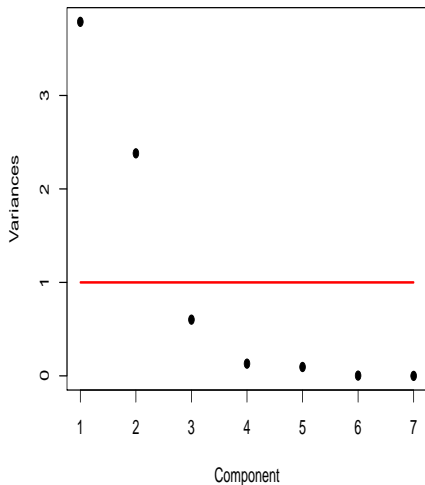
Principle Component Variances (right plot)

Hierarchy in Networks – BA PCA

Principal Components: 1 and 2

Hierarchy in Networks – BA PCA

Principal Components: 1 and 2

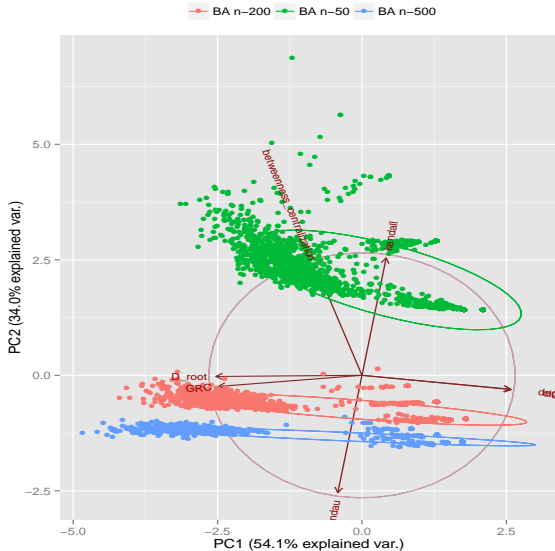