Brokerage in Practice:
Hints and Cautions

Appendices:

I. Strategic Leadership Exercise on Deploying Brokerage (pages 30-31)
II. Sources of Variation in 360 Evaluations (pages 32-33)
IV. Personality & Network Advantage (pages 36-40, from 2012, “Network-Related Personality and the Agency Question”)
V. Pulling Off the Blinders of Personal Experience (pages 41-42)

For text on this session, see Chapters 1 and 2 in Brokerage and Closure (including adjunct bits from Neighbor Networks).
Returns to network brokerage are a probability, not a certainty. Access to structural holes merely "increases the risk of productive accident," which allows for a great many trivial acts of brokerage.

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).

Bringing Behavior into the Analysis

Brokerage Opportunity
- **Structural Hole**
  (Granovetter 1973; Burt 1992)
- **Social Standing**
  (Burt 1997; Rider 2009)

Brokerage Behavior
- Framing and Frame Shifts
  (Psychology 101)
- **Personal Engagement**
  (Burt 2010; Goldberg et al. 2016)
- **Culture/Personality**
  (Xiao & Tsui 2007; Burt 2019;
  Mehra et al. 2001; Burt 2012)
- **Miscellaneous**
  (e.g., active holes, embedded holes,
  collateral brokerage, network activation)
- **Tertius Gaudens as Iungens vs Separans**
  (Obstfeld 2005; Kellogg 2014)
- **Consume vs Produce Emotional Energy**
  (Collins 1981; Furnari & Rolbina 2018)

Brokerage Result
- **Positive**
  (creativity, innovation,
  work evaluation, compensation,
  leadership)
- **Negative**
  (beyond shared benefits of broker achievement,
  are disrupted processes,
  neglected projects,
  broker anomie & crime,
  colleagues bruised by broker bad behavior)

Figure 4 in Burt, “Structural holes capstone, cautions, and enthusiasms” (2019)
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 Bank’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.*

COVER STORY

Pfizer

Sildenafil, 1991

First tested on humans in 1991, Sildenafil didn't prove effective for its initial indication: angina, or chest pain. After patients reported erections as a side effect, Pfizer began testing the compound for erectile dysfunction. In 1998, Viagra became the first drug to treat the condition, and the blockbuster has been a household name ever since.

Read the story
Reader comments
More Slide Shows

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.

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.

*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.
Network brokerage is a process by which people 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.

Competition in theory eliminates variation, but social clustering in networks usually indicates variation in understanding and practice. For example, BP learning in the refining businesses.

Strong belief/culture/process/paradigm reinforce closed networks, and can obscure or blind people to variation between subgroups within the network. 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 Coca Cola brand
- "Hard" sciences & the negative correlation between age and contribution
  look for use of right-wrong versus productive-unproductive or interesting-uninteresting

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. Getting out of our routines can be accomplished with deliberate action, but sometimes requires exogenous shock (Appendix V).
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 renowned 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.
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).
Strategic Leadership

Brokerage in Practice: Hints and Cautions (page 9)

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

Jon Martin
Senior Planner

British Steel Strategy Discussion Meeting

Video Footage of Closed-Network Framing Failure

*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).
PERSONAL ENGAGEMENT: Network Advantage Is Contingent on Personal Engagement.

Statement: A way to obtain brokerage benefits quickly is to build connections with people who are already brokers.

True or False? Why?

Which manager, John or Jim, would you assign to provide local leadership in the transformation.

C versus $IC = \sum_j C_j/N$
The ostensible advantage is spurious, here illustrated predicting banker compensation from direct constraint (banker's own network) vs indirect (from neighbor networks).

<table>
<thead>
<tr>
<th></th>
<th>Total Annual Compensation</th>
<th>Bonus Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.63</td>
<td>-1.92</td>
</tr>
<tr>
<td>Direct Network Constraint</td>
<td>-.38 (.09)**</td>
<td>_____</td>
</tr>
<tr>
<td>Indirect Network Constraint</td>
<td>_____</td>
<td>-.39 (.11)**</td>
</tr>
<tr>
<td>Senior Job Rank</td>
<td>.73 (.08)**</td>
<td>.79 (.09)**</td>
</tr>
<tr>
<td>Peer Evaluation</td>
<td>.51 (.09)**</td>
<td>.58 (.10)**</td>
</tr>
<tr>
<td>Years with Firm</td>
<td>.02 (.01)</td>
<td>.03 (.01)*</td>
</tr>
<tr>
<td>Minority</td>
<td>-.05 (.19)</td>
<td>-.14 (.19)</td>
</tr>
<tr>
<td>US Headquarters</td>
<td>.28 (.11)*</td>
<td>.23 (.11)*</td>
</tr>
</tbody>
</table>

