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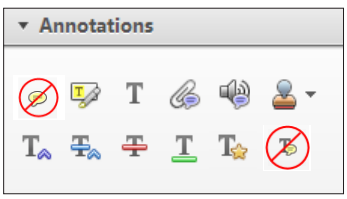

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SI: The transformative and innovative power of network dynamics

Dynamics of Social Capital: Effects of Performance Feedback on Network Change

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Abstract
We present a theory of social capital dynamics. In particular, we examine how individuals in organizations respond to events such as performance evaluations by changing whom they interact with and the extent to which they utilize their contacts. We argue that positive performance feedback from supervisors increases levels of self-efficacy and results in the creation of new social capital as well as the increased utilization of existing social capital (i.e., forming new ties with sources of information and aid, and increasing interactions with existing contacts). In addition, negative feedback decreases self-efficacy, resulting in reallocation of social capital utilization to concentrate on a small number of existing frequently-accessed contacts (i.e., decreasing interactions with some contacts while increasing interactions with others). Our arguments highlight the role of individual agency in social capital dynamics and clarify the role that individual performance evaluations can play in the evolving structure of social networks. To test our hypotheses, we use a longitudinal social network data-set collected over a six-year period in the IT department of a global engineering firm. Using fixed-effects panel regression models, we find support for our hypotheses, suggesting that performance feedback is a determinant factor in social capital dynamics.

Keywords
network dynamics, performance evaluations, social capital, social networks

Introduction

In organizations, interactions are vital to getting things done. In what Wellman (2002) calls "networked individualism," work is increasingly self-organized and implemented in a collaborative

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and negotiated fashion with colleagues rather than through formal task relationships. Through social relationships, individuals access and coordinate the resources needed to accomplish work. Persons with strong access to and utilization of relation-based resources—in short, social capital—are better able to successfully complete their work tasks and are likely to collect rewards as a result (Lin, 1999, 2001). Research taking this social capital perspective has typically focused on differences in social capital across individuals and how these differences relate to differences in outcomes (e.g., Lin, Cook, & Burt, 2001). However, social capital also varies within individuals across time—we refer to this change as *social capital dynamics*. Individuals may arrive at an organization knowing almost no-one, and within a few months develop a number of relationships that provide them with key information and aid that enable them to do their job. But social capital dynamics is more than a linear accumulation of relationships. First, as Sasovova, Mehra, Borgatti, and Schippers (2010) point out, relational change can be chaotic—contacts come in and out of a person's work life as a function of numerous factors, including new employees being hired, job changes, location changes, and so on. Much of this churn may be outside a person's control, but it is also clear—especially in settings like the one we study—that individuals continually make decisions about whom to interact with in order to achieve their goals. Second, in addition to changes in relationships, we use social capital dynamics to refer to change in the mobilization or utilization of existing ties.

It should be noted that the creation of new social capital and adjustments in the pattern of utilization of existing social capital need not occur only when goals change. As has been well studied, individuals monitor their progress toward achieving their goals and make changes accordingly (Lord, Diefendorff, Schmidt, & Hall, 2010). In organizations where realizing the benefits of social capital is part and parcel of accomplishing goals, this sets up a fundamental mechanism for social capital dynamics. As individuals monitor and receive feedback about their performance, they make changes in how they construct—and then utilize—their social worlds. In short, one impetus for social capital dynamics is performance feedback.

Performance evaluations are intended to reinforce behavior that is in line with organizational goals and extinguish behavior that is misaligned (e.g., Kluger & DeNisi, 1996). Goal-setting theory (Locke & Latham, 1990), control theory (Carver & Scheier, 1981), and feedback intervention theory (Kluger & DeNisi, 1996) all suggest that individuals are motivated to change their behavior as a result of performance feedback. However, theories of self-efficacy (Baron, 1988; Gist & Mitchell, 1992) suggest that an individual's belief in their own capabilities is malleable, and receiving a high versus low performance evaluation will influence their belief, which will have an impact on their goal-oriented decision-making. We suggest that in knowledge-intensive organizations, where obtaining information from others is key to performance (Cross & Cummings, 2004; Maurer, Bartsch, & Ebers, 2011; Sparrowe, Liden, Wayne, & Kraimer, 2001) and idea generation (Burt, 2004; Kijkuit & van den Ende, 2010), an individual's level of self-efficacy will impact their decisions regarding how they obtain these resources. The decisions that individuals are motivated to change are likely to include networking behaviors, such as how much to utilize each potential information source in their work environment.

