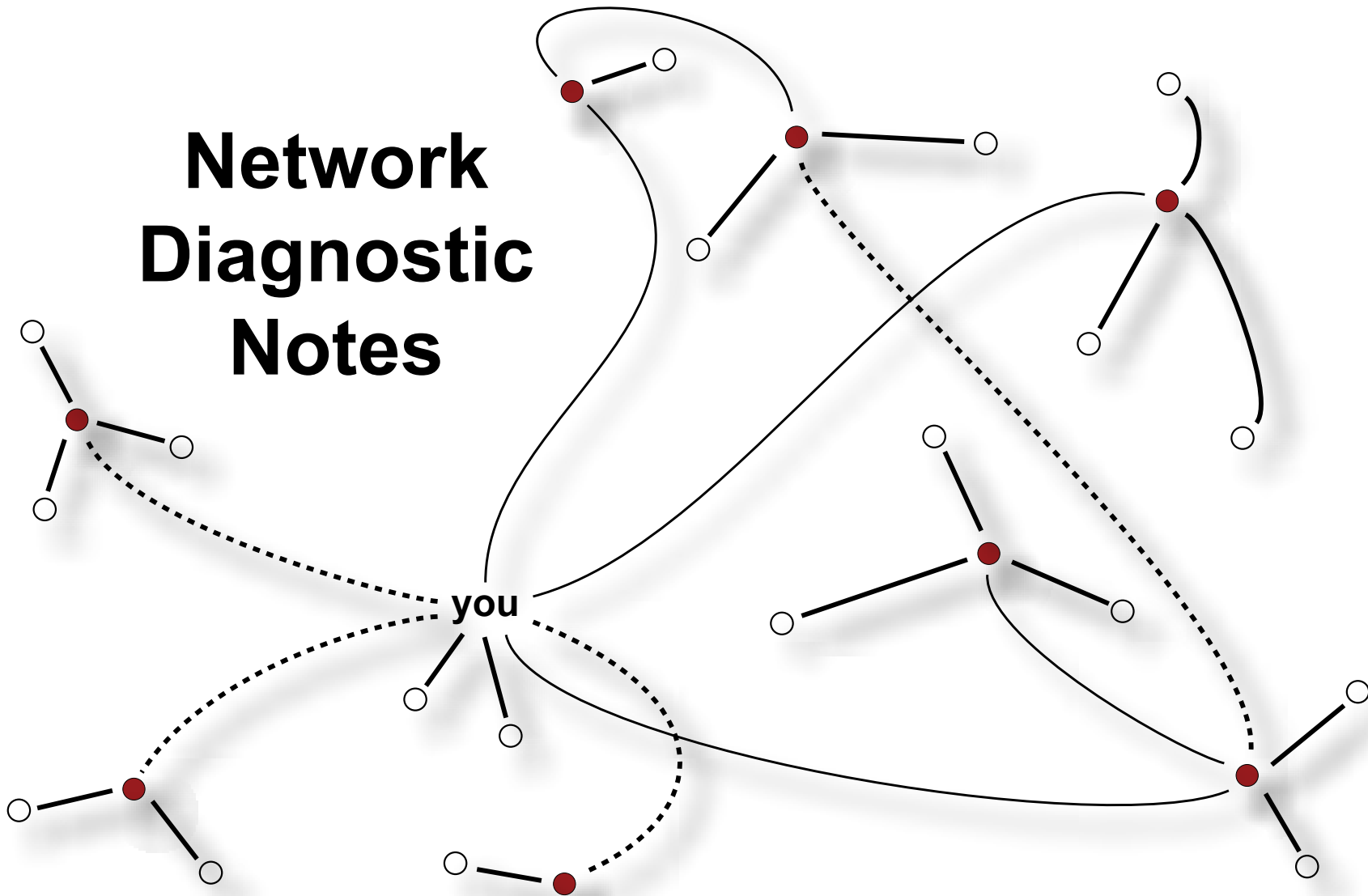


Network Diagnostic Notes



Self-Diagnosis Project

The project assignment in this course is to get an INSEAD analysis of your network, and write a project report from the results. Your project write-up should be two pages, Arial 12 font, single spaced. You are free to attach images from your INSEAD report (in fact, I recommend it), but put them after the initial two pages. Invitations to the INSEAD website will go out after the mid-term break (October 27). The deadline for completing the INSEAD network questionnaire is two weeks later, November 10. (No report if you miss the deadline.) I'll go through a couple example reports and this handout in the November 13 class session. Your project report should be submitted by November 27 (submit through Blackboard).

Here are the four steps to completing the project report:

1. As explained in the October 9 BlackBoard message to you, registered students attending this course, will receive by email an invitation to the INSEAD social capital website. Your user name at the website is your Bocconi email address (or the alternative you sent to me). The invitation contains the URL for the website, a deadline for completing the network questionnaire, and an admission password that is unique to you. Your analysis is confidential information that will not be shared with other students. After you have your report, you are of course free to use the analysis any way you wish.

2. Once you are in the INSEAD website, you will be asked a series of questions about your network. Your answers are used to build, and send to you, a "social capital" analysis of your network.

Remember, these network questions are intended to elicit networks from managers, so some will be above your pay grade. You are the one who is going to interpret your network report, so answer the questions as they apply to your current life. For example, the question about "discussing matters important to you" is as meaningful to you as it is to managers. With respect to socializing, I expect you can figure out who are the people with whom you most enjoy informal socializing. Be patient with the country of origin question. Selecting countries is clumsy, but useful. Kinds of resources also go on for quite a bit, but the analysis is trying to figure out your relative dependence on individual contacts.



Personal Report on the Social Capital of Your Network

This report analyzes your **core network** - that is, the people that are most important to you and your job at this particular time. It uses your responses to the **Social Capital Questionnaire** to compute indexes that summarize important aspects of your core network. To facilitate the interpretation, we compare your scores with those of a reference group set up by your instructor.

The report highlights the benefits and limitations of different types of core networks according to established research. Yet, we also know that the benefits of a specific type of network may vary across contexts.

This is why you should consider your specific personal and professional situation when reflecting on the insights included in this report. A network that serves you well today may become a liability when you move to a professional role with a broader and different span of responsibilities.

3. After the November 10 deadline, I'll have the INSEAD website pool the data and produce individual analyses. When the analyses are ready, you will receive an email message with a URL where you can download yours. To download your INSEAD analysis, you'll need the email address and INSEAD password in your invitation email.

4. Now write your project report for this course answering the following questions (less than 10 pages):

- a. How would you characterize your network? Are you positioned more for top-line growth (brokerage) or to secure trust and cooperation (closure)? Is that where you want to be?
- b. Where is the core strength of your network; your strong bridges? These are bridge relations in which your trust in the contact is independent of mutual acquaintances as we discussed with the Balance handout in sessions 7-8.
- c. Where is your contact diversity? That is where you are likely to discover good ideas. In particular, thinking of our discussion of guanxi, how diverse are your closest contacts? Diversity could be contacts of different ages, different functional areas, different companies, etc. Is your area of greatest diversity the area in which you want to have good ideas? If yes, great. If no, look for more varied contacts in the target area (e.g., head of engineering).
- d. Where is your greatest network constraint? Constraint can be in the form of a bottleneck contact or a cluster of homogeneous, interconnected contacts. Does the constraint affect your ability to deliver on good ideas? If no, great. If yes, look for more varied contacts to erode the constraint (e.g., dense commercial bank), but be careful to appear consistent with social norms in the dense cluster constraining you.
- e. Is anything missing from your network that could enhance your value? The analysis shows how you see your social network. What is missing that might be obvious to a new person entering from outside your area, or from another organization (e.g., head of engineering)? Here are a couple questions to ask yourself: When was the last time you did something for the first time? Who, outside your family, is happy to meet you whenever you two meet?
- f. What advantages/disadvantages for your career post-Master's degree do you see in your network? Networks are a learned activity. What you do today is your template for tomorrow. Connect your discussion to network concepts and effects we have discussed in class. Consider an AI opinion on your future. Go to ChatGPT and enter "I am graduating from Bocconi University with a Master's degree. My core network contains NN contacts, with density DD, centralization CC, with (or without) strong bridges. What are the implications for X?" where NN, DD, and CC are scores from your INSEAD analysis, and X is a topic for which you'd like to see implications. Example implication topics could be "my career as a XXX?" (you fill in the XXX profession) "my well-being?" "my ability to learn new skills?"