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 ≤ .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.

\[
P = b_2 \ln(\text{IC}) + b_3 X + R
\]

\[
P = b_1 \ln(\text{C}) + b_2 \ln(\text{IC}) + b_3 X + R
\]

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

<table>
<thead>
<tr>
<th>Study Population</th>
<th>Direct Contacts</th>
<th>Indirect Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia-Pacific product launch</td>
<td>2.70</td>
<td>1.00</td>
</tr>
<tr>
<td>Supply-chain managers</td>
<td>4.17</td>
<td>0.92</td>
</tr>
<tr>
<td>HR employees</td>
<td>4.35</td>
<td>0.21</td>
</tr>
<tr>
<td>Investment bankers</td>
<td>3.43</td>
<td>1.50</td>
</tr>
<tr>
<td>Investment analysts</td>
<td>3.18</td>
<td>0.24</td>
</tr>
</tbody>
</table>

*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.
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*.
These results are from a Chicago executive education program in which managers were followed for four years after graduation.

Field Experiment: Network Advantage Can Be Learned

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

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

Network brokerage involves moving sticky information from a source to a destination. As a T-shaped manager, you are anchored in a group (home base) and connected into other groups (satellites), which defines four kinds of brokerage moves:

A - This is sharing information with colleagues who should already have the information. Advantage is low, but you get nice-guy points for helping to lower inefficiency.

B - This is what most of us do for a living: share information from our area of expertise with people in a target (client) group. Do you, or your homebase institution, have sufficient social standing to be a credible source of information in the target group? Social standing in the target group is often higher than in the home base.

C - This is reporting back from the field: deliver information to homebase colleagues that we learned from time spent with an outside group (e.g., I learned from my time working with the client that they . . .). Think behavioral economics. The question: Do you, or the satellite source, have sufficient social standing in your homebase to be a credible source of information?

D - In contrast to B, which would be apt description of a lawyer or doctor providing expert knowledge to a client, D involves learning from one outside group and moving what you learned to another outside group. Think management consulting.

Within each cell of the table, a network broker can move information in three ways to his or her benefit (making the broker the "tertius gaudens," the third who benefits) — each requires a kind of social standing sufficient to play the intended broker role:

Eliminate hole (tertius iungens): introduce source to destination (marriage broker, favor to a friend, Obsfeld, 2005 ASQ).

Arbitrage the hole (tertius separans): translate source information into destination information without either having to see the other (this is the usual move because target groups don’t want to bother translating for themselves; e.g., Kellogg, "Brokerage profession and implementing reform in an age of experts" 2014 American Sociological Review).

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)

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

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.
CULTURE: Don’t count on it. Don’t hide behind it. Cultural diversity typically does not eliminate the three 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.”
Business Success in US, EU, Asia Decreases as the Network Around a Person Closes

Define Z-Score

Raw Performance Indicator
(compensation, evaluation, promotion rate)

Manager Background
(e.g., job rank, age, geography, kind of work, organization division, education, etc.)

Bob's performance is higher than expected
Jim's performance is lower than expected

O Managers in the U.S.
(n = 2085, 7 study pops, r = -.75)

□ Managers in Europe
(n = 1094, 3 study pops, r = -.73)

▲ Managers in Asia, mostly China
(n = 1342, 3 study pops, r = -.78)

NOTE — Plotted data are average scores within five-point intervals of network constraint within each study population (2018 survey added to Burt, Social Networks 2019: Figure 1; see footnote 2 there for data sources; cf. Figure 1.8 in Brokerage and Closure). Correlations are computed from the plotted data using log network constraint. Inset graph to the upper left contains hypothetical data illustrating computation of z-score relative performance.
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 page 35, then use the graph below to determine your personal disposition toward being a network broker.

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

from Figure 1.6 in Brokerage and Closure
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.