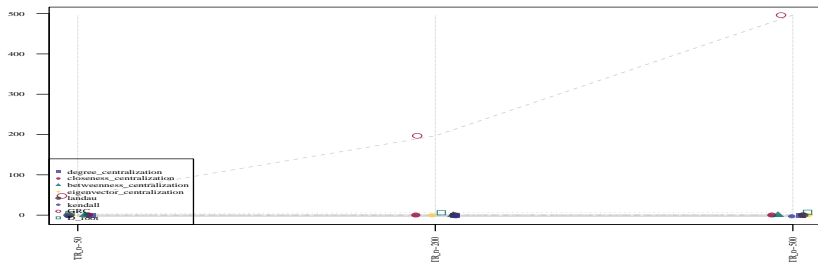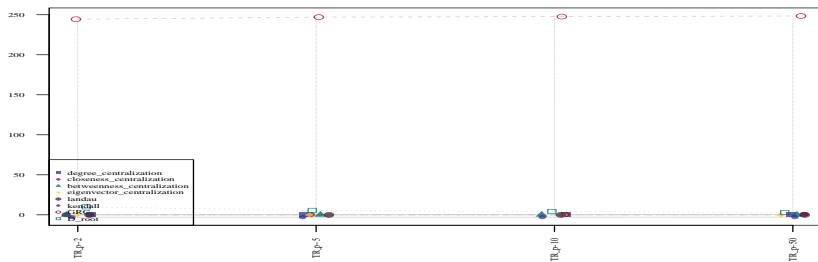BA n–200   BA n–50   BA n–500
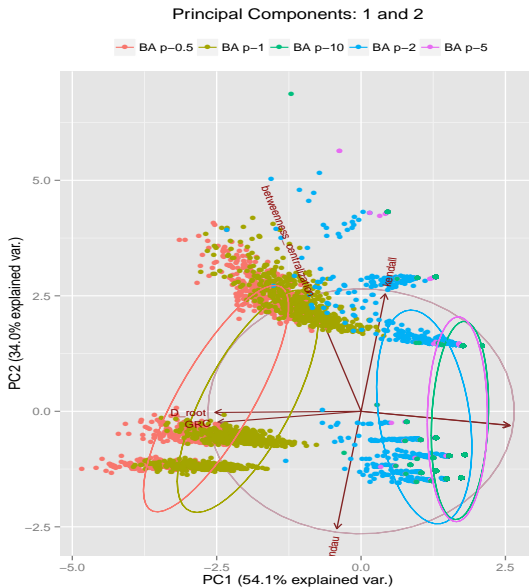
Hierarchy in Networks – TR
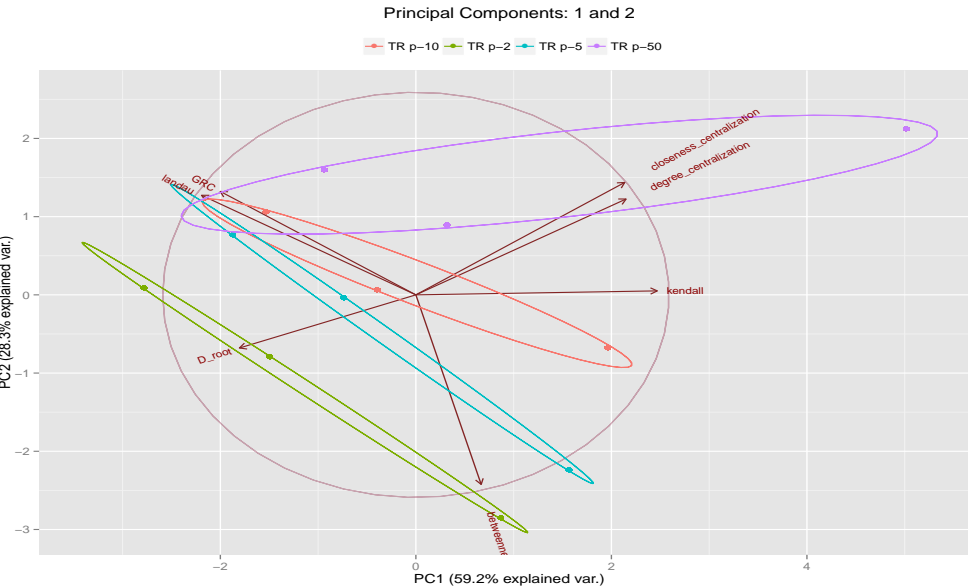
Hierarchy in Networks – TR PCA