Enjoy. The project write up should be interesting and enlightening since it is explicitly about you and your network. Good luck.



in your contacts. The link between your network and the social capital of your organization is not obvious. To understand it, take a more analytical view at the pattern of connections in your contacts.

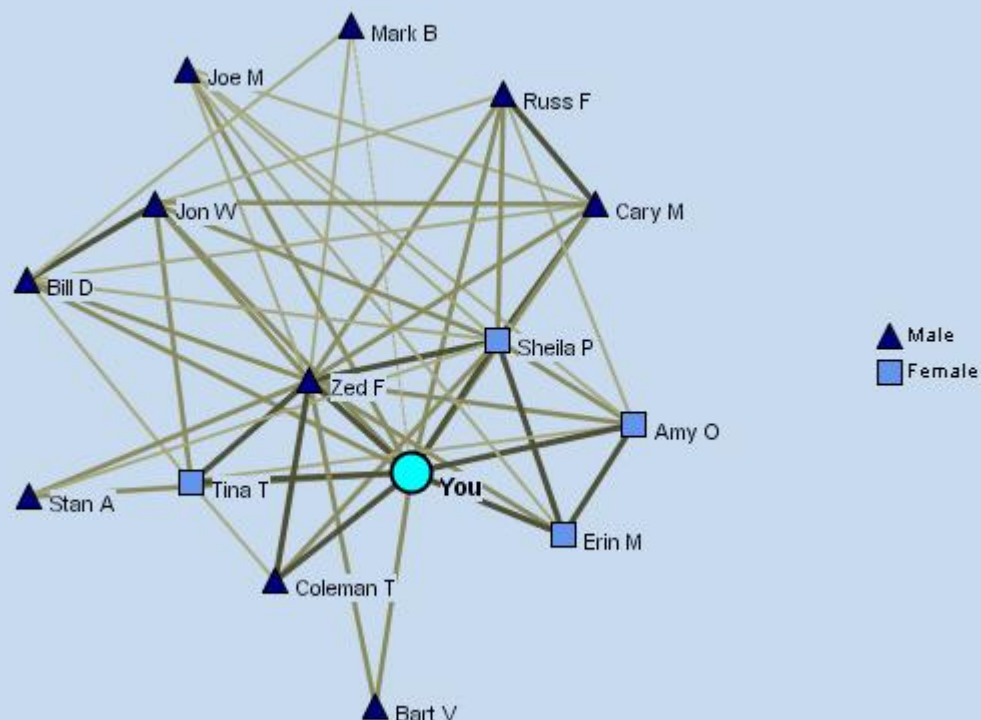
Structure of your network

One way to grasp the structure of your network is to visualize it. Below is a graphic representation of your network. Each shape represents one of your contacts. The large light-blue circle is you. Shapes represent the diversity of your contacts along with the strength of the relationship between you and them for this report. Lines between shapes represent social ties. The thickness of the line represents the strength of the relationship between you and the contact, so the thickest line corresponds to the strongest relationship and the thinnest line to "distant" relationships. You'll see only if necessary.

To grasp the intuition behind network density and centralization, imagine a friendship network. The more friends are also friends with one another, the higher the density of the network. The more one of the friends is also a friend of the others, while these are not friends among themselves, the more the network is centralized on this particularly well-connected friend. Look at the diagram of your network below: the more lines connecting your contacts, the higher the density of your network. The more these lines go to one single person among your contacts, the higher its centralization.

The density and centralization indexes vary from 100 for a perfectly dense (or centralized) network to 0 for a perfectly sparse (or flat) network. In the next section, we report the scores for your network. We also explain what these values mean by comparing them with those of the people in your reference group and discussing how they define "styles" of social capital.

♦ A graphic representation of your network



Social Capital

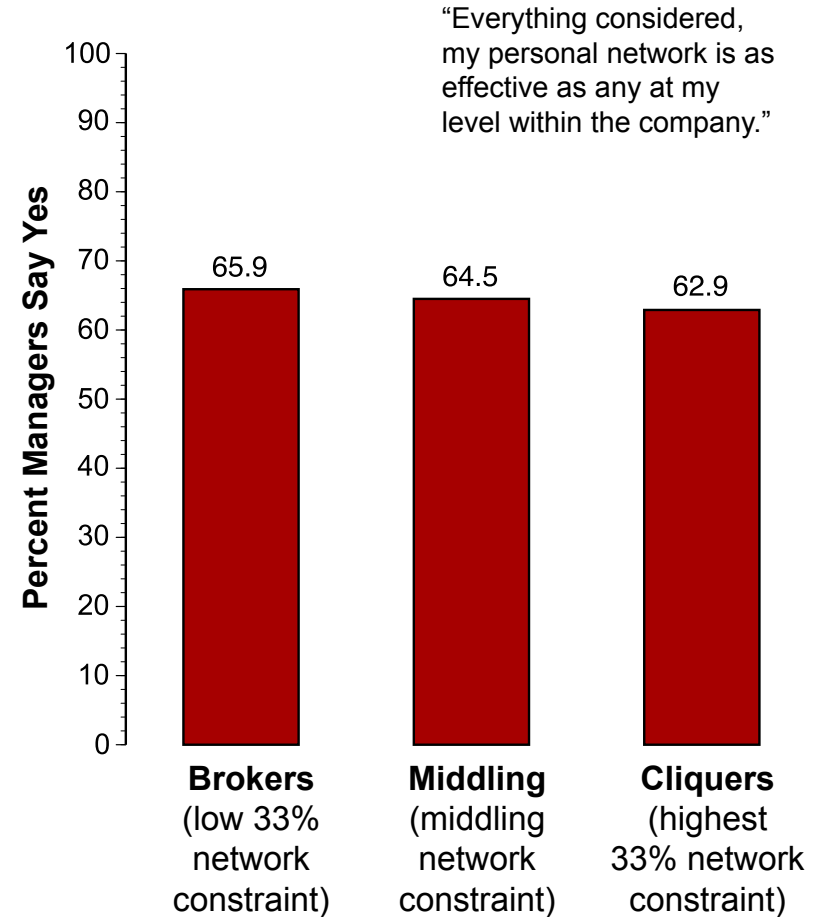
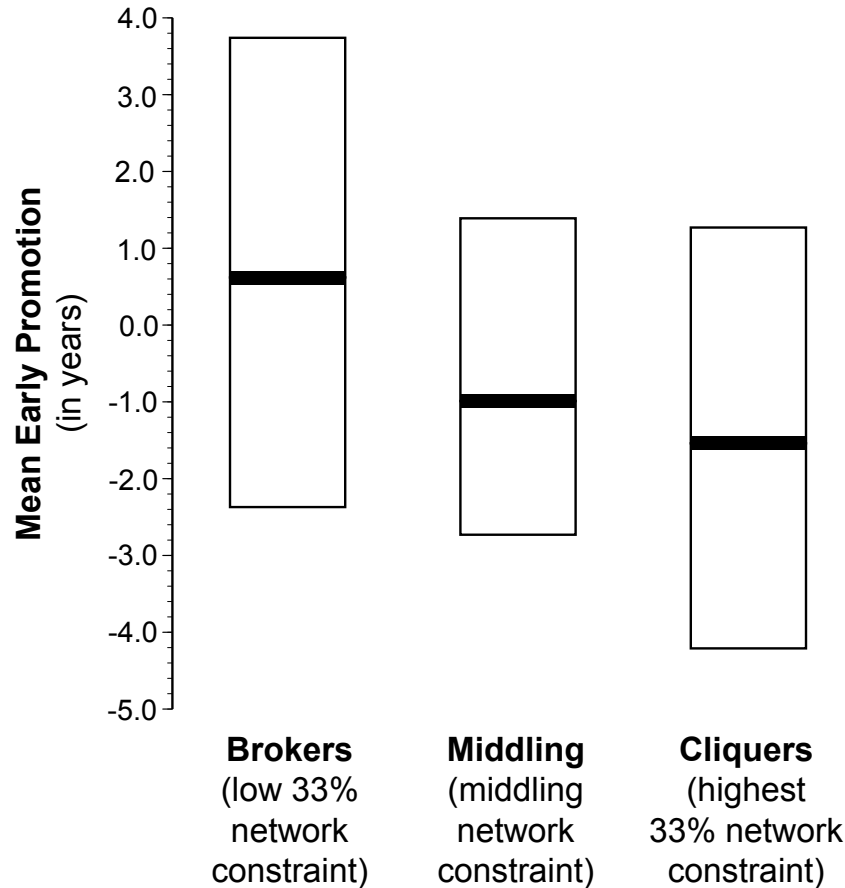
Identifying patterns in your network of relationships



