Pre-print of a chapter in a 2009 Edward Elgar book,
Social Capital: Reaching Out, Reaching In, edited by Viva Ona Bartkus and James H. Davis.

NETWORK DUALITY OF SOCIAL CAPITAL

May, 2008 © RONALD S. BURT
University of Chicago Graduate School of Business, Chicago, IL 60637
Tel: 773-702-0848, Fax: 773-702-9919, ron.burt@ChicagoGSB.edu

Author Blurb: Ronald S. Burt is the Hobart W. Williams Professor of Sociology and Strategy at the University of Chicago Graduate School of Business. His work concerns the social structure of competitive advantage (e.g., Brokerage and Closure, 2005, Oxford University Press).

Acknowledgement — I am grateful to the University of Chicago Graduate School of Business for financial support of work on this chapter. Portions of this manuscript were presented at the 2006 Academy of Management meetings and the "Interdisciplinary Conference on Social Capital" organized by Viva Bartkus at the Mendoza College of Business at the University of Notre Dame. Second-year network data on the virtual organization described here were gathered by a colleague who preferred to remain anonymous. I appreciate him sharing the data with which I compare the organization before and after the network intervention. The text was improved in response to comments by Viva Bartkus, Philip Evans, Don Ronchi, and Toby Stuart.

This chapter is about balance between brokerage and closure, the two primary mechanisms by which social networks constitute social capital. Brokerage involves building connections across groups to increase exposure to diverse opinion and practice. Brokerage is associated with growth and innovation. Closure involves strengthening connections within a group to focus the group on a limited set of opinions and practice. Closure is associated with trust and alignment, ultimately enhancing efficiency.

The balance between brokerage and closure is usually analyzed in terms of where to invoke the mechanisms: maximum advantage occurs when a closed network secures alignment within a team and team members have brokerage networks beyond the team (see Burt, 2005:126-166, for review and illustrative evidence).

The balance has also been discussed, though never to my knowledge with benefit of network data, in terms of when to invoke the mechanisms: brokerage and closure are in perpetual cycle as a network duality, mending and undoing one another; brokerage followed by closure, followed by brokerage, and so on. It is misadventure to break the cycle. Business examples abound. General Electric CEO Jack Welsh emphasized "integrated diversity" in the 1980s — a unity believed to work only "when the elements of that diversity, the thirteen business, were strong in their own right." (Slater, 1999:97). Rhone-Poulenc CEO Jean-René Fourtou emphasized the importance of preserving "le vide" (literally, vacuum or empty space, or in network terms, structural holes): "Le vide has a huge function in organizations." "Shock comes when different things meet. It's the interface that's interesting." Stewart (1996:165). Gernot Grabher (1993) concluded that economic development in the German Ruhr was hurt by rigid specialization enforced in dense interorganizational networks, the

same networks that enhanced the region's prior growth. AnnaLee Saxenian (1994) concluded that the San Francisco technology community in Silicon Valley had a competitive advantage over Boston's Route 128 because flexible specialization endured in Silicon Valley. Clayton Christensen (1997) drew attention to the frequent corporate failures that result when an industry leader is too focused on improving what made the company great rather than anticipating what will make the next industry leader great. John Hagel and John Seely Brown (2005) caution against pushing efficiency so far as to eliminate the "productive friction" that creates value. These are a sampling of many such discussions.

My purpose in this chapter is to make more explicit the network mechanisms underlying such discussions. I begin with a quick statement of the two network mechanisms responsible for social capital, offering illustrative evidence, then describe the mechanisms as they came together in a specific management initiative that illustrates a common network-duality failure mode, here discussed as "premature consensus." The moral is that bridging our differences today creates a risk of decimating future growth. Being aware of the risk is a first-line defense encouraging balance between brokerage and closure. More generally, the risk is less with more flexible embedding networks such as competing coalitions or safe-harbor common areas.

STRUCTURAL HOLES

Figure 1 is a sociogram of the network around a manager. Dots represent people. Lines represent relationships. The manager has eight direct contacts. Those eight contacts define the manager's immediate network. Of course, the network does not "belong" to the manager. It is co-owned with contacts. A more accurate label for Figure 1 would be "the interface between manager and social structure," but the label is clumsy. The structure of relations among the contacts defines the immediate network around the manager, which is typically what is meant when people talk about a person's network. Beyond the immediate network in Figure 1 are a host of indirect contacts, friends of friends at various distances. Hollow dots represent people with

whom the manager has indirect contact through her eight direct contacts. Dashed lines represent connections with and among the indirect contacts.

——— Figure 1 About Here ———

Inherent in the network is a level of social capital, a competitive advantage the manager enjoys as a result of the network. Two facts from empirical research are the foundation for network models of social capital: (1) People cluster into groups and tribes defined by the organizations with which they affiliate, the projects in which they are involved, the offices where they work, the places they meet and shared interests they discover. (2) Communication is more frequent within groups than it is between groups such that people in the same group come to have similar views of the history that led to today, similar views of proper opinion and practice, and similar views of how to go forward into the future. People tire of repeating arguments and stories explaining why they believe and behave the way they do. They make up short-hand phrases to reference whole paragraphs of text with which colleagues are familiar. Jargon flourishes. Not only jargon, but a system of phrasing, opinions, symbols and behaviors defining what it means to be a member of the group. What was once explicit knowledge interpretable by anyone becomes tacit knowledge meaningful only to insiders. With time, new combinations and nuances emerge. The tacit knowledge becomes more complex, making it more difficult to move to other groups. Much of what we know is not readily understood beyond the colleagues around us.

Explicit knowledge converted into local, tacit knowledge makes information sticky such that holes tear open in the flow of information between groups. Holes in the social structure of communication, or more simply “structural holes,” are missing relationships that inhibit information flow. A hole “is a buffer, like an insulator in an electric circuit” (Burt, 1992:18).

Structural holes are a source of efficiency at the same time that they are a source of growth. As a source of efficiency, structural holes are boundary markers in the division of labor. By not having to attend to the interpretations of people beyond the boundary around my specialty, I can focus on deepening my knowledge of what I already know pretty well. Without structural holes, we would be overwhelmed with the diversity of knowledge out there — and I expect that we would quickly establish

structural holes to re-establish a sense of control over our lives. Structural holes are simultaneously a source of growth from the hardy souls among us who reach out to broker connections across the holes to create new combinations of existing opinion and practice.

BROKERAGE AND GROWTH

As a network form of social capital, brokerage is about the advantage of exposure to variation in opinion and practice provided by building connections across structural holes, an advantage associated with performance in the form of innovation and growth (see Burt, 2005: Chaps. 1-2, for review). Brokerage is measured in terms of the opportunities a network provides to coordinate across structural holes. Where everyone knows everyone else, there are no structural holes to broker. The more disconnected the manager's contacts, the more likely her network spans structural holes in the surrounding organization and market. In the earlier example in Figure 1, the five contacts to the east have no connections with one another and their contacts do not connect. Therefore, the eastern part of the network is rich in structural holes.

People who connect across structural holes — call them network brokers, connectors, or entrepreneurs — have a vision advantage in detecting and developing lucrative opportunities. People who have no contact with one another often employ different problem-solving and practices in their work. Because network brokers are more exposed to the diversity of these diverse opinions and practices, brokers have a vision advantage in selecting alternative ways to go, synthesizing new ways to go, and detecting likely supporters/opponents to implementing a proposed way to go. Thus, people with strong relations to otherwise disconnected groups have a competitive advantage in detecting and developing rewarding opportunities.

Figure 2 contains illustrative evidence. People are sorted across the horizontal axes of the graphs by network constraint, a concentration measure of the extent to which a person's network time and energy is consumed by a single group (e.g., Burt, 1992: Chap. 2). Ideographs at the extremes of the horizontal axes illustrate network structures defining high and low constraint. To the right, everyone you know knows

one another. Your network is like a straight jacket locking you into one way of thinking. To the left, you are freed from the constraint of any one person or group by having connections with multiple groups, as indicated by the structural holes between your contacts. Network constraint approaches its minimum value of zero.