We develop a theory of social capital dynamics that explains how performance feedback and its impact on self-efficacy can result in an individual reevaluating their social capital, and with it decisions regarding whether to increase reliance on certain existing ties, decrease utilization of others, or create new ties. We characterize our work in three ways. First, our interest is in the role of individual agency and how an individual makes network changes in response to external events. This focus on agency is consistent with recent theorizing on network dynamics. For example, Ahuja, Soda, and Zaheer (2012) highlight the role of agency as a microfoundation of network change. Agency in this context is described as an "actor's motivation and ability to shape relations and

create a beneficial link or dissolve an unprofitable one" (Ahuja et al., 2012, pp. 437–8). In a similar vein, Gulati and Srivastava (2014) focus on the role that constrained agency plays in network dynamics, whereby the structural position of an individual constrains their actions, but also influences the resources they have available to them, as well as the motivation they have to use those resources. In our theory of social capital dynamics we examine relatively long-term network changes that may reflect elements of deliberate goal-oriented agency (à la Emirbayer & Mische, 1998), as opposed to, say, short-term emotional and perhaps unconscious reactions such as threat rigidity (Staw, Sandelands, & Dutton, 1981). We also note that the kind of agency we examine consists not of differences across individuals, as in personality or demographic differences, but within individuals over time, as in the work of Lord and colleagues (2010) on self-regulatory processes.

Second, our work might appear to spring from a long tradition of social capital research relating networks to performance. However, most work in that tradition sees performance as an outcome of network ties or position (Brass, 1981, 1984; Burt, 1992, 2005; Lin, 1999, 2001). This is not our aim. If anything, we examine how performance affects network ties. But in addition to that difference, it is not performance per se that we are interested in, but rather performance feedback. In this respect, our work is again more in keeping with the self-regulatory literature than the social capital literature.

Third, while the network dynamics literature (e.g., Snijders, van de Bunt, & Steglich, 2010) tends to focus exclusively on the formation and dissolution of ties, we add another dimension. Our subject is social capital, a concept that emphasizes the benefits that an actor might wring from their ties. As such, the network dynamics we study include changes in the utilization of existing ties, in addition to the formation of new ties. Specifically, we examine how individuals react to performance evaluations by reevaluating their social portfolio.

To test our ideas, we conduct a longitudinal analysis of a dataset containing social network and performance measures collected annually in the information technology (IT) department of a global engineering firm over a six-year period. Using fixed-effects regression models, we examine within-individual changes in tie creation and utilization over time.

Theory and Hypotheses

Our theoretical focus is on understanding the motivating factors that influence social capital dynamics as a result of performance feedback. The immediate consequence of a performance evaluation is likely to be an affective response such as positive or negative emotion, depending on how good or poor the evaluation. Research indicates that affective feelings such as emotions can have an impact on behaviors and decisions in the workplace (Fisher & Ashkanasy, 2000). There is evidence to suggest that strong emotions are more likely to result in spontaneous behavior than in more conscious goal-driven behavior (Fisher & Ashkanasy, 2000). Likewise, research on stress and uncertainty such as threat rigidity theory (Staw et al., 1981) indicates that as a result of stress, anxiety, and disasters, people instinctively follow well-learned routines as opposed to making calculated goal-driven decisions. While a performance evaluation, especially a negative one, can result in negative emotions as well as in stress and anxiety, we suggest that these types of reactions typically influence behaviors only for a short time after the negative stimulus.