(Q143) On average, people know whether they have a good network. **True or false?**

- A. True, because they are the person at the center of their own network.
- B. True, if they have a lot of work experience.
- C. False, because people tend not to know how their network compares to the networks around other people.
- D. False, because social networks are complex and often change from day to day.
- E. False, because people believe they are more similar to their contacts than they actually are.

Self-Diagnosis Suffers from Ignorance, Arrogance, and Feelings of Inadequacy. Often Interesting, Rarely Useful.



Kinds of Networks Have Consequences for Manager Promotions

($b = -.84$, $t = -2.55$, $P \sim .01$;
 $F = 3.30$, 2-281 d.f., $P \sim .04$)

But Managers Typically Believe They Have an Effective Network

($\chi^2 = 0.20$, 2 d.f., $P \sim .91$)
 (and no association between early promotion and manager's belief that his or her network is effective; 0.88 t-test, $P = .38$)

In Sum, There Are Three Network Forms of Social Capital

See Appendix III on seeming contradiction between strategic partners and secondhand brokerage.

An asterisk here indicates a page in the initial handout, "Brokerage."

from Burt, "Gender of social capital" (1998, *Rationality & Society*)

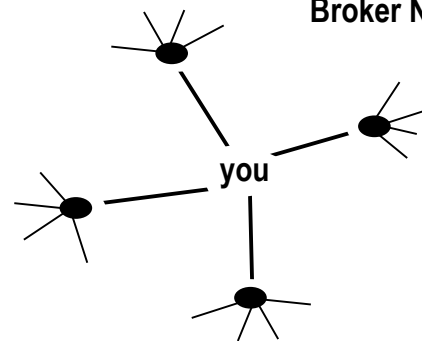
Network Indices

N = 4
D = 0.0
H = 0.0
C = 25.0

N = 4
D = 100.0
H = 0.0
C = 76.6

N = 4
D = 50.0
H = 16.8
C = 68.4

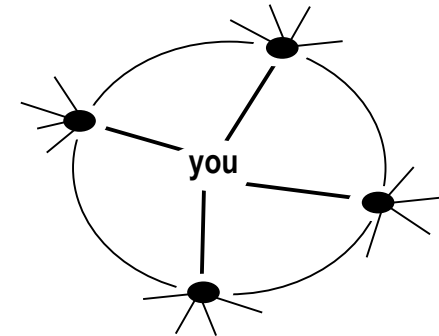
Broker Network: Create Value



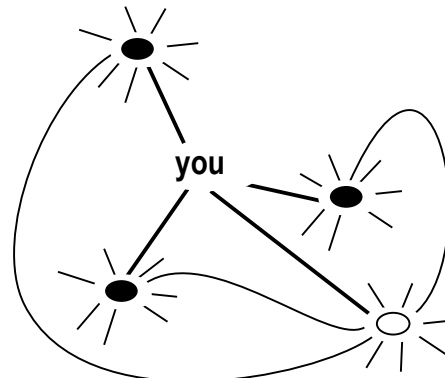
sparse, flat structure
independent relations sustained by you
abundant structural holes, low redundancy
creates information access and control benefits associated with successful insiders

Clique Network: Deliver Value

dense, flat structure
interconnected relations sustain one another for you
no structural holes, high redundancy
creates social support, but minimal information access and control benefits associated with unsuccessful insiders



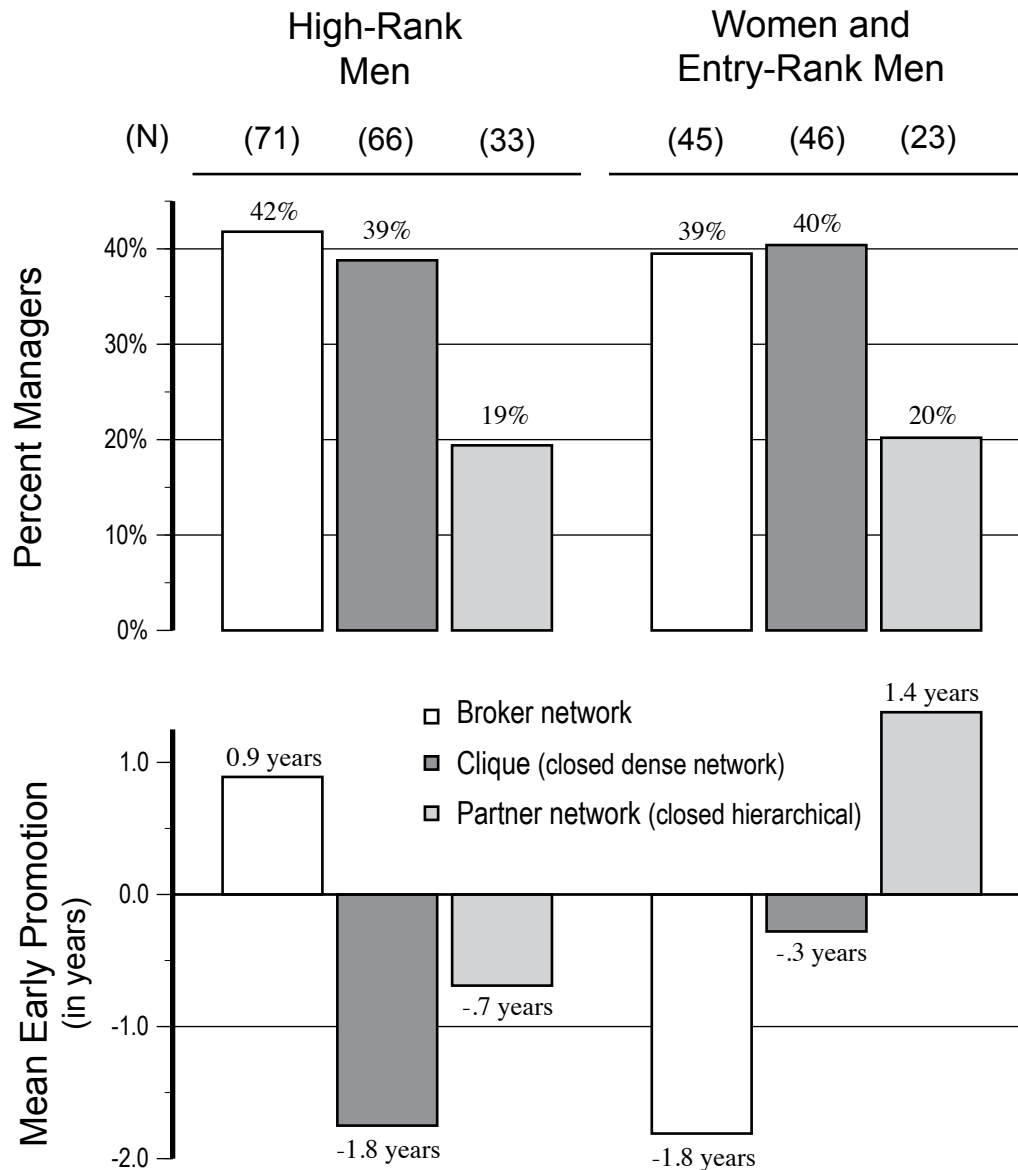
Partner Network: Sponsored Access to Create Value



sparse, center-periphery structure
ties sustained jointly by you and strategic partner
structural holes borrowed from strategic partner mean second-hand information access and control benefits associated with successful outsiders (and unsuccessful insiders)

The Situation Can Be Difficult To Self-Diagnose

Without network metrics, people rely on self-diagnosis — which is unreliable for various data and ego-preserving reasons. If no one contradicts the assumption that your network is fine, who's to say it isn't?



