Harvesting Value: Brokerage in Practice

For text on this session, see Chapters 1 and 2 in *Brokerage and Closure* (including adjunct bits from *Neighbor Networks*).

Appendices:

I. Competitive Advantage in Social Networks & Stigler's "Economics of Information" (1961 *Journal of Political Economy*)

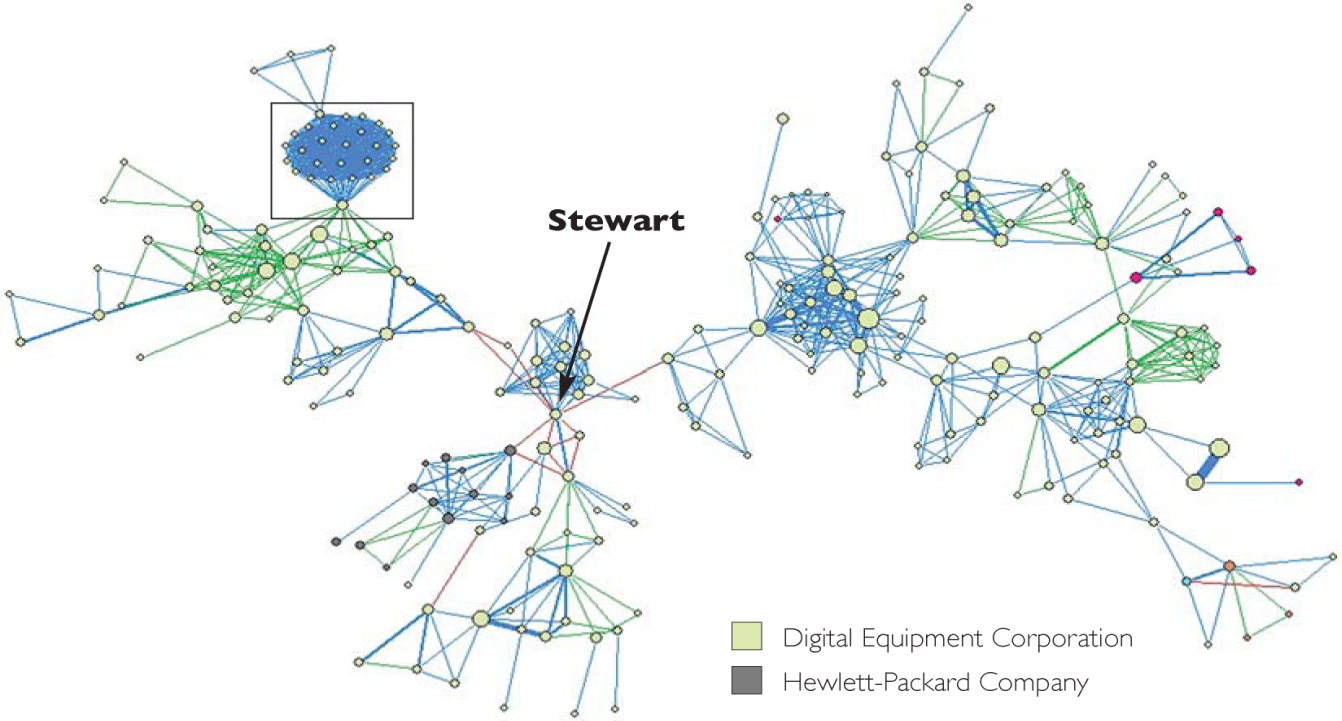
II. Reinforced Structural Holes (from 2015, "Reinforced structural holes" *Social Networks*)

III. Research Design for Spillover versus Contagion (from 2012, "Network-Related Personality and the Agency Question" *American Journal of Sociology*)

IV. Personality & Network Advantage (from 2012, "Network-Related Personality and the Agency Question")

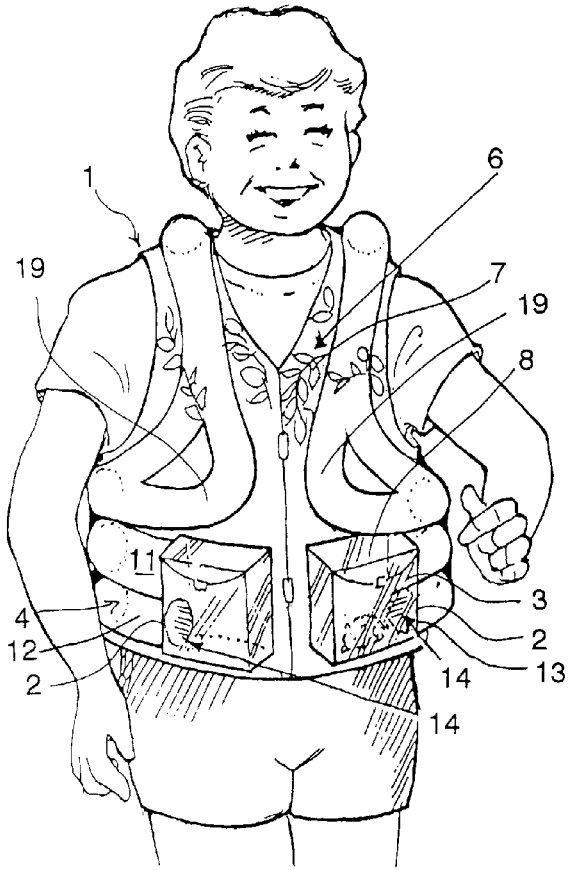
HOW THE NETWORK BROKERAGE EFFECT WORKS

Returns to network brokerage are a probability, not a certainty. Access to structural holes "increases the risk of productive accident," which means learning from practice, and trivial acts of brokerage. Two people disconnected from each other, but similarly connected elsewhere can be equally at risk of the same productive accident, resulting in “re-innovation” (Redlich 1951) and what Merton (1961) describes as “multiples.”



Robert Stewart, by facilitating the flow of information among three locally cohesive but insular clusters, turned Digital Equipment Corporation into a small world (though a small world that remained relatively unconnected to other firms). In contrast to Robert Stewart’s bridging connection, the box illustrates highly clustered inventors.

Patent co-authoring network from Lee Fleming & Matt Marx, "Managing creativity in small worlds" (*California Management Review*, 2006; see Fleming et al. 2007 ASQ). 418 3-digit primary tech categories for filing patents (> 120,000 subcategories).



from Brice Belisle, "Pet display clothing" (US Patent 5,901,666 granted May 11, 1999).

Taking Action; Three Ways to Go:

A network broker can move information in three ways to create value (making the broker the "*tertius gaudens*," the third who benefits):

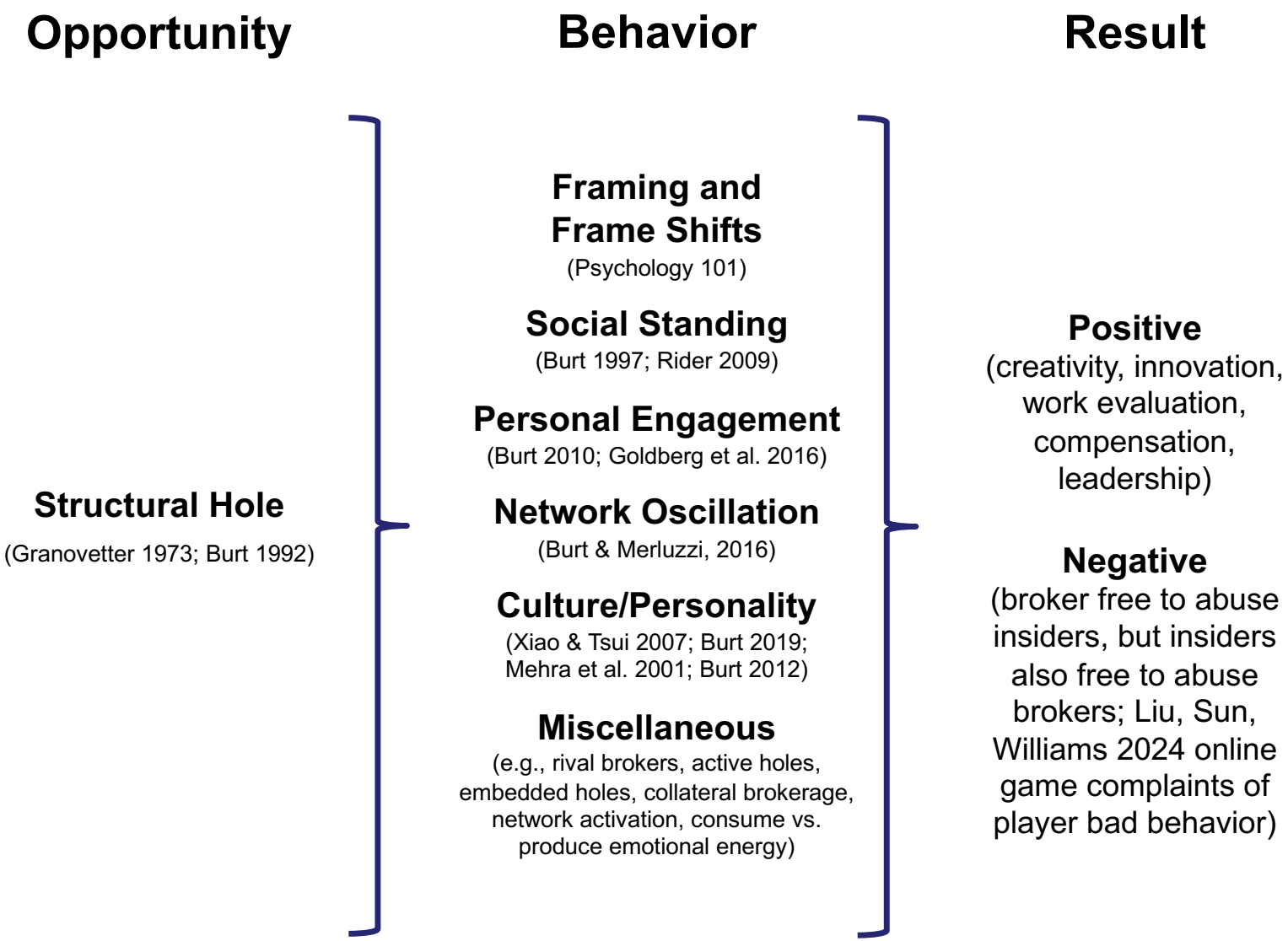
Eliminate the structural hole (*tertius iungens*): introduce source to destination so they owe you a favor or a fee (marriage broker, favor to a friend, team leader, Obstfeld, 2005 *ASQ*).

Arbitrage the hole (*tertius separans*): translate source information into destination information without either having to deal with the other. This is the usual move in general because target groups usually prefer to delegate search and arbitrage (e.g., consultants; for agents within the firm, see Kellogg, "Brokerage profession and implementing reform in an age of experts" 2014 *American Sociological Review*).

Reinforce the hole (*tertius separans* [*tertius repulsiva*?]): Play both sides against one another as competitors to extract rents from both sides or escape oppression from either (Chinese "compradors," Padgett & McLean, "Robust action and the rise of the Medici, 1400-1434" 1993 *AJS*, Fernandez-Mateo, "Who pays the price of brokerage?" 2007 *ASR*; Iorio, "Brokers in disguise" 2022 *ASQ*).

None of the three actions is inherently good or bad. Depending on the situation, each can be more or less appropriate, and more or less productive. As stressed by social psychologist, Solomon Asch (1952:61), early in the "golden age" of social psychology: "Most social acts have to be understood in their setting, and lose meaning if isolated. No error in thinking about social facts is more serious than the failure to see their place and function." (cf., Fundamental Attribution Error)

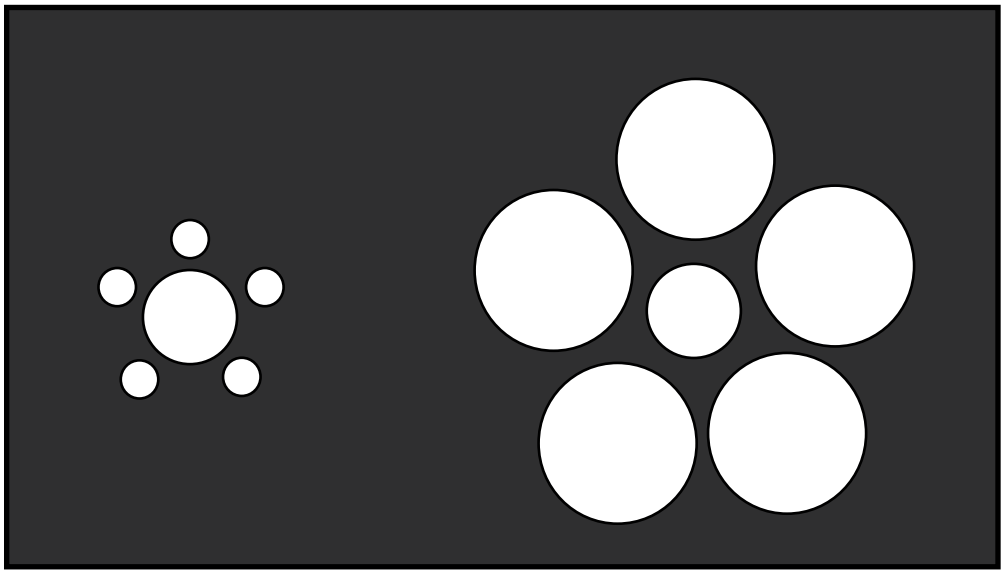
Bringing Behavior into the Analysis

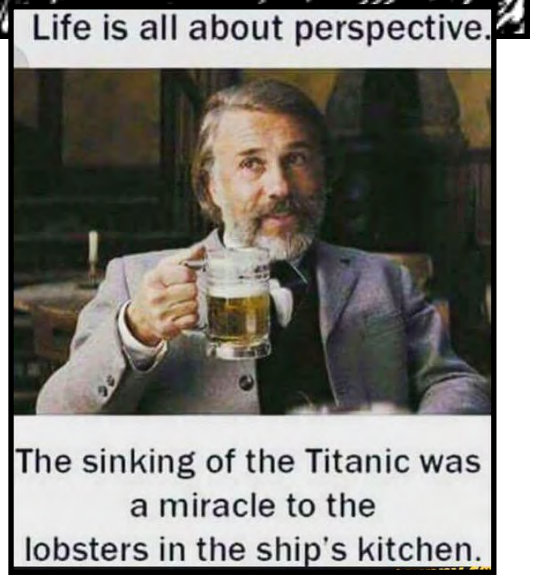


from Burt, *Structural Holes in Worlds Familiar, Foreign, and Virtual* (2022)

Framing for Target Audience

Meaning derives in some part
from the context in which
an object, idea, or person is viewed.





At the height of his wealth and success, the financier Baron de Rothschild was petitioned for a loan by an acquaintance. Reputedly, the great man replied, "I won't give you the loan myself, but I will walk arm-in-arm with you across the floor of the Stock Exchange, and you soon shall have willing lenders to spare." [from un-attributed material in Cialdini (1989:45)]

There is a delightfully descriptive word in Yiddish, mishpokhe, that refers to people who are "one of us." The word refers to extended family, but it is popularly used to refer to people who are one of us. Rosten (1989:338) illustrates with Chase Manhattan Banks's advertising campaign built around the slogan "You have a friend at Chase Manhattan." In a window of the bank next to a Chase Manhattan branch there appeared a sign; " — BUT HERE YOU HAVE MISHPOKHE!"

FRAMING & FRAME SHIFTS: Information arbitrage is about framing as much as content. Would the situation look different viewed from another perspective?

Problem vs. Paradox. What point of view, or frame of reference, will make the idea attractive to the target audience? The key is not to get "out of the box," so much as to see from within a different box. Failure here could be a good idea over there.*

Originally, minoxidil was used exclusively as an oral drug (with the trade name 'Loniten') to treat high blood pressure. However, it was discovered to have an interesting side effect: hair growth. Minoxidil may cause increased growth or darkening of fine body hairs, or in some cases, significant hair growth. When the medication is discontinued, the hair loss will return to normal rate within 30 to 60 days.

Carl Segerstrom, in Chicago's 2012 ADP, worked at Pfizer when the Viagra trials were run. Carl sketched the story: Trials showed that the new drug was a failure as a heart medicine, so the trials were shut down and the test samples were recalled. Subjects were asked to return the test samples, and they usually do, but in this case, an unusually high proportion of subjects did not return the test samples. Someone asked, "let's find out why they aren't returning the test samples," which revealed the profitable side-effect.

*The "problem vs. paradox" point is nicely elaborated by David Doltish, Peter Cairo, and Cade Cowan in The Unfinished Leader (2014). The "out of the box" point is nicely elaborated by Luc de Brabandere (2005), The Forgotten Half of Change: Achieving Greater Creativity through Changes in Perception. See IDEO on the saying "fail often to succeed sooner," Stuart Firestein (2016) Failure, on the critical role failure plays in successful science, and Ludwik Fleck (1979) Genesis and Development of a Scientific Fact, on the critical role that proto-ideas play in successful science.

Illustrative Framing and Re-Framing

Network brokers clear sticky-information markets. The rewards enjoyed by network brokers are compensation for clearing a market that would otherwise not clear. In other words, variation between clusters/silos is essential to the value of brokerage. If there are no information differences between social clusters, then there is no value to moving information from one cluster to another. Social clustering in networks usually indicates variation in understanding and practice, but not always (i.e., BP learning in the refining businesses).

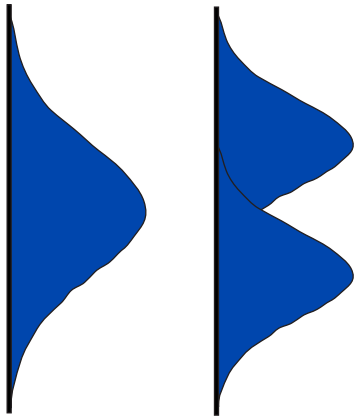
Strong belief/culture/process/paradigm reinforce closed networks, and that can blind people to productive variation. For example:

— Pfizer drug trial protocol

— Talent out of context (able musician in D.C. metro train station)

— INSEAD student teams

— Coca Cola as a distribution company versus custodian of the brand



— “Hard” sciences & the negative correlation between age and contribution (right-wrong versus productive-unproductive or interesting-uninteresting)

Brokers can rise above the limits of personal understanding by forcing themselves to re-frame.

Personal experience is an insidious blinder. Personal experience enriches our understanding, but also limits it. People get trapped in their routines. They hear/believe/understand knowledge consistent with what they've already experienced. The power of fundamental principles, and framing problems in different ways, is that you can reason your way through challenges that involve experiences you have not yet had — making you valuable beyond whatever experience life has happened to give you personally.

The Wisdom of the Naskapi Indians (Weick, The Social Psychology of Organizing, 1979:262-263): The Naskapi Indians of Labrador survive primarily by hunting. Each morning the adult males gather to ask: "Where should we hunt today?" An unusual procedure is used to answer the question: The men take the shoulder bone of a caribou, hold it over a fire until the bone cracks, then hunt in which ever direction the crack points. The procedure works. The Naskapi almost always find game, which is rare among hunting bands.

Why do you think they are successful?

Consider Journalism's Five Ws:

Who - This process works for men. How would it work for women?

What - This process is productive in R&D. How would it have to change to work in BD?

When - This process worked in the 1930s. How would it work today?

Where - This process works in Germany. How would it work in China?

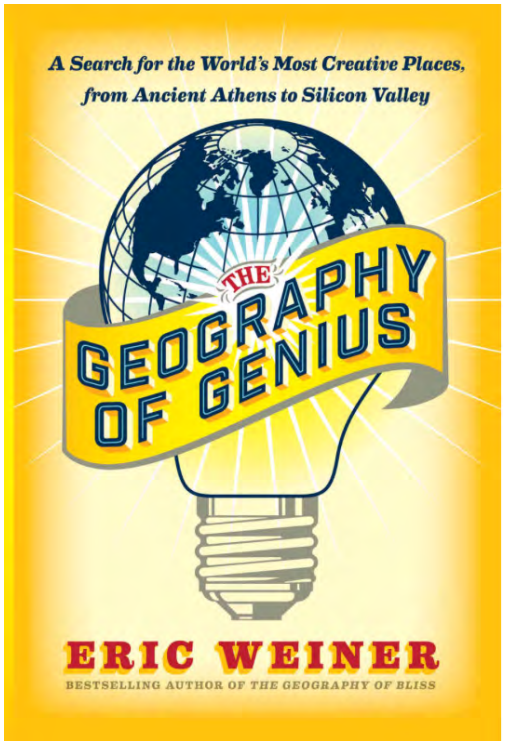
Why - This process runs on cash incentives. How would it work with a reputation incentive?

Sometimes brokerage is forced upon us, as in a merger, or migration, or a significant personal event.

Scan the roster of history's intellectual and artistic giants, and you quickly notice something remarkable: Many were immigrants or refugees, from Victor Hugo, W.H. Auden and Vladimir Nabokov to Nikolas Tesla, Marie Curie, Sigmund Freud, and Albert Einstein. That is especially true of the U.S., a nation defined by the creative zeal of the newcomer. Today, foreign-born residents account for only 13% of the U.S. population but hold nearly a third of all patents and a quarter of all Nobel Prizes awarded to Americans.

It isn't the immigrant's ambition that explains her creativity but her marginality. Uprooted from the familiar, immigrants see the world at an angle, and this fresh perspective enables them to surpass the merely talented. And it isn't necessarily new ideas from the outside that directly drive innovation. It's their presence as a goad. Some people start to see the arbitrary nature of many of their own cultural habits and open their minds to new possibilities. Once you recognize that there is another way of doing X or thinking about Y, all sorts of new channels open to you. "The awareness of cultural variety helps set the mind free." Exceptionally creative people such as Curie and Freud possess many traits, of course, but their "openness to experience" is the most important.

That seems to hold for entire societies as well. Consider a country like Japan, which has historically been among the world's most closed societies. Examining the long stretch of time from 580 to 1939, Dean Simonton compared Japan's "extra cultural influx" (from immigration, travel abroad, etc.) in different eras with its output in such fields as medicine, philosophy, painting and literature. Dr. Simonton found a consistent correlation: the greater Japan's openness, the greater its achievements.



History bears this out. In ancient Athens, foreigners known as metics (today we'd call them resident aliens) contributed mightily to the city-state's brilliance. Renaissance Florence recruited the best and brightest from the crumbling Byzantine Empire. Even when the "extra cultural influx" arrives uninvited, as it did in India during the British Raj, creativity sometimes results. The intermingling of cultures sparked the "Bengal Renaissance" of the late 19th century.

Not all cultural collisions end happily, of course, and not all immigrants become geniuses. The adversity that spurs some to greatness sends others into despair. But as we wrestle with our own immigration and refugee policies, we would be wise to view the welcome mat not as charity but, rather, as enlightened self-interest. Once creativity is in the air, we all breathe a more stimulating air. (The text is from an article by Eric Weiner in the *Wall Street Journal* (1/15/16), elaborated in the displayed book.)

Video Illustrations of Framing

What are the implications for medical sensors of Kobi Richter having served as a fighter pilot in the Israeli Air Force?

Kobi Richter

Board member and founder of Medinol, Dr. Richter is a renown Israeli businessman. Dr. Richter, who served in the Israeli military as a fighter pilot, directed the research and development department of the IAF and worked as a neuroscientist and AI researcher at M.I.T.

After his discharge from the army Dr. Richter founded Orbot with his brother. A company that manufactured testing systems for electric components.

Later, Dr. Richter founded biotechnology company Medinol. Medinol develops stents for cardiovascular treatments. Throughout the years Kobi has been involved in many other business ventures, one of them founding and managing the “Marathon” hedge fund.

Graphic is from video of Kobi Richter at 2016 TEDx in Emek Hefer, Israel.

Gandhi Mobilizes Colleagues to Action

Going back to India in 1919, what are the implications of Gandhi framing his proposed aggressive response to the new British law as a “day of prayer and fasting,” versus Jinnah’s interpretation of the idea as a “general strike,” or Jinnah’s proposal for “direct action on a scale they can never handle”?

Graphic is from video clip shown in class, *Gandhi*, (1982, directed by Richard Attenborough, distributed by Columbia Pictures).

British Steel Strategy Discussion Meeting

Video Footage
of Closed-Network
Framing Failure

Jon Martin
Senior Planner

Ron Atkin
Director of Project Engineering
(and BSC's chief negotiator with Korf)

*Stills are from the British Steel video shown during the session. "He will win who knows when to fight and when not to fight." (from Sun Tzu, in *The Art of War*, a melange of advisories assembled before the birth of Christ).

(Q256) Network brokers are more able than people in a closed network to propose an alternative frame of reference for interpreting a project result. **True or false?**

A. True, because network brokers are smarter, on average, than people in closed networks.

B. False, because network brokers do not have the depth of knowledge, on average, possessed by people in closed networks.

C. True, because network brokers are more familiar, on average, with the different perspectives of separate social groups.

D. False, because people in closed networks are smarter, on average, than network brokers.

E. True, because network brokers, on average, have lower job rank than people in closed networks.

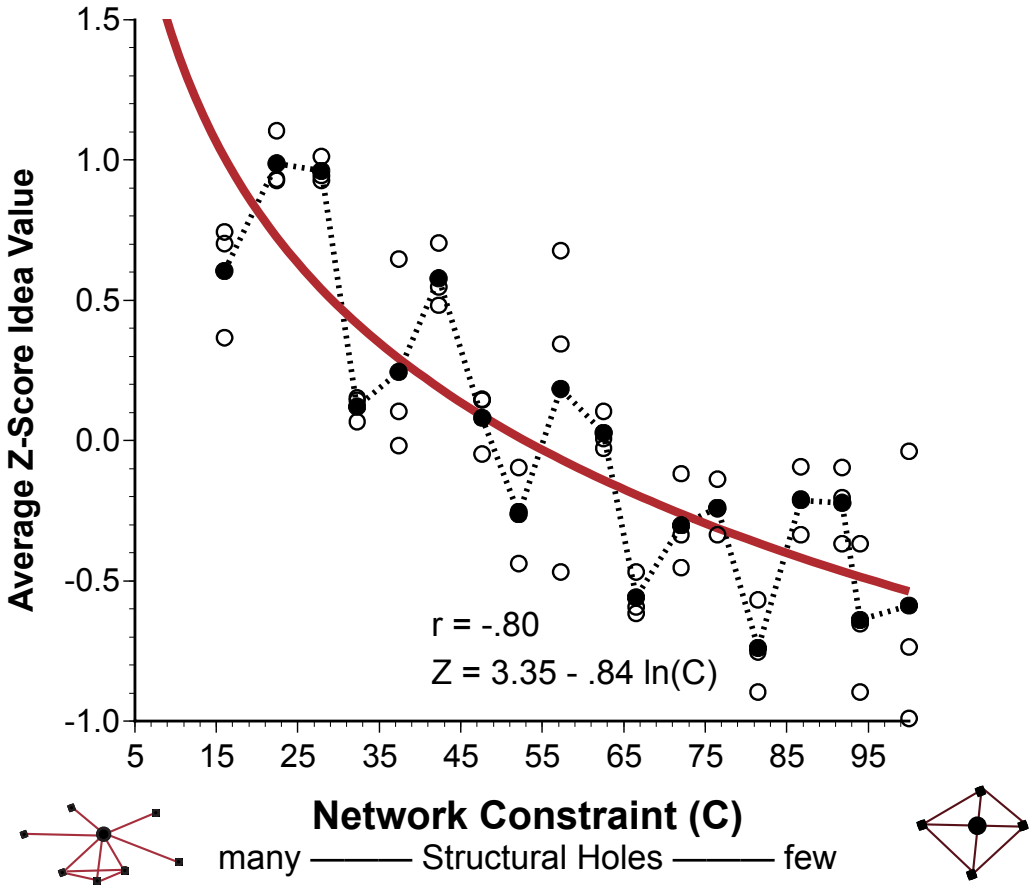
(Q76) We discussed the below graph with respect to network brokers having a competitive advantage in detecting and developing good ideas. **All of the below are broker creativity/innovation advantages, <u>except</u>:**

A. Broker is exposed to differences between groups so solution in one can be proposed to solve problem in another.

B. Broker has a sense of when the time is right to propose the idea to a specific audience.

C. Broker knows how to frame alternative versions of the idea to appeal to individual target audience.

D. Broker has a history of providing good ideas, which makes his or her current idea more credible.



(Q105) **In his argument with Ron Atkin at British Steel about buying 2 rather than 1 or 3 direct reduction plants, Jon Martin (pictured) did which of the following?**

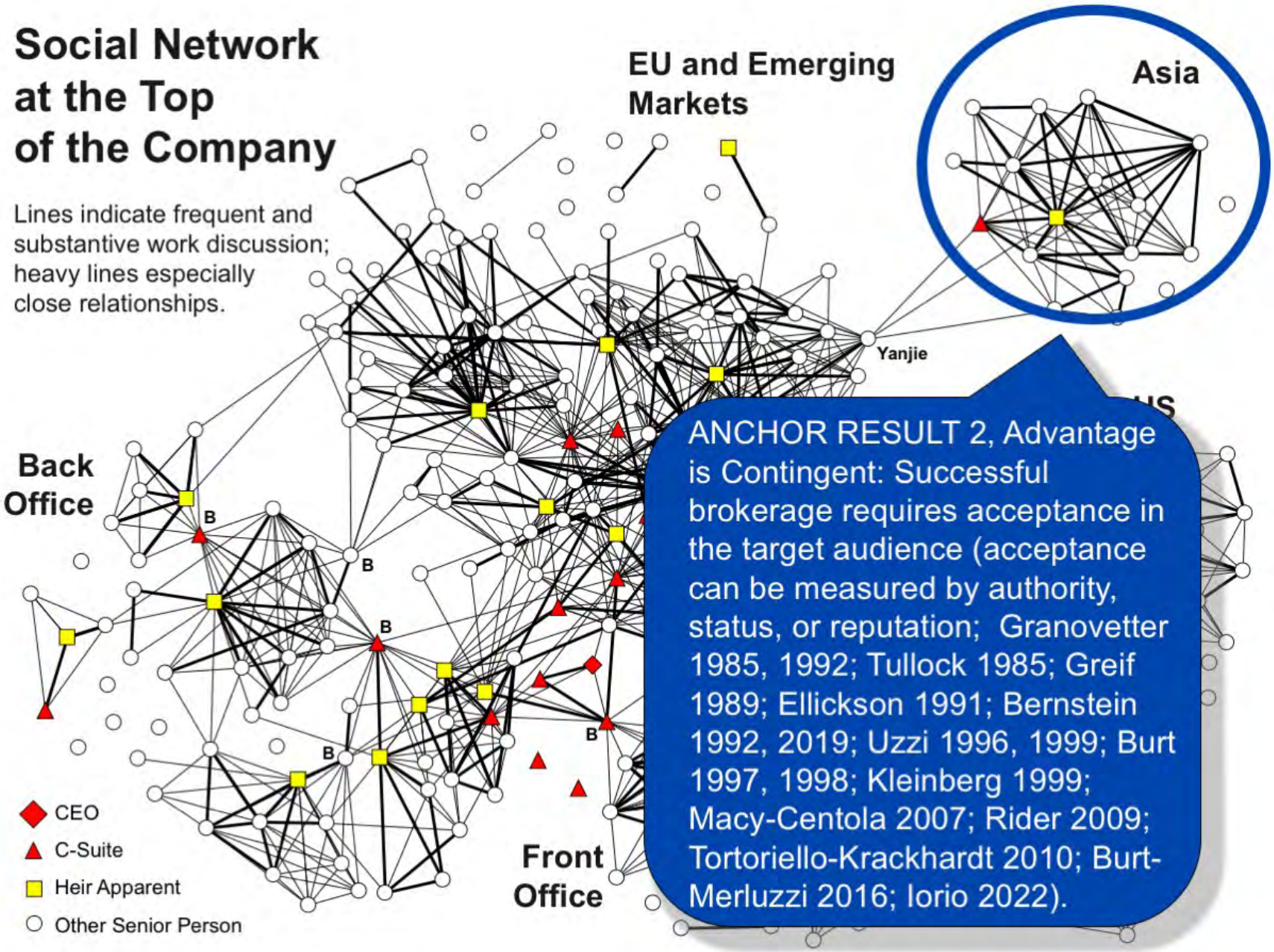
A. Assumed Ron would be convinced by the cost-benefit logic that Jon knew Finance would use to decide the issue.