——— Figure 2 About Here ———

Figure 2A shows the association between brokerage and performance. The data come from eight study populations — salesmen, the supply-chain managers in Figure 2B, investment bankers, human resource officers, engineers, operations people, organizations in America as well as organizations in France and Singapore (Burt, 2005: 34-46). The vertical axis is a residual z-score measure of performance relative to peers. A performance indicator is regressed over background factors such as job rank, kind of work, geographic location, experience, etc., where performance includes compensation, annual evaluations, and promotions. Some people do better than expected. Some do worse. That residual performance relative to how people "like you" perform is the vertical axis in Figure 2A. A score of zero indicates a level of performance typical for someone with your background. For the investment bankers, for example, it is the bonus compensation typical for someone with your job rank and your years in the company. For engineers in one of the study populations, it is the age at which people like you were promoted to your current job rank where "like you" means the same job rank, education, gender, race, functional area, region of the country, and so on. A score of one on the vertical axis in Figure 2A indicates someone one standard deviation ahead of peers. The graph shows a strong, negative correlation — more network constraint, weaker performance. People who have networks that span structural holes (to the left in the graph) perform above their peers. People with connected contacts (to the right in the graph) perform below their peers.

The advantage manifest as brokers enjoying higher compensation, more positive evaluations, and more likely promotion, can be traced to a vision advantage illustrated in Figure 2B. The graph shows an association between brokerage and good ideas. Supply-chain managers in a large American electronics firm were asked to describe their best idea for improving the value of the supply chain organization to the company. Their descriptions were judged by two senior vice presidents in the supply

chain, from which I computed standardized scores measuring idea "value" for the vertical axis of Figure 2B (Burt, 2004, 2005: 91-92). The strong, negative correlation in Figure 2B shows more positive evaluations of the ideas proposed by managers connected to otherwise disconnected groups in the organization.

The two graphs in Figure 2 show a statistically significant association between brokerage and performance. The association is also substantively significant. Pie charts in Figure 2C show how performance associations with brokerage compare to associations with other predictors. The first pie shows that brokerage accounts for a little more than half of the explained variance in investment-banker compensation and analyst recognition in the All-America Research Team (Burt, 2007a). Job rank contributes a fifth of the variance. Demographic and geographic factors account for the remaining explained variance. The second pie chart shows a small network effect in bureaucratic organizations. Within two functional organizations — supply chain in an electronics company (Burt, 2004) and human resources in a financial organization — brokerage contributes a statistically significant, but substantively small, 10% of predictable compensation differences between managers. Demographic and geographic factors make about the same contribution (9%). What really matters is job rank. In a bureaucracy, compensation is a function of job rank. The key to high compensation is high job rank. Compensation differences between the supply-chain and HR managers are largely determined by job rank (81%). But getting to a senior job rank is largely a function of network brokerage. The third pie chart in Figure 2C shows that brokerage contributes two-thirds of the explained variance in early promotion to senior job rank in a large electronics company (Burt, 1992). Thus, compensation remains a result of brokerage, but the effect is indirect through job rank in a bureaucratic organization — network brokers are more likely to get promoted to senior rank early, where they enjoy higher compensation.

Figure 2 illustrates an empirical result that has become familiar over the last two decades: people whose networks span structural holes are at higher risk of detecting and developing good ideas, because of which they enjoy higher compensation than peers, more-positive evaluations, and faster promotions.

CLOSURE AND STABILITY

Closure is about the benefit of protection from diverse opinion and practice, protection provided by building connections that do not span structural holes. This is a form of social capital associated with efficiency gains in performance (see Burt, 2005: Chaps. 3-4, for review). Closure is measured by the extent to which everyone in a network is connected to everyone else, through a central person in the network, or through direct connections between people in the network. Back in Figure 1, the manager and her three contacts to the west are densely connected, in part directly and in part through several friends of friends. The closed network is detrimental with respect to the vision advantage of brokerage, but can be an advantage with respect to coordinating work. Each bridge relation that coordinates across a structural hole increases closure, so it is useful to know how the emergent, more-closed network is tied to value.

Reputation is the mechanism by which closure has its effect. As connections close the network around a manager, people are more informed about one another and calibrate with respect to one another. Reputations emerge to distinguish the peripheral from the best among us. Some people are eminent, respected members of a network; others are peripheral, barely considered legitimate members. To preserve reputation among colleagues well-informed about one another's behavior, people are careful to behave well (which lowers the risk of trusting colleagues within the network) and people work to keep up with colleagues (which lowers cost within the network by increasing the quality and quantity of work and decreasing the need for a supervisor to monitor individual behavior).

For reputation to have its salutary effects, there has to be credible threat that a person's reputation will persist to affect future relationships. From a woman's work in one project group, word gets around defining her reputation, which precedes her into her next project group. If positive reputation quickly dissolves, reputation loses its attraction as an incentive to align with colleagues because yesterday's good behavior is too soon forgotten. If negative reputation quickly dissolves, reputation loses its coercive power because yesterday's poor behavior is too soon forgotten. "Too soon" is relative. It could be a day, a month, a year. Relative stability is the key. Reputation

has to persist longer than the productive relations it facilitates and the hurtful relations it protects against.

Stability cannot be taken for granted. Network closure varies from low to high, so closure-induced stability must vary. How does stability change with closure? How closed must a network be before there is a credible cost for losing reputation?

Figure 3 contains illustrative evidence on investment-banker reputations in a financial organization during the 1990s (Burt, 2005: Chap. 4). Banker reputation is measured here as it is measured in the organization: the average evaluation a banker receives from colleagues. Each year, people in the bonus pool are asked to name colleagues with whom they worked closely during the year, and describe how it was to work with each colleague (4 outstanding, 3 good, 2 average, 1 poor; these are my synonyms for the words actually used). A banker's average rating is then used to guide promotion and bonus decisions. Despite massive change in relationships from one year to the next, reputations persist. Three of four relationships cited this year are not cited next year, but a banker's reputation this year is correlated .6 with his or her reputation next year.

Intrigued by stable reputations in chaotic networks, I raised the issue over drinks with one of the organization's senior people. He looked puzzled, then patiently explained to me that "of course" employee reputations are stable. They are the company's market index of employee quality. A good employee this year is a good employee next year, regardless of the colleagues with whom the employee works. Reputations are expected to go up and down a little depending on personalities and business opportunities, but good employees continue to be good employees, and weak employees are weeded out.

In other words, the division head had a human-capital explanation for reputation stability. Able people receive good evaluations. Weak people receive poor evaluations. Reputation is correlated over time because human capital continues over time, certainly between adjacent years.

I had a social-capital explanation. Colleague evaluations are based on limited personal experience mixed with the experiences of colleagues with whom work is discussed. The more connected the colleagues making evaluations, the more likely

their evaluations are in part formed by stories they have shared about the object evaluated.

The human-capital and social-capital explanations can be tested against each other. If individual ability is the reason for reputation stability over time, then stability should be independent of connections between colleagues. An able employee should receive good evaluations whether the colleagues who made the evaluations work together (i.e., are more connected) or work in separate parts of the organization (i.e., are less connected). If reputation stability is defined by colleagues sharing stories about the employee, then stability should be higher when colleagues are more connected because they are more likely to have shared stories about the employee.

Evidence in Figure 3 supports the social-capital explanation: reputation stability increases dramatically with network closure.

Reputation stability is measured on the vertical axis by correlation between reputations in adjacent years within a subsample of the six bankers with less-closed networks and the six bankers with more-closed networks (Burt, 2005:209n). Bankers at the top of the vertical axis have reputations this year very similar to their reputations next year.

——— Figure 3 About Here ———

Closure is measured on the horizontal axis by the extent to which an employee is evaluated by connected colleagues. For each colleague citing an employee in a particular year, the number of mutual contacts is the number of people citing the employee that year and connected to the colleague by an evaluation. An employee's score on the horizontal axis in Figure 3 is the employee's average number of mutual contacts with evaluating colleagues. For this illustration, I rounded scores to the nearest of the eleven integer categories on the horizontal axis (see Burt, 2007:Table 2, for regression results with continuous measures and controls).

Lines in the graph show reputation stability increasing with closure. Where colleagues have no contact with one another, banker reputation this year has no correlation with reputation next year (.09 correlation). Do the same work with interconnected colleagues, and reputation this year is a good predictor of reputation next year (.73 correlation for 10 or more mutual colleagues). And the closure effect is

separate from work quality: the bold and thin solid lines in Figure 3 show that the stability of positive and negative reputations increases similarly with closure.