Kinds of Networks Are Similarly Likely across Kinds of Managers

($\chi^2 = 0.15$, 2 d.f., $P = .93$)

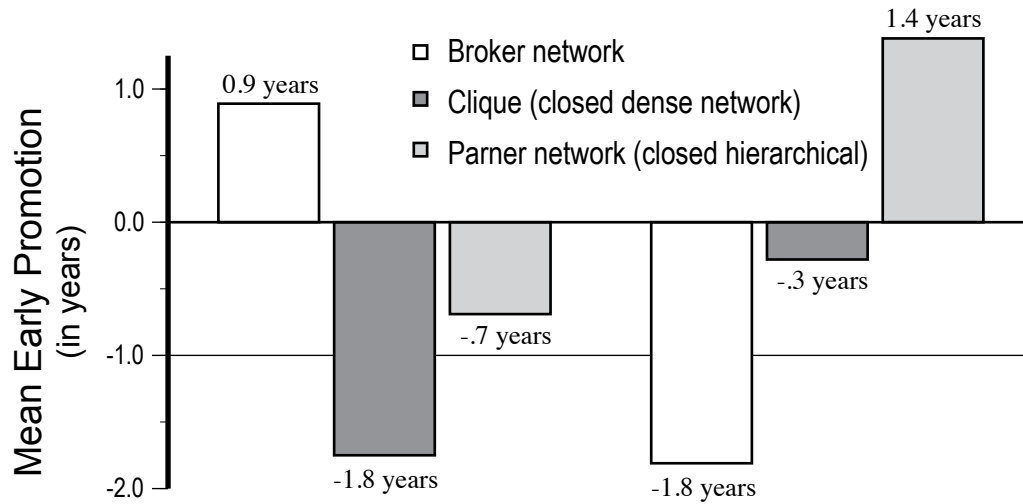
(In other words, pick a network for what it can do, not for the kind of people who picked it in the past.)

Kinds of Networks Have Different Consequences for Kinds of Managers

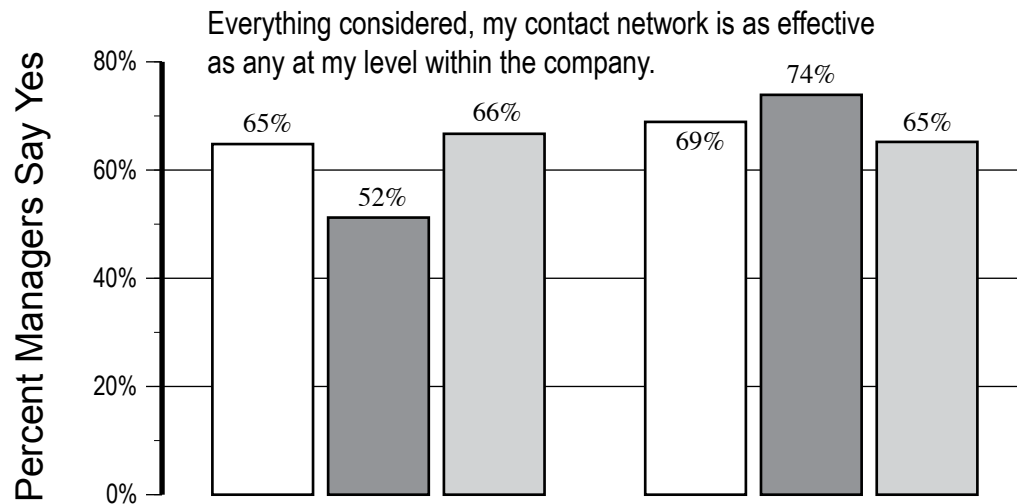
($F = 3.77$, 5-278 d.f., $P < .01$)

from Burt, "Gender of social capital" (1998, *Rationality and Society*) and Figure 7.4 in *Neighbor Networks*.

The Situation Can Be Difficult To See



Kinds of Networks Have Different Consequences for Kinds of Managers
($F = 3.77, 5-278 \text{ d.f.}, P < .01$)



Regardless, Managers Believe That They Have an Effective Network
($\chi^2 = 6.97, 5 \text{ d.f.}, P = .22$)
(and no association between early promotion and manager's belief that his or her network is effective; 1.63 t-test, $P = .20$)

Assign
Network
to Three
Broad
Categories

Broker
(lower left)

Clique
(lower right)

Partner
(top half)