In research investigating the effects of firm performance on the social networks of firm leaders, McDonald and Westphal (2003) contrast threat rigidity theory (Staw et al., 1981) with self-categorization theory (Hogg & Abrams, 1993) as explanations of the networking behavior of CEOs. The scholars find support for self-categorization theory and show that CEOs of low-performing firms tended to seek guidance from executives who were friends, with the same functional background and in similar industries. This resulted in limited diversity in the advice

they received and less organizational change where more may have been needed. McDonald and Westphal's (2003) self-categorization model explains how low performance leads CEOs to select advice ties based upon homophily. In contrast, we seek to understand whether performance feedback influences resource-driven decisions with regard to the mobilization of new ties and utilization of existing ties. In addition, we focus on within-person changes as opposed to comparisons across individuals. Therefore we seek an alternative explanation.

Another potential explanation of how environmental events in a person's life may influence social capital creation and utilization is network activation theory (Menon & Smith, 2014; Smith, Menon, & Thompson, 2012). The theory distinguishes between a person's potential network, consisting of their entire set of acquaintances, their activated network, consisting of the subset of those that come to mind at a given moment, and their mobilized network, consisting of those they actually seek out for advice or aid. Smith et al. (2012) theorize that high- and low-status persons react differently to job threat, with low-status people exhibiting a winnowing effect on their activated network (and thereby their mobilized network). The status effect is not something we address, but the notion of an activated network provides a useful conceptualization of the mental processing that results in the mobilization effects that we study here. Of course, we also study the formation of new ties, which is not considered in activation theory.[1]

A person's willingness to mobilize their network—i.e., exploit their social capital—with regard to obtaining goal-oriented resources is likely a function of their confidence or self-efficacy. Self-efficacy is an individual's perception of their ability to complete a specific task (Gist & Mitchell, 1992). The concept was developed by Bandura (1977, 1982) and has been shown to be an important factor in performance and learning outcomes (Taylor, Locke, Lee, & Gist, 1984; Stajkovic & Luthans, 1998; Wood & Locke, 1987). Bandura (2001, p. 10) suggests that "efficacy beliefs are the foundation of human agency. Unless people believe they can produce desired results and forestall detrimental ones by their actions, they have little incentive to act or to persevere in the face of difficulties." Self-efficacy is thought to determine the amount of effort that people will put into a task and how long they will persist in doing it (Bandura, 1982). Unlike personality traits, it is also thought to be a dynamic property of individuals that can change as a result of life events (Gist & Mitchell, 1992).

Linkages between performance feedback and self-efficacy have been documented in the literature. Research indicates that the more positive the feedback, the greater the increase in an individual's self-efficacy (Karl, O'Leary-Kelly, & Martocchio, 1993). Baron (1988) tested the effect of different types of performance feedback on self-efficacy. He found that individuals receiving negative feedback indicated having lower self-efficacy with regard to two later tasks compared to individuals receiving positive feedback or no feedback. Others propose a downward efficacy-performance spiral such that low evaluations negatively affect self-efficacy, which in turn results in low performance and lower evaluations (Lindsley, Brass, & Thomas, 1995). Research consistent with this theory includes a longitudinal study by Bandura and Jourden (1991) that found some individuals had a negative-feedback loop in the relationship between self-efficacy and performance.

There is also research investigating the influence of self-efficacy on social relationships. Work from social psychology suggests that individuals with low self-efficacy are less likely to initiate and engage in social interactions due to feelings of social anxiety (see Leary & Atherton, 1986, for a review). When individuals feel socially anxious they tend to adopt defensive behavior (Lee, 1984) and avoid interacting with others so that they do not lose additional confidence (Schlenker & Leary, 1982, 1985). In organizational research Brown, Ganesan, & Challagalla (2001) find that individuals with high self-efficacy are more likely to seek information from their supervisor and colleagues to increase role clarity and ultimately perform more effectively than employees with low self-efficacy.

In the following section we develop hypotheses regarding the relationship between performance feedback and social capital dynamics. We consider three distinct aspects of social capital dynamics: (1) adding new ties, (2) decreasing reliance on select existing ties, and (3) increasing reliance on select others. We ground our work in interactions that result in getting information, but the theory is meant to apply more generally to any resources that a person in an organization can obtain or control through their social relationships with others.