Consider two hypothetical bankers who work with ten colleagues this year. One works with colleagues segregated in the organization so they do not cite one another in the annual peer evaluations (illustrated by the sociogram at the bottom-left in Figure 3). That banker would be over the "0" on the horizontal axis in Figure 3. The second banker works with five colleagues who work together in one division and another five colleagues who work together in a second division (sociogram to the bottom-right in Figure 3). The second banker would be over the "4" on the horizontal axis.

Even when both bankers do good work, it is the second banker's work that will be remembered. The bold solid line in Figure 3 shows that a banker doing good work for colleagues not connected with each other can expect to be forgotten. The exact correlation expected between the banker's reputation this year and next year is given by the level of the bold solid line over the "0" on the horizontal axis. The correlation is indistinguishable from random noise. Bankers work with so many new contacts each year that their work is quickly forgotten -- unless the colleagues with whom they work talk to each other. For the second banker, the one who worked with two groups of connected colleagues, reputation has an expected correlation of .57 over time. What carries a banker's reputation into the future is gossiping colleagues.

An implication is that you do not own your reputation. Rather, the people who own your reputation are the people in whose conversations it is built, and the goal of those conversations is not accuracy so much as bonding between the speakers (Burt, 2005: Chap. 4). You are merely grist for the gossip-mill through which colleagues strengthen their relationships with each other. Coleman (1988:S107) had it right when he opined that: "Reputation cannot arise in an open structure."

——— Figure 4 About Here ———

Closure's stabilizing effect on reputation can be traced back to a stabilizing effect on the individual relationships in which reputation is defined. Closure creates an endogenous force for the status quo that secures and expands the boundary around a network, protecting new relations from decay until they are self-sustaining. Figure 4 shows how this works by mapping decay against age for colleague relations between

the bankers (see Burt, 2005:197-208, for details). Decay, on the vertical axis, is the probability that a relationship cited this year is not cited next year. Age, on the horizontal axis, is the years for which a relationship has been continuously observed. The lines show closure slowing decay. Bridge relations — that is, relations that span structural holes — almost all decay during their first year. Ninety-one percent of bridge relations decay during their initial 13 months. Bridge relations have to survive on their own merit. There are no mutual attachments to keep unproductive relations in place. In contrast, when you and I have mutual colleagues, we keep bumping into one another even if we would prefer otherwise. Figure 4 shows that relations formed within a closed network — that is, relations new this year between bankers who have many mutual colleagues — decay relatively slowly. The bold decay line in Figure 4 peaks at .47 probability of decay in relations that have lasted 22 months.

A VIRTUAL ORGANIZATION

I now wish to apply these ideas to a practical problem facing the leadership of a West Coast high-tech manufacturing organization at the turn of the century (hereafter, “the firm”). The firm was composed of four business divisions, each of which was doing well in its established product markets.

However, the product markets were changing rapidly. Internet considerations were intruding everywhere. Small companies seemed to be chipping away at the firm's markets with new products rapidly developed in response to emerging opportunities. Leadership was advised by an expensive external consultancy that the firm was missing lucrative opportunities that lay between the markets on which the four businesses were focused. For example, the consumer market was evolving to combine voice over data in electronic data transmission along with video signal. This evolution is apparent today in digital broadcasting within companies, the home, and to handheld devices. However, at the time, the technology had alternative ways it could develop and customer channels were only vaguely coming into focus. Some leaders in the firm believed the consultant-defined opportunities were less real than imagined. More, the four businesses were doing well with their established products. Earnings

would be less certain with less familiar products. Shifting a business division to go after the opportunity would be risky. Senior leadership faced the generic issue facing all organizations of size at the turn of the century: how to harvest the efficiencies and growth of coordination across the enterprise made possible by technological advances without giving up productivity within the existing businesses.

Rather than modify the firm's structure, the leadership team decided to form a virtual organization, a cavalry unit that cut across the existing four businesses. The goal of the virtual organization was to identify and develop market opportunities that lay between the existing businesses. Prospects could be a new customer looking for a product that the firm was already shipping, an emerging market for which the firm could develop a lucrative product quickly from what was already going on in the firm, or an emerging market where the firm would have an advantage in creating new products from combinations of its existing technologies. A senior person from each business was given the job of recruiting people to the virtual organization.

The sociogram at the top of Figure 5 describes the virtual organization as a network of discussion relations. These data were gathered about a year after the virtual organization had been launched. Each dot is a person. Dots with an X over them indicate the four people who were to recruit people to the virtual organization. The boundaries of the virtual organization were identified with snowball sampling. Each X-dot leader was asked to name the people on whom he or she most depended for collaboration in the virtual organization. The people named were asked who they most depended on, and so on. Shape and shade indicate business division. For example, grey squares indicate people drawn from business D. Product details are not needed for this illustration. I refer to the businesses as A, B, C, and D.

——— Figure 5 About Here ———

There was progress in the first year. Most obviously, groups of people emerged. Moreover, the X-dot leaders did not try to own the virtual organization. The four X-dots in Figure 5A are not central in the discussion around them. For example, using "number of discussion partners" as a centrality metric, the X-dot leader to the southeast of Figure 5A named two discussion partners. The two discussion partners are much more central, one has seven discussion partners and the other has eleven.

Similarly, the other X-dot leaders are connected to discussion partners more central than themselves.

Visible progress notwithstanding, the first year was unsatisfactory. The most obvious issue was that the virtual organization looked too much like the formal organization. The problem could have been driven by the way people were recruited; leaders had mobilized people in their own division and those people turned to colleagues they already knew well. There was little evidence of people making new contacts. Discussion partners at the top of Figure 5 had known one another for eight years on average, which was well before the launch of the virtual organization in the previous year. With respect to recruiting within one's own division, notice that the shape and shade of each X-dot leader always matches the shape and shade of his or her discussion partners. Note also the two structural holes in the virtual organization that correspond to boundaries between businesses in the formal organization. People from Business A (white circles) are concentrated in a cluster to the northwest of Figure 5A. Two people from the business are network brokers into the adjacent cluster. On the other side of the virtual organization, to the southeast in Figure 5A, there is a cluster of people drawn from Business D (grey squares). They are connected into the adjacent cluster by one network broker in Business C (white square).

The evidence of myopia — people focused on familiar colleagues within their own division — was troubling: Efficiencies and opportunities across business units were being missed. Stories had come back from the field about the groups stepping on one another's toes, and the toes of the established businesses, in presenting customers with multiple, contradictory images of the company. It was disconcerting to see people respond to the new initiative by turning to the same people they had turned to in the past. People did not seem to "get" the virtual-organization strategy.

As an intervention to facilitate the virtual organization, the network analysis in Figure 5A was used to identify key people to send to workshops on managing informal organizations. Always in the background was the fact well-known among managers that company leadership was unhappy with progress made in the first year.

After another year, the virtual organization looked very different, as you can see in Figure 5B. More people were involved in the virtual organization, but what is striking

is the coordination across businesses. People became more connected, and more connected with new acquaintances. Path distance is the shortest number of links required to connect two people in a network: discussion partners are one link distant, friends of friends are two links distant, and so on. After the first year in operation, people in the virtual organization were separated by four and a half links. At the end of the second year, people on average were separated by three and a half links. People were working more often with new contacts. In the first year, people cited discussion partners they had known a long time (8 years on average). At the end of the second year, that number is cut in half: discussion partners had known each other for four years on average. Cutting the average in half means that people made a lot of new contacts.

EVALUATION

Did the changes in Figure 5 strengthen the virtual organization? The short answer is yes; yes with respect to brokerage, closure, and senior opinion. With respect to brokerage, connections span the structural holes that previously balkanized the virtual organization, and people are connecting with new acquaintances. After two years in operation, a sense of growth and optimism developed as people worked on resolving differences in opinion and business practice across the company. With respect to closure, increased connections across the virtual organization created the sense that people more often recognize one another as participants in the virtual organization, a special group apart from usual businesses. Positive relations developed in the course of working through previous differences in opinion and practice. Reputations developed for the people active in the virtual organization. Maintaining reputation within the virtual organization became its own incentive to work harder to make the organization a success. Senior opinion was quite positive about the change displayed in Figure 5. Attention shifted to more pressing issues.

New People More than New Network

Further analysis — out of the limelight of C-suite politics — revealed a dark side to the change. As an external consultant to the project, I was initially struck by the level of turnover between the two years. I described the contrast between Figures 5A and 5B in terms of people connecting across the businesses. In fact, the network did not change so much as the people changed, and the new people established a new network. Of 88 people active in the first year of the virtual organization, 37 continued through the second year — less than half. The other 51 returned to their regular jobs in the businesses. That means 67 new people entered in the second year (104 total in Figure 5B minus 37 continuing). The turnover seemed high: 58% of last-year's people left, 64% of this year's people are new.