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.

\[
P(\text{entrepreneurial network}) = \frac{1}{1 + e^{-f}}; \quad f = -2.71 + 2.52S + (.59 - .59S)\text{INDEX}
\]

\[
\begin{align*}
\text{Clerical, Technical and Junior Managers} \\
\text{(.591 slope; network is NOT correlated with performance)} \\
\text{Middle and Senior Managers} \\
\text{(.004 slope; network is correlated with performance)}
\end{align*}
\]

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 (see Leavitt experiment in Appendix III 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.
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.

<table>
<thead>
<tr>
<th></th>
<th>PASSIVE</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Hole Is Maintained by:</td>
<td>NOTHING. No one is interested in preserving or eliminating the disconnect between the groups.</td>
<td>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).</td>
</tr>
<tr>
<td>Difficulty Building the Bridge</td>
<td>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.</td>
<td>HIGH. Bridge is opposed so partners might be required to legitimize the bridge, regardless of the bridge’s value (e.g., American in France).</td>
</tr>
<tr>
<td>Threat of Imitators</td>
<td>HIGH because bridge difficulty is low. Bundle the bridge with other benefits to be the high-value broker.</td>
<td>LOW because bridge difficulty is high. Broker monopoly can trigger abuse by brokers (e.g., Asian “compradors”).</td>
</tr>
</tbody>
</table>

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. Sanford 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).

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%

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.

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?

Personal Engagement is Essential to Broker Advantage
There is no advantage or disadvantage to affiliation with network brokers. Advantage comes from personal exposure to structural holes. Advantage does not result from access to the information of diverse contacts so much as from personal skills developed when translating information between diverse contacts. Brokers develop skills of analogy and metaphor for seeing and communicating across social clusters, “tribes” of people. Social capital is a forcing function for human capital.

Hints and Cautions
- Don’t hide behind personality. Personality can affect performance, but brokerage links with achievement independent of personality.
- 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.
- Active structural holes are reinforced so bridging can be difficult regardless of value. Bridging active holes is especially sensitive to timing and legitimacy: 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 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: Strategic Leadership Exercise on Deploying Brokerage

Describe a place in your business where you believe the business would benefit from more network brokerage.

(A) Diagram the situation to communicate to others the brokerage you have in mind.

(B) In brief, what benefits do you expect for the business?

(C) Given the benefits, why is the situation the way it is? (history, preserving forces)

(D) Discuss 2-3 difficulties to be overcome before you'll see the expected benefits. Be sure to consider external costs, how you would manage the brokers, and where you would locate them in the business.
Strategic Leadership Exercise, Process

10 minutes: Do items A, B, C individually in the main room.

5 minutes: Assemble as group.

20-25 minutes: In a brisk discussion, have each person in the group succinctly, quickly, describe their A-B-C.

5 minutes: Select an idea to be presented in the main room. The selection is up to you. Perhaps multiple people had similar ideas, or the idea situation is interesting because it so clearly requires network management, or the situation involves an interesting difficulty to be overcome before the idea would have value. Any idea is attractive that is likely to generate engaging and productive discussion back in the main room.

10 minutes: Select presenter(s) and outline the A-B-C presentation, covering primary difficulties to be overcome before you'll see the problem resolved. Be sure to consider external costs, how you would manage the brokers, and where you would locate them in the business.

5 minutes: Return to the main room.

In the remaining time available, teams will be called out to present their work for general discussion.
Appendix II: Sources of Variance in 360 Evaluations

Most of the variance in evaluations is about the way two people work together, not their averages as individuals.

The below pie charts describe the variance explained in regression models predicting ego's evaluation of alter from ego's average rating of colleagues [rater variance] and alter's average rating from colleagues [reputation variance].

**Banker Relationships**
(N = 12,640)

- **25.1% Rater Variance**
  (qualities of the person making the evaluation)

- **61.5% Dyad Variance**
  (qualities specific to the subject-respondent dyad)

- **13.4% Reputation Variance**
  (qualities of the person evaluated)

**Staff Officer Relationships**
(N = 2,304)

- **18.4% Rater Variance**
  (qualities of the person making the evaluation)

- **52.2% Dyad Variance**
  (qualities specific to the subject-respondent dyad)

- **29.4% Reputation Variance**
  (qualities of the person evaluated)
and Good versus Bad is the Primary Dimension to Evaluations

I focus on good versus bad as a reputational quality that assuages audience concerns about a would-be broker. The focus is in contrast to studying reputation in terms of specific behaviors for which a person is known. Statistically significant correlations are likely to occur with details of reputation for specific behaviors, but it will be difficult to generalize the correlations into construct-validity hypotheses about reputation because of the diversity that studying details allows and wide confidence intervals around current measures of reputation. My focus on good-bad is based on the knowledge that good versus bad is the primary dimension to human evaluation in general. There are other dimensions, but good-bad is the primary one. In the interest of replicable results, I focus on the primary dimension for the time being.