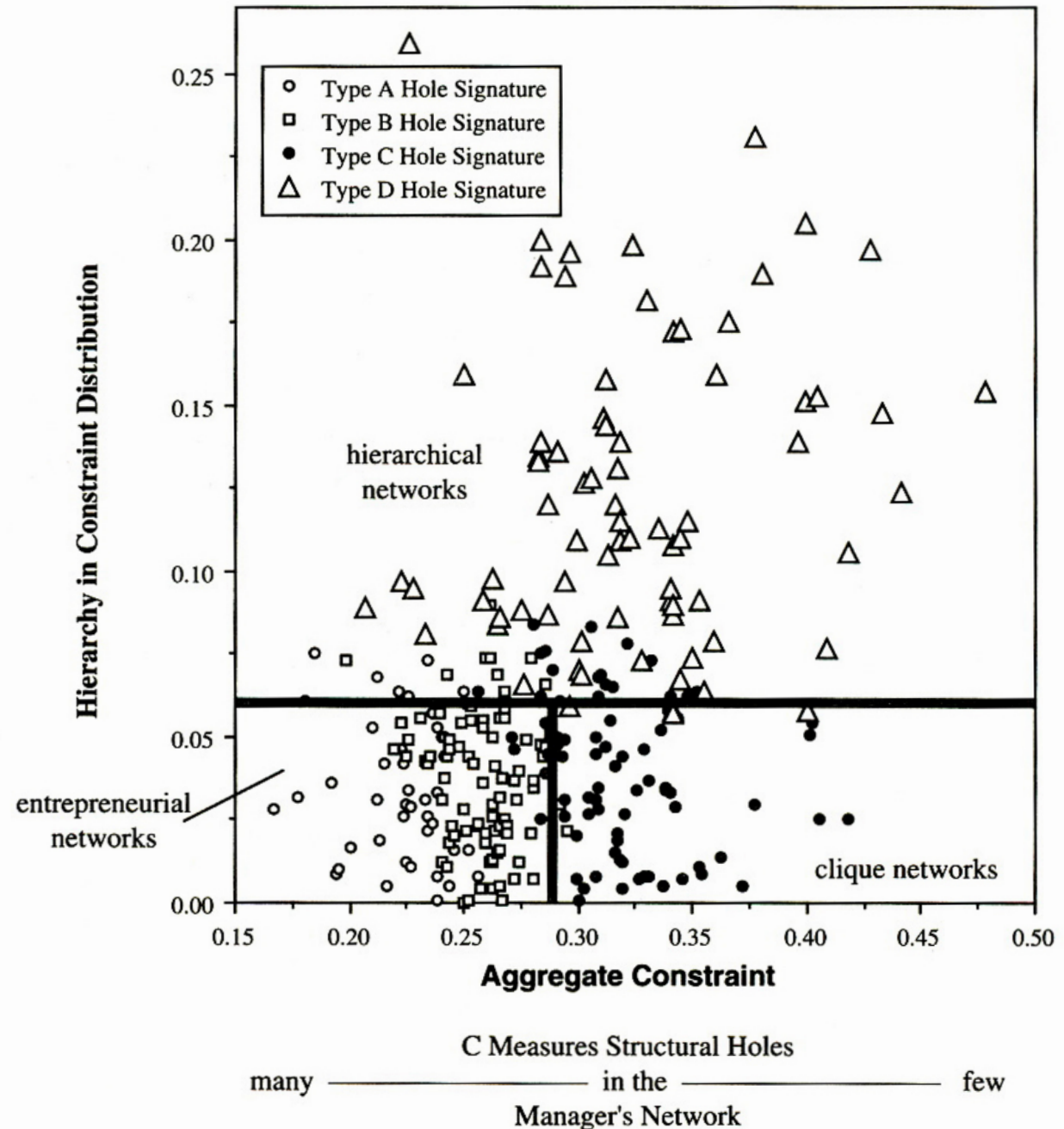
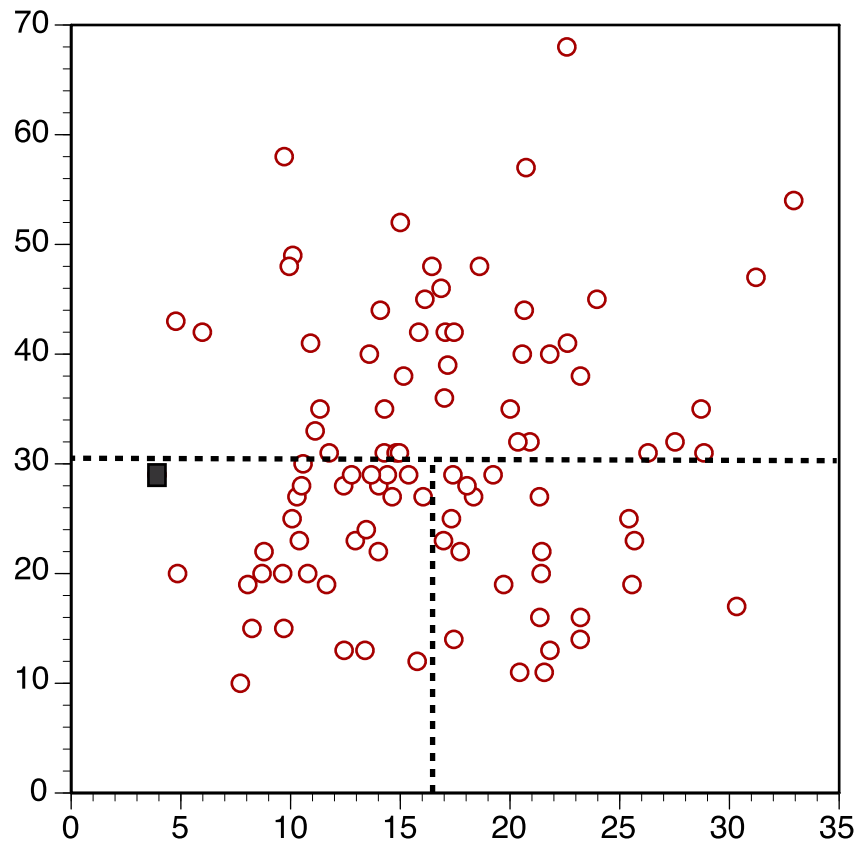
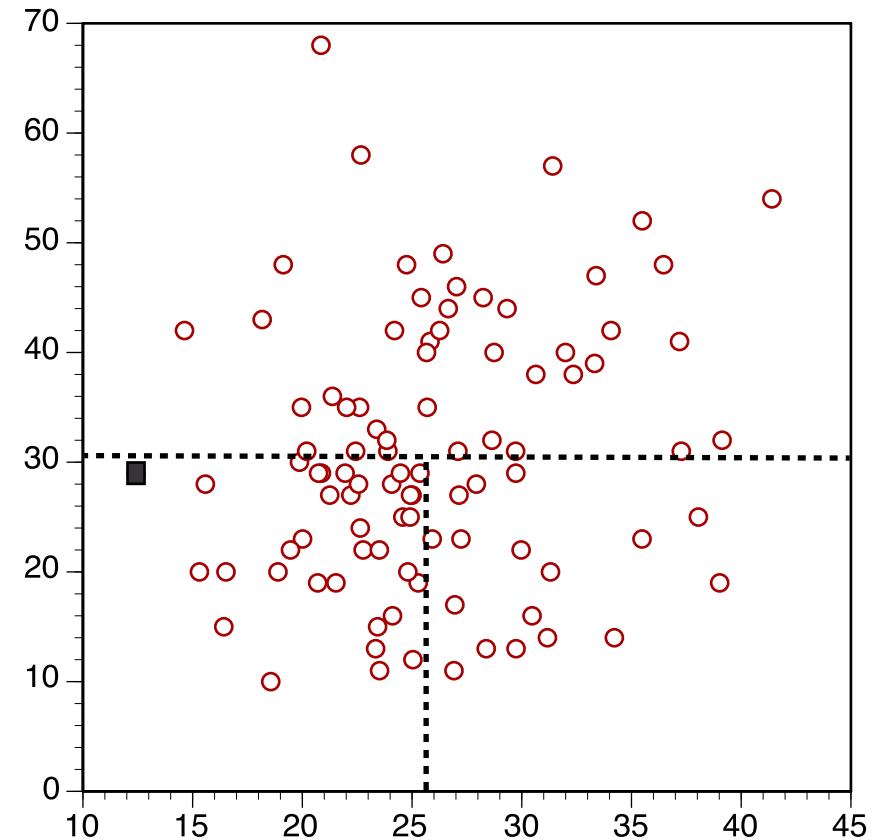


Figure 4.8 Constraint, hierarchy, and kinds of manager networks. (The bold horizontal line marks the mean of hierarchy and the bold vertical line marks the mean of aggregate constraint.)

bdensity		1.0000		
density		0.7826	1.0000	
constraint		0.4858	0.5747	1.0000



Network Density
(average continuous relation
between contacts)