B. Looked down on Ron's ability to make a coherent argument.

C. Behaved like a person in a closed network.

D. Was humiliated by Ron and his friend disparaging Jon's "academic exercise."

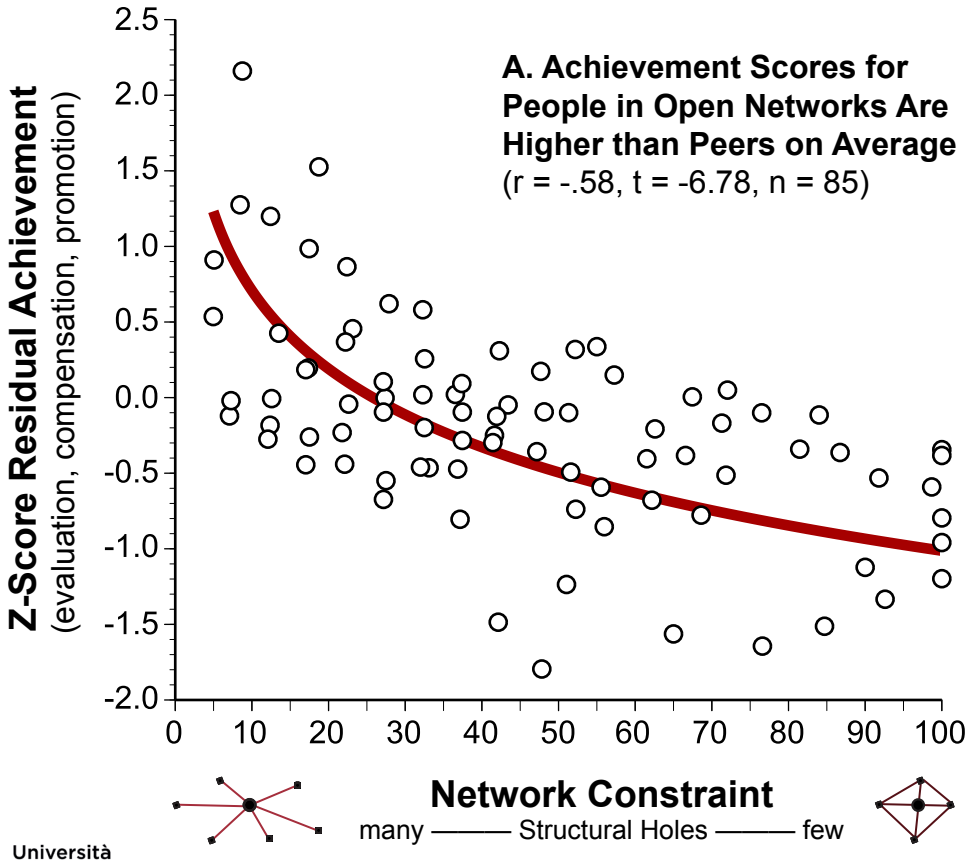
E. All the above.


Social Network at the Top of the Company
Lines indicate frequent and substantive work discussion; heavy lines especially close relationships.
EU and Emerging Markets
Asia
Yanjie
Back Office
Front Office
B
CEO
C-Suite
Heir Apparent
Other Senior Person
ANCHOR RESULT 2, Advantage is Contingent: Successful brokerage requires acceptance in the target audience (acceptance can be measured by authority, status, or reputation; Granovetter 1985, 1992; Tullock 1985; Greif 1989; Ellickson 1991; Bernstein 1992, 2019; Uzzi 1996, 1999; Burt 1997, 1998; Kleinberg 1999; Macy-Centola 2007; Rider 2009; Tortoriello-Krackhardt 2010; Burt-Merluzzi 2016; Iorio 2022).

Social Standing in Target Audience

Graph A below is from *Brokerage & Closure* and the previous handout showing achievement increasing with more access to structural holes. Circles are z-score residual achievement for 1,986 observations averaged within five-point intervals of network constraint in each of six management populations (analysts, bankers, and managers in Asia, Europe, and North America, see discussion of Figure 2.3 in Chapter 2; heteroscedasticity is negligible, $X^2 = 2.97$, 1 d.f., P ~ .08). Bold line is the vertical axis predicted by network constraint.

Graph B to the right shows the raw data that were averaged to create Graph A. Vertical axis is wider to accommodate more variable achievement. Heteroscedasticity is high due to achievement differences between advantaged individuals ($X^2 = 269.5$, 1 d.f., P < .001), but the association between achievement and network advantage remains statistically significant when adjusted for heteroscedasticity (Huber-White, t = -8.49).



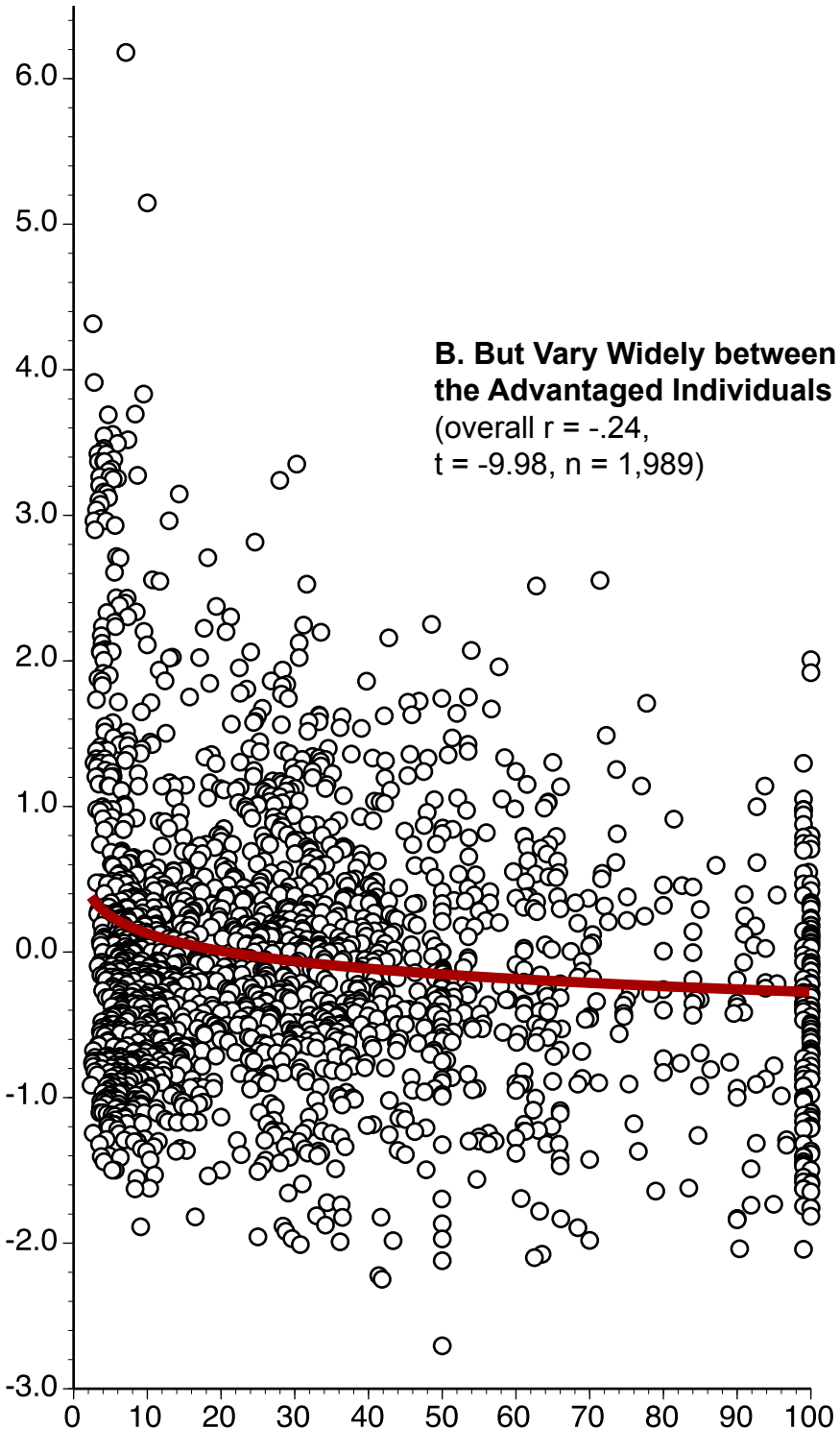


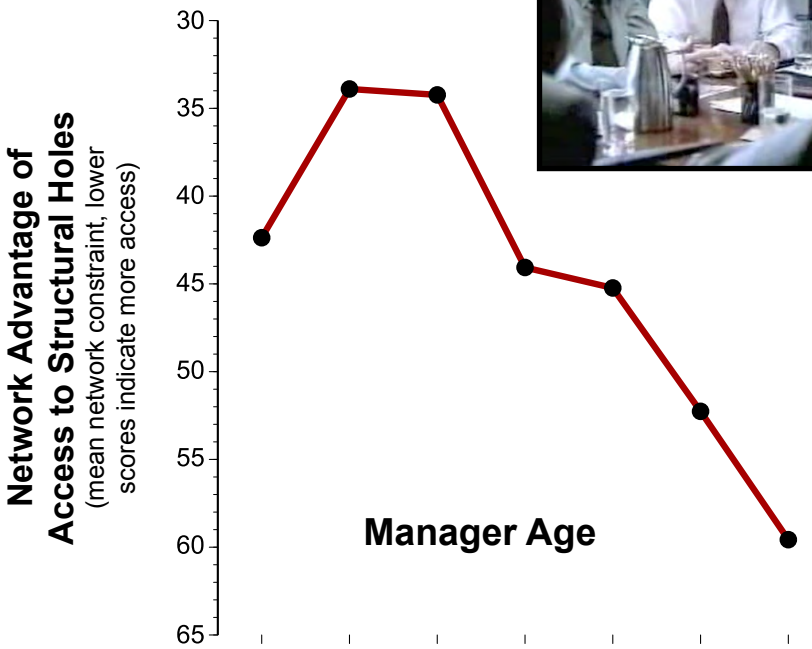
Figure adapted from Figure 1 in Burt (2012, "Network Related Personality," *American Journal of Sociology*).

When a broker proposes something new, there is no guarantee that the proposal will work in our market, with our company processes, staffed by our people. There is risk to accepting the proposal. Chains of command broken in service of company interests can just as easily be broken in service of personal interests, or in service of well-intentioned but strategy-eroding interests. How will you be viewed in the target audience as the proposal source?

For Example, Are You the Right Age To Be Accepted as the Source of a Proposal?

The graphs plot averages across 2,206 senior managers in six organizations in electronics, finance, software, and supply chain. The top graph shows the age at which people have the most access to structural holes (more open networks at the top).

The bottom graph shows the age at which people have the greatest returns to brokerage. Vertical axis is test statistic for the strength of association between a manager's relative achievement and his or her network constraint (calculate for each age group the returns to brokerage graph).



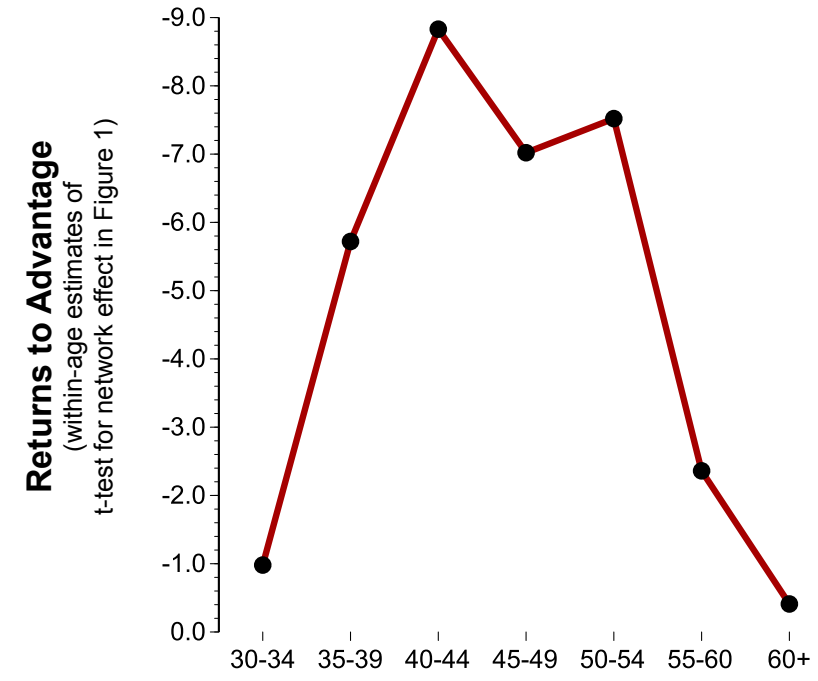
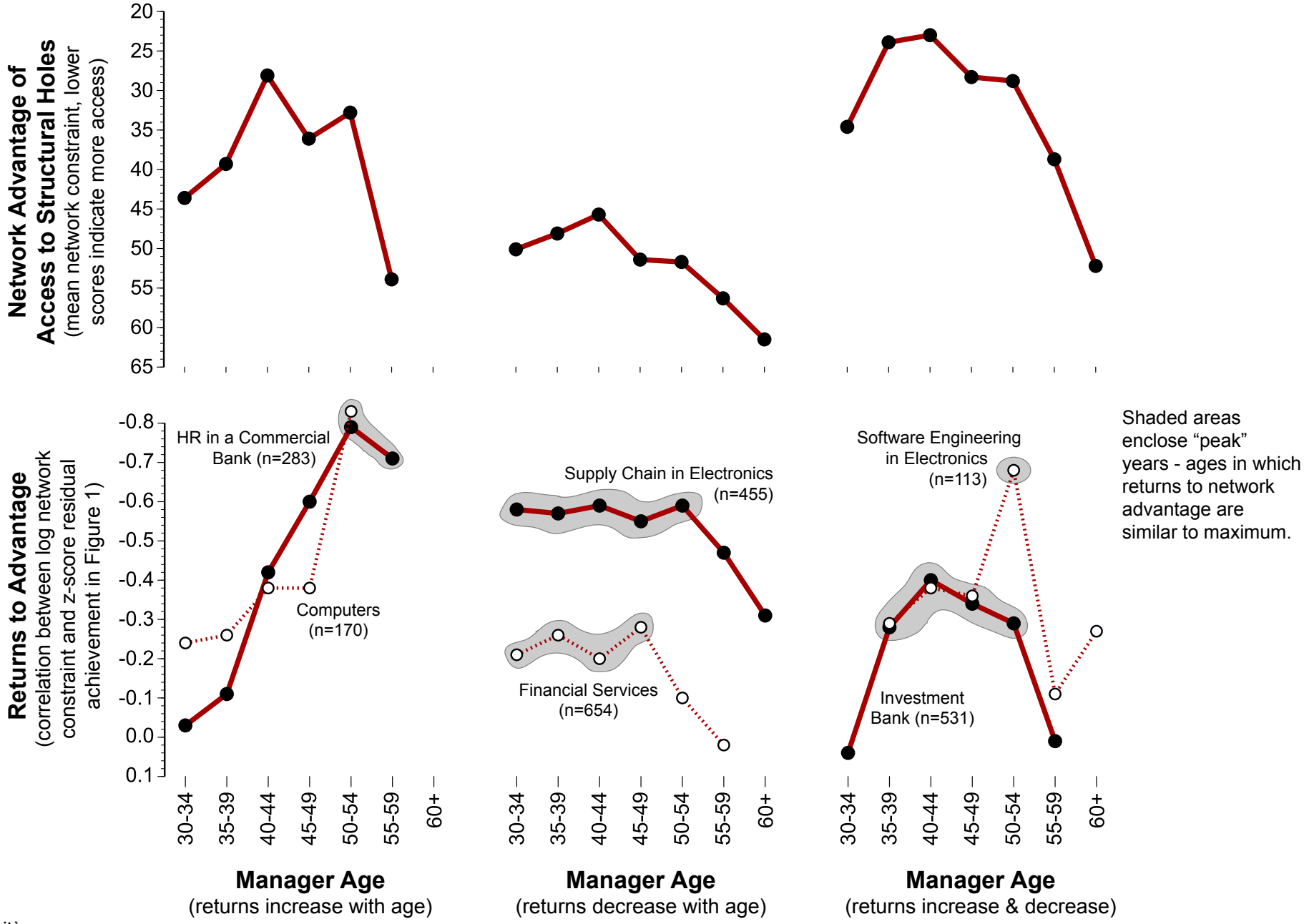


Figure 4.2 in Burt, "Life course and network advantage" (2019 *Social Networks and the Life Course*).

Age is Not a General Caution. It Is More a Function of Company Culture: "Peak" Periods in Manager Life-Cycle



Shaded areas enclose "peak" years - ages in which returns to network advantage are similar to maximum.

Figure 3 in Burt (2018, "Life course and network advantage")

SOCIAL STANDING: Broker Job Status Reassures, or Lack of It Concerns, the Target Audience

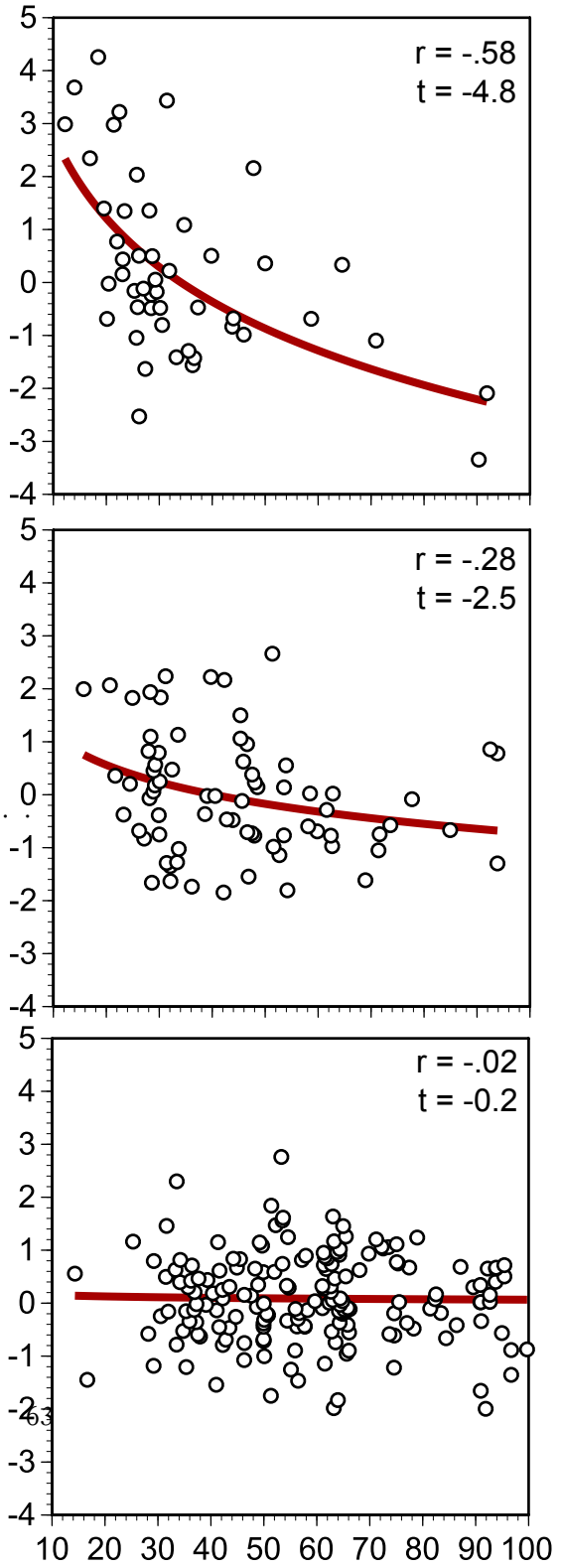
Which means the network around a senior person is especially important for his or her achievement.

	Salary	
Manager 1	−31,099**	(2,882)
Manager 2	−16,652**	(2,745)
Manager 3 (reference)	. . .	
Sr. manager	19,638**	(3,782)
Executive	65,394**	(4,522)
Purchasing	754	(1,351)
Age	338**	(52)
Bachelor	1,610	(1,003)
Graduate	734	(864)
Hightech	3,516**	(880)
Lowtech	−6,927**	(1,481)
Urban 1	3,613**	(1,046)
Urban 2	5,049**	(1,010)
Network constraint	−7	(25)
Mgr2 × constraint	−19	(35)
Mgr3 × constraint	−47	(38)
SrMgr × constraint	−214*	(75)
Executive × constraint	−681**	(124)
N	673	

Graphs for executives, managers, and junior managers to the right show z-score compensation relative to peers (controlling for background differences) across levels of network constraint. Not only do more senior people have more open networks (on average), they earn higher returns to having open networks (also pay more if they don't have an open network).

Table to the left is from page 371 of Burt, "Structural holes and good ideas" (2004, *American Journal of Sociology*).

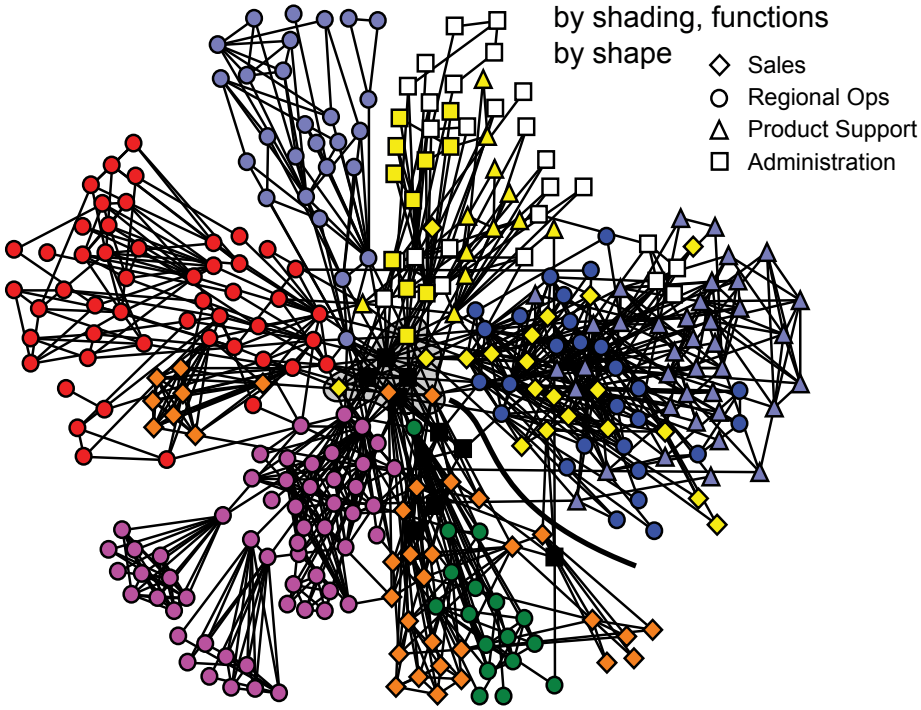
See pp. 156-162 and Figure 3.8 in *Brokerage and Closure* for general discussion showing the form of contingency functions.