High turnover need not indicate instability. If the people most connected during the first year continue to be the people most connected through the second year, then the virtual organization would stay on course despite massive turnover among people marginally involved in the organization. However, turnover ran right to the center of the virtual organization. It is so high that leadership in the first year cannot predict leadership in the second year. Among the people with above-average numbers of discussion partners in either year, their number of discussion partners in the first year has no correlation with discussion partners in the second year ($r = .01$). Some of the people central in the first year are marginal in the second. Some of the new entrants are among the most central at the end of the second year.

This is not a quality issue. People active in the first year were no more or less able than the people active in the second year. I suspected when I first noticed the turnover that able people might be avoiding the political bother of the virtual organization and less-able people were finding refuge there, or new hires were being assigned to the virtual organization as a temporary assignment until a permanent position was defined. However, leavers, stayers, and entrants were similar kinds of people (51, 37, and 67 people respectively): They were the same age on average (1.82 $F_{(2,152)}$, $P \sim .57$). There are no statistically significant differences in their years with the firm (2.30 $F_{(2,152)}$, $P \sim .10$), nor in their relative numbers joining the firm within the previous year (1.91 chi-square, 2 d.f., $P \sim .39$). Job evaluations were no different

across the three categories (1.92 chi-square, 4 d.f., P ~ .75, for annual evaluations distinguishing poor, good, and excellent work). In short, the people leaving, staying, or entering were comparably experienced and able. Nevertheless, it was clear that what seemed change in connections between people was more precisely change in the people connected.

Premature Consensus on Good Ideas

A second, more serious concern emerged after the second year. People active in the virtual organization seemed to come to premature consensus on good ideas. Beyond my impressions from listening to conversations between people active in the virtual organization, I have two indicators of premature consensus: one indicator of consensus, the other of consensus premature. This evidence is not conclusive, but it is consistent with the effects of network closure illustrated in Figures 3 and 4.

An indicator of consensus is the link that emerged, in the third year, between the virtual organization and budgets for inter-divisional new products. The virtual organization had no budget. In contrast, following the strategy of Sharp's Gold Badge projects, financial support could be solicited from the R&D budget to facilitate the development of specific new products that involved more than one of the businesses. Coincident with launching the virtual organization, seven of several new-product proposals were funded at various levels depending on need and promise. Seven small teams of people worked on each of the seven new products. Company support for each team was visible when team budgets increased or decreased from one year to the next.

The teams varied in their connection into the virtual organization. Team members were sometimes mentioned as discussion partners by the people active in the virtual organization. Some were mentioned often. Many were never mentioned. I computed an “integration” index for the seven teams by counting the number of times that team members were named as discussion partners by people in the virtual organization, named in year one (Figure 5A) then a second index of how often team members were named in year two (Figure 5B).

For the first year of the virtual organization, there was no association between new-product team integration into the virtual organization and the extent by which the team budget increased or decreased going into the second year. The different market groups had different perspectives on what would work in reaching the market, and the new-product teams were variably connected with people in the four market groups.

The virtual organization came together in the second year as illustrated in Figure 5B, and during that year new-product team connections into the virtual organization became strongly associated with budget change.

Three new-product teams contained individuals often mentioned in year two as discussion partners by people central in the virtual organization. Budgets for these "strongly connected" teams increased from year two to year three by an average of 72%.

Three teams were sometimes mentioned for discussion in the virtual organization. The budgets for these "somewhat connected" teams increased by an average of 18%.

One new-product team was composed of people never mentioned as discussion partners in the virtual organization. The budget for the one "social isolate" team was decreased by 70%.

I have few data here. There are only seven teams. But the pattern is clear: The more your team is connected into the virtual organization, the better your funding.

My second indicator — anecdotal evidence of consensus premature — concerns successes attributed to the virtual organization. I checked with a company executive a year after Figure 5 to learn what had come of the experiment. The virtual organization was still operating. It was credited with two successes: a new customer for an existing company product and a new product that combined two existing products from one of the divisions. These are successes, but neither was a new product across divisions. In fact, as the executive explained (parentheses inserted), "The businesses were very involved in winning the two contracts since the work was going to be done in the businesses (virtual organization had no employees), so labor and facilities had to be secured. If you were to ask the businesses, they would probably claim credit for the wins." Was consensus in the virtual organization a little too early? The virtual

organization made worthy contributions, but the contributions were closely related to activity already ongoing in the established businesses. People central in the virtual organization were under time pressure because the operation had been running for a year without result. There is no certain answer to the question, but similarity between the virtual organization's contributions and activities already ongoing in the established businesses raises a question: How far beyond the consensus reached in the virtual organization was a mix of study-firm technologies that would constitute a genuinely new product?

Moral of the Story

Consensus is a good and necessary thing, but coming to it prematurely can freeze out superior courses of action. Tentative trials with alternative courses of action is essential to lower risk in business exploration. The problem I see in the described virtual organization is too much focus on finding common ground. It is naïve to think that subject-matter experts are also expert in exchanging ideas across previously segregated subjects. Brokerage experience matters (Burt and Ronchi, 2007). Employees in the study firm were accustomed to life in a corporate hierarchy. In the virtual organization they established consensus within a hierarchy. So much attention was given to building bridges across divisions and market groups that too little was paid to preserving the differences that were a competitive advantage in the target markets. The people involved were able. But people with different backgrounds, tackling a shared task, often get excited about finding common ground. They can lose sight of the fact that preserving their unique strengths is what makes it productive for them to get together. First-year participants in the virtual organization were connected to the established businesses. Second-year participants were connected to one another. In the excitement of connecting across the separate market groups, and so across the firm, people in the virtual organization came to consensus about how to go after markets not already targeted by company businesses. As experts in new-market business, their consensual opinion informed the allocation of funds to new-product teams, illustrated by team budget increases closely associated with connections to people in the virtual organization. Consensus in the study-firm virtual organization

narrowed the variety of new products pursued and overlapped to a great extent with ongoing activity in the established businesses. The moral here is succinctly embodied in a business mantra I first heard in IDEO, America's premier design firm: "Fail often to succeed sooner." (Kelly, 2001:232). We learn by trying alternatives. To do that, you need alternatives and the ability to pursue them.

THE MORE GENERAL POINT

Every act of brokerage is implicitly an act of closure. Every step taken to coordinate across a structural hole to try something new increases closure locking you into a course of action. The competitive advantage by which social networks constitute social capital is a balancing act between brokerage and closure. Social capital is an intersection of two functionally-distinct networks, a "differentiating" network in which people are distinguished by skills or resources, and an "embedding" network in which people with complementary skills or resources are brought together to better pursue their interests. Brokerage is about positioning bridge relations in the embedding network to span structural holes in the differentiating network. Closure is about reinforcing bridges in the embedding network to harvest bridge value.

The task for business and civic leaders is to strike a balance between brokerage and closure. They must decide whether the time is right to tighten connections within the group to obtain the trust and efficiency benefits of a closed network, or build bridges beyond the group to obtain the innovation and growth benefits of a brokerage network. Imbalance defines the four failure modes in Table 1. The columns distinguish situations in which people are thinking about building social capital from situations in which they have taken successful action, either by establishing a beneficial bridge between two previously-disconnected groups (brokerage) or by closing the network around a community such that members feel a sense of identity and reputation within the community (closure).

——— Table 1 About Here ———

Across the first row in the table, too much brokerage will erode coordination into a chaos of inconsequential personal opinion. Before action is taken, this failure mode

is apparent in a lack of effective action despite people trying. Effort is moving in too many different directions, or discussion is in so many directions that it stymies effective collaborative effort in any direction (e.g., Burt, 2005: 240-244). After a successful bridge has been developed, this failure mode is apparent in people squandering the success of the bridge by again moving in too many different directions.