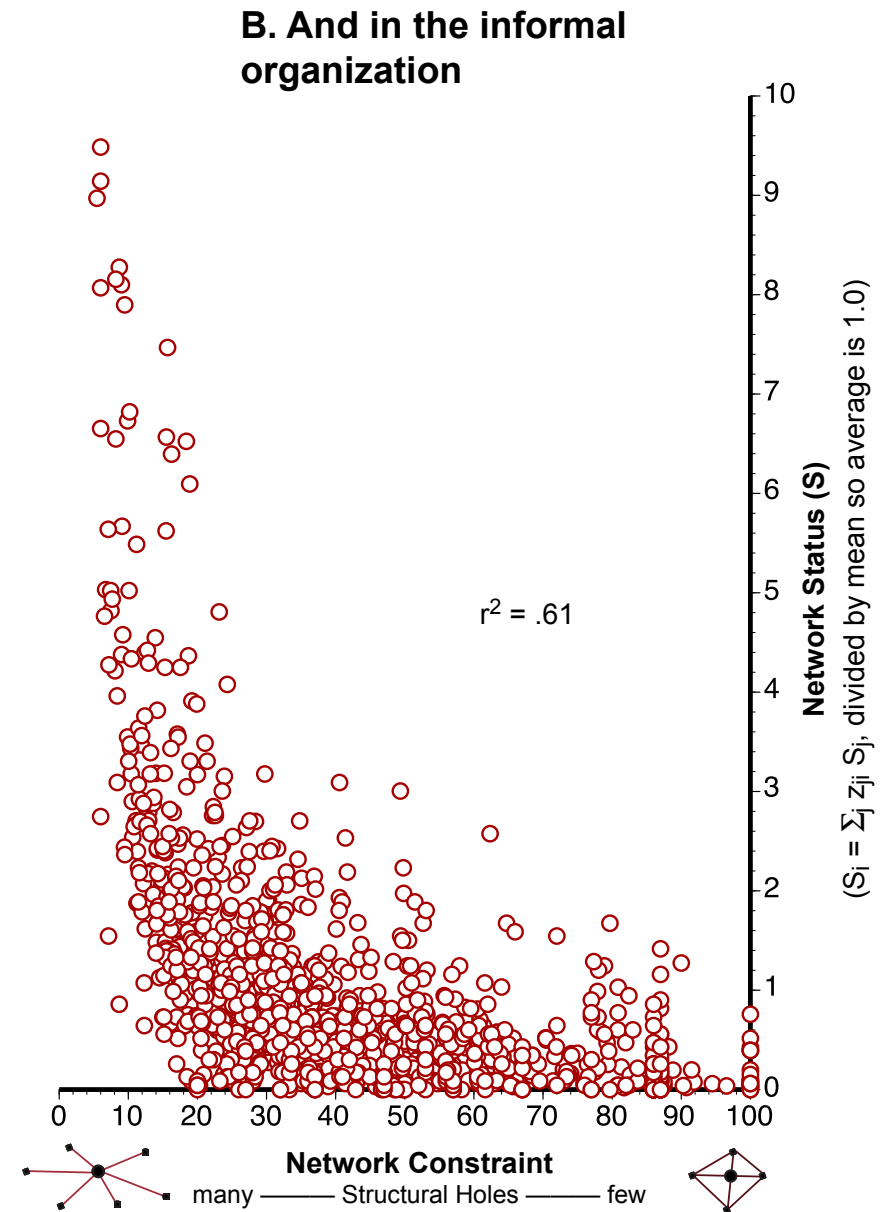
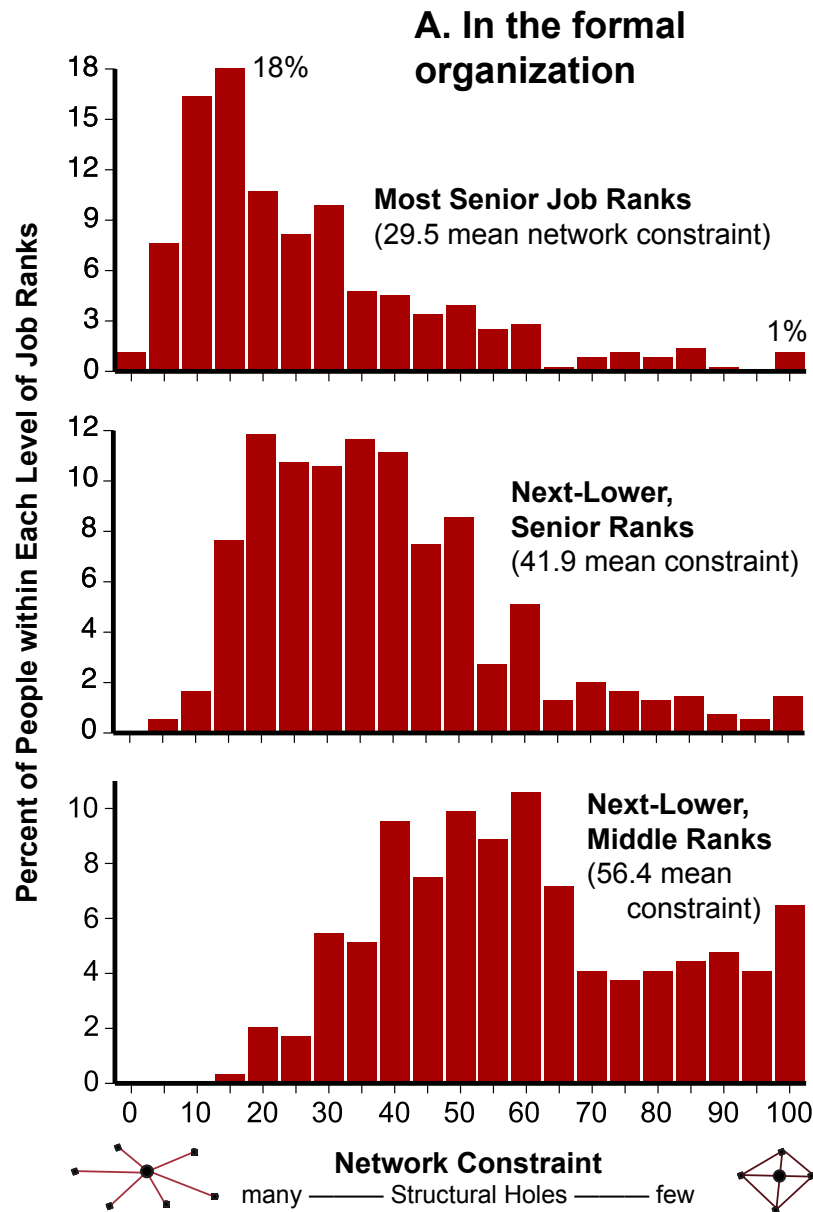


Network Constraint
(concentration of relations
in one group)

These graphs are based on MBA data from a previous year. The vertical axis is the measure of network centralization in the INSEAD instrument. Network density is computed from continuous-strength data on relations (versus "bdensity" from the INSEAD instrument which is based on binary relations). Network constraint is computed from continuous-strength data on relations in the usual manner.

Network Brokers Tend To Be Recognized Leaders

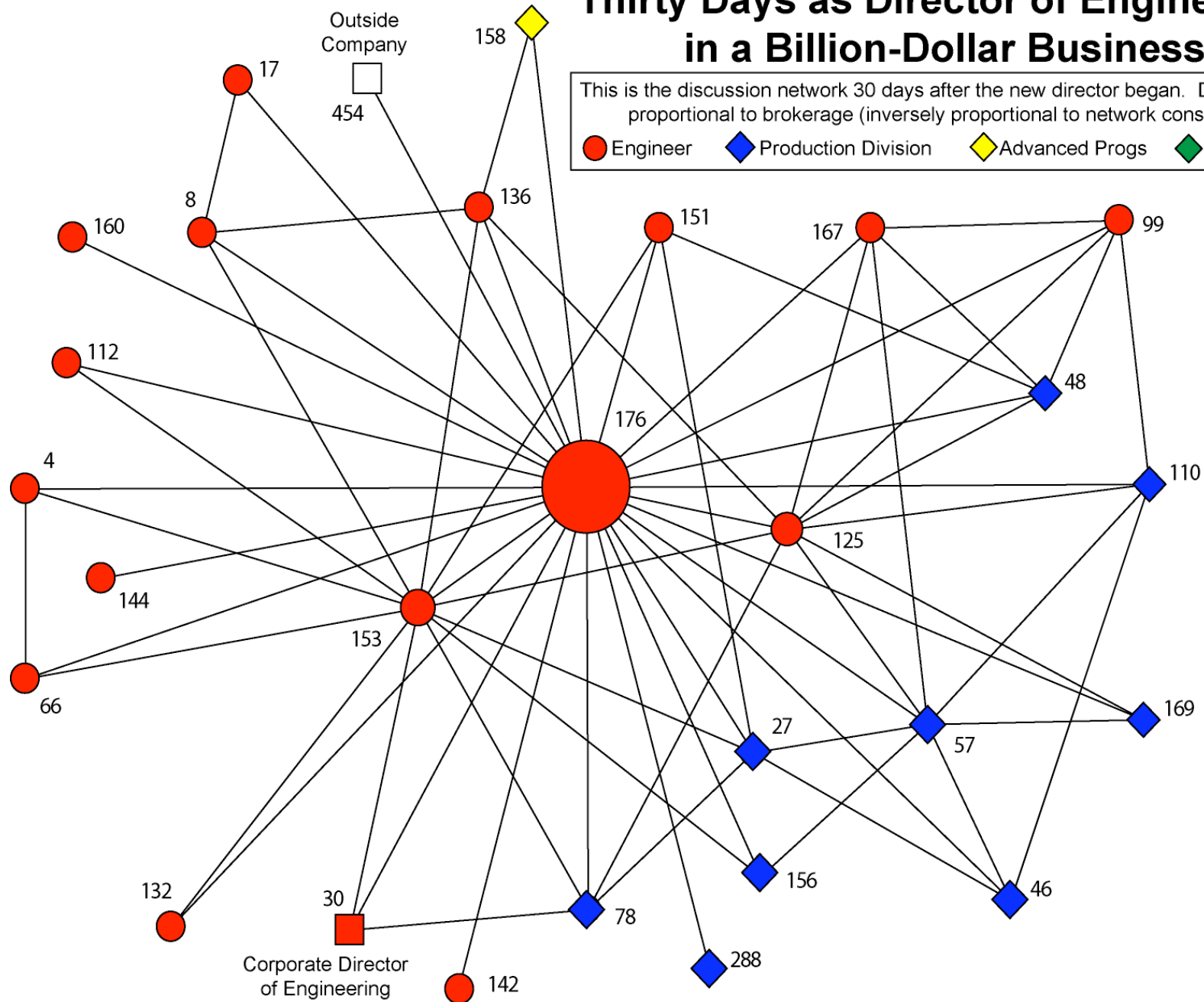
But are you broker enough for your job rank? Senior people are punished for closed networks. Constraint and status here are computed from work discussion networks around twelve hundred managers in four organizations.