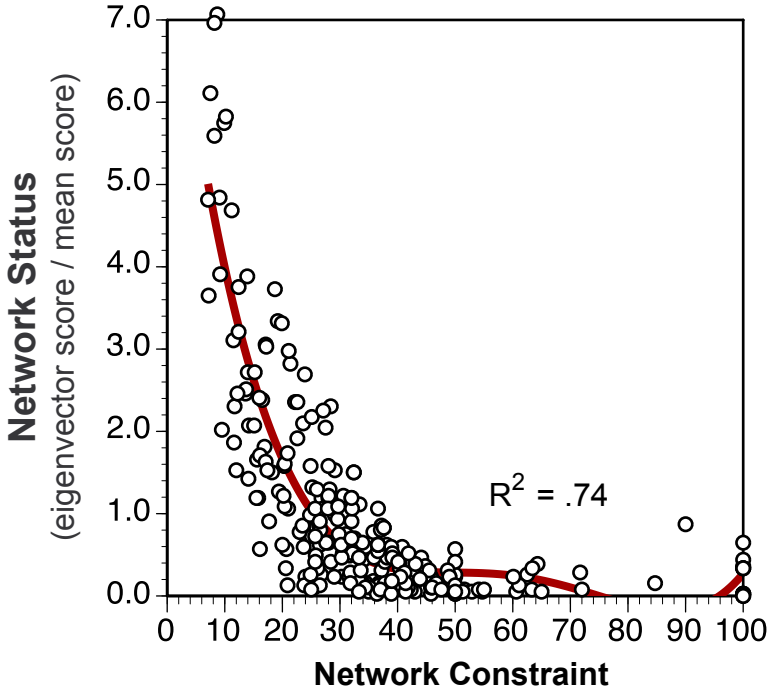


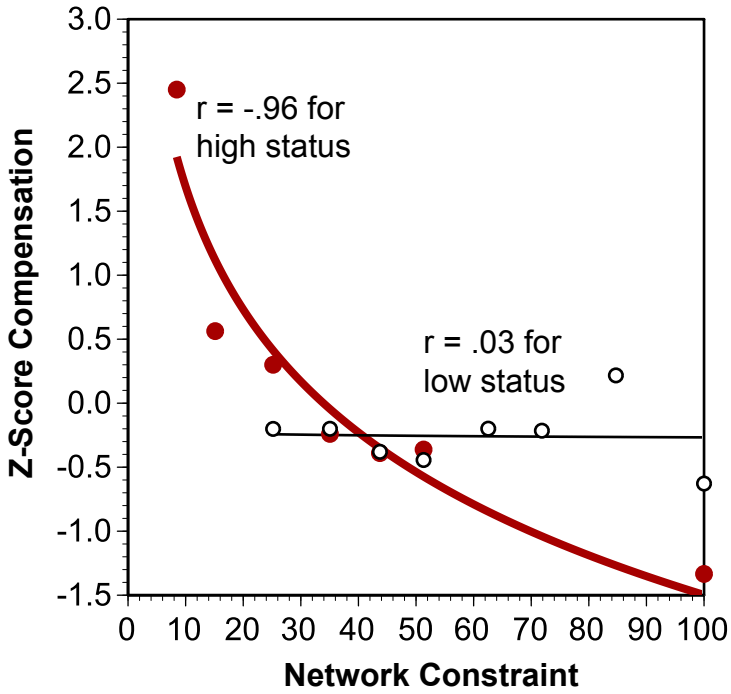
SOCIAL STANDING: Broker Network Status Reassures or Concerns the Target Audience

Network status is on the vertical axis of the top graph. Status is defined in the same way that price is defined in the general equilibrium model: $S_i = \Sigma_j z_{ji} S_j$, where S_i is status of person i, and z_{ji} is connection from j to i. Like price, status is only meaningful in reference to the status of some numeraire benchmark person. Here, status is normalized at the mean, so a score of 1.0 indicates a person of average status in the network.

$$S_i = \sum_j z_{ji} S_j$$







Sociogram is Figure 3.2 in *Neighbor Networks* and the graphs are from Figures 1 and 2 in Burt & Merluzzi discussion of the link between brokerage and network status as a reputation measures (2013, "Embedded brokerage," *Research in the Sociology of Organizations*)

SOCIAL STANDING: Reputation Can Substitute for Status, making reputation valuable as the key to being accepted as a broker.

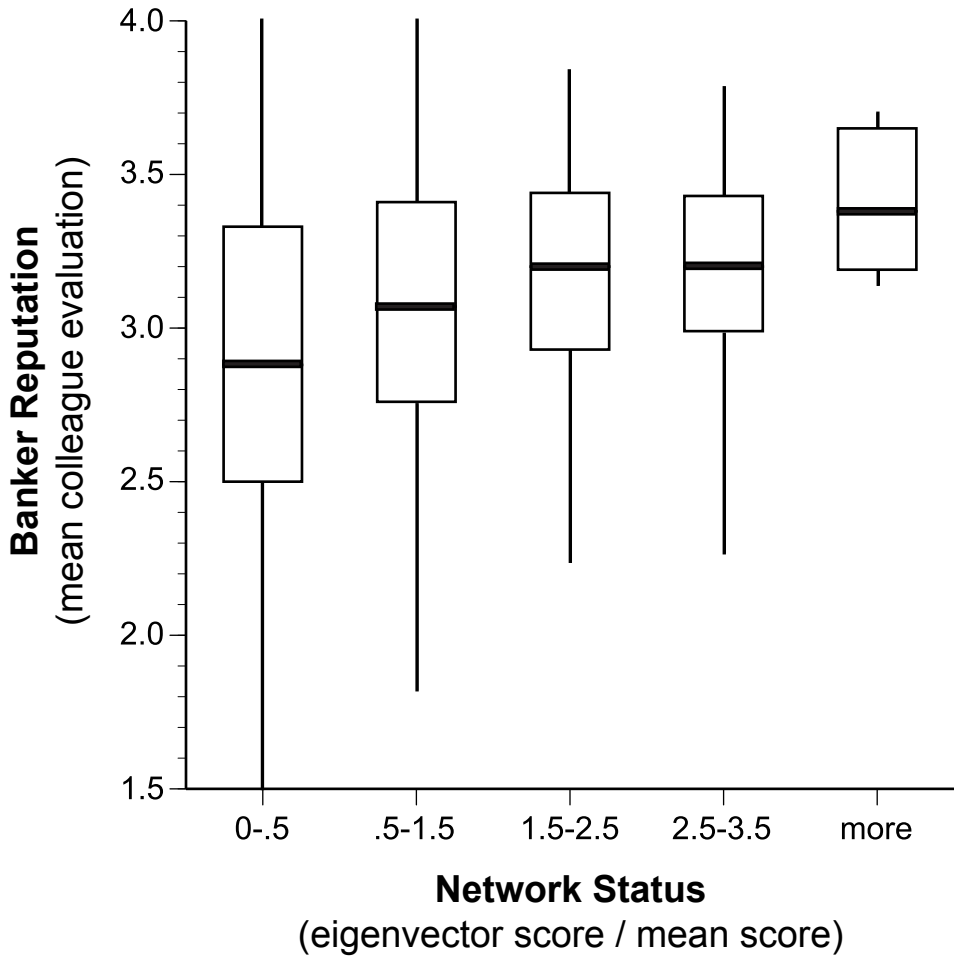
Graph plots investment banker reputation by levels of network status. Reputation is measured by average colleague evaluation. Boxes span 25% to 75% with bold horizontal at the mean. Whiskers extend down to minimum reputation, up to maximum.

Reputation Is Correlated with Status, but Is Distinct

High Status Is a Good Signal of Positive Reputation.

Low Status Is an Ambiguous Signal

GENERIC DEFINITION: "Differences in detail aside, most social scientists agree upon two aspects of reputation: first, knowing a business partner's past behavior mitigates uncertainty about his future performance; second, reputation demonstrates the person's credibility as an honest business partner and reduces the uncertainty associated with trusting him." (Hillmann and Aven, 2011, AJS, page 485)

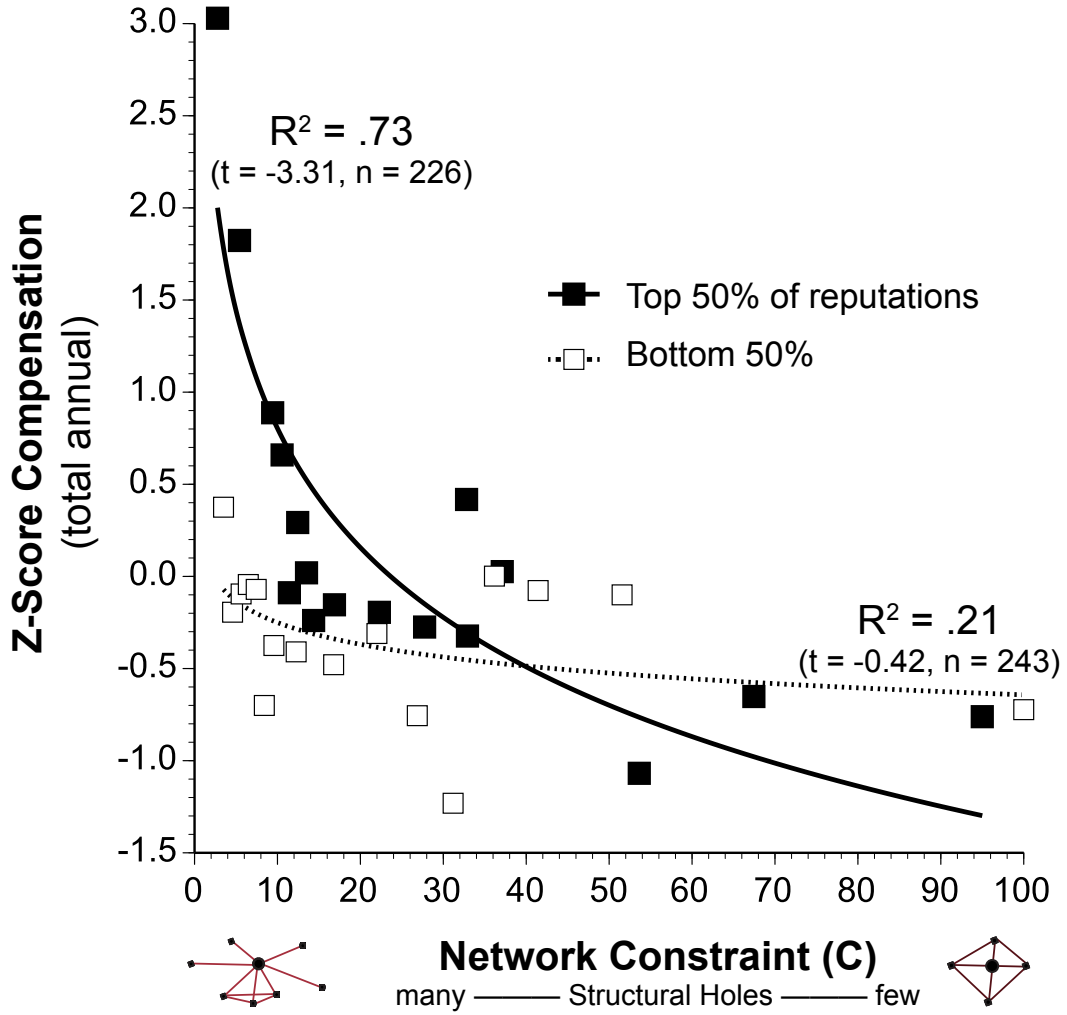


From Burt (2020, *Structural Holes in Virtual Worlds*). The boutique investment bank, Moelis — "Best Global Independent Investment Bank" in 2010 and "Most Innovative Boutique of the Year" in 2011 — nicely illustrates the competitive advantage of reputation as an entree to brokerage opportunities (download free Moelis case from www.sbs.oxford.edu/reputation/cases).

Broker Advantage Contingent on Reputation

Graph plots relative banker compensation across levels of constraint in the banker's discussion network. Compensation is averaged within intervals of network constraint, but the test statistic is for all 469 observations, holding constant job rank, peer evaluation, years with the organization, minority, and working in US headquarters (Burt, *Neighbor Networks* 2010:91-93).

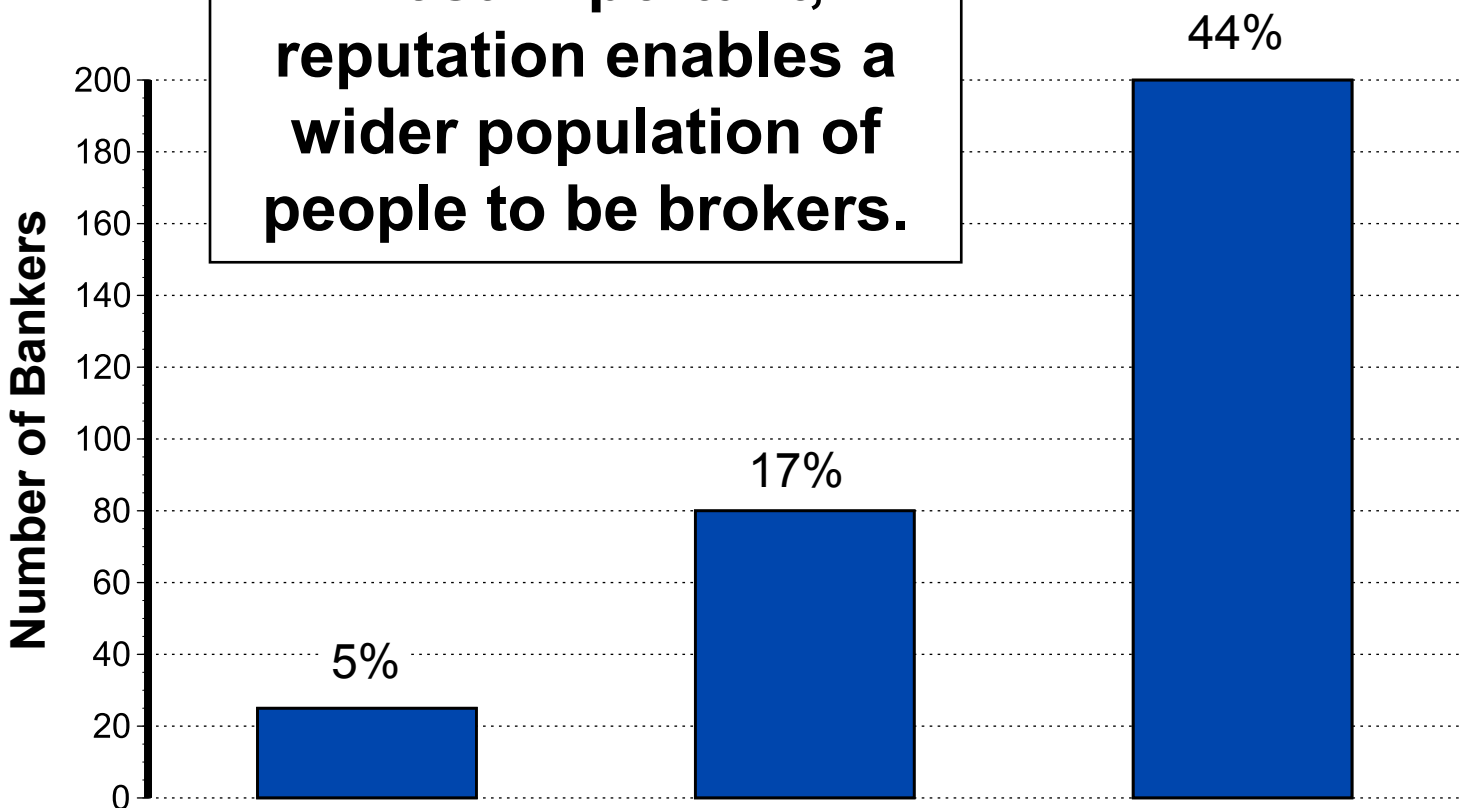
There are two predictions: one for bankers with above-average reputations (solid squares), the other for bankers with below-average reputations (hollow squares). Network status is added to each prediction as a control for a banker's social standing across all senior people in the bank.



As Rider (*ASQ* 2009:578-579) explains for placement agents: "a broker's reputation for consistently representing actors of high quality is a valuable, intangible asset that enables a broker to realize future rents on the brokerage position. . . If a positive reputation reduces the costs of assuaging potential exchange partners' concerns, then the returns to brokerage should be positively related to a broker's reputation." Similarly, Nee and Opper (*Capitalism from Below* 2012: 211) describe Chinese entrepreneurs building reputation in the course of brokering connections: "Through personal introductions and fine-grained information passed through social networks, the 'broker' typically signals trustworthiness and reputation of the prospective business partners. Moreover, it is in the broker's interest to make good recommendations, as most business partners will tend to reward their networking contacts in one way or another. Such introductions can span the social gaps, or 'structural holes' between groups."

For discussion, see Burt & Merluzzi (2014, "embedded brokerage"). The boutique investment bank, Moelis — "Best Global Independent Investment Bank" in 2010 and "Most Innovative Boutique of the Year" in 2011 — nicely illustrates the competitive advantage of reputation as entree to brokerage opportunities (download free Moelis case from www.sbs.oxford.edu/reputation/cases).

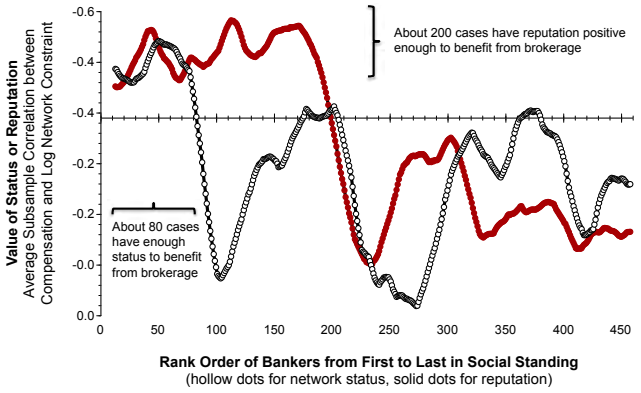
Most important, reputation enables a wider population of people to be brokers.



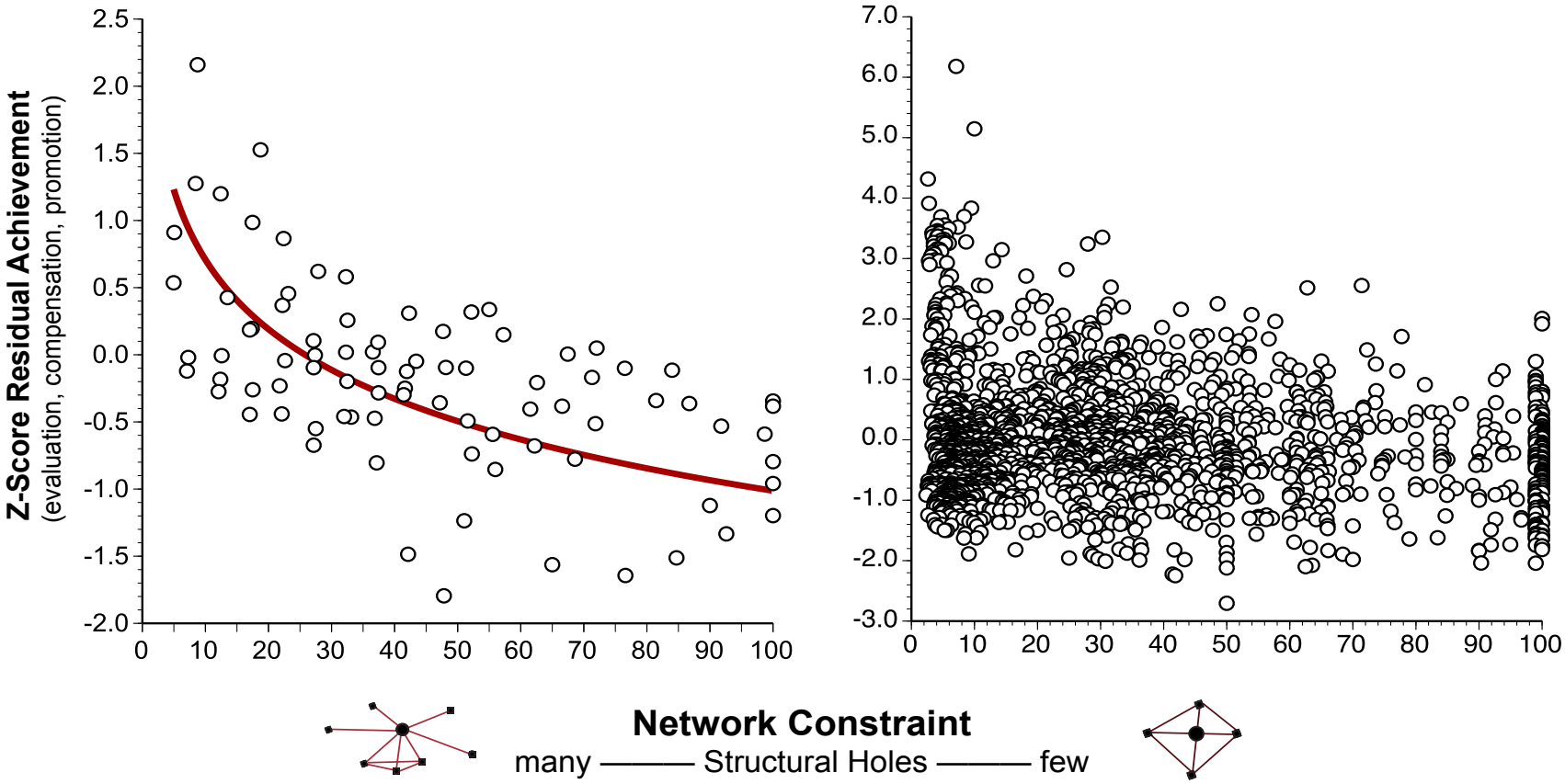
Relative to job rank and network status, reputation opens organizations and markets to the largest number of people with good ideas.

I am putting aside the idea that brokers are viewed as disreputable by definition so they have to make themselves appear to target audience as a closed-network person (e.g., Iorio, 2022 ASQ).

Horizontal axis ranks banker observations from highest status (hollow dots) or most-positive reputation (solid dots) to the opposite extreme. Vertical axis is the correlation between compensation and log network constraint for a sample of observations adjacent to each banker (24 of higher social standing plus 24 of lower). Displayed data are smoothed by averaging across 24 adjacent observations.



From Burt (2020, *Structural Holes in Virtual Worlds*).



(Q158) The graph to the left above shows average returns to brokerage. The graph to the right shows individual returns before they are averaged. **What do the two graphs tell you about the returns one can expect to earn as a network broker?**

A. You can earn more as an individual.

B. Average returns are high.

C. Network advantage does not guarantee high performance.

D. Average returns are heteroskedastic.

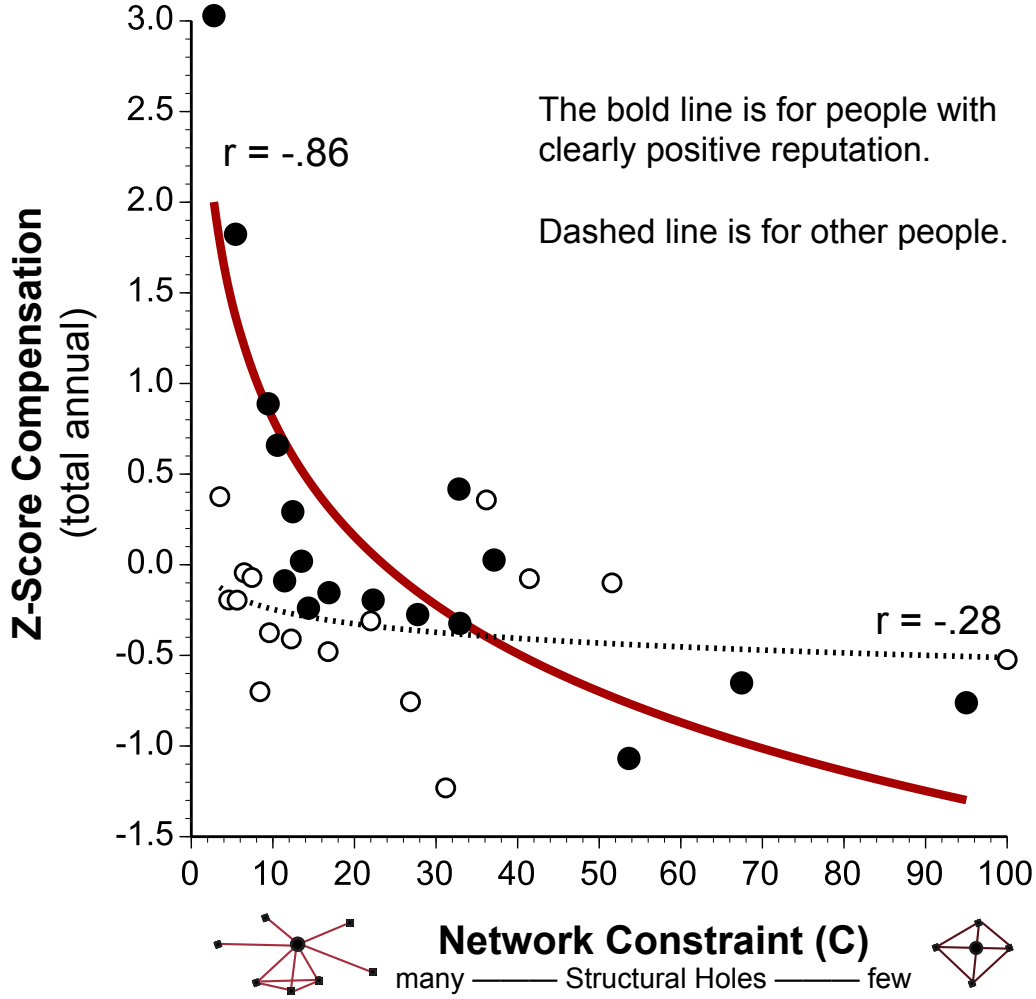
(Q161) The graph below displays returns to brokerage for two categories of bankers in a large financial organization. **From the graph, you can infer that:**

A. Broker access to structural holes is valuable.

B. Broker status in the informal organization is valuable.

C. Broker reputation is valuable.

D. Broker compensation increases with job rank.



(Q206) After age 50, your opportunities to broker across structural holes decrease but returns to brokerage increase. **True or false?**

A. True

B. False

(Q195) We discussed network brokerage facilitated by a broker's job rank, status, and reputation. **As contingency factors for successful brokerage the three variables are most similar with respect to:**

A. Authority of eligible brokers

B. Visibility of eligible brokers

C. Broker eligibility to broker

D. Cost of the broker's proposal

E. Number of eligible brokers

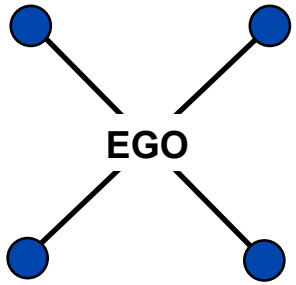
PERSONAL ENGAGEMENT IS CRITICAL (context and neighbors)

To what extent do the returns to brokerage vary with the context in which brokerage occurs? For example, a person indicated below as "ego" is always a network broker with four disconnected contacts. But ego's network is sometimes (a-b) inside a structural hole, (c) on the edge of a structural hole, or (d) away from substantial structural holes. What are the implications for ego's returns to brokerage?

Correlations 801 Bankers/Managers

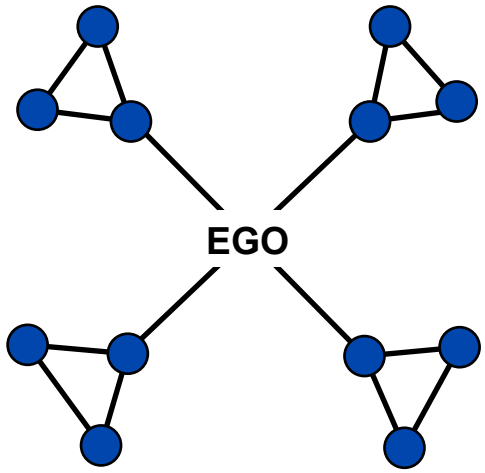
Constraint	1.00		
AugConstraint	.97	1.00	
RSH	-.84	-.80	1.00

A. Global



(25)
[25]
{0}

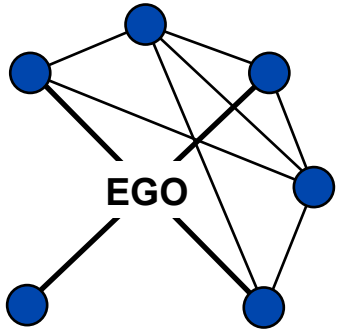
B. Negotiator



(25)
[25]
{67}

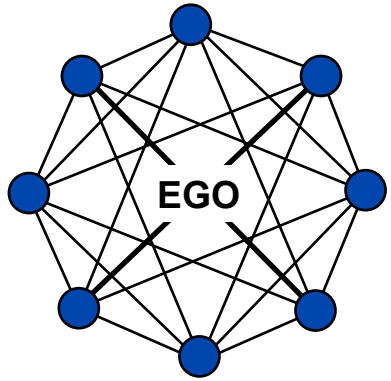
Constraint
Augmented
RSH

C. Importer



(25)
[67]
{17}

D. Local



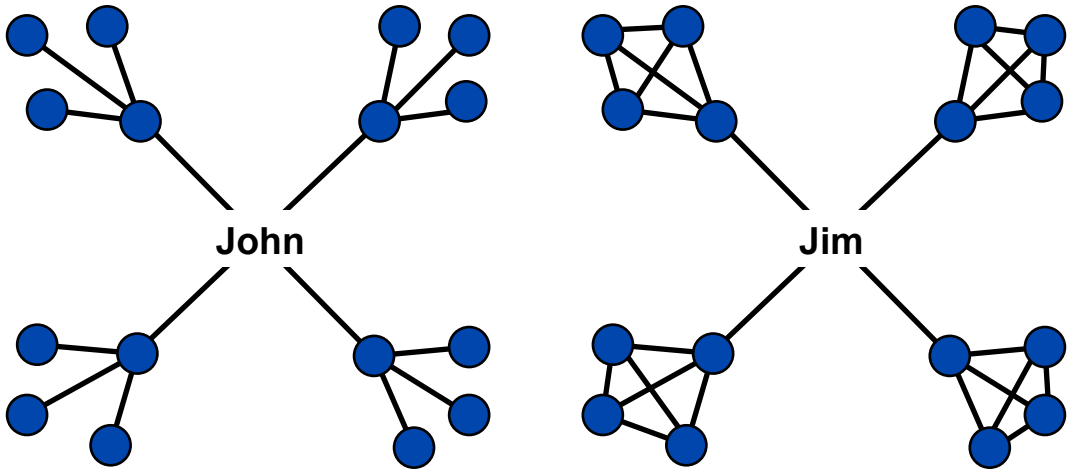
(25)
[92]
{0}

Network constraint is the usual measure. "Augmented" is constraint adjusted to capture indirect connections among ego's contacts through people who are not ego's contacts (D is high). "RSH" is an index measuring the extent to which structural holes in ego's network are reinforced by clustering around ego's contacts (B is high, Appendix II).