Hierarchy in Networks – TR PCA
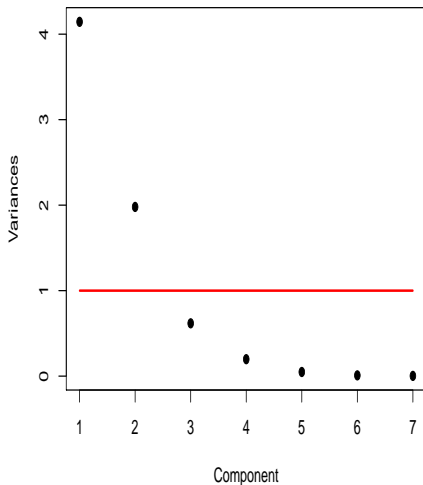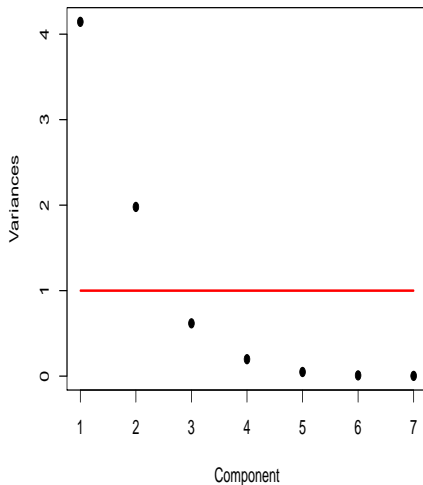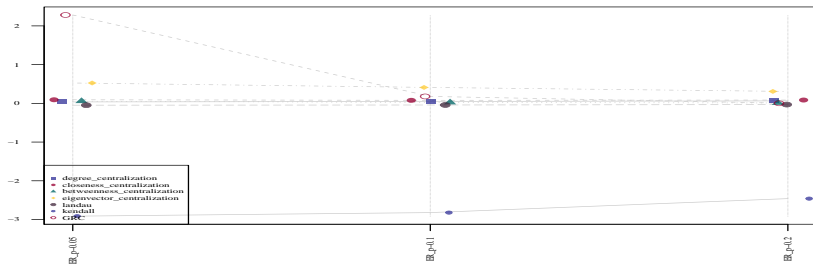