Thirty Days as Director of Engineering in a Billion-Dollar Business

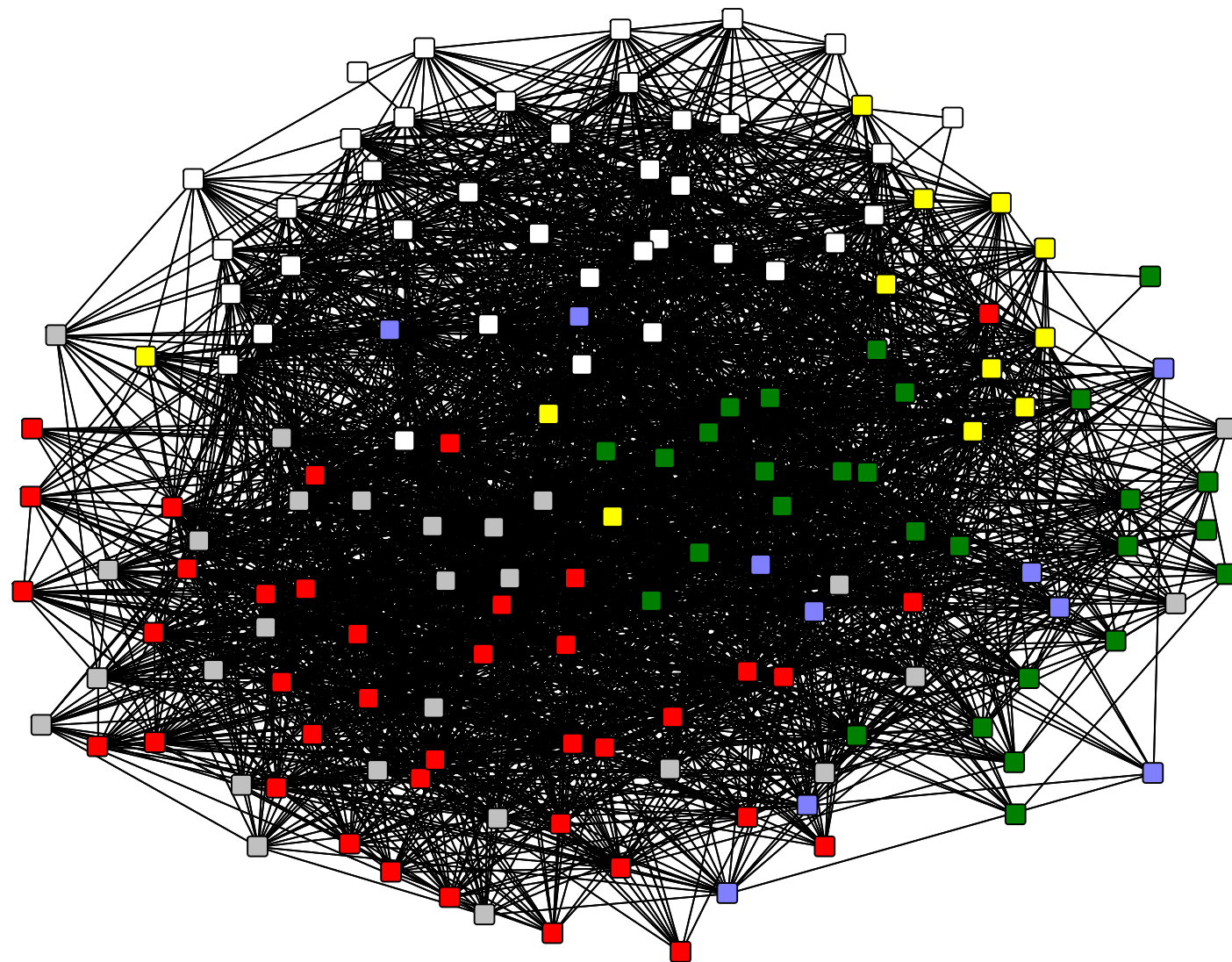
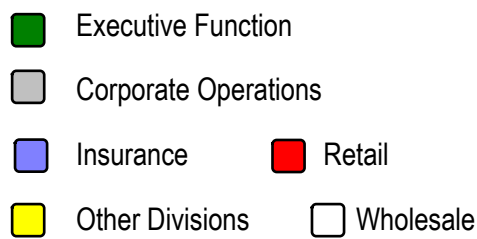
This is the discussion network 30 days after the new director began. Dot radius is proportional to brokerage (inversely proportional to network constraint).

● Engineer ◆ Production Division ◆ Advanced Progs ◆ Bus. Devel.



These are the senior leaders in a large commercial bank.

Lines indicate people who have frequent and substantial face-to-face contact. Average such connection is embedded in 28 mutual friends (0 minimum, 63 maximum).



What are the implications of such a dense network for bank operations? Customer service? Employee engagement? Bank adaptation to the changing business environment?

NetDraw Quick Start

Making your own sociograms and computing network metrics for a group, project, organization, or market

```
*node data
id
ego
A
B
C
D
E
F
*tie data
from to tie
ego A 1
ego B 1
ego C 1
ego D 1
ego E 1
ego F 1
A B 1
E A 1
F A 1
B D 1
```

1. DOWNLOAD THE FREE NETWORK SOFTWARE, NETDRAW (<https://sites.google.com/site/netdrawsoftware/> download, then click on the "Exe only" option)

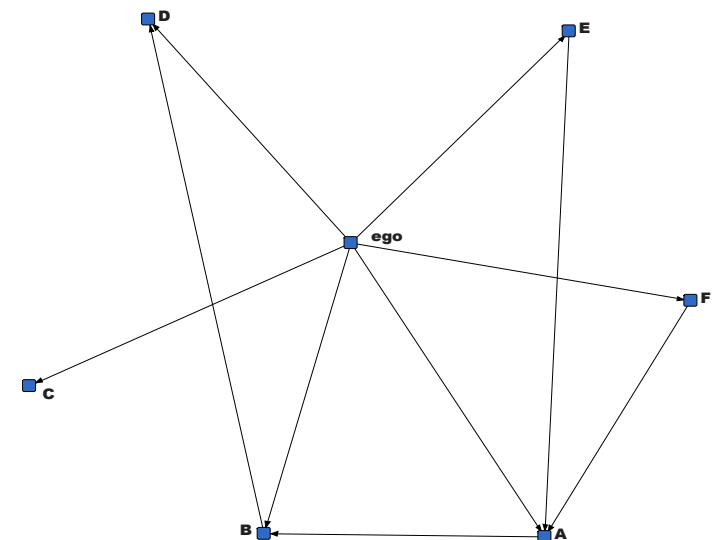
2. TYPE INTO A TEXT FILE THE LINES TO THE LEFT. FILE CAN HAVE ANY NAME, BUT END WITH EXTENTION ".vna" (e.g., test.vna). The 21 lines in the file (listed to the left) are a roster of people in the network followed by a roster of relations (e.g., ego has a relation to person A at strength 1). These data define the network illustrating network constraint in the "Brokerage" handout (see next page of this handout).