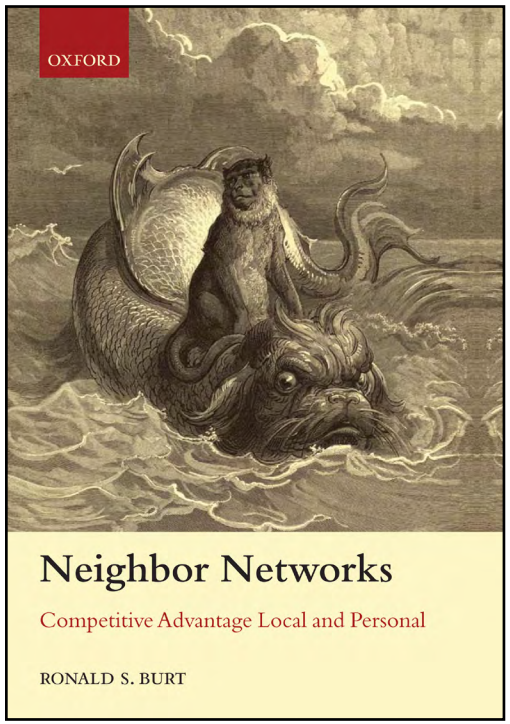
Broaden the context to look for spillover from neighbors. Neighbor networks can reinforce structural holes as well as provide further access.

Between John or Jim, who is more likely to turn in higher performance?

Why?



(25) [25]	Constraint (C) Indirect Constraint (IC)	(25) [58]



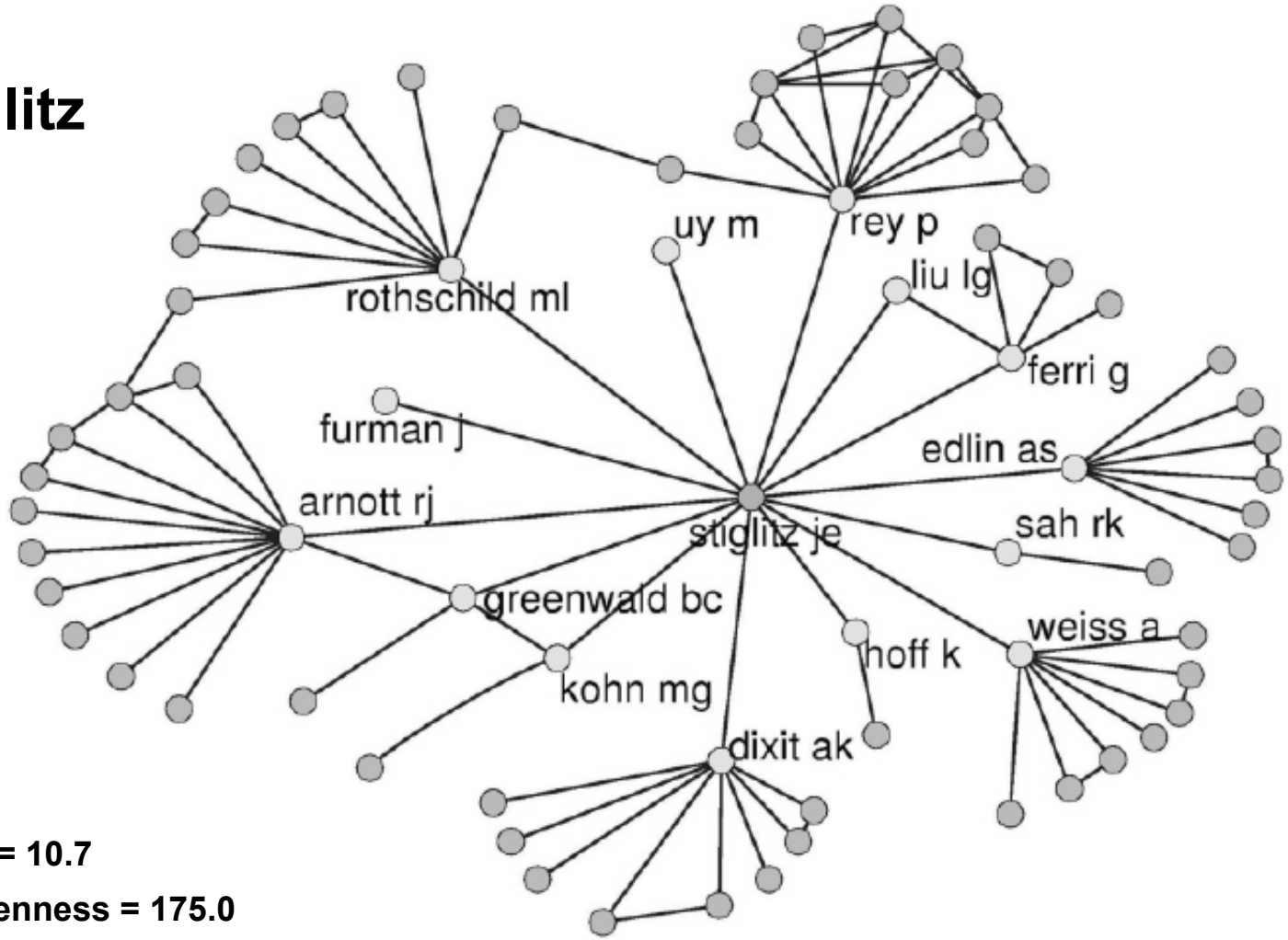
C versus

$$IC = \Sigma_j C_j/N$$

See Appendix III on measuring network spillover from neighbors.

Collaboration network around the prominent economist,

Joseph Stiglitz



Size = 14

Density = 3.3%

Network Constraint = 10.7

Ego-Network Betweenness = 175.0

Lines indicate coauthorships of articles in EconLit journals during the 1990s. Sociogram includes all coauthors and coauthors of coauthors (path distance 2) for J. E. Stiglitz, as well as coauthorships between people. Sociogram is from Goyal et al. “Economics, an emerging small world” (2006 *Journal of Political Economy*). In 2001, Stiglitz received the Nobel Memorial Prize in Economics Sciences.

The ostensible advantage is spurious, here illustrated predicting banker compensation from direct constraint (banker's own network) vs indirect (from neighbor networks).

	Total Annual Compensation			Bonus Only
	A	B	C	D
Intercept	-1.63	-1.92	-1.41	-1.41
Direct Network Constraint	-.38 (.09) **	——	-.32 (.09) **	-.34 (.09) **
Indirect Network Constraint	——	-.39 (.11) **	-.18 (.12)	-.16 (.12)
Senior Job Rank	.73 (.08) **	.79 (.09) **	.73 (.08) **	.68 (.08) **
Peer Evaluation	.51 (.09) **	.58 (.10) **	.51 (.09) **	.53 (.09) **
Years with Firm	.02 (.01)	.03 (.01) *	.02 (.01)	.02 (.01)
Minority	-.05 (.19)	-.14 (.19)	-.07 (.19)	-.06 (.19)
US Headquarters	.28 (.11) *	.23 (.11) *	.27 (.11) *	.28 (.11) *

NOTE — Regression coefficients are presented for annual data pooled across three years (469 observations). Compensation next year is predicted from row variables this year. Network constraint is the log of constraint. Annual compensation includes salary and bonus. Compensation is measured as a z-score within each year to indicate relative annual compensation. Squared multiple correlations for the equations are .31, .28, .31, and .31 (zero-order correlations in Appendix E, Table E4). Standard errors, given in parentheses, are adjusted for autocorrelation within individuals across years (* $p < .05$; ** $p \leq .001$).

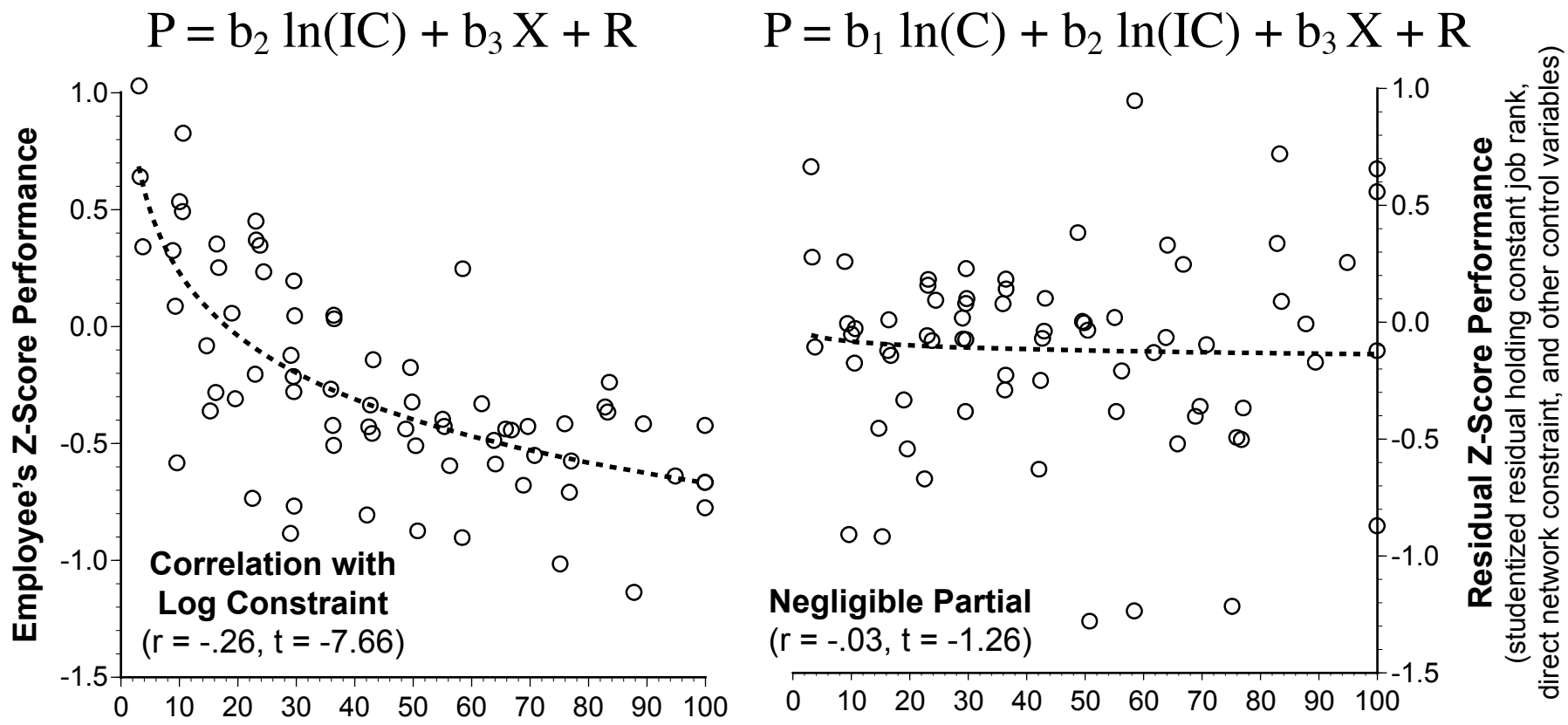
Table 4.2 in *Neighbor Networks* (from Table 3 in Burt, "Secondhand Brokerage" (2007, *Academy of Management Journal*).

In general, "secondhand" brokerage via neighbors has no effect on performance.

Within each of five populations (analysts, investment bankers, HR employees, product-launch employees, and supply-chain managers), a dot below indicates a population average on performance and network constraint within five-point intervals of network constraint. Correlations and routine test statistics are computed across 1,819 observations, with correction for repeated annual observations. See Appendix III for research design.

Study Population	Direct Contacts	Indirect Contacts
Asia-Pacific product launch	2.70	1.00
Supply-chain managers	4.17	0.92
HR employees	4.35	0.21
Investment bankers	3.43	1.50
Investment analysts	3.18	0.24

*Cells contain t-tests predicting employee performance in the row population from structural holes in the employee's network of direct contacts and holes between the employee's indirect contacts, with controls for job rank, function, location, and experience (see Table 6.5 in 2010, *Neighbor Networks*). Observations vary from 258 to 469.



Lack of Structural Holes in Networks around Employee's Contacts
(average network constraint on contacts, averaged within five-point intervals)

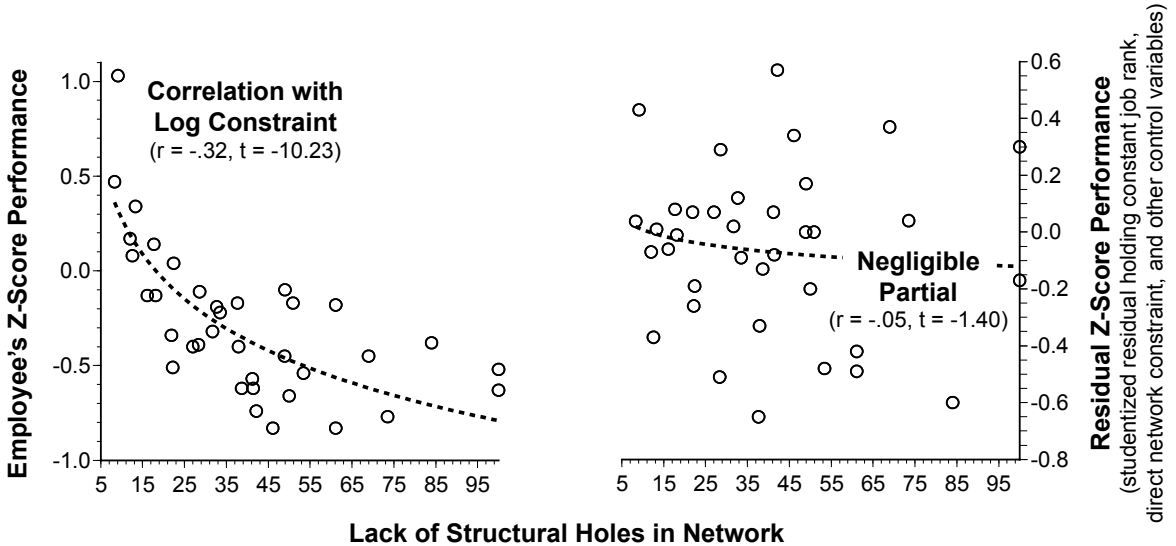
Figure 4.5 in *Neighbor Networks*.

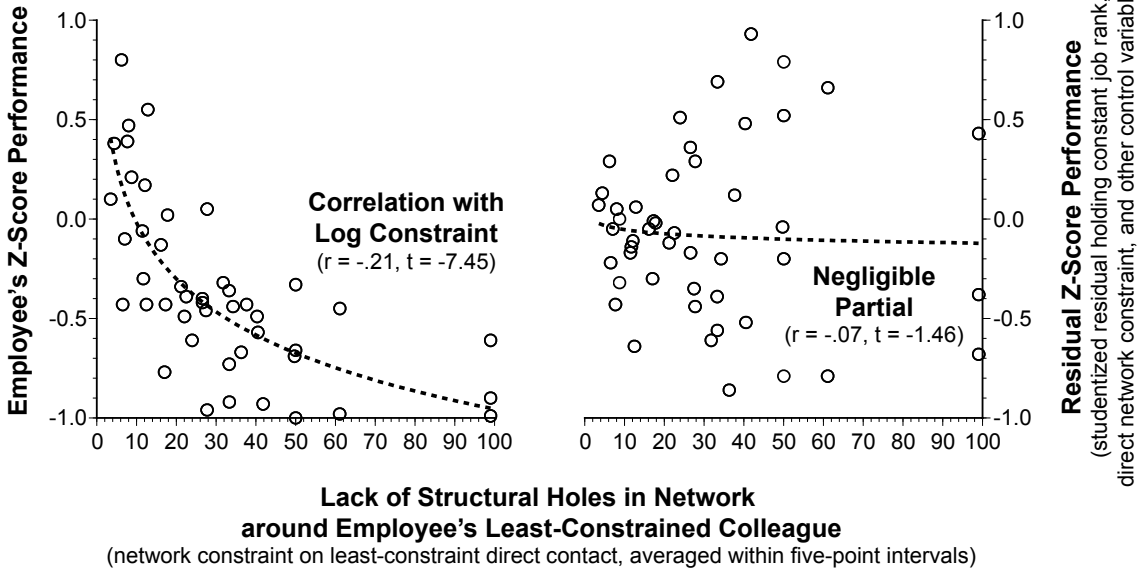
More, there is no evidence of spillover benefit from a network broker boss,

or colleague.

Each dot is a population average on the Y axis and X axis for a five-point interval on the X axis (HR employees, product-launch employees, and supply-chain managers). Correlations and test statistics are estimated across individuals.

Graphs are Figures 4.6 and 4.7 in *Neighbor Networks*





Implication of Absent Spillover from Neighbor Networks

The advantage of network brokers is less about access to diverse information than it is about personal skills in processing diverse information.

People who operate in a network of diverse contacts — that is to say, network brokers — develop personal skills with similarity and analogy needed to facilitate communication between people who think differently.

Those skills make them more able to arbitrage information across groups, but developing those skills requires direct, personal engagement with diverse contacts. In short, the social capital of brokerage is concentrated in ego's personal network.

From the prologue to *Neighbor Networks*:

The moral I take away from this book is a bit of Confucian wisdom often ignored in social network analysis: "Worry not that no one knows you, seek to be worth knowing." The old saying speaks to a tension we all feel at one time or another, a tension between hope and suspicion. The hope: people are rewarded for their ability and effort. The suspicion: rewards go to people with well-connected friends.

I present evidence on analysts, bankers, and kinds of managers showing that rewards in fact do go to people with well-connected colleagues. Look around your organization. The individuals doing well tend to be affiliated with well-connected colleagues.

The advantage obvious to the naked eye is spurious. It disappears when the individual's own characteristics are held constant. ... The research to be presented shows that affiliation with well-connected people adds stability but no advantage to a person's own connections. Advantage is concentrated in people who are themselves well-connected. ... In the words of Confucian disciples, "seek to be worth knowing." For readers more down home, there is the immortal Billie Holliday, "God bless the child that's got his own."

On a related note,

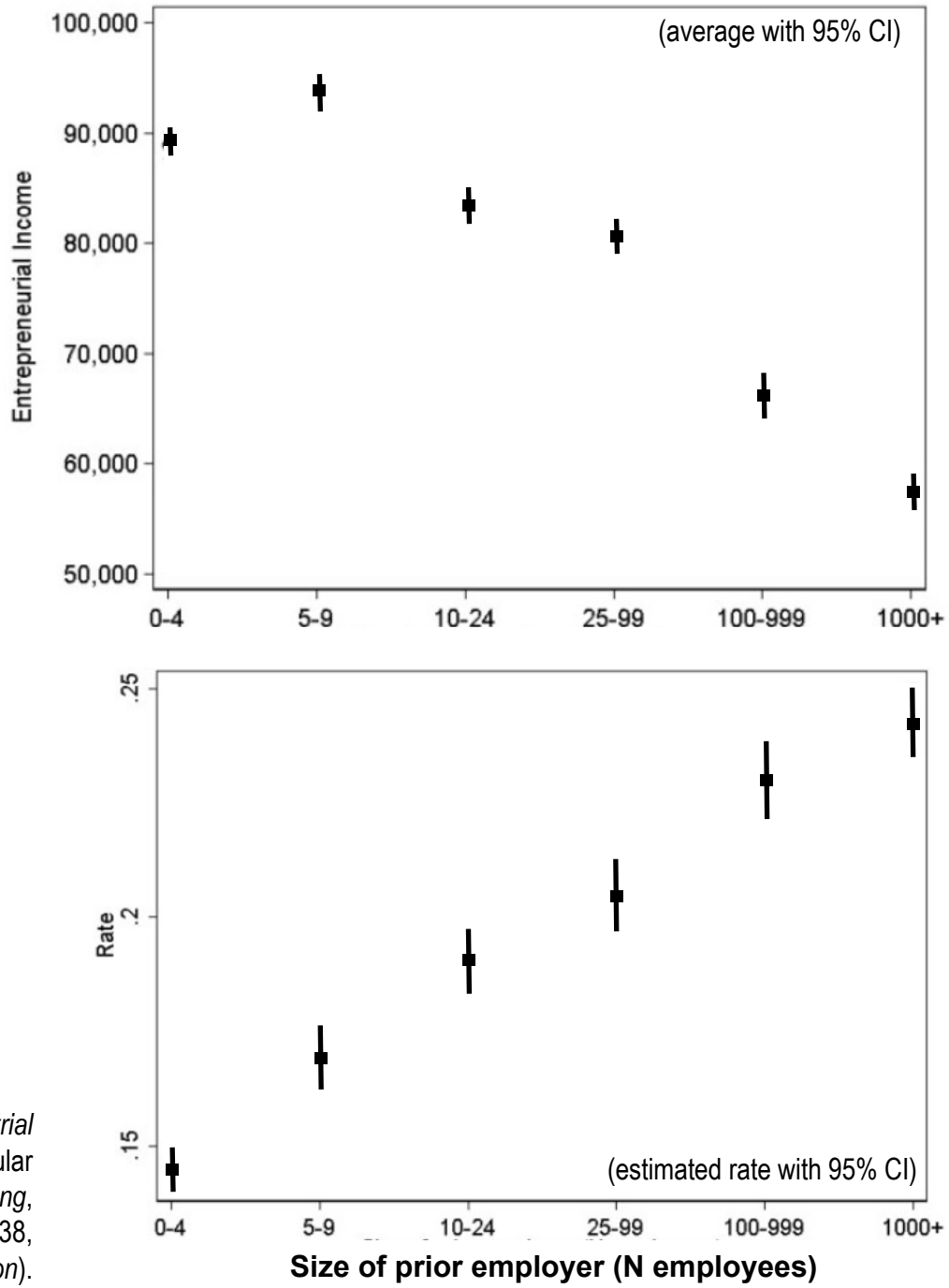
The graphs show two facts from (difficult to obtain) census data on all first-time entrepreneurs in Denmark in 1988, 1990, and 1992:

(1) The larger the organization in which a person worked before launching his or her venture, the less average annual income he or she obtains from the venture (top graph, 10K Danish krone)

(2) The larger the organization in which a person worked before launching his or her venture, the more likely he or she will leave entrepreneurship (bottom graph, exit rate).

The authors interpret the facts in terms of work experience (education and other factors held constant). The larger the prior employer, the more likely the entrepreneur worked in a siloed function, primarily focusing on his or her piece of the business. The smaller the prior employer, the more likely the entrepreneur had to work across functions, simply because there weren't enough employees for anyone to be myopic in focusing on just their piece of the business. In short, experiencing work diversity trumps merely knowing about work diversity, or at least lowers the odds of being ignorant about the diverse aspects of a business.

Graphs are based on Figures 1, 2 in Sorensen and Phillips (*Industrial and Corporate Change*, 2011:1287-1289; N ~ 50,000). A popular textbook on experiential learning is Kolb's (2014) *Experiential Learning*, with John Dewey's initial statement a continuing classic (1938, *Experience and Education*).



McDonald's is a useful illustration. How do you explain the McDonald brothers' genius? Why were they the guys to discover fast food? Does network brokerage explain their creative innovation? (Remember the Gene Stoner story.)

Kroc sells Lilly cups to soda fountains (early 1930s)

buys rights to distribute Multimixers (1939)

Soda fountain market softens in late 1940s

McDonald brothers open movie theater (early 1930s)

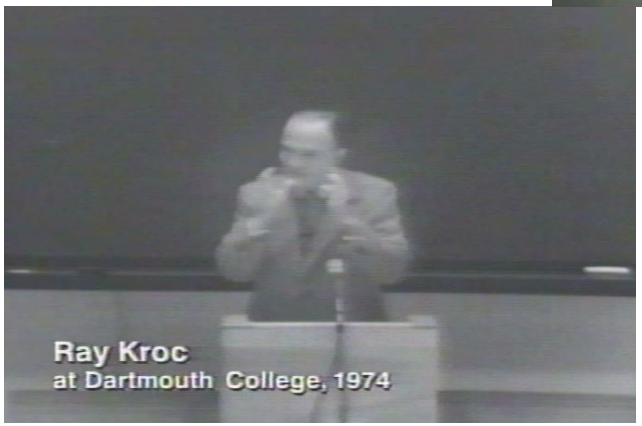
Hot dog stand (1937)

McDonald's drive-in (1940)

McDonald's Hamburgers (1948)

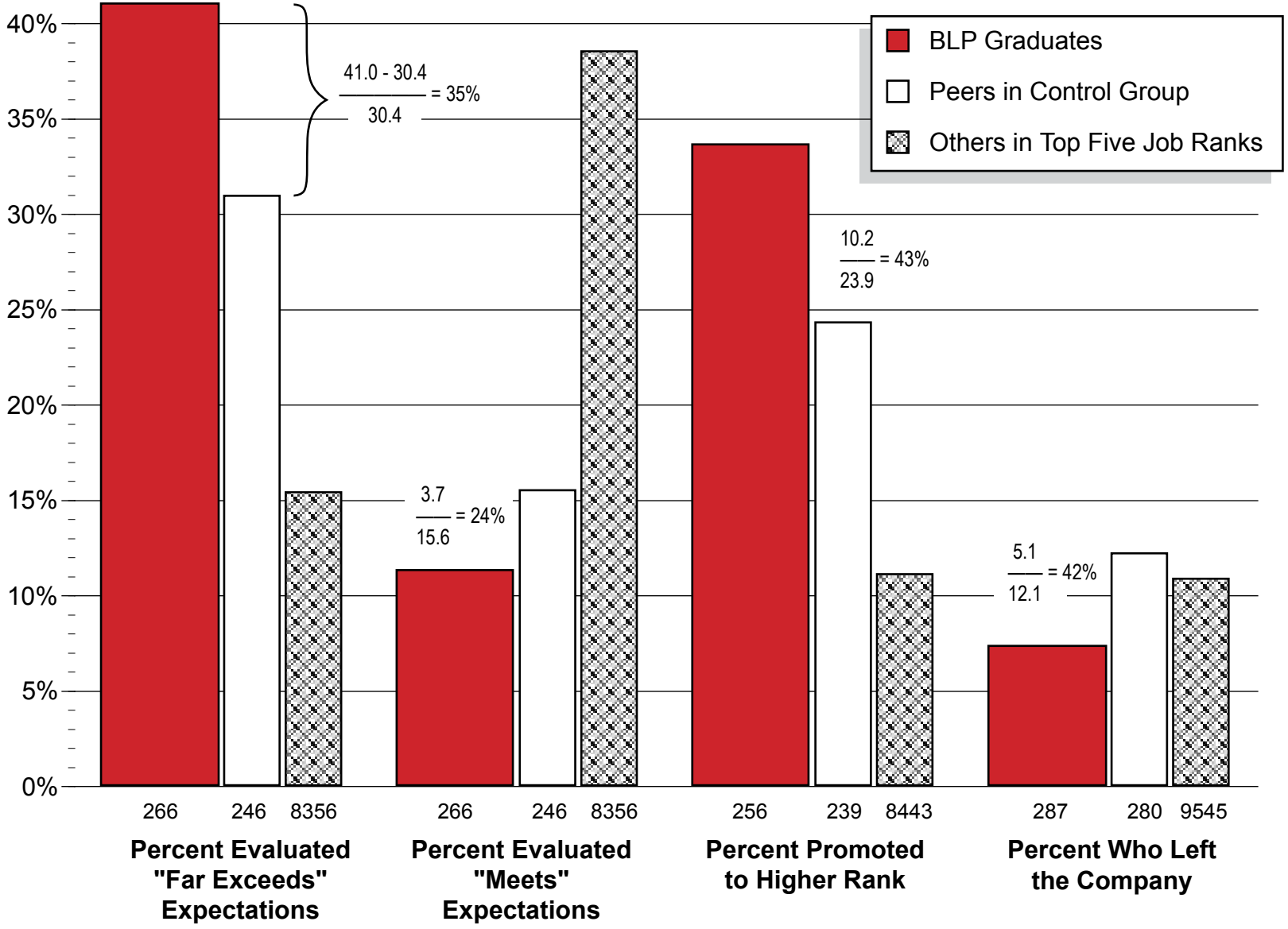
McDonald brothers begin one-off franchizing (1953; Occidental Petroleum exec Neil Fox, bro-in-law)
Kroc sees McDonald's and buys rights to distribute (1954)
Adds real estate rental to model & expands coast to coast
Buys out the McDonald brothers (1961)
Hamburger University (1961)

Highway bypasses Sanders' gas station/restaurant so he starts selling franchises for his chicken process (1956)



*Photos are from the video shown in class (1998 Ray Kroc segment in PBS *Biography* series; also see Wikipedia on oldest McDonald's restaurant.)