Across the second row in the table, too much closure locks the organization into rigid adherence to past practice, groupthink, and people passively waiting for orders (see Burt, 2005: Chap. 4, for review). Before action is taken, this failure mode is apparent in people having an exaggerated sense of themselves (hubris, which thrives on the lack of data typical in a closed network) and searching through a narrow range of alternatives. Elements of this failure mode were illustrated by the virtual organization in Figure 5. After a community is successful, the too-much-closure failure mode is apparent in people resisting ideas inconsistent with their previous success. A hardened social shell forms around the community, protecting them from ideas not invented here. I focused on the second row of Table 1 in this chapter because it is the more likely failure mode for the many management initiatives intended to strengthen coordination across an enterprise. Structural holes allow differences among us to develop, which are the foundation for tomorrow's new ideas. Hagel and Brown (2005:87) discuss the importance of having company processes by which people exchange opinion and practice as expected in the Figure 5 virtual organization: "Productive friction occurs when people with diverse and appropriate specializations creatively resolve difficult business issues. But to gain its full benefit, companies must also establish processes . . . to help them reflect on the practices emerging from these collaborations, recognize patterns, and increase awareness of high-impact solutions."

There are two management strategies for finding the balance between brokerage and closure. One is to artfully shift between brokerage and closure, implementing sufficient brokerage to prevent premature consensus from closure followed by sufficient closure to ensure that something concrete results from the good ideas provided by brokerage. This strategy is well-suited to smaller groups such as work teams and project groups in which leaders can keep a finger on the emotional pulse of the group so as to avoid the failure modes in Table 1.

In large organizations, shifting between policies of brokerage or closure can be confusing to employees and unwieldy to implement. The failure modes in Table 1 are likely. A second strategy, especially appropriate to larger groups, is to take away the monopoly rights of the embedding network in favor of rights more flexibly tied to the underlying differentiation network (an organizational analog to forgetting, Starbuck, 1996; Mayer-Schönberger, 2007).

The virtual organization in the study firm is an example of a monopoly embedding network. Employees were encouraged to propose new products where they saw value, but getting senior attention could be difficult. The virtual organization was the company-approved vehicle for proposing new products across divisions. Traditional examples of monopoly embedding networks are churches, corporations, guilds, marriage, or government more generally. These are embedding organizations in the sense that they provide rules and obligations for the conduct of interpersonal relations. They are also jealous organizations. They do not typically encourage affiliations with competitors. Your priest would be surprised to meet your rabbi. Your employer would unhappy to discover your job working evenings and weekends with another employer. Government presumes control over all activity on its sovereign soil.

Flexible embedding networks are emerging rapidly in response to coordination issues created by the global connections possible with the wireless internet. The general idea is to harvest the trust and collaboration benefits of closure's reputation mechanism without incurring the rigidity of monopolistic closed networks. For example, multiple embeddings can compete as coalitions. The virtual organization in the study firm consisted initially of three groups (Figure 5A). Each group competed as a coalition recruiting participants. There were three network brokers who were active in two groups, but most employees were active in a single group. Instead of creating closure across the groups (Figure 5B), senior leadership could have preserved the separate groups but focused on ensuring that they learned from one another's trials and that each was aware of progress made in the others to maintain competitive reputation pressure between the groups. The firm would thus function like a standards-setting body that defines rules for routine exchange between the competing coalitions. GSM played such a role in the mobile phone market (originally Groupe

Spéciale Mobile, now Global System for Mobile communication). Launched in 1982 for communication across Europe and taking off in 1992, GSM has been adopted as an inter-operability standard by most of the world. Focused on domestic communication, the US did not adopt, choosing instead to live with a variety of competing standards not compatible with GSM. The GSM standard meant that firms such as Ericsson, Nokia, and Samsung could invest in new features expecting returns from a large GSM market across countries. The result: mobile phones outside the US are richer in exciting capabilities. Apple adopted the GSM standard for its feature-rich iPhone, which limits initial US distribution in favor of distribution in the larger global market.

A more extreme approach to flexible embedding is for senior leaders to create a physical or virtual "common" space in which employees sketch ideas in search of collaborators elsewhere in the firm. This approach is extreme in that it is meant to harvest the value of interpersonal collaboration with minimal intrusion from a governing organization (a social network version of Saltzer, Reed and Clark's, 1984, end-to-end argument for computer network design). The corporation functions here as a security force to protect open communication while employees play in the common space. This imagery can be seen in safe-harbor regulations that limit liability on the condition that action is taken in good faith. For example, the Federal Communications Commission facilitates open communication by defining a safe-harbor period from 22:00 to 6:00 for the broadcast of material indecent for children. The Digital Millennium Copyright Act facilitates open communication by defining safe-harbor provisions that limit internet service provider liability for copyright infringement by users. The imagery of an intellectual commons or safe harbor also can be seen in corporate policies that authorize employees to spend a percentage of their work-week developing ideas independent of their assigned tasks. Able employees do not require authorization to be imaginative, but can require a company policy to counterbalance a supervisor impatient for the employee to complete an assigned task.

The above are progressive solutions. Monopoly solutions are more common, like the virtual organization in the manufacturing firm in Figure 5. In this, efforts to build social capital put me in mind of tobacco farmers in early Virginia. Tobacco plants drain

soil nutrients such that it is difficult to grow crops on the same land for many years. Farmers chasing the profits of increasing English demand for tobacco, worked a plot of land until it was destroyed, then moved to a new plot and destroyed the new land (e.g., Kulikoff, 1988:47-54). Similarly, efforts to harvest social capital by bridging structural holes can eliminate the diversity that made the bridges initially valuable. Like Virginia tobacco farmers, managers focus on the short-term benefit of building bridges across the structural holes between groups. The long-term cost of farmers draining the soil, or managers eliminating differences in perspective and practice, are born by the sovereign organization and future residents. Senior people would be wise to remember Jean-René Fourtou on managing le vide, the structural holes, in organizations and markets — some instances of le vide should be preserved as catalyst for future advantage.