3. LOAD THE .vna FILE INTO NETDRAW ("File" menu, "open" option, then "VNA text file" and "Complete")

4. GENERATE A SPATIAL DISPLAY OF THE NETWORK ("Layout" menu, "graph theoretic layout" option, then "graph theoretic layout"). YOU SHOULD GET THE SOCIOGRAM BELOW.

To learn the wide capabilities of the software, play around with the data. Click and drag a node to move it and its relations around. Remove arrows by clicking on the arrow button to the right of the row of command buttons just above the sociogram display. Save the sociogram to a file for editing, pasting, and printing ("File" menu, "save diagram as" option, then "metafile").

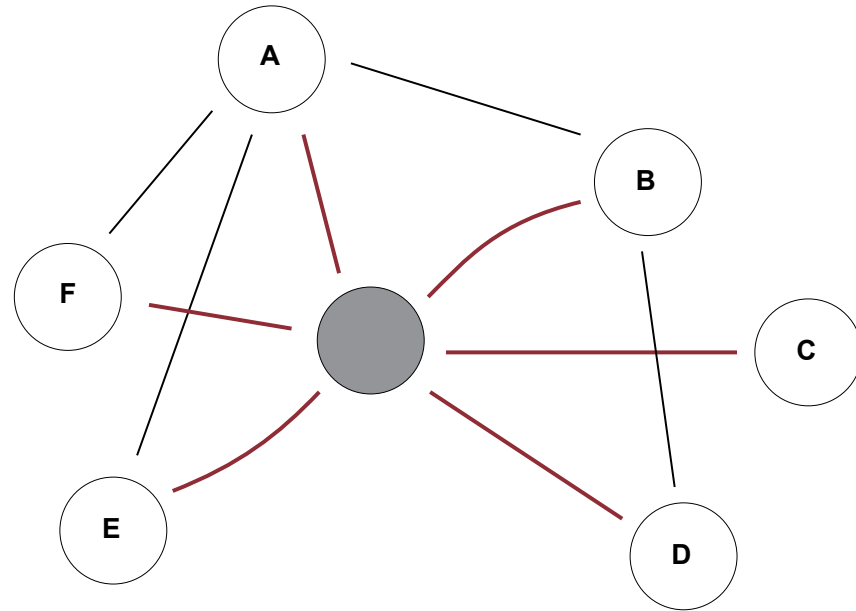
For more complex work, such as computing network metrics ("Analysis" menu, "structural holes" option, then "ego network model" and save the data). If you are not comfortable using new software, it might be wise to bring in someone who can play with the software then brief you. FOR TEXT EXPLAINING THE NETWORK METRICS, see Appendix II in the "Brokerage" handout. Caution: Some versions of NetDraw compute incorrect values of network constraint for isolates. Network constraint is infinite for isolates, so constraint should be its maximum of one. Some versions of NetDraw report a value of zero for infinity.



This is page 57 in the Brokerage handout (1_20979_Brokerage.pdf).

Illustrative Network and Computation

Constraint
measures the
extent to which a
network doesn't
span structural
holes



Network constraint measures the extent to which your network time and energy is concentrated in a single group. There are two components: (direct) a contact consumes a large proportion of your network time and energy, and (indirect) a contact controls other people who consume a large proportion of your network time and energy. The proportion of i 's network time and energy allocated to j , p_{ij} , is the ratio of z_{ij} to the sum of i 's relations, where z_{ij} is the strength of connection between i and j , here simplified to zero versus one.

$$c_{ij} = (p_{ij} + \sum_q p_{iq}p_{qj})^2 \quad q \neq i, j$$

contact-specific
constraint (x100):

A	15.1
B	8.5
C	2.8
D	4.9
E	4.3
F	4.3

100(1/36)

network data

	A	B	C	D	E	F	gray dot
A	.	1	0	0	1	1	1
B	1	.	0	1	0	0	1
C	0	0	.	0	0	0	1
D	0	1	0	.	0	0	1
E	1	0	0	0	.	0	1
F	1	0	0	0	0	.	1
gray dot	1	1	1	1	1	1	.

total 39.9 = aggregate constraint ($C = \sum_j c_{ij}$)

Figure 2.2 in *Structural Holes*.

TECHNICAL NOTE ON NETWORK MEASURES

Network Size N

The number of contacts cited by the respondent i , or “ego” (N)

Network Density d

$$d_i = \sum_j z_{jk} / N * (N-1), \quad z_{ij} > 0 = 1$$

Where:

- $z_{jk} = 1$ if contacts j and k are connected ($z_{jk} > 0$) and 0 otherwise; N = number of contacts cited

Network Closeness CL

$$CL_i = \sum_j z_{jk} / m$$

Where:

- z_{jk} is the actual valued tie between contacts j and k , so z_{jk} can take values 1.00 (very close), 0.70 (close), 0.30 (acquaintance), or 0.01 (distant).
- m is the number of nonzero ties among contacts j, k ($z_{jk} > 0$). Unlike network density, closeness does not consider ties between contacts that are “totally strangers”.

Contact's Degree centrality C_i

The number of nonzero connections of contact j with other contacts k in ego's network ($z_{jk} > 0$; $C_{j(max)} = N-1$)

Network Centralization NC

$$NC_i = (C_{i(max)} - C_i) / (N-1) (N-2) \quad (\text{Check with instructor.})$$

Where:

- $C_{i(max)}$ is the theoretical maximum degree centrality for a network of size N (so $C_{i(max)} = N-1$)
- C_i is the degree centrality of contact j

Source: Freeman, L.C (1979) "Centrality in social networks: Conceptual clarifications." Social Networks 1:215-239.

NDI (Network Diversity Index ND)

$$ND_i = 1 - \sum_k (p_k p_{0,k})^2$$

Where:

- p_k is the proportion of contacts in the k^{th} category (and $\sum_k p_k = 1$).
- $p_{0,k}$ is the mean proportional relationship strength between ego and alters in that category.
- $p_{0,k} = \sum_{i \in k} p_{0,i} / j \in k$ (i.e., alter j belongs to category k).
- $p_{0,i} = z_{0,i} / \sum_j z_{0,j}$, being $z_{0,i}$ the strength of the tie between ego (i) and alter (j).

Source: Reagans, R. & B. McEvily (2003). Network structure and knowledge transfer: The effects of cohesion and range. Administrative Science Quarterly, 48: 240-267.

Dependence (D)

The extent to which the respondent i (ego) depends on each of his or her contacts j (alter).

$$D_{ij} = \sum_l (B_{ij} * R_{ij}),$$

where B_{ij} is the extent to which respondent i receives benefit B from contact j and R_{ij} captures how easy would be for the respondent to replace this contact ($0 \leq B_{ij} \leq 4$; $1 \leq R_{ij} \leq 5$)

Benefit Concentration Index (BCI)

$$BCI_{i,B} = 1 - \sum_k (p_k)^2$$

Where:

- p_j is the proportion of the network benefit B provided by alter j and $\sum_{j \in A} (p_j) = 1$