More Specifically, Network Advantage and Experiential Learning



from Figure 5 in Burt & Ronchi, "Teaching executives to see social capital: results from a field experiment" (2007, *Social Science Research*). Results are from an executive education program in which managers were followed for four years after graduation.

Personal Engagement Matters

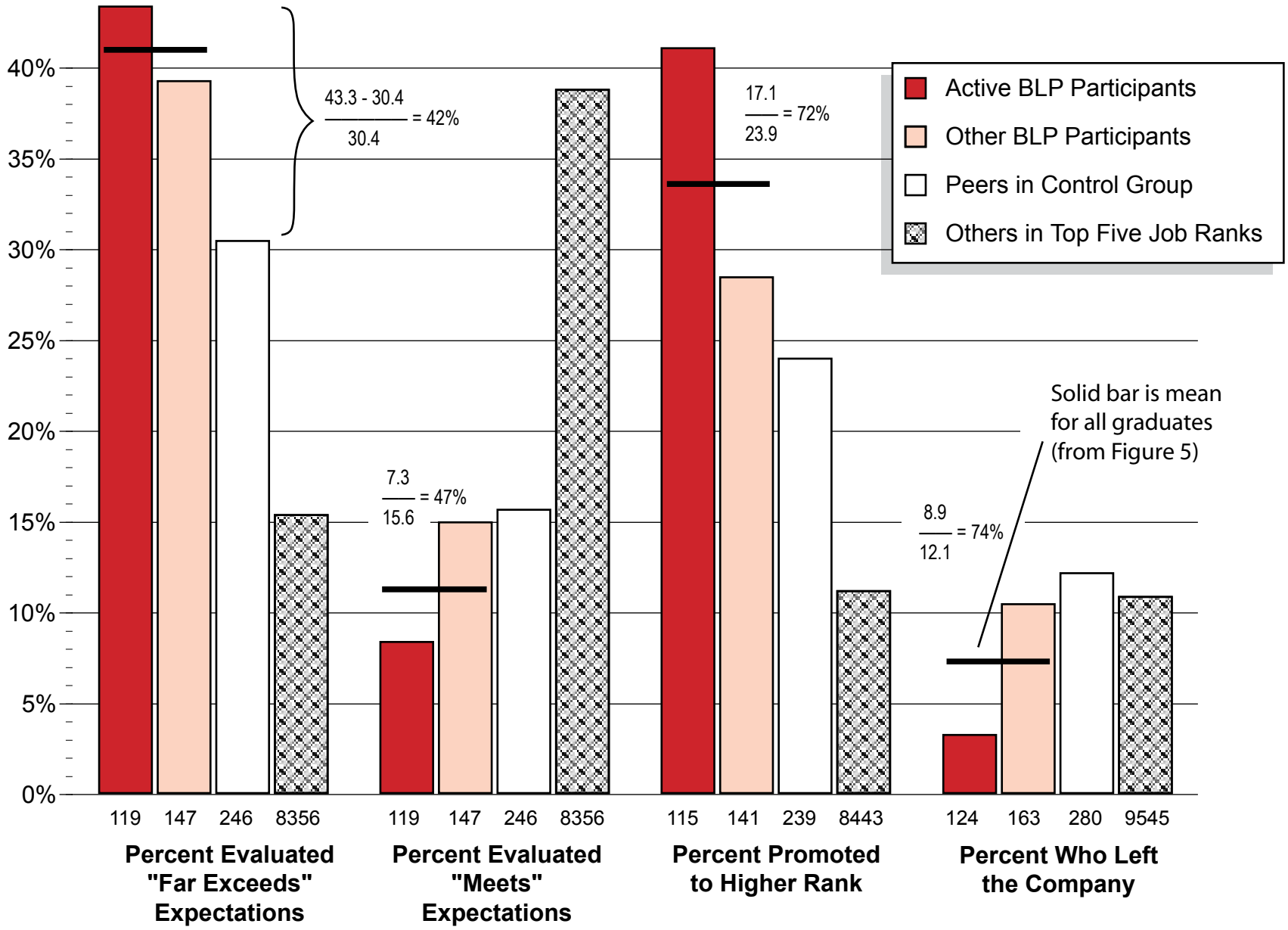


Figure 6 in Burt and Ronchi, "Teaching executives to see social capital" (2007, *Social Science Research*)

(Q263) We discussed the competitive advantage of network brokers depending on personal engagement. **Which of the following two statements better describes the reason for personal engagement being important?**

A. The advantage of network brokers rests on them having access to diverse facts.

B. The advantage of network brokers rests on them having access to diverse interpretations of facts.

(Q14) One way to obtain brokerage benefits quickly is to build connections with people who are already brokers. **True or false?**

A. True, because they have information breadth, timing, and arbitrage advantages.

B. False, because there is no guarantee that they will share their information advantages.

C. True, and this is a particularly efficient way to build broker benefits quickly.

D. False, because the information advantage associated with your success is in your network, not theirs.

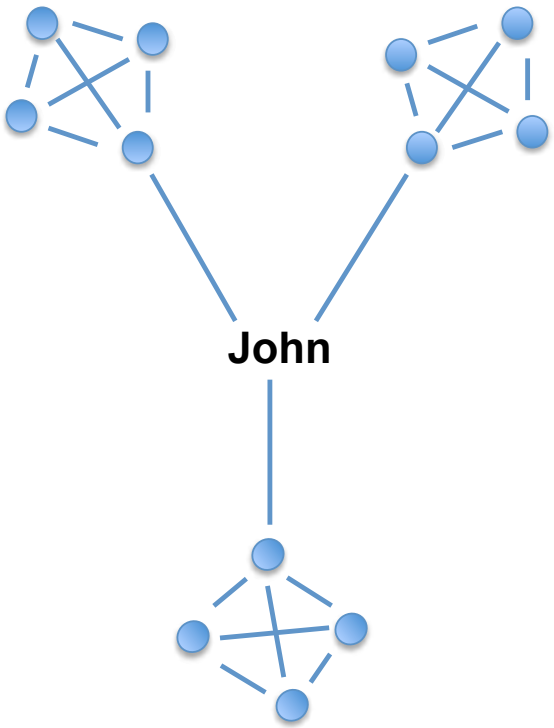
E. True, because you shouldn't worry about being known, just whether you are worth knowing.

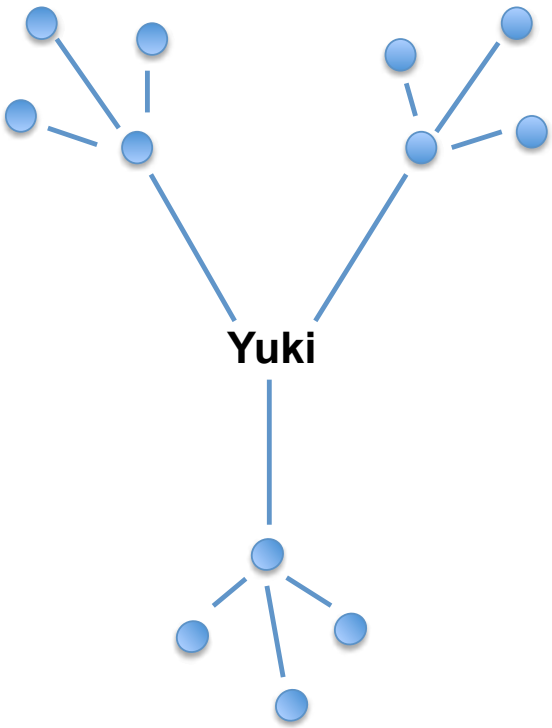
(Q264) Suppose John and Yuki below are similar on all performance-related factors except the displayed networks. **From whom would you expect higher performance, John or Yuki?**

A. John

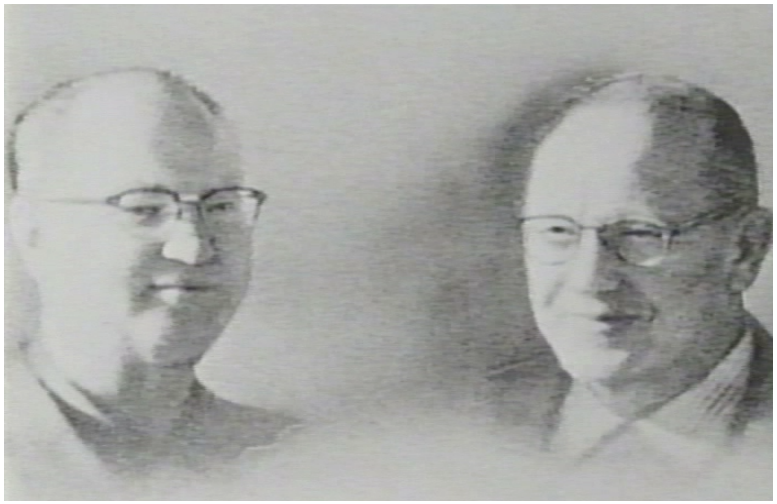
B. Yuki

C. About the same.





(Q270) **To what did we attribute the McDonald brothers' genius in creating the fast food business?**



A. Their experience with customers wanting faster service.

B. Their personal experience with diverse food businesses.

C. Their personal connection with Ray Kroc.

D. Their personal experience with limited scale of current business.

E. Their personal experience with customers moving to the suburbs.

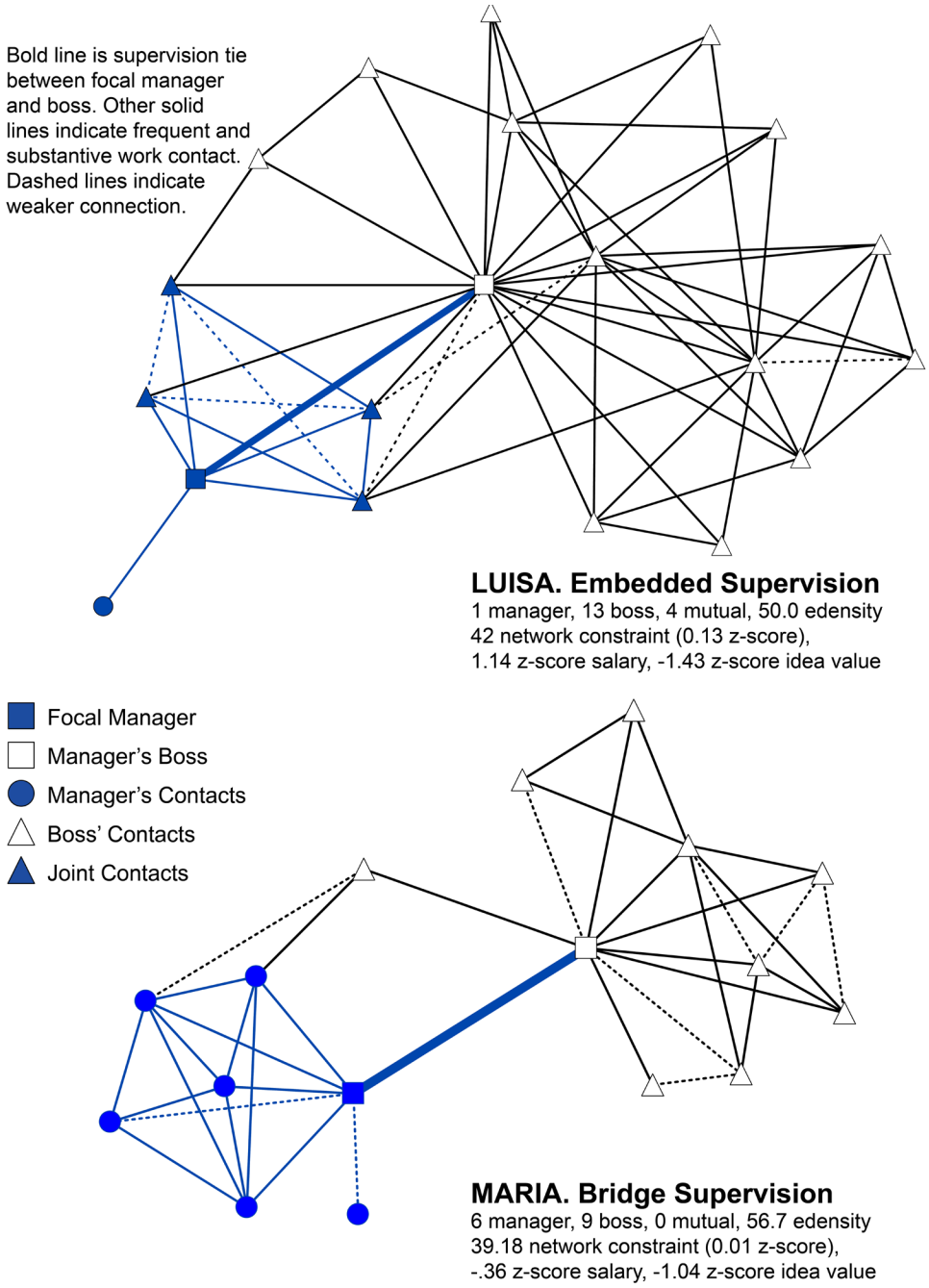
(Q331) The two sociograms show two managers, their bosses, and colleagues with whom both discuss work. Luisa operates under “embedded supervision” in that she and her boss discuss work with many of the same people. Maria operates under “bridge supervision” in that she and her boss have separate colleagues so supervision is exercised over a network bridge between their separate social worlds.

In an analysis of the management population in which Luisa and Maria work, whose network is associated with higher performance?

A. Managers like Luisa perform higher.

B. Managers like Maria perform higher.

C. Managers like Maria and Luisa perform about the same.



Sociograms are from Figures 1 and 2 in Burt and Wang, “Bridge supervision: Correlates of a boss on the far side of a structural hole” (2022 *Academy of Management Journal*).

Given Importance of Personal Engagement: Network Effects Involve Momentum and Compounds

Both are instantaneous. There is no time lag. However, momentum requires a build-up period to establish a pattern of network behavior, and compound effects are a function of pre-established networks.

"Momentum effects" occur when an established pattern of network behavior predisposes a person to predicted behaviors or outcomes. The established pattern could have been learned, or come to be in any other way that makes it routine, taken-for-granted behavior. In essence, momentum effects are autocorrelations: an established pattern of behavior is used to predict subsequent behavior. Much of network theory and analysis falls into this category.

> Examples would include the effect hypothesized in network theories of status (Podolny, 2005), the network effect hypothesized in structural holes theory (Burt, 1992, 2005, 2021), Coleman (1988) and Putnam's (1993, 2000) image of social capital, long-familiar network effects in the diffusion of behavior and opinion (Coleman, Katz, & Menzel, 1957), and the many behavioral correlates of closed networks such as low self-monitoring (Mehra, Kilduff, & Brass, 2001), low creativity (Soda, Mannucci & Burt, 2021), and temporal myopia (Opper & Burt, 2021).

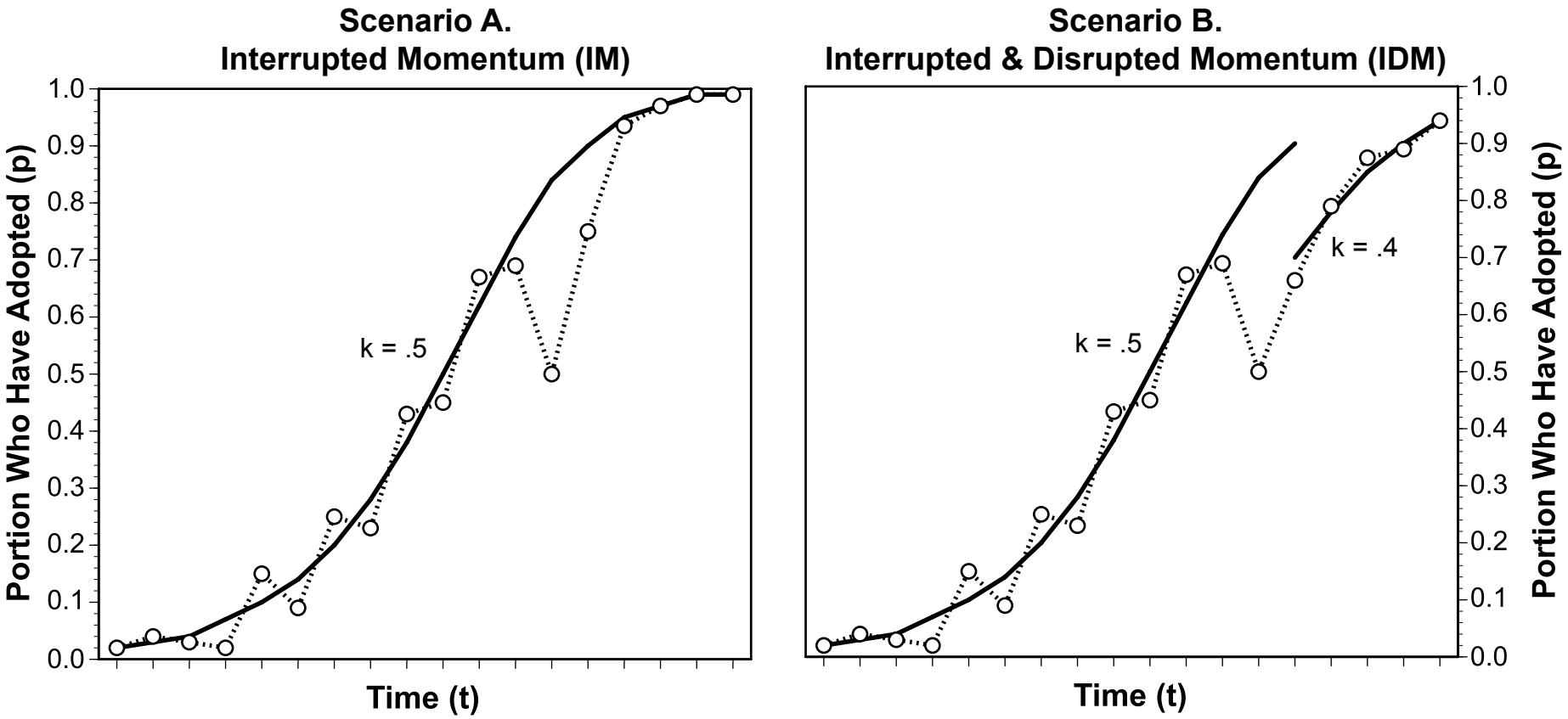
"Compound effects" occur in two forms: (a) a mixture of multiple momenta (in complement or contradiction),

> Familiar examples of multiple momenta are returns to brokerage contingent on a person's social standing (Rider, 2009; Burt & Merluzzi, 2016), or the distinct effects of relational versus structural embedding (Granovetter, 1992; Burt, Bian & Opper, 2018), or the complementary effects of brokerage versus closure (Burt, 2005) among a person's colleagues versus friends (to which I return at the end of this note).

(b) or a combination of momentum with an event that disrupts the momentum.

> Familiar examples of momentum disrupted by an event would include the many lab experiments in which restricted network access to colleagues has predictable consequences (Leavitt, 1951; Cook et al., 1983; Markovsky, Willer, & Patton,1988; Burt, Reagans, & Volvovsky, 2021), or the general task of search in which a person instrumentally tries to locate something, as when you use an internet browser to search for something (Milgram, 1967; Lee, 1969; Granovetter, 1974; Watts & Strogatz, 1998; Kleinberg, 1999, 2000; Lin, 2001; Burt et al., 2019). Examples also include Covid, to which I return later in this note.

Text is from a 2021 unpublished note on my research website, "Note on the Time Lag for Network Effects." References are given there.



In a population of people who have access to one another, diffusion from one time period to the next can be modeled as: dp/dt = k(1-p)p, where p is the proportion of the population that has adopted, and k is the average probability of an individual adopting (e.g., Coleman et al., 1957:261). The change in proportion expected during a unit of time equals the average probability of an individual adopting (k) times the proportion of the population available to adopt (1-p) times the proportion of the population that has already adopted (p). The model describes a familiar S-shaped curve in which there are few adoptions initially as people are nervous about early adoption (low p), followed by a rapid bandwagon spread of adoptions as neighbors adopt, followed by a decrease in adoptions as their are few people remaining who have not already adopted (high p).

The bold line in Figure A is a prediction for a population where people on average are 50/50 about adoption (k = .5). The dashed line in Figure A shows a hypothetical observed diffusion curve. The observed line hovers around the

theoretical line across time — until it reaches a point at which the observed drops well below expected. The drop in adoptions is what Pemberton (1937) observed when World War I or the Great Depression lowered the availability of adopters during ongoing diffusion processes. The key point in Pemberton's examples is that the momentum of the diffusion process is re-established subsequent to the event, such that adoptions continue along the initial theoretical prediction — as illustrated by the dashed line reverting to the solid line in Figure A. The exogenous event merely interrupted the momentum of an established pattern of behavior.

The graph in Figure B describes a hypothetical event that interrupts and disrupts established behavior. Activity is the same in the two graphs up to the event. Subsequent to the event, Figure A shows a return to the prior pattern, while Figure B shows a new pattern consistent with theory, but at a lower level resulting in slower diffusion. If Figure A is an interrupted momentum effect ("IM effect" for easy reference), Figure B is an interrupted and disrupted momentum effect ("IDM effect").

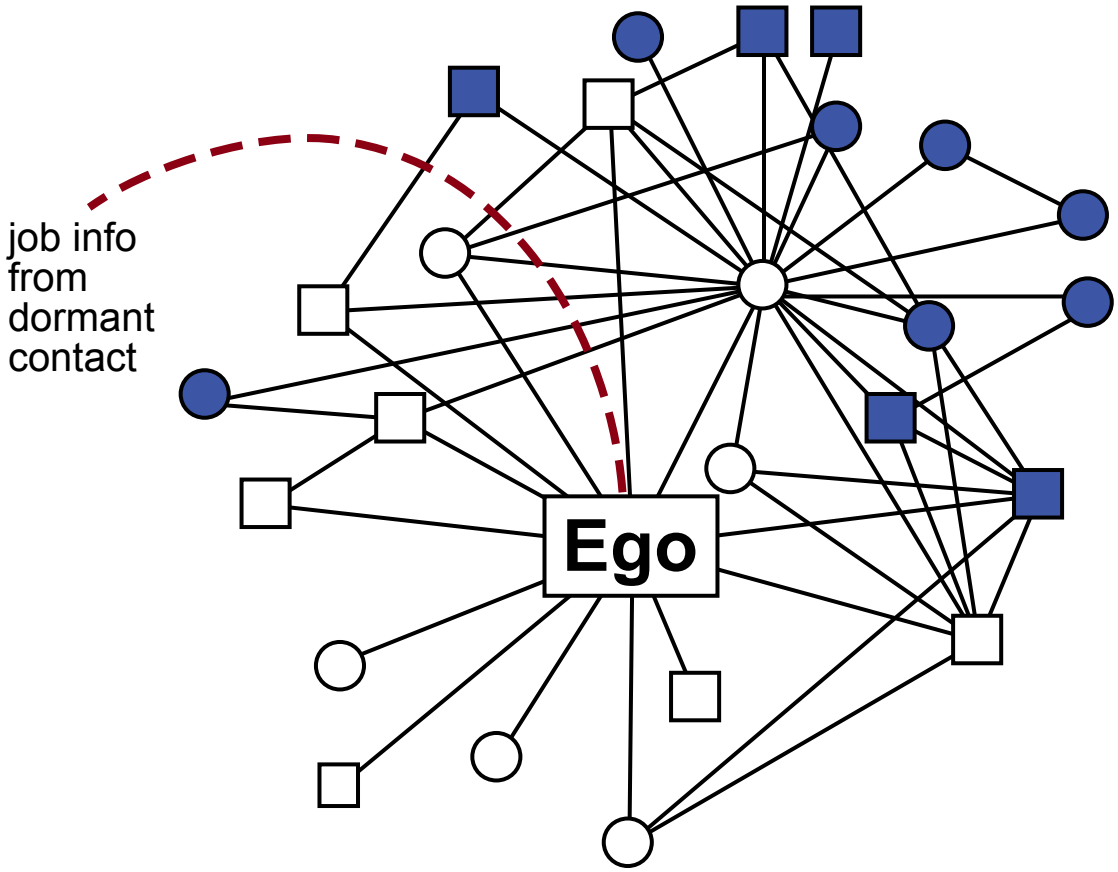
Compound network effects raise a question for any experiment reporting a network effect. Since subjects are almost never randomly assigned to treatment with respect to their established network behavior, treatment effects can be affected by network behavior established before the experiment.

Outside the lab, in our day-to-day lives, we often expect the disruption in Figure B when living through an event because we take for granted the established pattern waiting to re-assert itself. How many strategies intended to change behavior are advanced on the basis of the IDM effect in Figure B, but end up frustrated by the IM effect in Figure A? Management changes get made, public policy changes get made, all to be undone when managers revert to old habits. People participate in programs to eliminate self-destructive habits in their many forms (smoking, drinking, other drugs, eating, abuse, etc.), then return to their pre-program established behavior. Nevertheless, Pemberton's examples all show the IM pattern in Figure A. Even constrained by the severe events in Pemberton's examples, the pre-event diffusion process re-asserts itself. Perhaps this is the reason for immigrants being disproportionately the source of good ideas that develop into intellectual property (Weiner, 2016). Established network behavior cannot reassert itself when it is left behind, in a distant place.

It would be reasonable to speculate that a process has to be well-established to survive events as severe as war or depression, let alone the usual modest events in network experiments. If the bandwagon period in a diffusion process indicates established behavior, then the speculation is supported by Pemberton's examples. In three of Pemberton's four examples, the interrupting event occurs well after the bandwagon began. However, Pemberton's fourth example is one in which the interrupting event occurs during the initial period of slow adoptions.

Text is from a 2021 unpublished note on my research website, "Note on the Time Lag for Network Effects." References are given there.

INTERRUPTED MOMENTUM (IM) EFFECT: Search is often an event that merely interupts established network behavior. Even a novice can take advantage of structural holes during search. The question is whether the searcher follows, or rises above, his or her established patterns of behavior.



Granovetter (1973, AJS) "The strength of weak ties." Information that leads to a new job tends not to come from close friends or colleagues. It is more likely to come from a dormant contact — a person with whom you were close in school, or where you used to live, or where you used to work, et cetera. The point in this classic article: Dormant ties, when re-animated, are often valuable bridges. Lee (1969) reports similar results for women searching for an abortionist when it was illegal. Relatedly, Small (2017, *Someone To Talk To*) describes people using casual ties for significant support.

INTERRUPTED & DISRUPTED MOMENTUM (IDM) EFFECT:

Variation indicates sticky information (Appendix I). The below graphs show variation in fish prices before and after cell phones are available to fishermen and wholesale buyers.

Weekly surveys were conducted with sample wholesalers in three regions for a common category of fish sold (sardines). Regions are administrative districts in the Indian state of Kerala.

Network brokers are a mechanism that clears sticky information in a market.