Performance feedback and creation of new ties

Following Baron (1988), we theorize that positive performance evaluations contribute to an individual's sense of self-efficacy. That is to say, a positive evaluation increases an individual's belief in their "capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (Wood & Bandura, 1989, p. 408). In contrast, a negative evaluation leads an individual to have decreased belief in their own capabilities. However, as Bandura (1982, 2001) indicates, people with lowered self-efficacy tend to avoid decisions that lead them into behaviors that exceed their coping strategies. In addition, individuals will only expend effort in situations that they perceive they are competent in (Wood & Bandura, 1989). This suggests that individuals with lowered self-efficacy may know the appropriate action to take to achieve a specific goal but in some cases are reluctant to take it (Bandura, 1982). It is important to note that we are not examining the differences in self-efficacy across different persons (controlled for in our fixed-effects models). In addition, our view is that the performance evaluations provoke goal-oriented decisions over the months that follow, as opposed to mindless, habitual decisions that can occur shortly after an environmental event. This claim contrasts with the threat rigidity perspective (Staw et al., 1981), which emphasizes habitual, well-learned responses to events.

We believe that in a work context where the ability to use others as resources is key, performance evaluations will have a direct effect on a person's assessment of their ability to network. Consider, for example, the case of forming a new tie with a potential source of information. New ties carry a certain amount of risk. First, there is uncertainty about the value of the information that the new contact controls as well as how easily and quickly this knowledge can be transferred (Reagans & McEvily, 2003). An individual needs a certain level of confidence to overcome this uncertainty. Second, in organizations there is competition for others' attention, especially those who have resources (Davenport & Beck, 2001; Simon, 1971). Spending time and effort courting an individual who is already highly committed to many others requires confidence that the time and effort will be well spent. While some requests for information may result in a minimal effort required by the person sought out, other requests in the knowledge-intensive environment of our study require considerably more effort.

When an individual has increased confidence in their capabilities, we posit that they will be more likely to see that the benefits involved in creating new ties outweigh the risks. In addition, individuals are more willing to exert effort in situations where they believe they have the requisite capabilities (Wood & Bandura, 1989). This willingness to put in additional effort is important in the creation of new ties. Furthermore, we suggest that the feeling of competence an individual gets from a positive evaluation can give them the confidence to admit to others that they don't know something, an often necessary step when seeking information from others. Increased self-efficacy means that an individual has confidence that they will have something to offer in return when seeking out new instrumental ties (Gouldner, 1960). Thus, we expect that receiving positive performance feedback makes an individual more willing to take the risks involved in working with new contacts, resulting in new social capital.

In contrast, when the same individual receives negative feedback, they will have lowered self-efficacy, and we expect them to adapt their networks in a different way. In this situation there will be less inclination to create new social capital in the form of new ties, as the individual will have less confidence in themselves and will be less motivated to put in the necessary effort due to their perception that the risks outweigh the benefits. Note that the comparison is not between generally high-performing individuals and low-performing individuals (who may differ on a number of grounds), but between the same individuals responding to high or low performance evaluations.

Hypothesis 1: The more positive the performance feedback that an individual receives, the more likely they are to add ties to new sources of social capital.

Changes in utilization of existing informational sources

In the knowledge-intensive setting that we consider here, employees know the importance of workplace relationships (Cross & Parker, 2004). As we have suggested above, when individuals receive positive feedback, their self-efficacy is heightened and they become more willing to take the risks associated with developing and utilizing new social capital. Conversely, when they receive negative performance feedback, they avoid situations in which they have less belief in their ability to cope (Bandura, 1977); hence they make decisions consistent with a preference to minimize both effort and risk. Specifically, they are less likely to utilize new unproven information sources. In line with this thinking, we posit that high versus low performance feedback will also lead individuals to make different goal-directed decisions about ways to manage their existing relationships.