Principal Components: 1 and 2

TR p–10   TR p–2   TR p–5   TR p–50

Hierarchy in Networks – TR PCA

Principal Components: 1 and 2

TR n–200   TR n–50   TR n–500

Hierarchy in Networks – ER

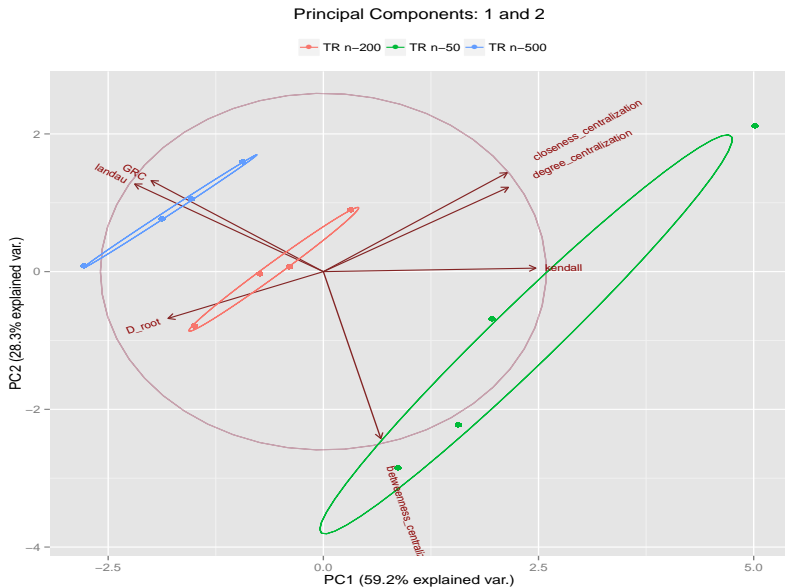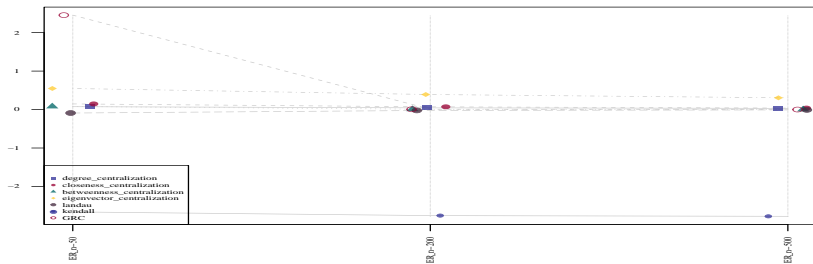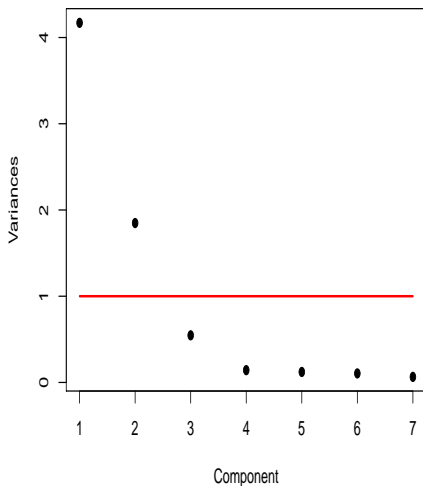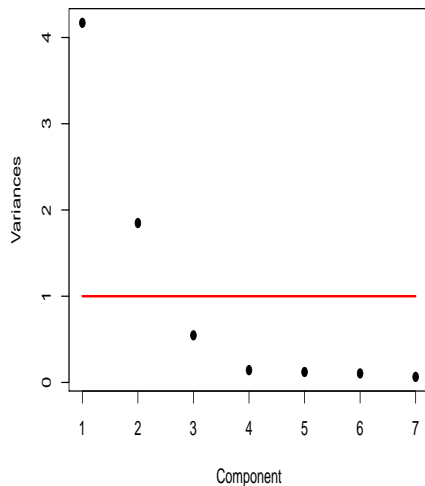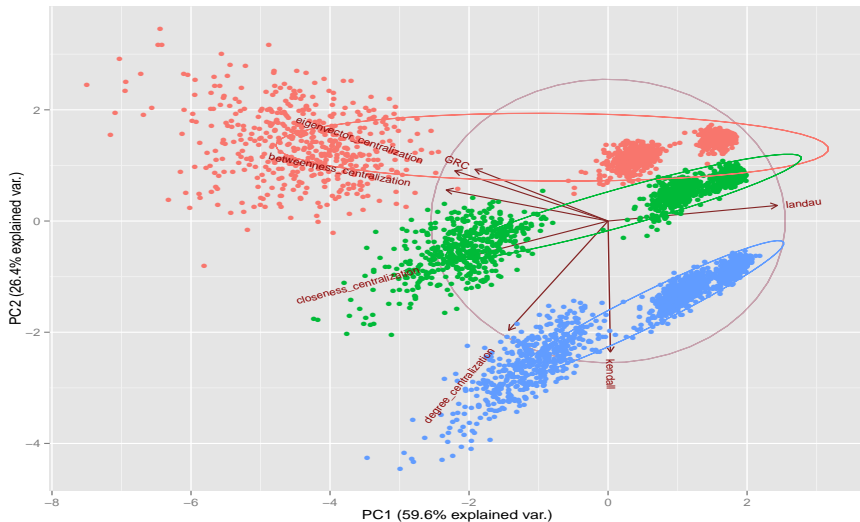# Hierarchy in Networks – ER PCA