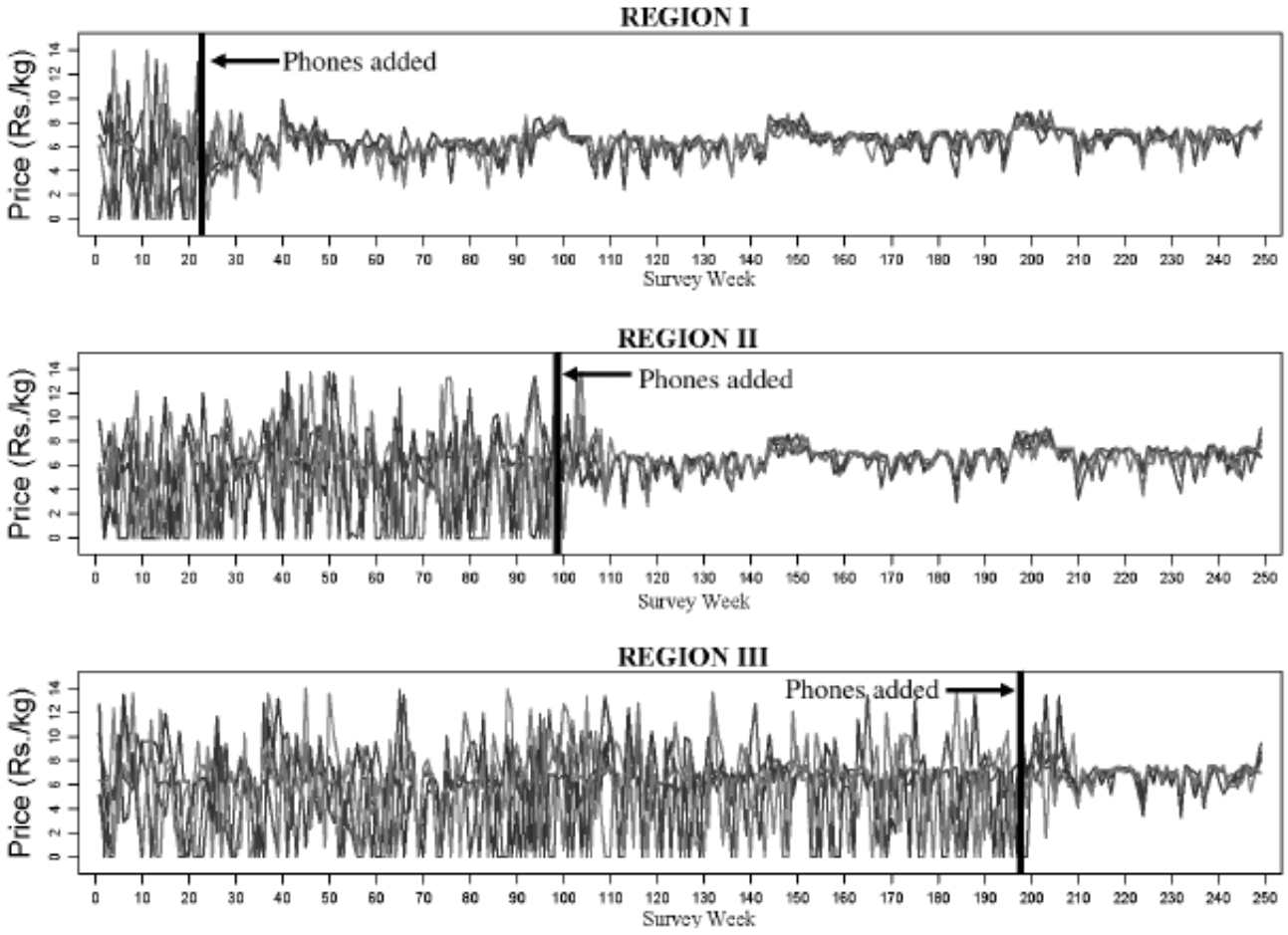


Figure 4 in Jensen, "The digital divide: information (technology), market performance, and welfare in the south Indian fisheries sector" (2007 *Quarterly Journal of Economics*).

Shirley Franklin, Mayor, Atlanta GA (2002-2010)
(text from unknown news magazine source)

The City of Atlanta was perceived to be corrupt at the time most of the City Council and I were elected in 2002. There were 10 former city officials who were serving jail time for corruption and fraud. That year, I proposed a change in city law that the council actually made more stringent. It called for a zero-tolerance ethics policy for city employees and contractors seeking city business. It means you couldn't accept lunch, or baseball tickets, or any gratuity at all.

It passed resoundingly. Then about six weeks ago, the council completely reversed themselves. They went from allowing $0 per contractor to $75, with no disclosure requirements. It's a complete reversal of the mood that was here when I came into office. It is the most discouraging thing that's happened during my term.

My mistake was a misjudgment I had assumed that once we developed consensus for change, the culture of the organization would change. I thought we'd passed over a drawbridge, pulled it up, and nobody was ever going to try that again. That is a mistake. The culture of an organization does not change with the passage of a policy.

(Q329) **Mayor Franklin's policy change on local corruption is an example of:**

A. a failure
B. an interrupted momentum (IM) effect
C. a network momentum effect
D. an interrupted & disrupted momentum (IDM) effect
E. a welcome change in government

(Q230) Network brokers do well in American and European business, but in Chinese business, the emphasis on *guanxi* and family means that higher success goes to people in closed networks. **True or false?**

A. True

B. False

CULTURE: Don't count on it. Don't hide behind it. Cultural diversity typically does not eliminate the rules of network advantage, but it does reveal interesting variations.

Popular belief distinguishes Asia for its emphasis on the collective over the individual, and success contingent on connections aligned with the formal chain of command. Brokerage could clash with collectivist social norms such that returns to brokerage are non-existent or even negative in China.

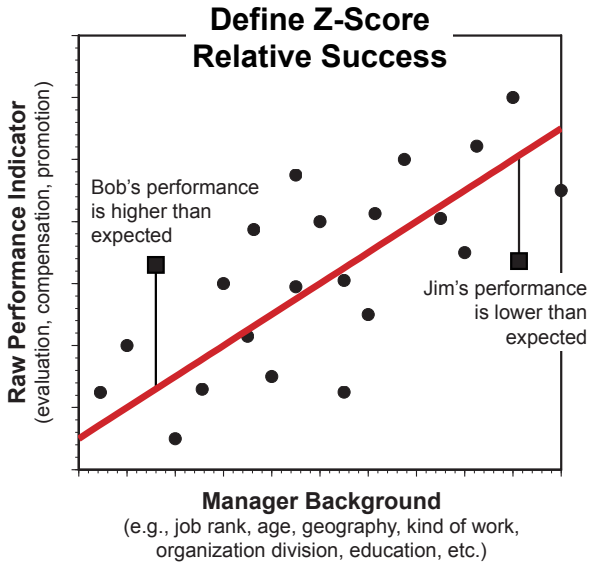
Evidence is mixed on the issue. In support of the idea that Chinese culture inhibits brokerage, Yang and Zhang (2015) had difficulty finding structural holes in entrepreneur networks and quote one of their entrepreneurs on fear of failure. Consistent with the quoted sentiment, Batjargal (2010) reports that networks around Chinese entrepreneurs are smaller and more dense than the networks around Russian entrepreneurs, Ma, Huang, and Shenkar (2011) report that networks rich in structural holes around Taiwanese managers weakened manager ability to identify opportunities, and Xiao and Tsui (2007) do not find achievement higher for Chinese employees with larger, more open networks.

On the other hand, there is evidence that business practice in China rewards brokerage. Batjargal offers a portfolio of studies reporting greater success for Chinese entrepreneurs who have larger networks richer in structural holes (Batjargal 2007a; 2007b; 2010; Batjargal et al., 2013). Merluzzi (2013) reports similar results on Chinese and other Asian managers in a large software company, and Bian and Wang (2016) report cross-sector relations being helpful for raising start-up capital by self-employed respondents in an area probability survey of eight large cities in China. Concluding that returns to brokerage are exceptionally high in China, Batjargal et al. (2013:1040) summarize their analysis in China and Russia as adverse and uncertain environments (relative to France and the United States): "entrepreneurs benefit from their network's structural holes. However, those entrepreneurs who operate in settings where the entire institutional order is adverse and uncertain benefit more from their networks' structural holes."

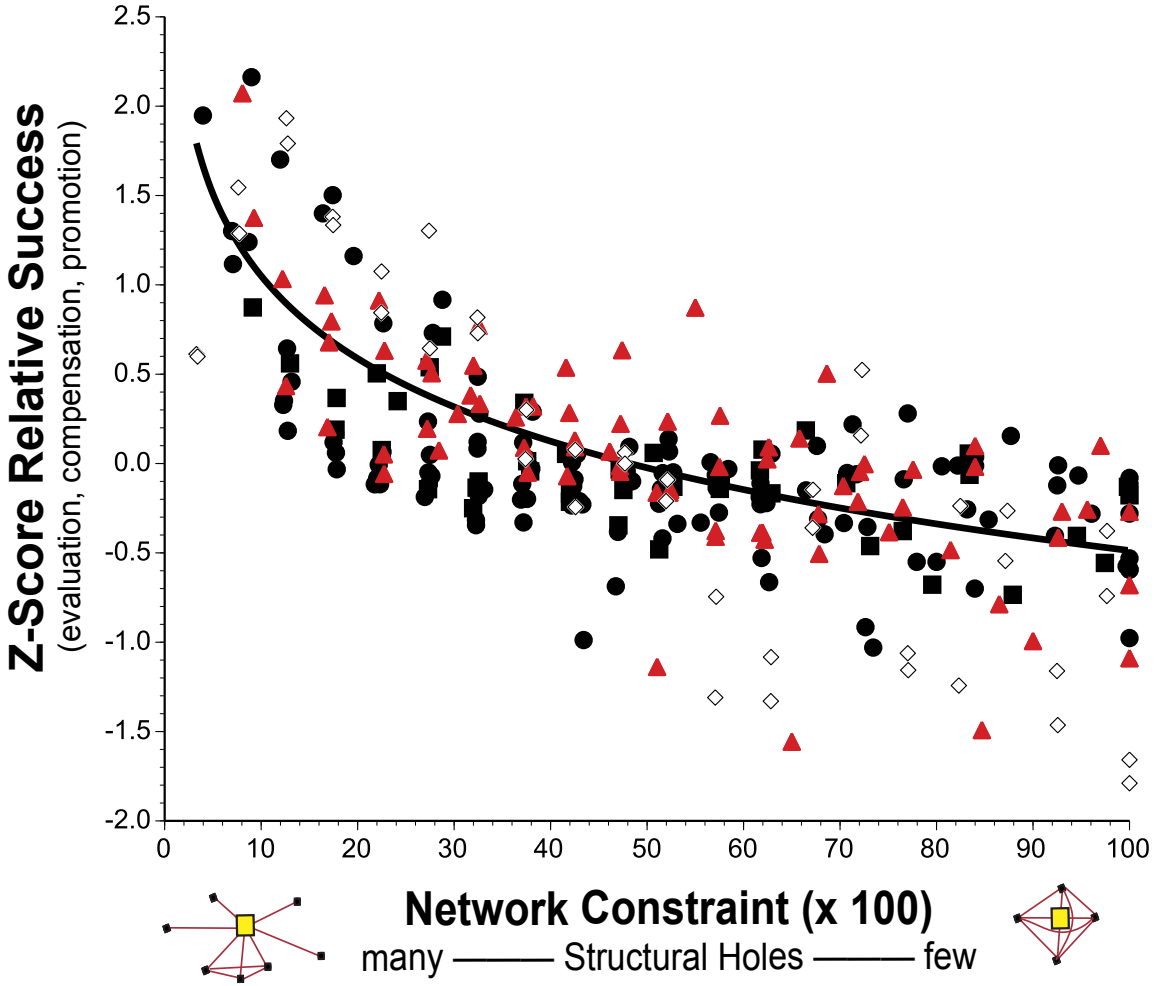
from page 227-229 in Burt and Burzynska, "Chinese entrepreneurs, social networks, and *guanxi*" (2017 *Managerial and Organization Review*)

Business Success in US, EU, Asia Decreases as the Network Around a Person Closes

from first session



- Managers in the U.S. (n = 3093, 8 study pops, r = -.72)
- Managers in Europe (n = 1270, 4 study pops, r = -.70)
- Managers in Asia, Primarily China (n = 1591, 4 study pops, r = -.75)
- Virtual World (21536 avatars in EverQuest II, played by 13968 people, 2 samples, r = -.76)



(Q9) Personality is associated with the structure of the network around a person, but the two have separate effects on success. **True or false?**

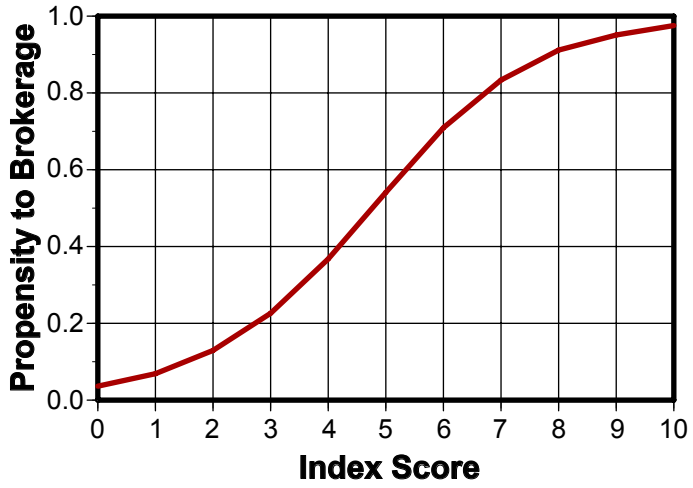
A. True

B. False

PERSONALITY: Don't Count on It Don't Hide Behind It

Network Entrepreneur Personality Index

Select the phrase under each item that better describes you (circle A or B). Select only one phrase per item. If you disagree with both phrases, select the one with which you disagree less. With so few questions, it is important to select phrases that describe how you actually operate, rather than how you feel you should or would like to operate. There are no right or wrong answers. When you are finished, you should have a total of ten phrases circled. To get your score, see the answer key on the last page of this handout, then use the graph below to determine your personal disposition toward being a network broker.



from Figure 1.6 in *Brokerage and Closure*

1. When evaluating opportunities, I am likely to look . . .
A. for a chance to be in a position of authority
B. for the long-run implications

2. My strength lies in the fact that I have a knack for . . .
A. being easygoing
B. getting a point across clearly

3. In discussions among peers, I am probably seen as . . .
A. an outspoken advocate
B. motivating people to my views

4. I believe that people get into more trouble by . . .
A. being unwilling to compromise
B. not letting others know what they really think

5. In a leadership role, I think my strength would lie in the fact that I . . .
A. won people over to my views
B. kept everyone informed

6. In evaluating my aims in my career, I probably put more emphasis on . . .
A. my ability to create an aura of excitement
B. being in control of my own destiny

7. As a member of a project team, I . . .
A. seek the advice of colleagues
B. closely follow the original mandate of the group

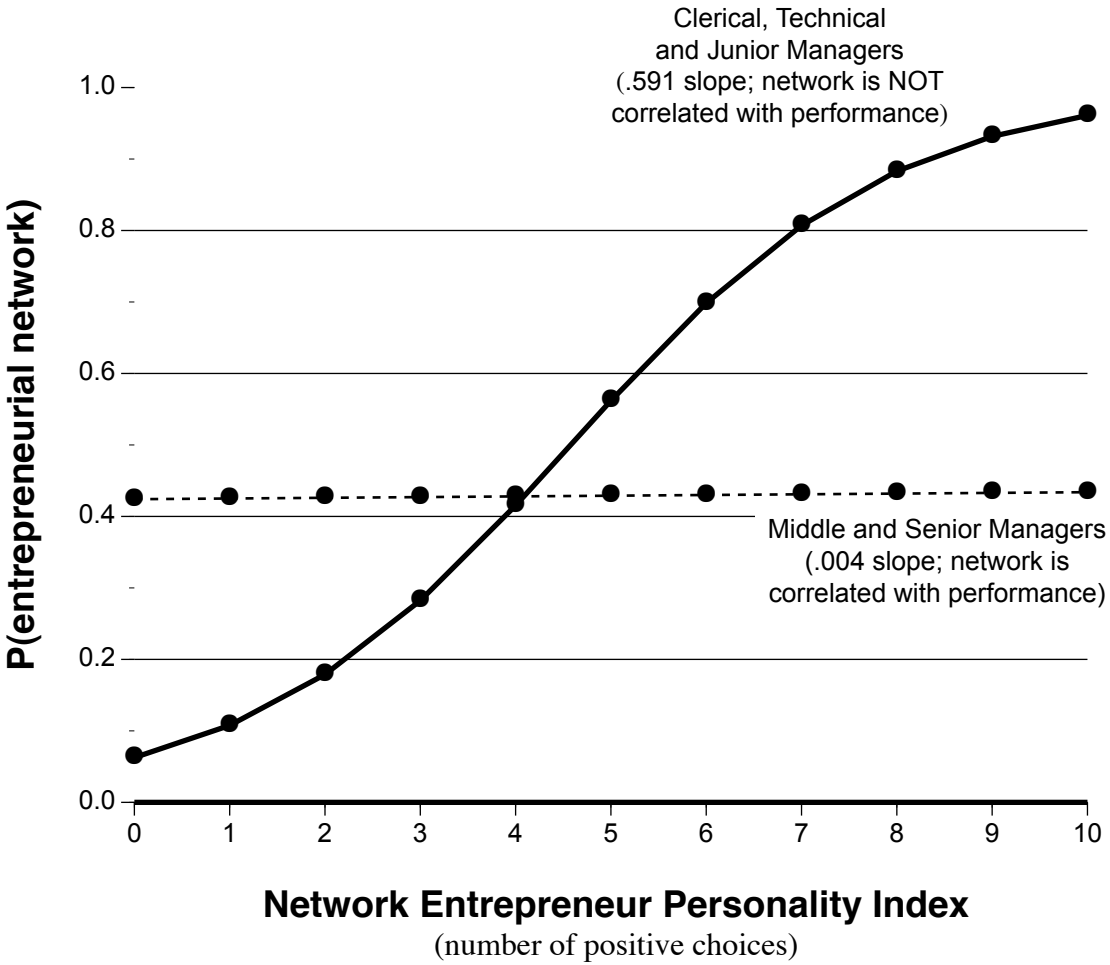
8. Others are likely to notice that I . . .
A. let well enough alone
B. let people know what I think of them

9. In an emergency, I . . .
A. take the safe approach
B. am quite willing to help

10. I look to the future with . . .
A. unshakable resolve
B. a willingness to let others give me a hand

Università Bocconi
MILANO

Personality differences are associated with the networks built by these staff officers, but only below managerial rank (clerical and technical staff), where there is no social capital association with performance



$$P(\text{entrepreneurial network}) = \frac{1}{1 + e^{-f}} \quad ; \quad f = \underset{(2.7)}{-2.71} + \underset{(2.5)}{2.52}S + \underset{(-2.4)}{(.59 - .59S)}INDEX$$

For the purposes here, an employee has an entrepreneurial network if his or her network constraint score is no more than the average for all respondents.

S is a dummy variable distinguishing employees in senior ranks.

from Burt, Jannotta, and Mahoney, "Personality correlates of structural holes" (1998, *Social Networks*)

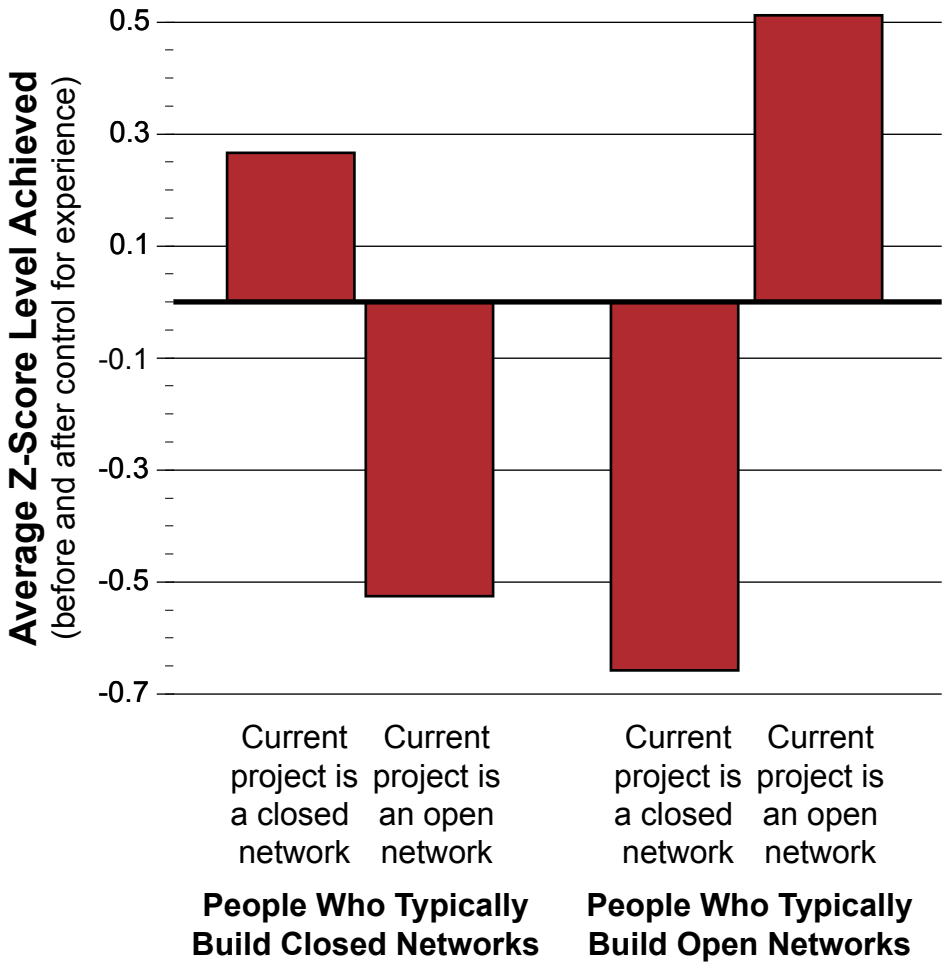
More Important, Is there Evidence of Personality Affecting Network Advantage?

The evidence to the right shows personality affecting network advantage. It would be important — when estimating the returns to brokerage in this population — to hold personality constant (in terms of however personality manifests as a preference for closed rather than open networks).

The horizontal distinguishes people who prefer to work in a closed network (left) versus those who prefer to work in an open network. Each group is then divided into those whose current project is a closed versus an open network.

Z-score relative performance is measured by the columns over each category.

Notice that people who prefer closed networks perform better in a closed-network project and people who prefer an open network perform better in an open-network project.



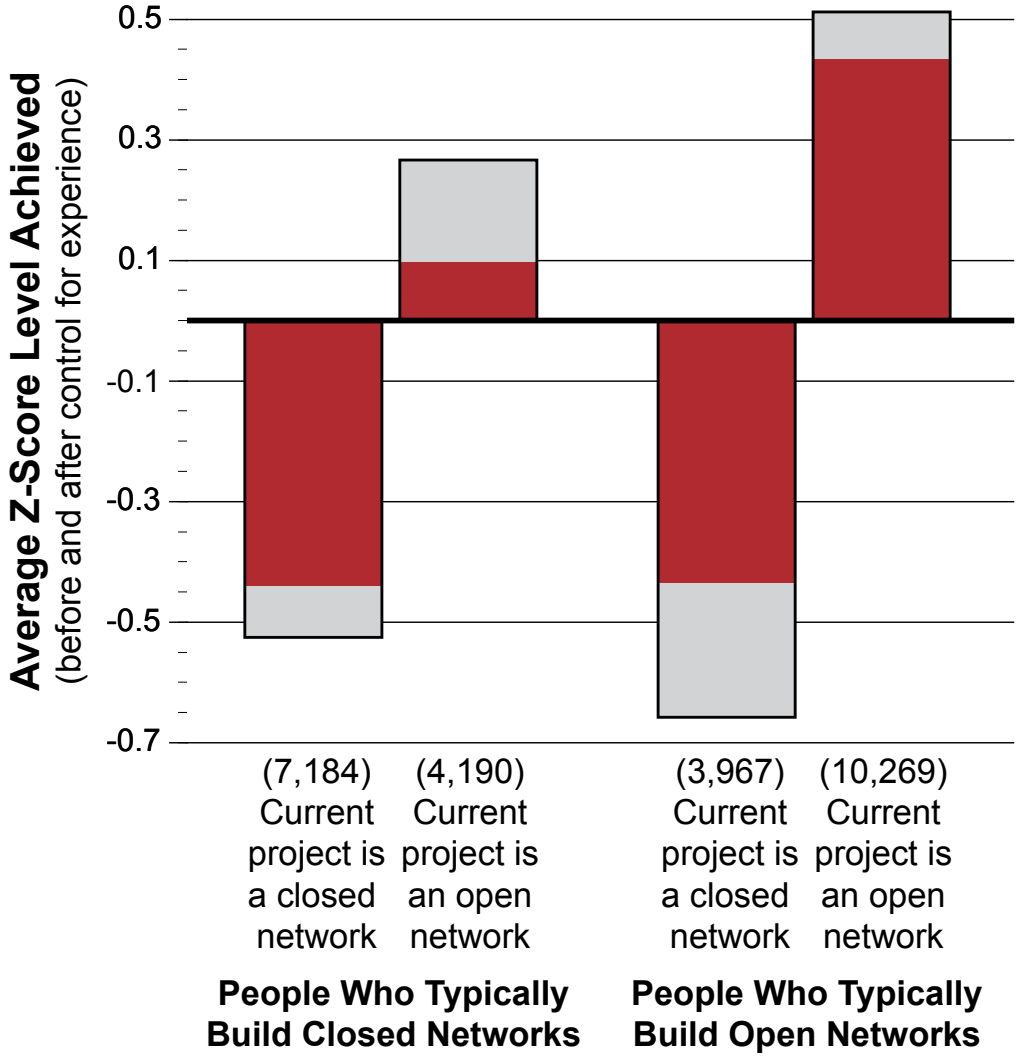
Network Advantage Is Not Contingent on Kind of Person. It Exists Independent of Personality.

But the evidence on the previous page doesn't exist. Network effect is evident when people are assigned at random to networks (discussed in first handout), and there is no evidence of an interaction between personality and network advantage, as illustrated in graph to the right.

Open versus closed networks are distinguished at median levels of current network (N) and usual network (network-relevant personality, P). Network index is number of nonredundant contacts.

Bars indicate average z-score character level achieved. Number of characters is given in parentheses.

Dark portion of each bar is the mean z-score level when player experience is held constant (notice the statistically negligible tendency for a larger experience effect when person is not operating within his or her usual network).



From Figure 7 in Burt, "Network-related personality and the agency question: multirole evidence from a virtual world" (2012, *American Journal of Sociology*). For more detail, see Appendix IV on network-related personality.

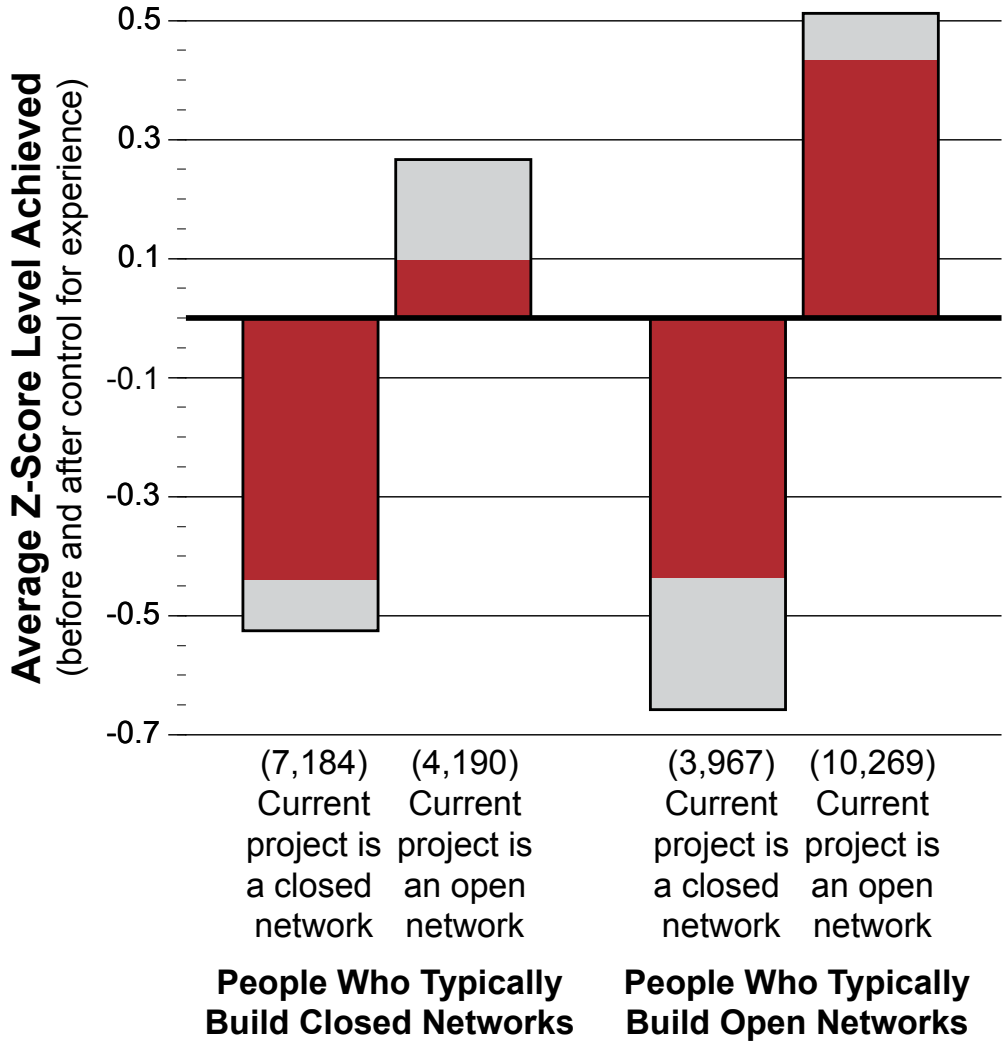
(Q174) **In the organization described by the performance bar graph below, how does personality affect network advantage?**

A. No effect on network advantage.

B. Strong effect on network advantage for people in open networks.

C. No effect on network advantage for people in closed networks.

D. Strong effect on network advantage.



Miscellaneous Considerations

Be Careful About Rival Brokers

Structurally equivalent people are substitutes for one another, which makes them by definition competitors for their constituent relationships (Burt 1982, 1987, 2010). As the equivalence set reduces to two people, competition can intensify into rivalry (Kilduff 2014; Kilduff et al. 2016; Kilduff et al. 2024). Team experiment networks to the right contain two structurally equivalent broker positions and three subordinate positions.