Our theory of social capital dynamics proposes that utilizing existing ties has costs and benefits. On the benefits side, existing ties provide individuals with information of known quality and reliability (Cross, Parker, Prusak, & Borgatti, 2001). However, there are also costs such as the time and effort required to maintain the relationship (Hansen, 1999; Hansen, Podolny, & Pfeffer, 2001), and the probable need to reciprocate the help at a later time (Grant, 2013; Mueller & Kamdar, 2011). Individuals with lowered perceptions of self-efficacy are more likely to doubt their ability to pay these costs and hence will carefully evaluate the value of all their existing social ties. However, this does not mean that individuals with lowered self-efficacy will completely cease contact with all those in their network, as they are aware of the benefits of ties. But they will try to balance the benefits of information with their reluctance to frequently put themselves in situations they are not comfortable with. As a result, we expect to see a selective reduction in the utilization of existing social capital.

One approach by which an individual with negative performance feedback can minimize the risks and costs of accessing resources is to prune the ties to those with whom they have had less interaction. Thus,

Hypothesis 2: Lower performance feedback will result in the reduced utilization of rarely-tapped social capital.

Individuals with whom one interacts frequently are likely to have a similar understanding of the work environment and have shared experiences (Krackhardt, 1992; Mizruchi & Stearns, 2001). While there may be less to gain from existing contacts with regard to novel information, there is also less risk, which, as we argue, is a driver of the subsequent network changes of individuals after receiving low performance feedback. Thus, a negative performance evaluation leads one to redirect their efforts to better utilize known sources of information. The case of high evaluations or positive feedback is different. A positive performance evaluation confirms for the employee that

they are relying on the right sources of information, and an individual would tend to learn from and replicate that behavior (Levitt & March, 1988; March 1999). In addition, elevated levels of self-efficacy associated with a positive performance evaluation increase an individual's subsequent level of effort (Wood & Bandura, 1989), likely resulting in increased interaction with all contacts, including ones already heavily relied upon. When an individual receives a mid-range performance evaluation, they have neither the same need to balance risks and benefits as recipients of low performance feedback nor the same affirmation regarding their social capital utilization as recipients of positive performance feedback. Therefore, we expect there to be a U-shaped curvilinear relationship between performance feedback and social capital utilization, with both high and low performance evaluations resulting in increased utilization of favored information sources and moderate performance evaluations resulting in no increase. We formalize these ideas as follows:

Hypothesis 3: Both exceptionally high and low performance evaluations will lead individuals to increase utilization of social capital they already rely on most heavily.

Methods

Data

The data for the paper come from a six-year study of the global IT department of one of the world's largest engineering consulting firms with over 7000 specialists worldwide. The firm was originally founded in the nineteenth century and has grown through numerous mergers. While the global headquarters is based in the United States, there are also regional offices throughout the Americas; Europe, Middle East and Africa (EMEA); and Asia/Pacific. Employees of the IT department were dispersed across 11 offices in various countries such as India, New Zealand, the United Kingdom, and the United States. The number of people in each location varied from one to 41. The work conducted by members of the IT department was internal to the firm and involved supporting the IT infrastructure of the organization, e.g., maintaining the networks and servers. Members of the IT department also supported the day-to-day needs of the business through managing a technical help desk and maintaining and upgrading the enterprise resource planning (ERP) system across geographic regions. Thus, the IT department members did not have required workflow relationships other than formally assigned reporting relationships (which we account for in our analyses). In an interview, the head of the IT department indicated that there was the expectation that department members would reach across their locations for information to help them solve the IT challenges that they faced on a daily basis. This view is also reflected in the IT department's mission statement to "*create strategic solutions to connect people and knowledge for the firm and our global client community.*"

Access to information from individuals across the IT department had notable performance implications for members. For example, to accomplish work-related tasks such as developing global IT standards, establishing network reliability, and dealing with virus attacks, department members often needed to connect with others across geographic regions. The more they were able to access information, the better their performance would likely be as knowledge exchange was crucial to ensuring acceptable work products and effective rollouts of upgrades and new IT platforms. Overall, accessing knowledge from other department members was key to performance in the IT department.