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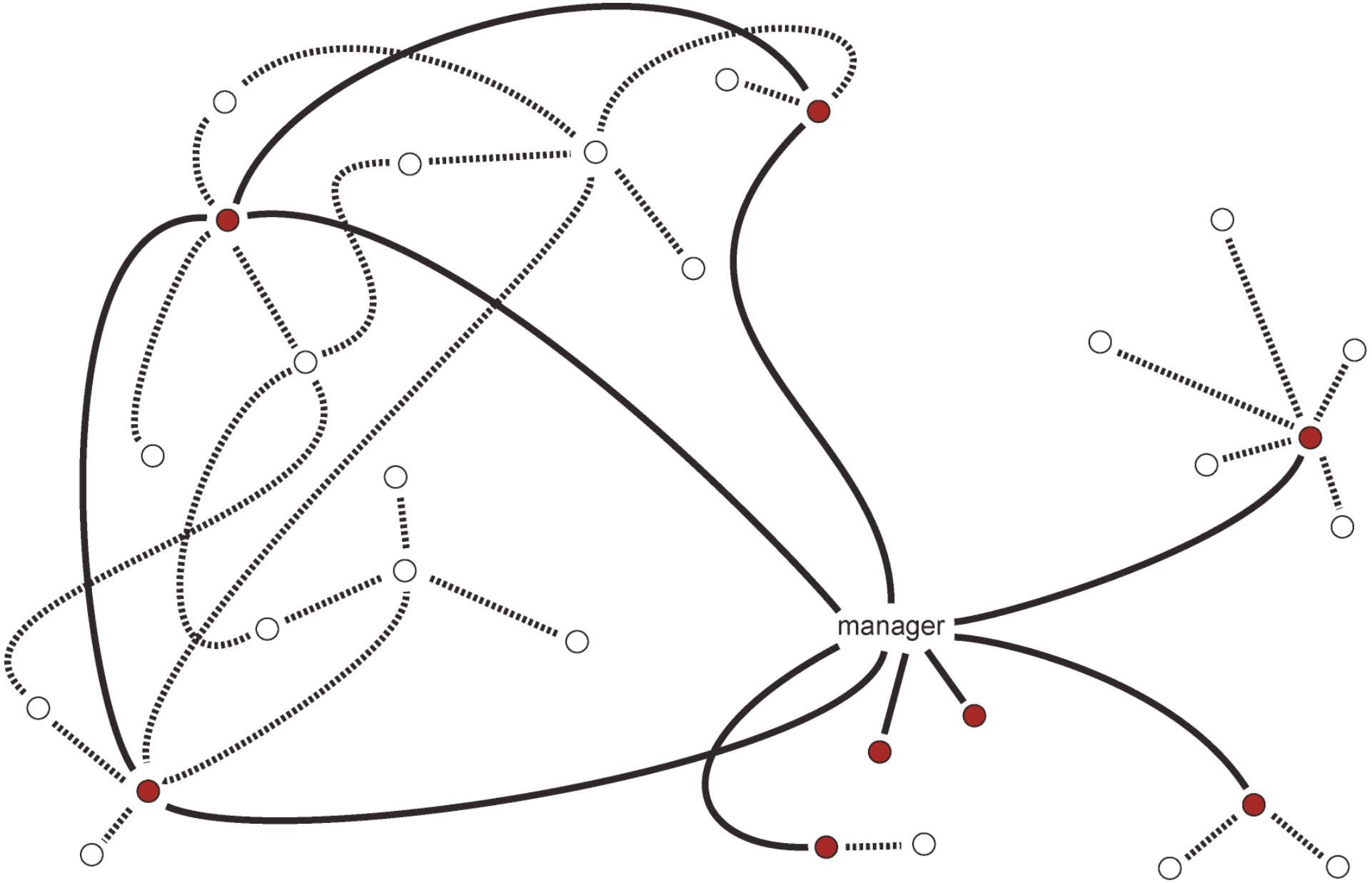
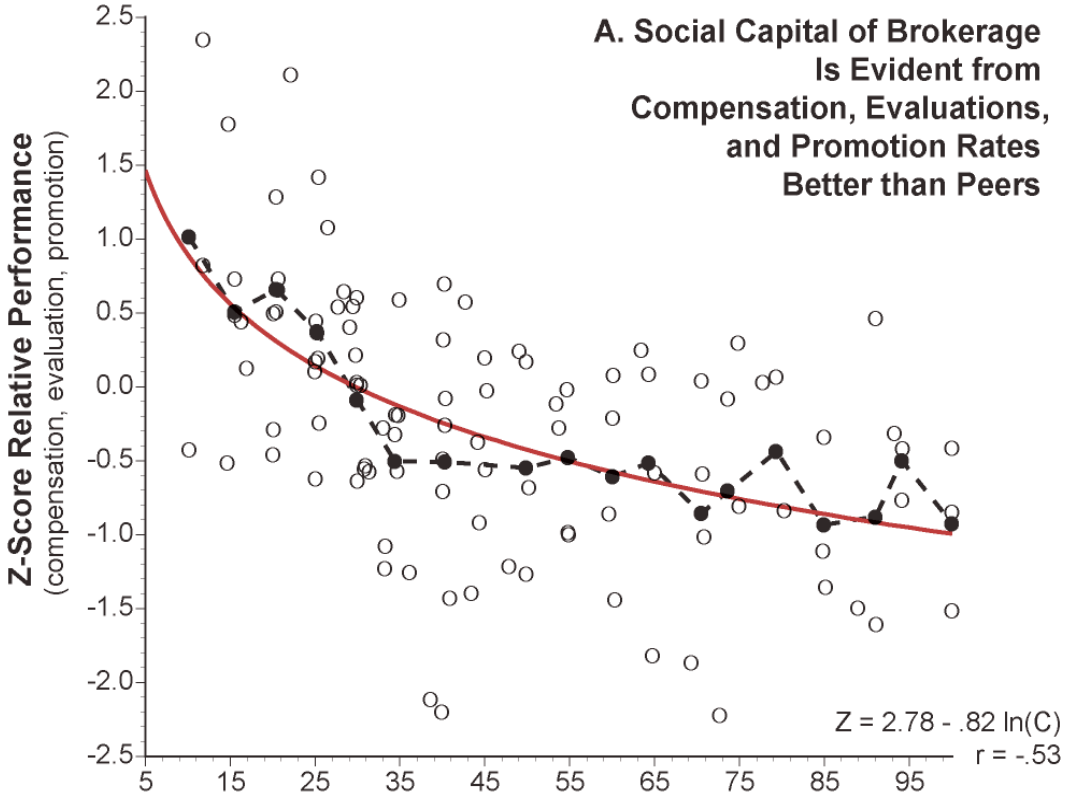
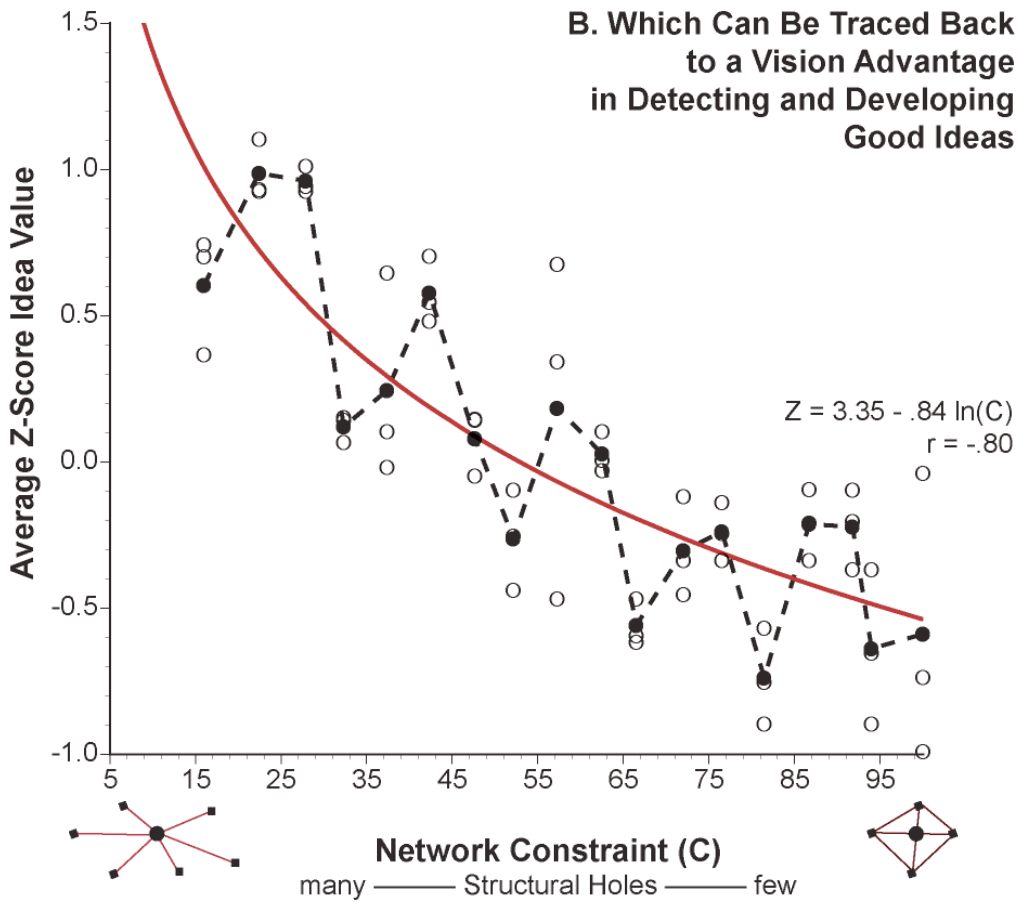
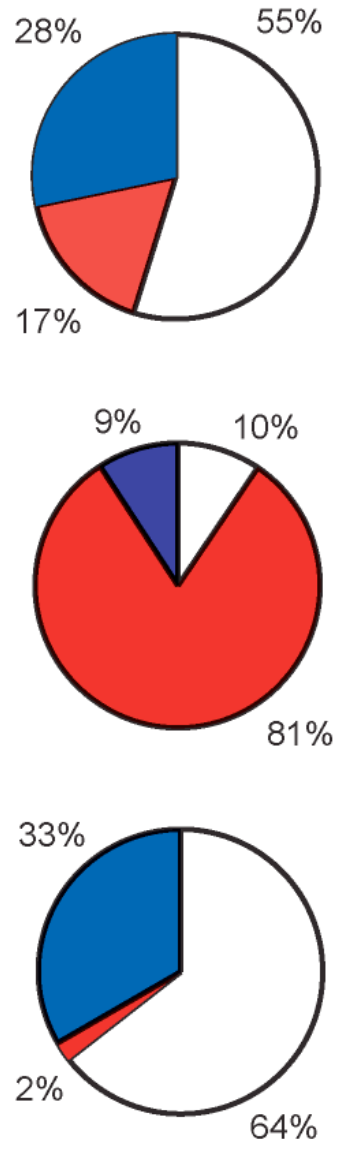
Figure 1. Manager Network
Illustrating Opportunities for Brokerage and Closure









C. And Is Much of the Predicted Variance: network constraint (white), job rank (red), and other factors (blue). The first pie is investment banker compensation and analyst election to the All-America Research Team. Second pie is supply-chain and HR manager compensation. Third pie is early promotion to senior job rank in a large electronics firm.