RQ: Between a pair of structurally equivalent network brokers, does rivalry develop such that one works to dominate the other? (Triplett, 1898:533: “the bodily presence of another contestant participating simultaneously in the race serves to liberate latent energy not ordinarily available.”)

RQ: How does the broker rivalry affect team performance?

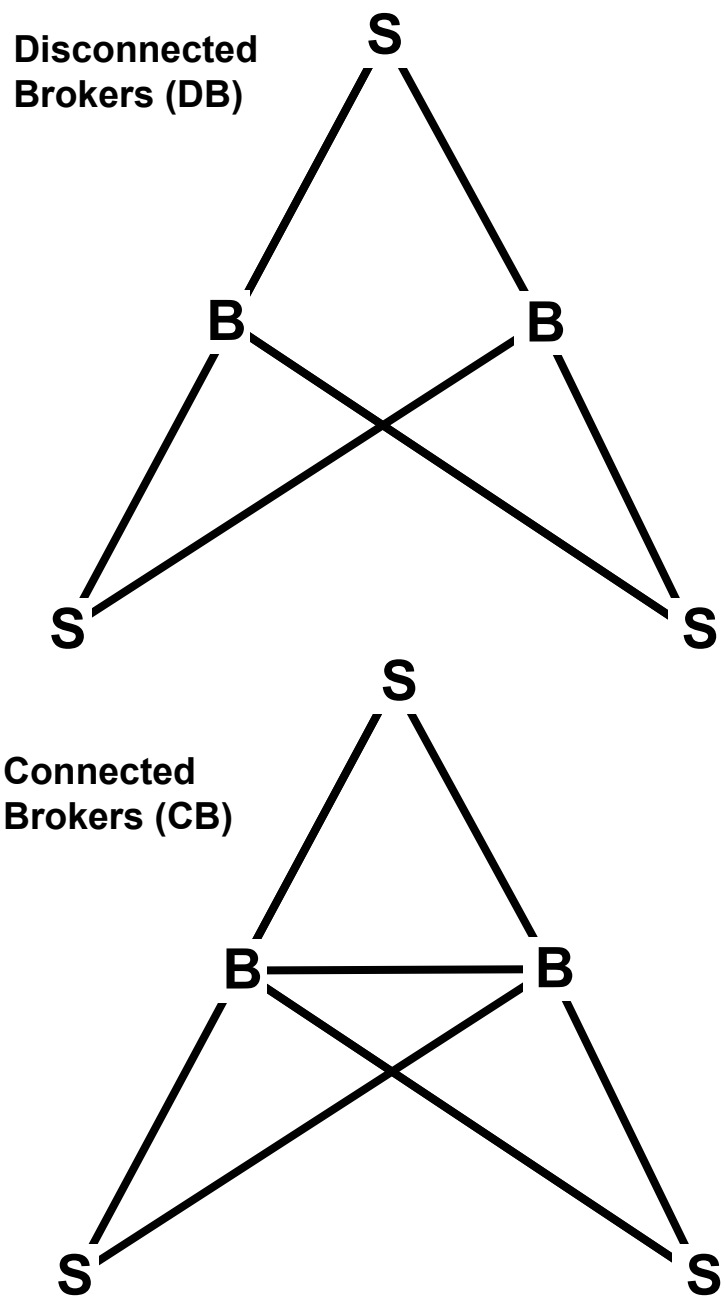
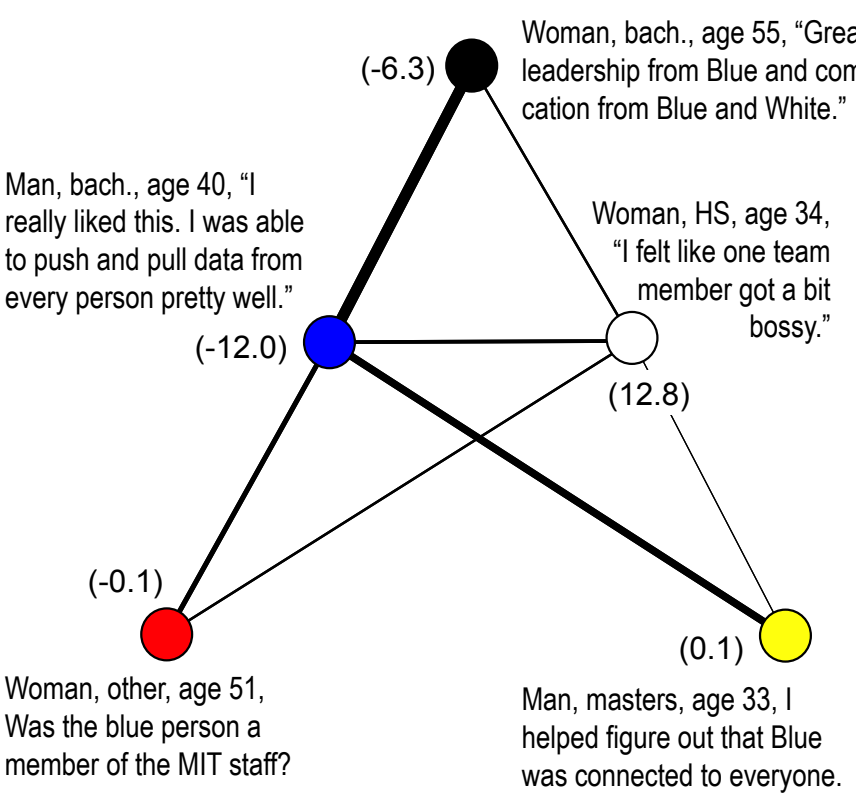
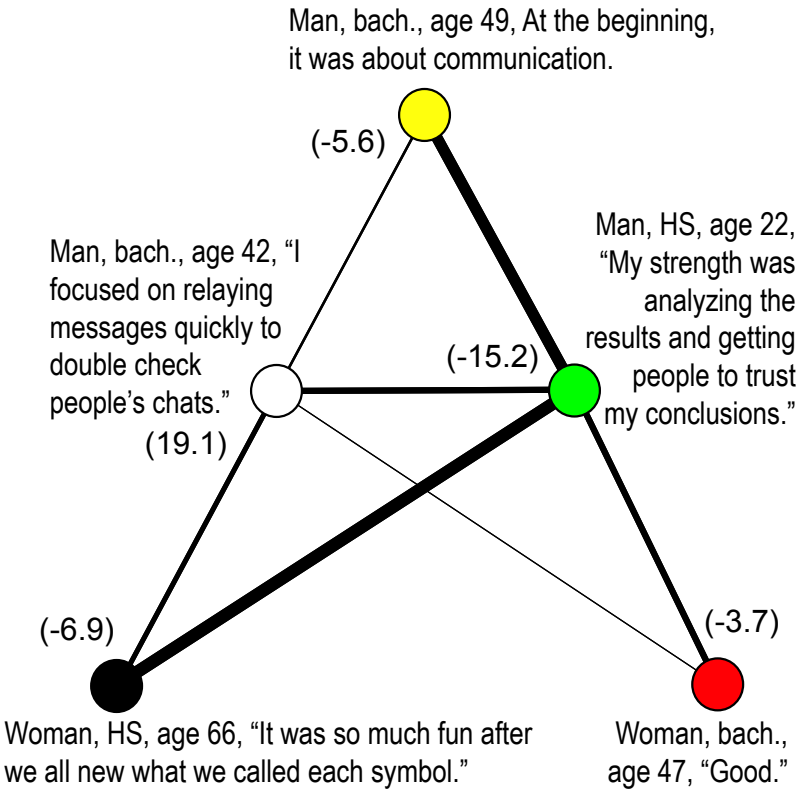


Figure 4 in Burt, Reagans & Opper, “Phantom Networks” (2024 Academy of Management Meetings)

Assigned to CB Network, These Teams Experience a WHEEL Network





A. Team 15 Behavioral Network

(Blue is lead broker and receives 100% of leader citations. Deviation gap between brokers is 13.2+11.6 = 24.8)

B. Team 66 Behavioral Network

(Green is lead broker and receives 100% of leader citations. Deviation gap between brokers is 19.5+14.8 = 34.3)

NOTE: Thicker lines indicate more messages. Behavioral deviation score is in parentheses (behavioral – treatment constraint). Quotes are response to question: "How would you describe your strength in the game?" No quotes on abbreviated responses. Other attributes are gender, education, and age.

Figure 5 in Burt, Reagans & Opper, "Phantom Networks" (2024 Academy of Management Meetings)

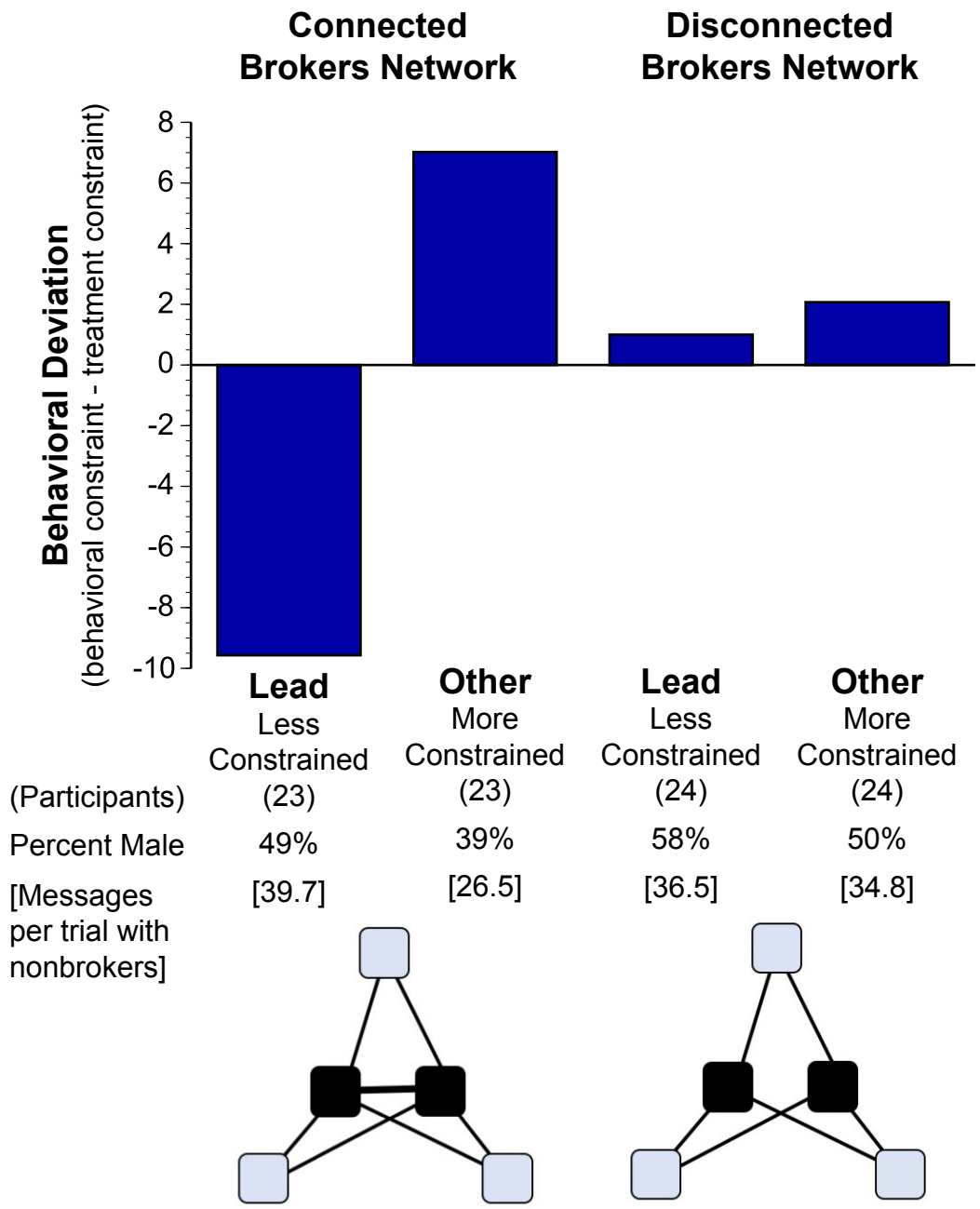


Figure 6 in Burt, Reagans & Opper, "Phantom Networks" (2024 Academy of Management Meetings)

In Sum, Rivalry Is Likely between Brokers Working the Same Constituency

Usually, one person emerges as a broker coordinating communication within the team. This is not because the person is experienced with brokerage. The emergent brokers tend to come from closed networks in their personal life. They emerge as brokers through a high volume of communication, which leaves less time for teammates to message one another, which creates a wheel structure with the emergent broker at the hub. Thus, emergent brokers are more bossy than collaborative; less working with the team than barging into it, imposing their leadership as solution to frustrating teammate behavior.

In clique networks, men tend to be the emergent broker. In structured teams defining alternative leaders, gender washes out and one alternative leader works to dominate the other.

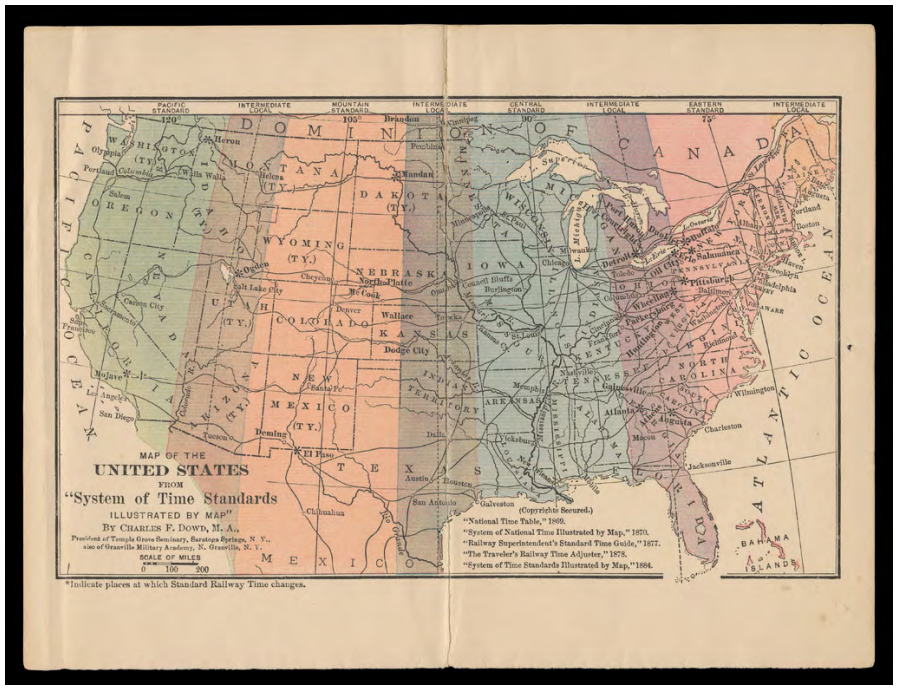
Returns Low if Active Holes Are Treated as Passive: Active structural holes are reinforced in place so bridging them can be especially difficult regardless of value. Common reinforcing mechanisms are education, business function, legacy organization, culture, gender, age, race/nationality, along with others. If you have a good idea for brokerage, ask why the idea has not already been implemented. Something is preserving the status quo. First bridge is critical precedent for spanning active structural hole. "Local action" and displayed structural equivalence can be significant facilitators.

	PASSIVE	ACTIVE
Structural Hole Is Maintained by:	NOTHING. No one is interested in preserving or eliminating the disconnect between the groups.	SOMETHING: Hole (1) provides opportunities for insiders on one side to exploit outsiders on the other side (e.g., Asian "compradors"), (2) permits insiders to hoard opportunities from outsiders, (3) makes it easier for insiders to launch organizations in which insiders are advantaged, or (4) daily routines and valued relations have adapted to the hole (e.g., Clendenin at Xerox, New England cotton early 19th).
Difficulty Building the Bridge	LOW. No interests oppose the bridge, so the bridge should easily absorb into the surrounding social structure, and support should be in proportion to bridge value.	HIGH. Bridge is opposed so partners might be required to legitimate the bridge, regardless of the bridge's value (e.g., American in France).
Threat of Imitators	HIGH because bridge difficulty is low. Bundle the bridge with other benefits to be the high-value broker.	LOW because bridge difficulty is high. Broker monopoly can trigger abuse by brokers (e.g., Asian "compradors").

For discussion of active versus passive structural holes, see pp. 235-240 in *Brokerage and Closure*, and "Reinforced structural holes" (Burt, 2015 *Social Networks*). Local action is discussed by Leifer, "Interaction preludes to role setting: exploratory local action" (1988, *American Sociological Review*).

Active Hole: Where did US time zones come from?

Until 1883 each United States railroad chose its own time standards. The Pennsylvania Railroad used the "Allegheny Time" system. By 1870 the Allegheny Time service extended over 2,500 miles with 300 telegraph offices receiving time signals. However, almost all railroads out of New York ran on New York time, and railroads west from Chicago mostly used Chicago time, but between Chicago and Pittsburgh/Buffalo the norm was Columbus time, even on railroads which did not run through Columbus. The Northern Pacific Railroad had seven time zones between St. Paul and the 1883 west end of the railroad at Wallula Junction.



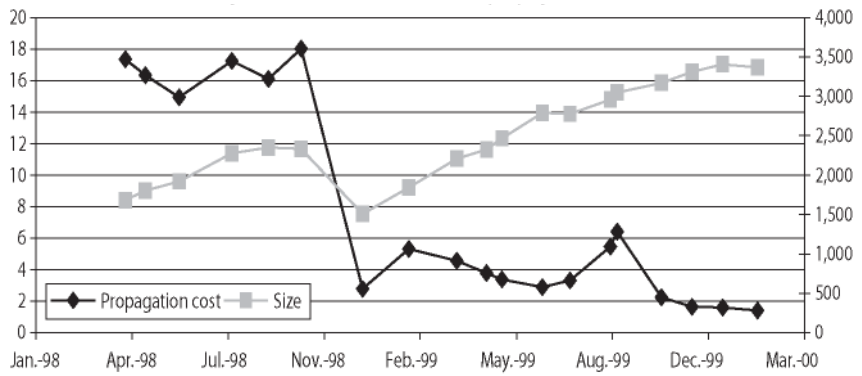
In 1870 Charles F. Dowd proposed four time zones based on the meridian through Washington, DC for North American railroads. In 1872 he revised his proposal to base it on the Greenwich meridian. Sandford Fleming, a Canadian, proposed worldwide Standard Time at a meeting of the Royal Canadian Institute on February 8, 1879. Cleveland Abbe advocated standard time to better coordinate international weather observations and resultant weather forecasts, which had been coordinated using local solar time. In 1879 he recommended four time zones across the contiguous United States, based upon Greenwich Mean Time.

The General Time Convention (renamed the American Railway Association in 1891), an organization of US railroads charged with coordinating schedules and operating standards, became increasingly concerned that if the US government adopted a standard time scheme it would be disadvantageous to its member railroads. William F. Allen, the Convention secretary, argued that North American railroads should adopt a five-zone standard, similar to the one in use today, to avoid government action. On October 11, 1883, the heads of the major railroads met in Chicago at the Grand Pacific Hotel and agreed to adopt Allen's proposed system. ... Standard time was not enacted into US law until the 1918 Standard Time Act.*

*Text comes from October 24, 2015 Wikipedia entry for "Standard time" (five zones include one east of Eastern zone). Map is Dowd's 1884 fifth version advocating to railroaders the adoption of standard time zones. Engraving of William Allen is from *Frank Leslie's Popular Monthly* (April 1884). For details on bureaucratic infighting over standard time, see Bartky, *Selling the True Time* (2000, Stanford University Press).

Returns Low Because of Nested Holes

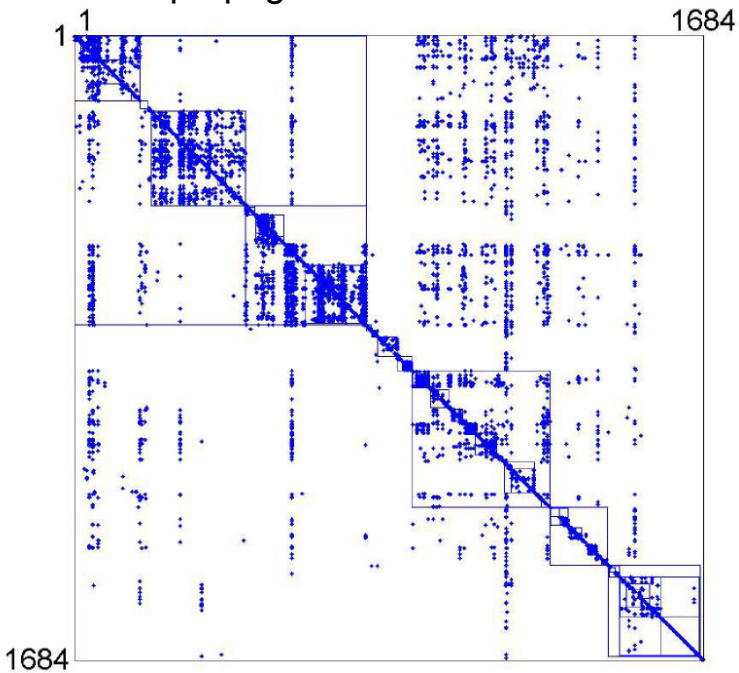
Modularity increases the risk of productive accident. This is the logic behind short courses (encourage breadth by lower cost to exploration).



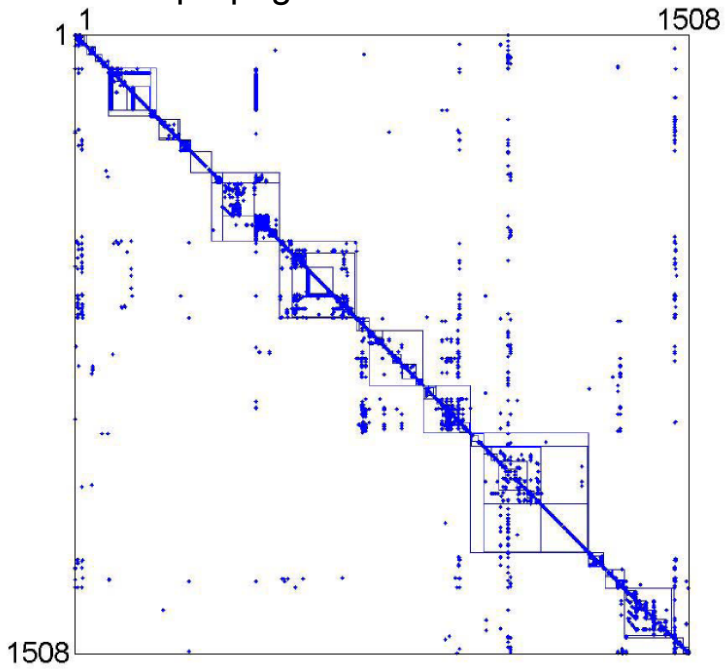
Longitudinal Evolution of Mozilla Propagation Cost*

Netscape's Navigator was released under open-source license in March 1998 as Mozilla. It was re-designed for modularity to make it more attractive to contributors. Networks below show module dependencies before and after the re-design. "Propagation cost" is the average percentage of code that must be updated following a change in any one module.

Mozilla version 1998-04-08
propagation cost:* 17.35%



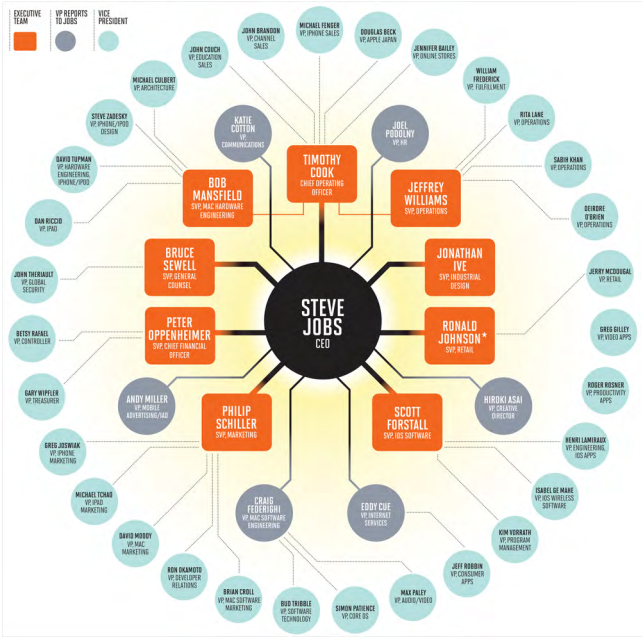
Mozilla version 1998-12-11
propagation cost: 2.78%



From MacCormack, Rusnak,and Baldwin, "Exploring the structure of complex software designs" (2006, *Management Science*). For broad discussion of modularity in high tech, see Baldwin and Clark, *Design Rules: The Power of Modularity*, 2000, MIT press. More specifically, see Kronblad (2020 *Academy of Management Discoveries*) on digital content leading to professional service firms becoming more modular.

Don't Try to Connect Everything: The cost is prohibitive and holes provide variation needed for innovation. Holes emerge from a division of labor, and there is even value to explicitly cultivating them.

"Le vide" between product labs at Rhone-Poulenc: Have you noticed that really top scientists get their best ideas from people outside their own discipline? "Shock comes when different things meet. *Le vide* has a huge function in organizations. If you don't leave *le vide*, you have no unexpected things, no creation. There are two types of management. You can try to design for everything, or you can leave *le vide*." (Jean-René Fourtou CEO Rhone-Poulenc, explaining why two Rhone-Poulenc chemists won the nobel prize for Chemistry; quoted in 1996 *Fortune*, November 25)



Secrecy between product labs at Apple: "We have cells, like a terrorist organization. Everything is on a need-to-know basis." (Jon Rubinstein, formerly Apple's senior hardware executive; quoted in 2012 *Fortune*, January 18; org chart from 2011 *Fortune*, May 23)

Critical role of "disconnected" cities in emergence of jazz music: Central cities like Chicago and New York produced the largest number of early jazz recordings, but the pieces most often re-recorded across markets as jazz classics came from "disconnected" cities like Memphis, Louisville, St. Louis, and Buenos Aires (tango & jazz). "Boutique beer" is analogue. Sociogram below is from Damon Phillips (*Shaping Jazz*, p. 15, Princeton U. Press 2013, which was initially on p. 439 of his article, "Jazz and the disconnected" in the 2011 *AJS*). Arrows indicate volume of bandleaders from source city recording in the target city, 1930-32.

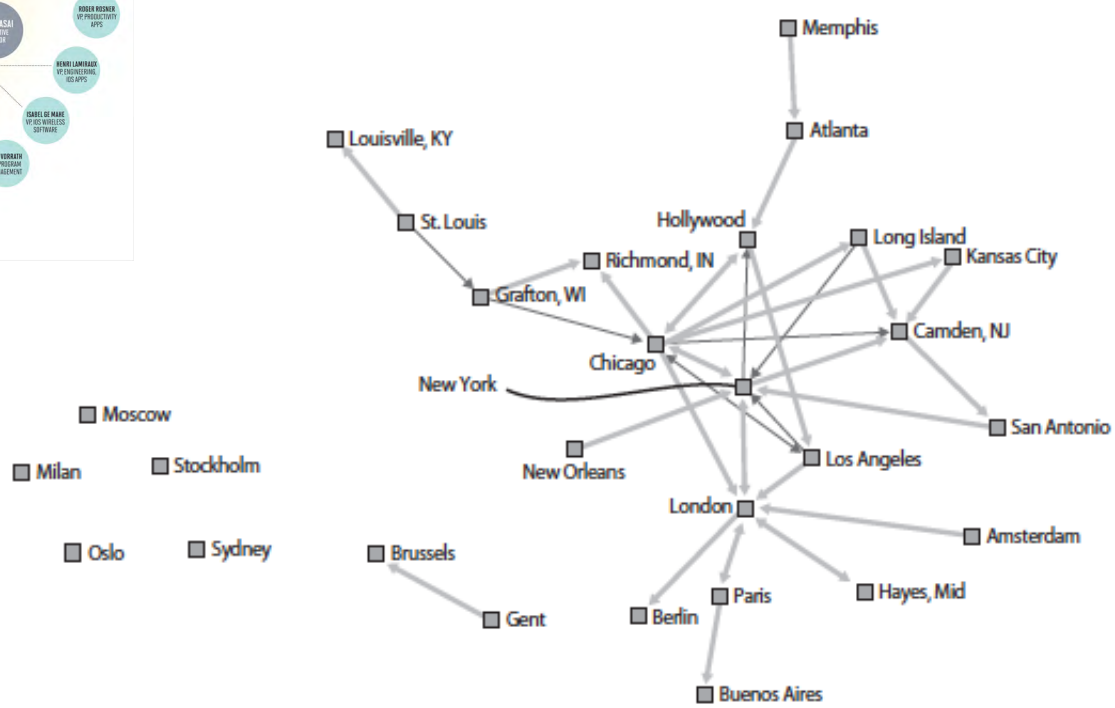


FIGURE 1.1. The network of cities connected by musician mobility (1930–32). Cities that are not listed here did not produce jazz from 1930 to 1932.