Initial evidence for the primacy of good-bad was given in Osgood, Tannenbaum, and Suci (1957, *The Measurement of Meaning*) based on factor analyses of semantic-differential data from diverse populations. They find three recurring dimensions to evaluations of words and phrases: a good-bad contrast (termed the primary "evaluation," 69% of common variance), a strong-weak contrast (termed "potency," 15% of common variance), and an active-passive contrast (termed "activity," 13% of common variance). Note here that dimensional analyses of network data show managers distinguishing relations primarily on a good-bad dimension of closeness and secondarily on a personal-impersonal dimension (e.g., Burt, 2010:287). Osgood et al. (1957:38) emphasize that the good-bad contrast, "plays a dominant role in meaningful judgments, here accounting for almost 70 per cent of the common (extracted) variance, and this impression will be confirmed in subsequent studies to be reported."
Appendix III. Research Design for Spillover versus Contagion

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 \( \sum_j \delta_{ij} P_j \) where \( \delta_{ij} \) 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.
Figure 2.3 in *Neighbor Networks*. More detail on computing network constraint is given in Appendix II in the first handout.

Answer key to page 20 — Add 1 for each of the following you circled: 1A, 2B, 3A, 4B, 5B, 6A, 7A, 8B, 9B, 10A

Use the graph on page 20 to determine your probability of being a network broker.

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

$$P = \frac{\sum_{k} N_k}{K}. \tag{1}$$

I will refer to $P$ as ego’s “network-relevant” personality. Role-specific network scores can be predicted from $P$:

$$N_k = b_n + b_{np}P + b_{nx}X_k + U_k, \tag{2}$$

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:

$$A_k = b_a + b_{ap}P + b_{ax}X_k + b_{an}N_k + R_k, \tag{3}$$

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)

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)

Figure 6 in Burt, "Network-related personality and the agency question" (2012, AJS)
And the conclusion is robust across consequential differences between people.

<table>
<thead>
<tr>
<th>Percent Variance in Network Around Character (Figure 5)</th>
<th>Percent Predicted Variance in Character Achievement (Figure 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NonRedundant Contacts (Model 7)</td>
</tr>
<tr>
<td>All Characters (n = 25,610)</td>
<td>32</td>
</tr>
<tr>
<td><strong>Role Strain, Too Little Focus</strong></td>
<td></td>
</tr>
<tr>
<td>Person’s primary characters (n = 15,117)</td>
<td>48</td>
</tr>
<tr>
<td>Person’s secondary characters (n = 10,493)</td>
<td>12</td>
</tr>
<tr>
<td><strong>Role Strain, Difficult Combinations</strong></td>
<td></td>
</tr>
<tr>
<td>Person’s characters all same gender (n = 15,947)</td>
<td>34</td>
</tr>
<tr>
<td>Gender mix also played by others (n = 6,851)</td>
<td>31</td>
</tr>
<tr>
<td>Rare gender mix (n = 2,812)</td>
<td>25</td>
</tr>
<tr>
<td><strong>Role Strain, Overlapping Constituents</strong></td>
<td></td>
</tr>
<tr>
<td>High percent multi-character contacts (n = 10,783)</td>
<td>34</td>
</tr>
<tr>
<td>Low percent multi-character contacts (n = 14,827)</td>
<td>28</td>
</tr>
</tbody>
</table>

Note — Rows distinguish subsets of characters more or less likely to display network-relevant personality. Network-relevant personality is computed as an average across characters in the same row. The column regression model is estimated for characters in each row as described for Tables 4 and 5, from which percentage contributions to variance are computed as described for Figures 5 and 6.

Table 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)
Appendix V. Pulling Off the Blinders of Personal Experience

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?


1. It isn’t good enough.
2. It’s only an experiment.
3. Surprises should be question marks.
4. All dissents and warnings have some validity.
5. Collaborators who disagree are both right.
6. What does a stranger think strange?
7. All causal arrows have two heads.
8. The converse of every proposition is equally valid.

Sometimes structural holes occur exogenously, as in a merger, or immigration, 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.)