Figure 2. Performance and Brokerage

Circles are average scores on the vertical axis (Z) for a five-point interval of network constraint (C) within each study population. Dashed line goes through mean values of Z for intervals of C. Bold line is performance predicted by the natural logarithm of C. Other details are in the text.

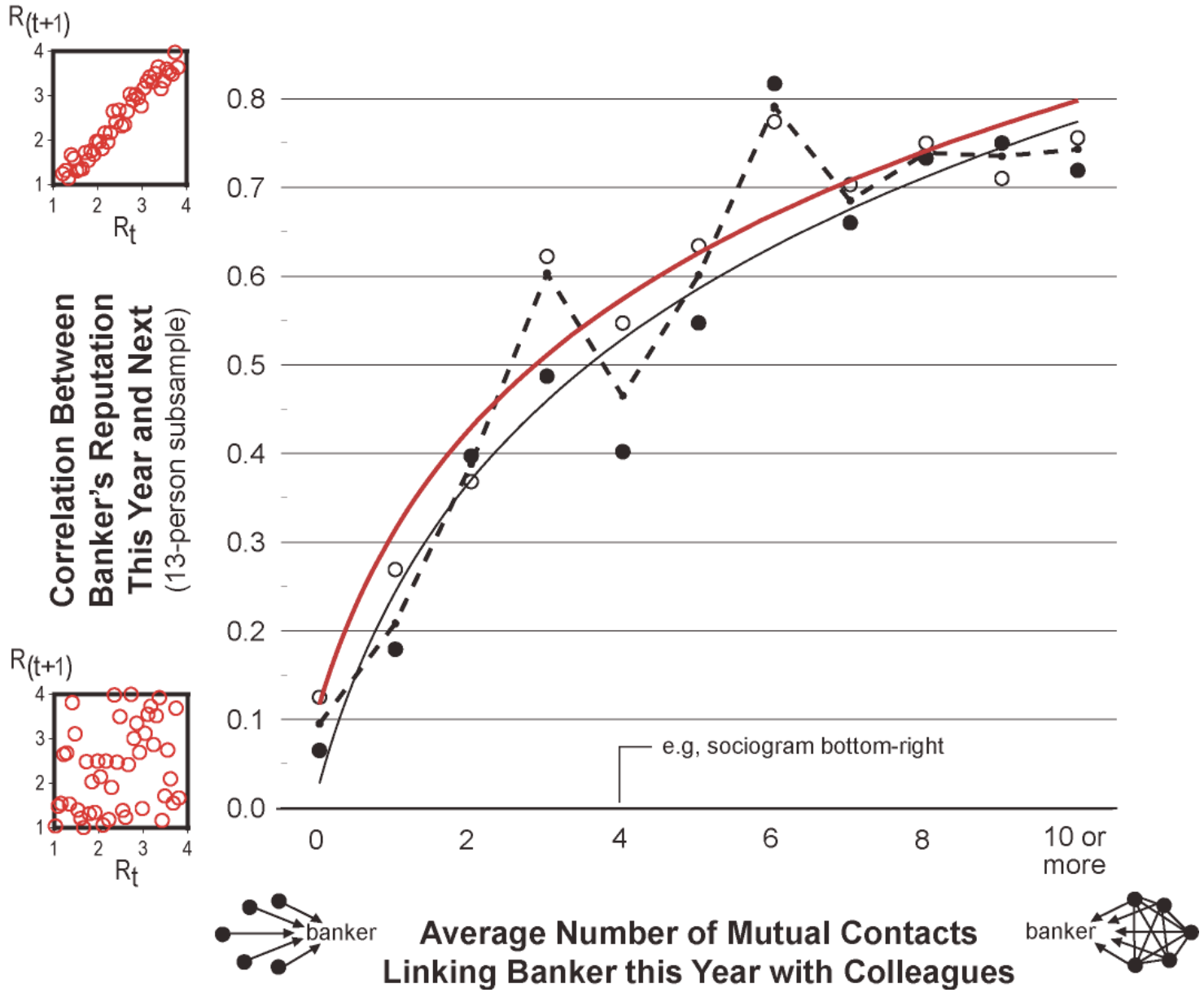


Figure 3. Closure and Banker Reputation Stability

Dots are average correlations at each level of closure. Bold regression line through the hollow dots describes stability in positive reputations (8.1 routine t-test). Thin regression line through solid dots describes stability in negative reputations (6.1 routine t-test). Dashed line goes through mean correlations across all of the bankers at each level of closure.