Principle Component Variances

Hierarchy in Networks – ER PCA

Principal Components: 1 and 2

ER p–0.05   ER p–0.1   ER p–0.2

Hierarchy in Networks – ER PCA

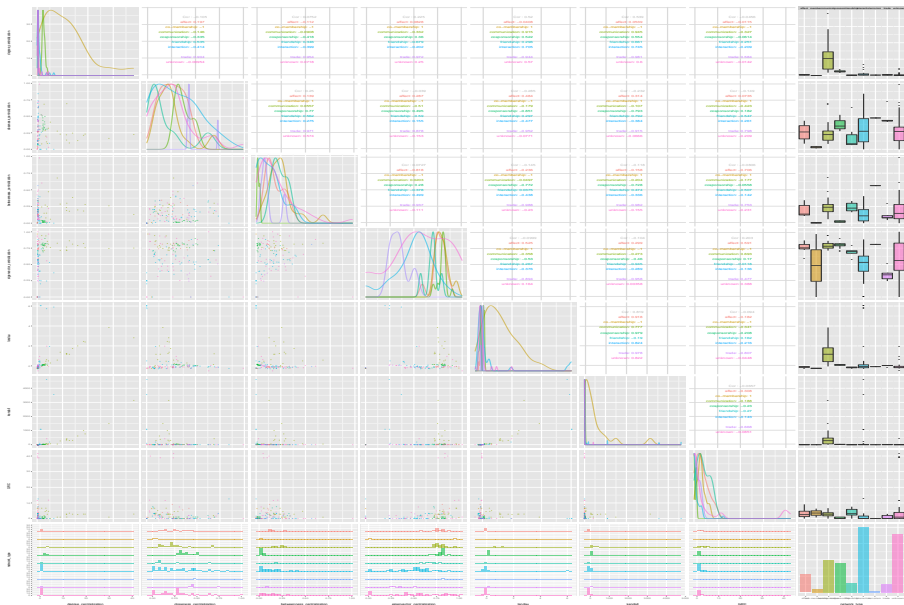Principal Components: 1 and 2

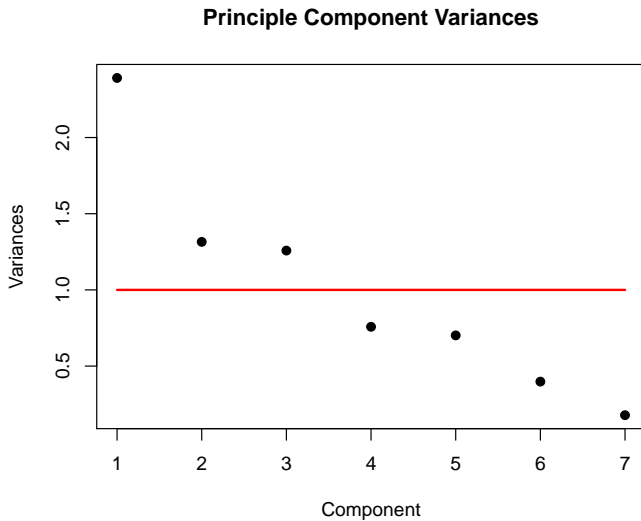ER n–200   ER n–50   ER n–500

Hierarchy in Networks–Datasets

- 141 datasets from UCINET, organizational emails, and Congress

Type	Nodes	Edges	Density	Cluster Coeff.
Communication	25.714	2419	3.483	0.558
Cosponsorship	101.222	13358.889	1.317	0.788
Co-membership	22	9267.333	18.318	0.377
Interaction	23.075	1944.95	1.985	0.589
Unknown	76.833	4688.25	0.360	NaN
Friendship	29.833	92	0.122	0.348
Affect	17.636	95.182	0.319	0.329
Terrorism	63	308	0.079	0.361
Trade	24	285.6	0.5170	0.734

Hierarchy in Networks – Global Measures

Hiearchy in Networks – PCA

Principle Component Variances
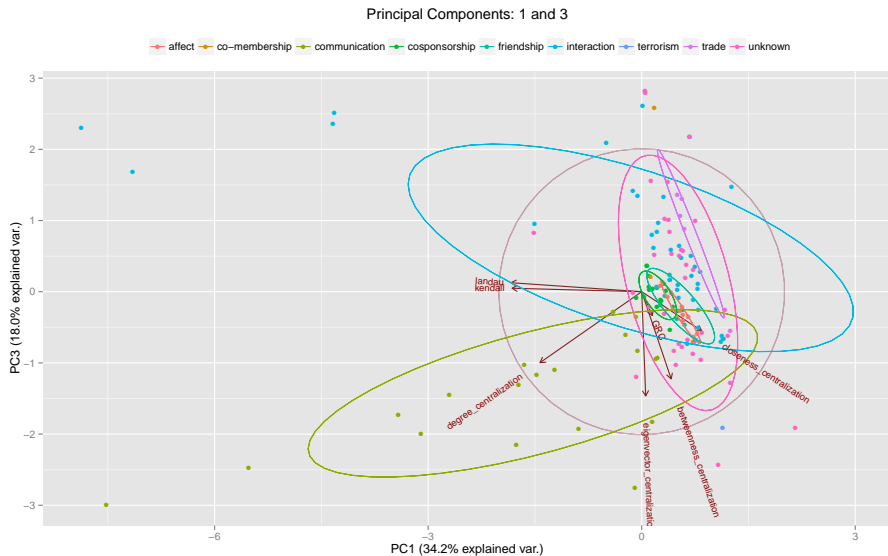
Hierarchy in Networks – PCA

Principal Components: 1 and 2

Hierarchy in Networks – PCA

Principal Components: 1 and 3

affect — co–membership — communication — cosponsorship — friendship — interaction — terrorism — trade — unknown

Hierarchy in Networks – PCA

Principal Components: 2 and 3

affect — co–membership — communication — cosponsorship — friendship — interaction — terrorism — trade — unknown