Also, it can be unproductive to close holes: see Kellogg, "Brokerage professions & implementing reform in an age of experts," 2014 *ASR*.

Don't Be Greedy:

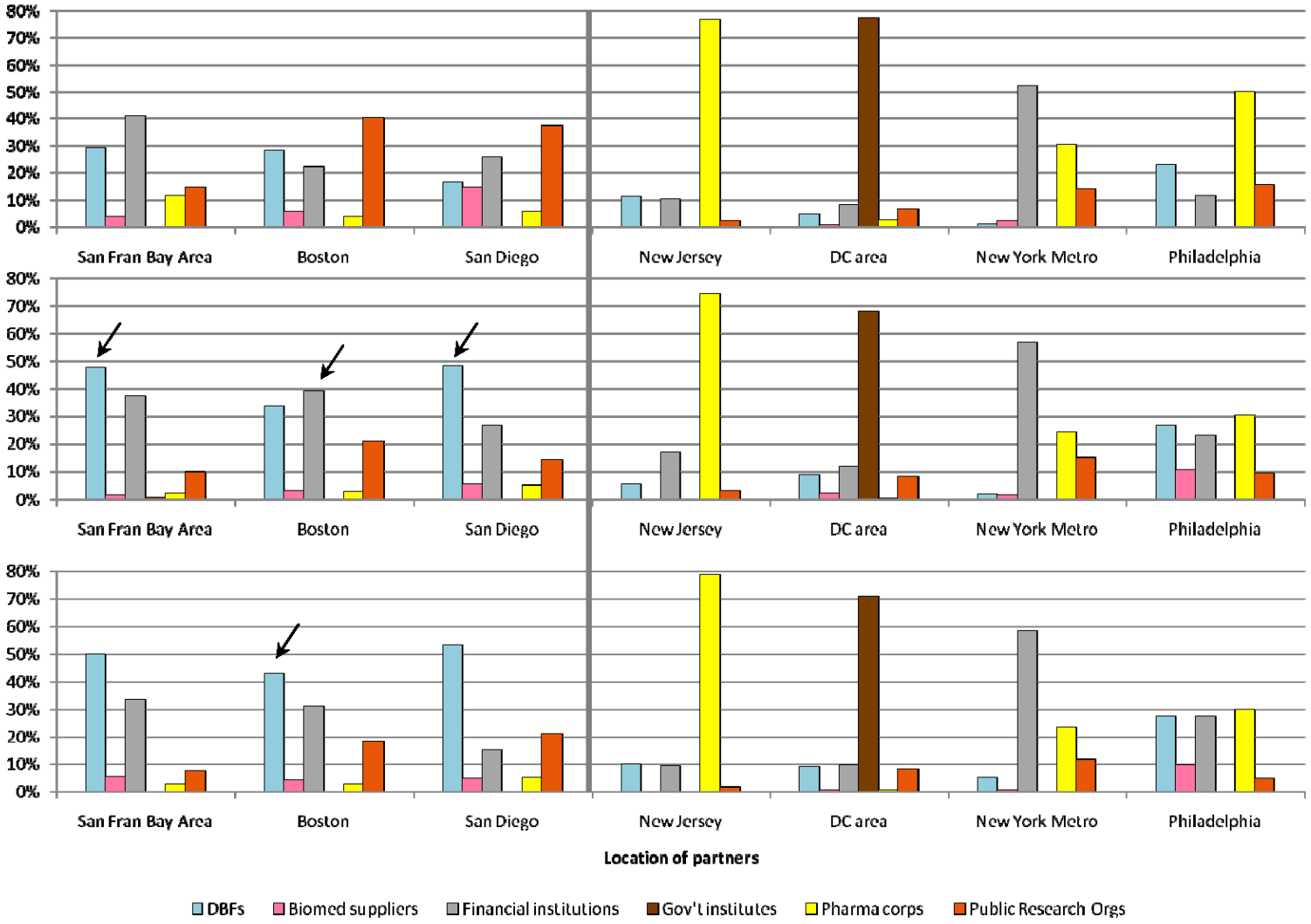
Collateral brokerage is brokers facilitating the brokerage of others

Bars measure the extent to which a kind of organization is central in the local network of biotech alliances. Where a biotech cluster emerges (three cities to the left; based on patent activity and 50% of firms) you see collateral brokerage: central broker organizations foster the new brokers. Initial brokers facilitate project diversity and exchange across projects, which results in spin-off broker organizations.

Where a cluster does not emerge (four cities to the right) you see the initially central organizations maintain their dominant position in the network. Nothing new develops.

Genentech | Harvard, MIT | Hybritech, UCSD, Eli Lilly | pharmas | NIH | finance and pharmas | pharmas

Figure 10: Anchor tenants vs. 800 lb. gorillas: % of ties by organizational form (1990, 1996, 2002)



DBF = Dedicated Biotech Firm. Figure is from Woody Powell, "Organizational and institutional genesis and change: the emergence and transformation of the commercial life sciences," presented at Nobel Symposium, "Foundations of Organizations," Stockholm, August 2008 (more detailed version published as Powell, Packalen, Whittington, "Organizational and institutional genesis," Pp. 435-465 in *The Emergence of Organizations and Markets*, edited by Padgett and Powell, Princeton University Press, 2012).

In Sum, Returns to Brokerage Are Contingent in Known and Likely Ways on Situation and Behavior

The Substance of Brokerage: Framing & Frame Shifts

Information arbitrage is about framing as much as content. Would the situation look different viewed from another perspective? Is failure on the original goal success on another?

How the Network Brokerage Effect Works

Social Standing: To the extent that a broker is proposing something new, there is no guarantee that what has been successful elsewhere will work in our market, for our company, staffed by our people. There is risk to accepting the proposal. Chains of command broken in service of company interests can just as easily be broken in service of personal interests, or in service of well-intentioned but strategy-eroding interests. Social standing in the form of job rank, network status, or reputation is the way would-be brokers overcome the suspicions with which brokers can be viewed (with reputation legitimating the largest number of people).

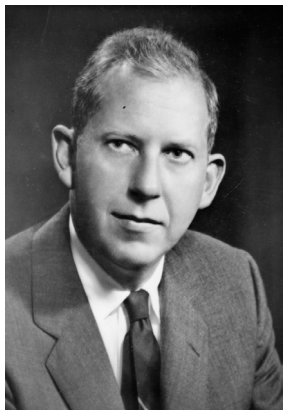
Personal Engagement: Network advantage is learned from personal engagement with structural holes, from skills developed when communicating information across diverse social groups, tribes, organization silos. The network effect is instaneous, of magnitude depending on value and momentum built up from experience. Interrupted momentum (IM) effects are distinct from interrupted-disrupted momentum (IDM) effects.

Hints and Cautions

- Don't hide behind personality. Personality can affect performance, but brokerage links with achievement independent of personality.
- Don't hide behind culture. Brokerage links with achievement for U.S., E.U., and China sample managers.
- Watch out for triggering rivalry with network brokers working your constituency. Rivalry almost always develops.
- Active structural holes are reinforced by surrounding social structure so brokerage can be difficult regardless of value (e.g., time zones). Timing and legitimacy can be key. Show value in the first bridge.
- Returns can be low because target structural holes are nested such that brokering across one requires brokering across many others. Look for modular elements where brokerage is practical, as in the Mozilla example.
- Don't try to connect everything. The cost is prohibitive and holes provide variation needed for innovation. Beware of eliminating future innovation and growth by imposing dense networks across current structural holes.
- Don't be greedy. Collateral brokerage grows the surrounding economy. Allowing others to be brokers expands group returns, and thus your share of the expanded returns, as in the biotech example.

Appendix
Materials

Appendix I: Competitive Advantage in Social Networks and Stigler's "Economics of Information," *JPE* 1961*



George Stigler, 1960

"The expected saving from given search will be greater, the greater the dispersion of prices." When price varies greatly between sellers, it is worth a buyer's time to search for the lowest price. It makes no sense to search for the lowest price of a commodity good; all prices are similar.

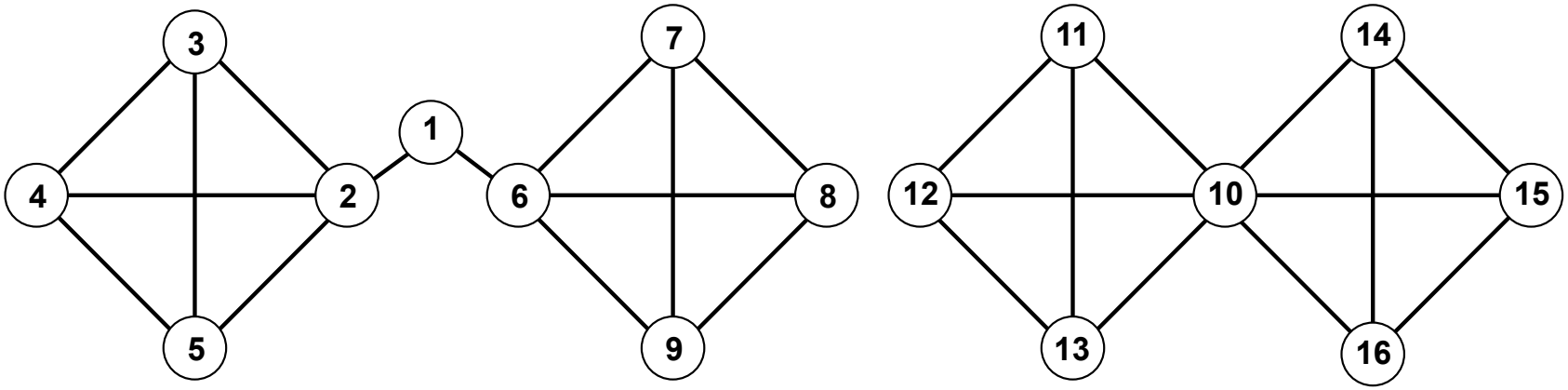
The potential value of search is an incentive for entrepreneurs to aggregate price information by enforcing localized transactions, as in medieval markets, or by becoming "specialized traders whose chief service, indeed, is implicitly to provide a meeting place for potential buyers and sellers."

In short, the value of search is proportional to information variation, and search is more productive for people more exposed to the variation.

As referenced in Stigler's 1982 Nobel acceptance speech: "The proposal to study the economics of information was promptly and widely accepted, and without even a respectable minimum of controversy." "All I had done was to open a door to a room that contained many fascinating and important problems."

*Discussed in Burt and Soda, "The social origins of great strategies" (*Strategy Science*, 2017). Photo is from University of Chicago Photographic Archive [apf1-07960], Special Collections Research Center, University of Chicago Library.

Appendix II: Reinforced Structual Holes.



Kind of Network	Network Size (Contacts)	Effective Size (NonRedundant Contacts)	Network Constraint	Ego-Network Betweenness (Structural Holes)	Reinforced Holes (RSH)		Ego-Network Modularity (Newman Q)
					Raw	Normalized	
Closed (3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 16)	3	1.0	92.6	.00	.00	0%	.00
Broker (1)	2	2.0	50.0	1.00	.75	75%	.00
Broker (2, 6)	4	2.5	58.3	3.00	1.75	29%	.00
Fold Broker (10)	6	4.0	46.3	9.00	6.00	40%	.50

This is Figure 3 in Burt, "Reinforced structural holes" (2015, *Social Networks*), based on the above networks in Figure 1 of Vedres and Stark, "Structural folds: generative disruption in overlapping groups" (2010, *American Journal of Sociology*). Correlations to the right are across the 801 bankers and managers analyzed in the 2015 article.

Log Constraint	1.00		
Effective Size	-.90	1.00	
EN Betweenness	-.71	.88	1.00
RSH	-.71	.93	.91

Appendix III: Research Design for Spillover versus Contagion

Predict performance from direct and indirect network constraint, subject to controls for human capital and organizational factors.

This isn't a contagion study in which all covariation between outcome response is measured subject to controls.

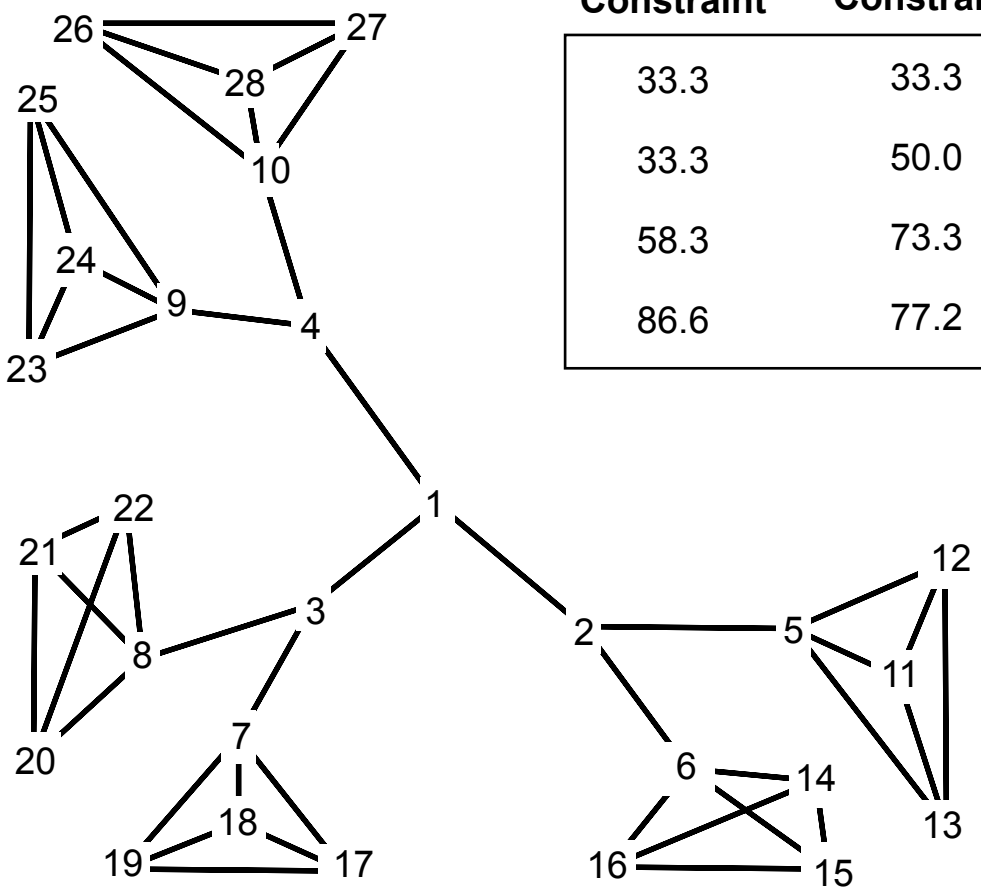
Only brokerage spillover is measured. It is possible for a strong contagion process to leave no evidence of brokerage spillover.

I propose to add indirect network constraint (measuring a manager's indirect access to structural holes in the networks around his contacts) to the usual regression model in which manager performance is predicted from direct network constraint (measuring manager access to structural holes in his own network) and controls for manager differences on other performance factors, such as job rank, seniority, and so on:

$$P = b_1 \ln(C) + b_2 \ln(IC) + BX + R,$$

where P is a measure of manager performance, R is a residual score of unpredicted performance, C is network constraint on the manager from direct contacts (first column of the table on next page), and IC is the indirect network constraint on the manager from connections among indirect contacts (second column in the table on the next page).

If this were a contagion analysis, I would predict — with controls for individual differences in experience and kind of work — manager i's performance from the performance of her contacts ($\Sigma_j \delta_{ij} P_j$ where δ_{ij} measures the extent to which person j is a close colleague for manager i; see equation G1 in Appendix G). The model is general in that it includes all factors responsible for performance similarity between manager and contacts. Specific factors are not distinguished. Their aggregate effect is the correlation between manager performance and contact performance (also discussed as a spatial, or network, autocorrelation, e.g., Ord, 1975; Doreian, 1981; Dow, Burton and White, 1982). The correlation describes the extent to which performance is homogeneous within the immediate network around a manager; able managers discussing work with other able managers, unable managers finding solace in one another's company.



Direct Network Constraint	Indirect Network Constraint	Network Betweenness	Role in Network
33.3	33.3	.69 = 243 / 351	Broker of Brokers (# 1)
33.3	50.0	.48 = 168 / 351	Broker (# 2, 3, 4)
58.3	73.3	.21 = 72 / 351	Group Leader (# 5 to 10)
86.6	77.2	.00 = 0 / 351	Group Member (# 11 to 28)

Figure 2.3 in *Neighbor Networks*. More detail on computing network constraint is given in Appendix II in the first handout.

Appendix IV: Network-Relevant Personality (P)

Given N_k, an index measuring ego's network advantage in role k, average ego's network scores across K roles to describe ego's average network advantage in the K roles:

$$\mathbf{P} = \sum_k N_k / K. \quad (1)$$

I will refer to **P** as ego's "network-relevant" personality. Role-specific network scores can be predicted from **P**:

$$N_k = b_n + b_{np}\mathbf{P} + b_{nx}X_k + U_k, \quad (2)$$

where X_k is one or more control variables for role k, b_n is an intercept term adjusting for means on the control variable(s), and U_k is the role-specific network index not predicted by ego's average across roles. The "how much does personality matter for network advantage" agency question can be answered by estimating Eq. (2) for a study population: To the extent that personal preferences determine the network advantage measured by N_k, each of ego's role-specific network scores will equal her average across roles, so ego's average score, her network-relevant personality **P**, will describe close to 100% of the variance in her role-specific scores. To see how much network-relevant personality matters for predicting achievement from network advantage, add **P** to the network prediction:

$$A_k = b_a + b_{ap}\mathbf{P} + b_{ax}X_k + b_{an}N_k + R_k, \quad (3)$$

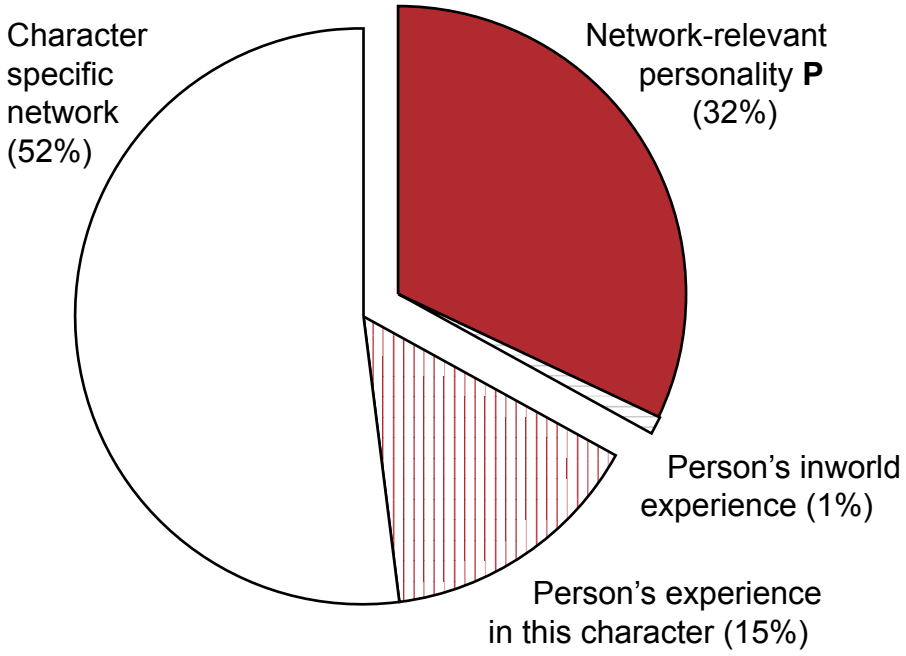
where A_k is a measure of ego's achievement in role k, b_a is an intercept term, **P** is ego's average network score across roles (Eq. 1), X_k is one or more control variables for the role, and R_k is a residual term. Coefficient b_{ap} measures the extent to which achievement in role k depends on network-relevant personality, and b_{an} measures the extent to which achievement depends on network advantage specific to the role.

From Burt,"Network-related personality and the agency question" (2012, *AJS*)

People build similarly open or closed networks in the roles they play.

(32% to 38% of network variance; 7,150 people playing 25,610 roles)

Number of NonRedundant Contacts



Network Constraint

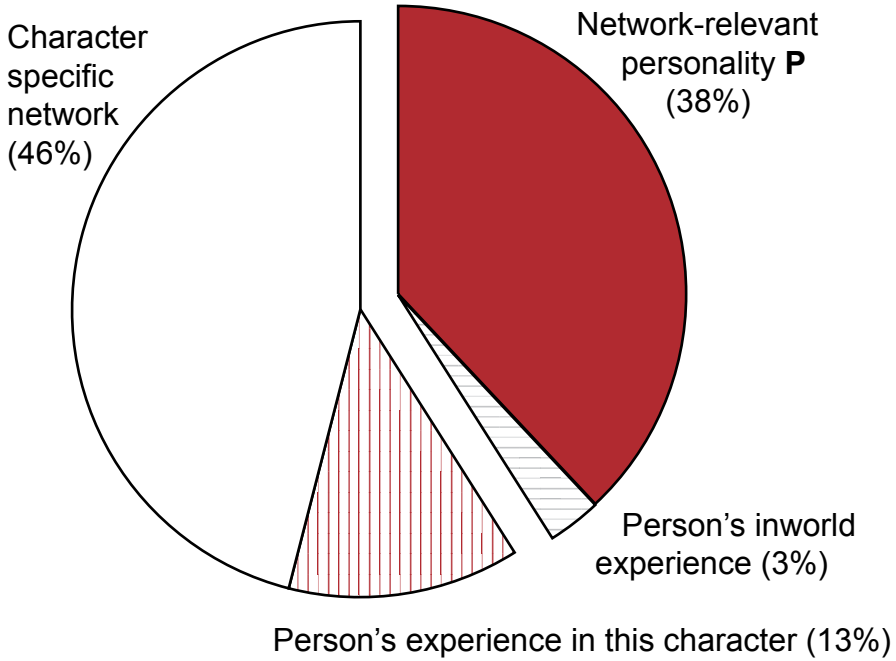
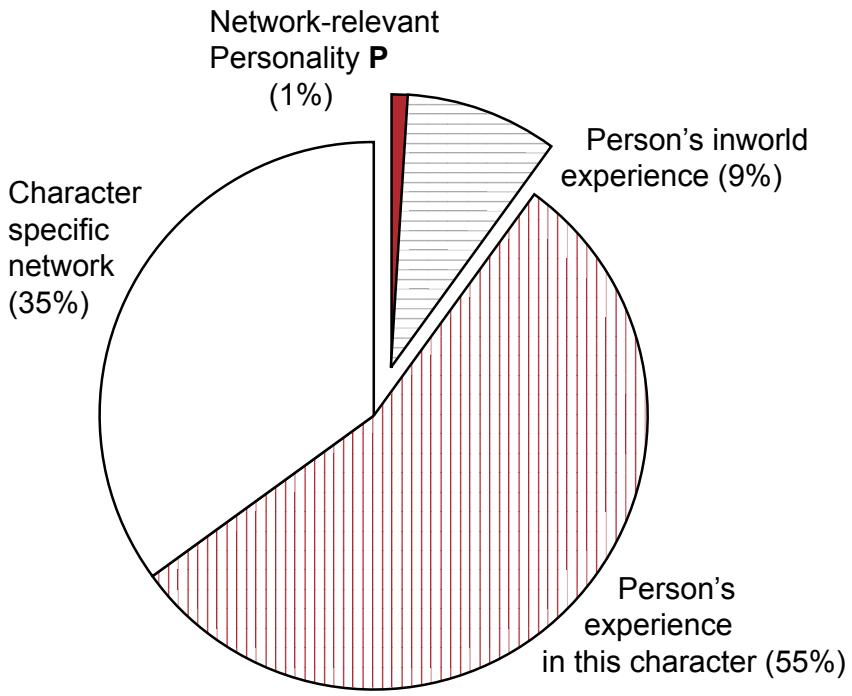


Figure 5 in Burt,"Network-related personality and the agency question" (2012, *AJS*)

But the network consistent across a person's roles makes almost no contribution to predicting achievement. Achievement depends on role-specific experience and the network you build in the role.

(88% to 90% of predicted achievement variance)

Number of NonRedundant Contacts



Network Constraint

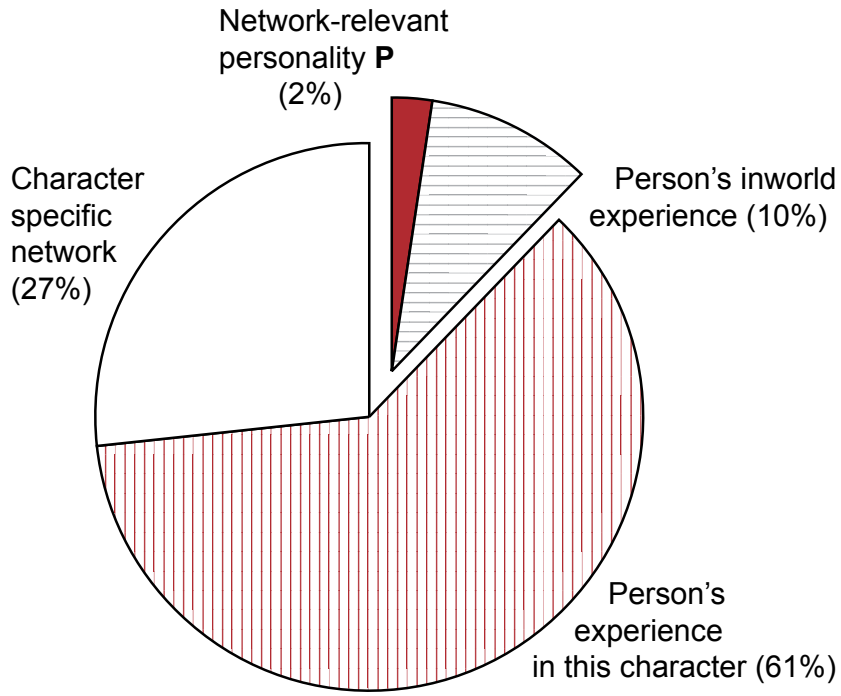


Figure 6 in Burt, "Network-related personality and the agency question" (2012, *AJS*)

Network-Relevant Personality, Conclusions

The multi-role research design used here has data requirements more demanding than the usual single-role design, so it is not suggested as a replacement for the usual single-role design. But where appropriate data are available, the multi-role design allows more general conclusions, like the two drawn from this analysis:

- There is clear evidence of people having a network-relevant personality. They tend to re-create the same network across the roles they play, which accounts for about a third of the variance in network advantage (Figure 5).

- But that variance has little to do with achievement. The dominant factors predicting achievement in a role are role-specific: a person's experience in the role and the network advantage the person built up in the role (Figure 6).

- The two conclusions are robust across substantively significant differences in the mix of roles combined in a multi-role network (too many roles, difficult combination of roles, roles played to overlapping audiences, or roles overlapping in time). (Table 6).

In sum, agency differences captured by network-relevant personality are more relevant to style than success. People do tend to build similar networks in the different roles they play, but their network consistency across roles has little to do with achievement. Network models of achievement can focus on role-specific experience and network advantage.

The fact remains that people vary widely in their benefit from access to structural holes. The analysis in this paper has not explained that fact, only ruled out individual differences in personality as the explanation.

From Burt,"Network-related personality and the agency question" (2012, *AJS*)

Answer key to Network Entrepreneur Personality Index — Add 1 for each of the following you circled: 1A, 2B, 3A, 4B, 5B, 6A, 7A, 8B, 9B, 10A. Use the graph on the Index page to determine your probability of being a network broker.