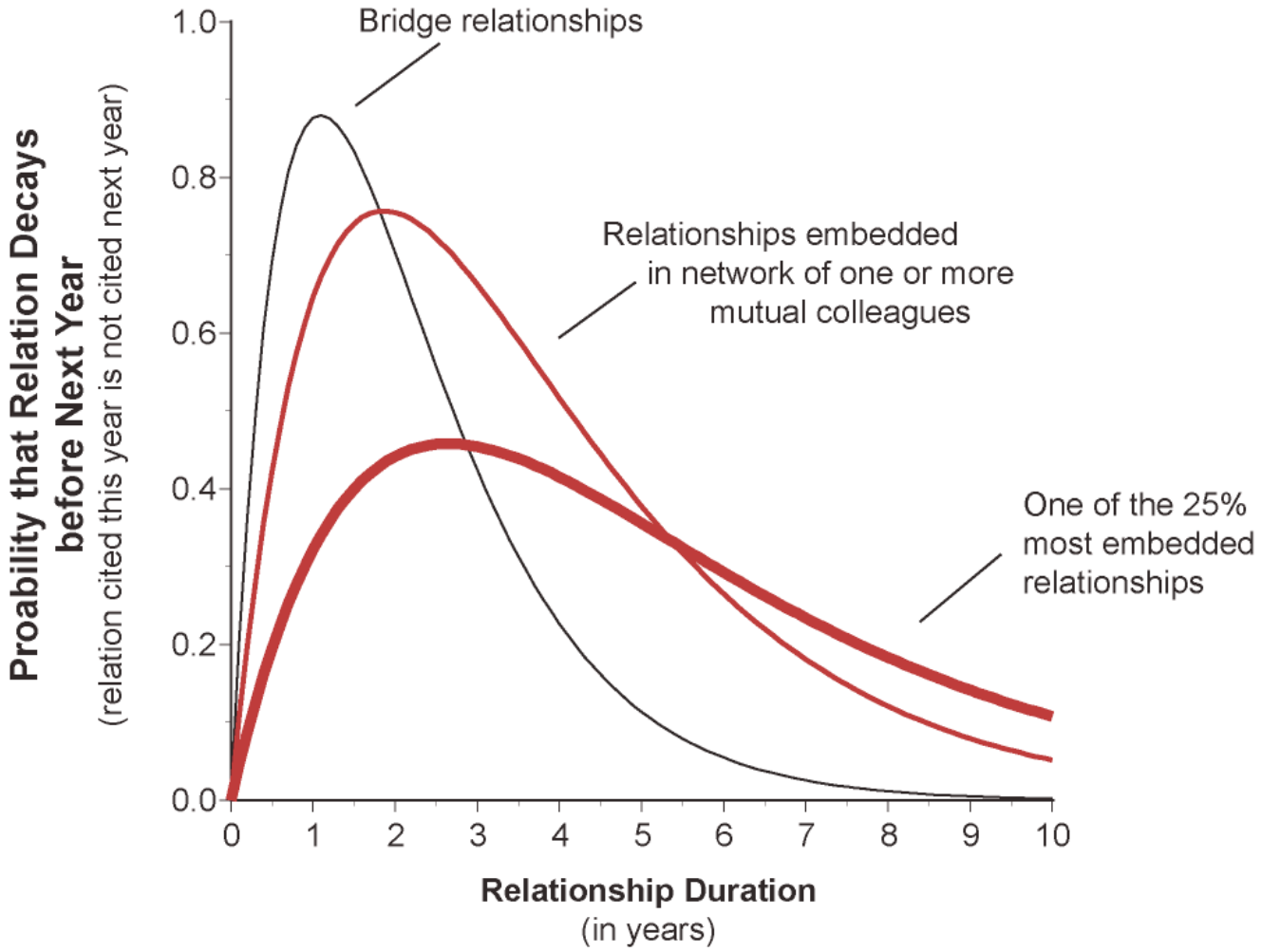
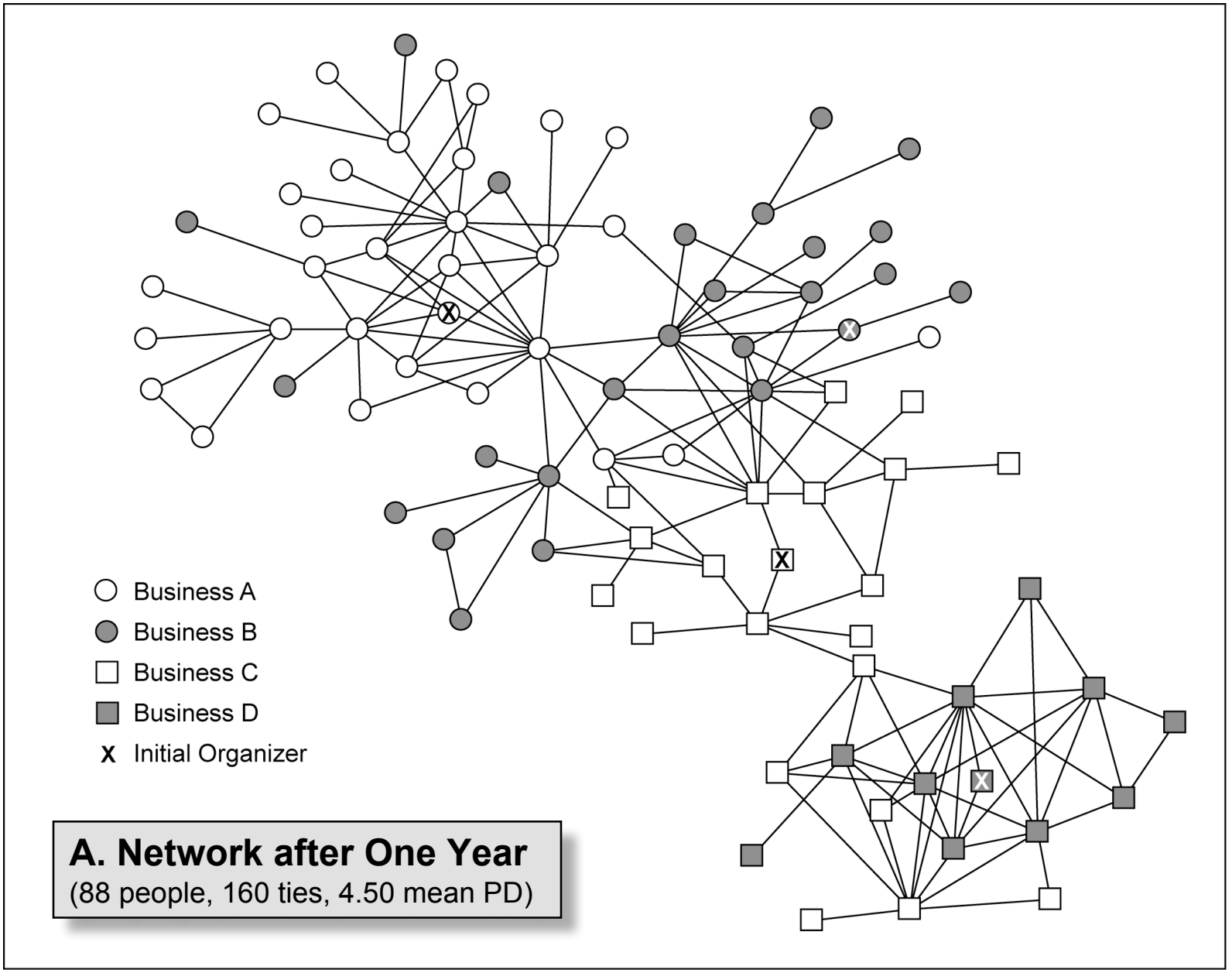


Figure 4. Closure Slows Network Decay, Especially in New Relationships

Figure 5. Discussion Network in a Virtual Organization



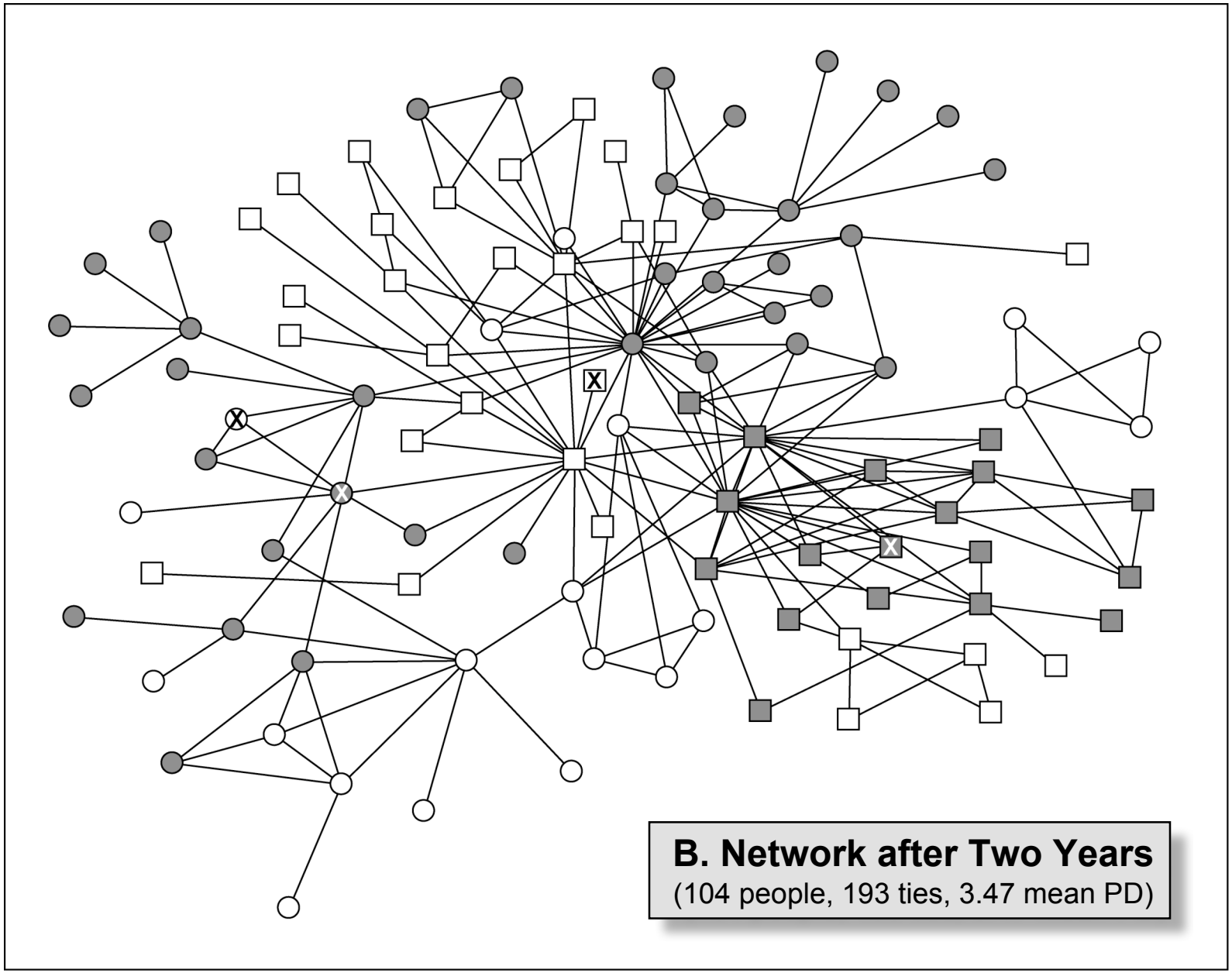

B. Network after Two Years
(104 people, 193 ties, 3.47 mean PD)

Table 1. Network Duality Failure Modes

	Before Action	After Action
Too Much Brokerage (chaos of new ideas and agency problems)	**No Consensus** (no effective action, dissipated resources)	**No Consensus** (ineffective action, dissipated success)
Too Much Closure (gossip-induced hubris, groupthink, rigidity, and stereotyping)	**Premature Consensus** (narrow search, risk local maximum)	**Dogmatic Consensus** (Rigid boundaries, hard edges to structural holes)