During the six-year period (2004−09) of the study, one of the authors conducted an annual social network analysis survey of the IT department. In the last two weeks of October of each year the entire population of the IT department was surveyed. The number of people surveyed annually

ranged from 161 in 2009 to 176 in 2004. In all years except one, the survey response rate was over 88%, which is consistent with other network studies (e.g., Sparrowe et al., 2001). In 2007 there was only a 65% response rate. While this is not ideal, we have kept the 2007 data in our analysis for the sake of continuity.[2]

The data in 2004 were collected through surveys emailed as documents to each member of the IT department. Respondents added their responses to the documents and emailed them back to the researcher. In subsequent years, data were collected through an online survey tool. The same questions were asked each year. Respondents were asked to indicate their relationships with all other members of the IT department using the roster method (Marsden, 2005). The roster consisted of all names in the IT department listed alphabetically. Respondents were also asked to provide their gender, tenure, location, and hierarchical level. Individual performance was evaluated by supervisors in late October and revealed to the employees during interviews conducted during the first two weeks of November. The performance data was given to us in early December of each year.

All network metrics were calculated using Ucinet (Borgatti, Everett, & Freeman, 2002). Most of these metrics were based on individuals' outgoing sociometric choices, since our interest is in agency and outgoing choices are the ones most under a person's control. However, metrics based on incoming ties were also used as controls.

Dependent variables

The dependent variables were based on the following sociometric survey question (Cross & Parker, 2004): "*Often we rely on the people we work with to provide us with information to get our work done. For example, people might provide us with simple or routine administrative or technical information that we need to do our work. Alternatively people might provide us with complex information or engage in problem solving with us to help us solve novel problems. Please indicate the extent to which the people listed below provide you with information you use to accomplish your work*." The respondent could indicate a value from 0 to 6, where 0 = do not know this person, 1= very infrequently, and 6 = very frequently. Although it is possible that a respondent might report receiving a great deal of information from a person they didn't have a relationship with and didn't seek information from, we have assumed that, in most cases, responses to the survey question reflect active information-seeking. A separate matrix was created for each data collection year, yielding six matrices representing information-getting at different times. If a tie between two people in a particular year was impossible, such as when one of them was not part of the IT department, the tie was coded as a missing value. These data matrices then served as the basis for the network measures that were our dependent variables.

New information-getting ties (formation of social capital): An information-getting tie was defined as a relationship used by the focal person (ego) to acquire work-related information from another individual (an alter). To identify the formation of new such ties, we first dichotomized each information-getting matrix at one or greater, meaning that any value greater than zero in an original data matrix was recoded to 1. Then, to get the number of new ties for a given person in a given year, we used the egonet change routine within Ucinet (Borgatti et al., 2002), which counts the number of 1s in that person's row that were not present in the previous year's matrix. As noted in the results section, dichotomizing at different cutoff values had little effect on our results. We disregarded new ties that were the result of required workflow by excluding ties involving a respondent's supervisor or subordinates.

Decreasing utilization of rarely-utilized ties (decreased utilization of rarely-used social capital): We define decreasing utilization of rarely-utilized ties as the condition whereby ego decreases the frequency with which they acquire work-related information from a particular alter, and in so doing

decreases the utilization of that bit of their social capital. We use the term "rarely-utilized tie" to refer to information-getting frequencies of 3 ("somewhat infrequently") or below, as 3 ("somewhat infrequently") was the highest response on the "infrequently" part of the response scale. To measure decreasing reliance on rarely-utilized ties, we counted the number of such contacts with whom a given individual reduced their frequency of information-getting (e.g., from 3 to 2, 3 to 1, and from 2 to 1). This was done for each pair of adjacent years.

Increasing utilization of already heavily-utilized ties (increased utilization of frequently-used social capital): We define increasing utilization of already heavily-utilized ties as the condition in which the focal person (ego) increases the frequency by which they acquire work-related information from another individual (alter) and by so doing increases the utilization of their stock of social capital. We use the term "heavily-utilized tie" to refer to information-getting frequencies of 4 ("somewhat frequently") or above, as 4 was the lowest response on the "frequently" part of the response scale. To measure increasing reliance on such ties, we counted the number of frequent-tie contacts with whom a given individual increased their frequency of information-getting (as in going from 4 to 5, 5 to 6, or 4 to 6). This was done for each pair of adjacent years.

Independent variables

The principal independent variable for this study was a person's recent performance as rated by their supervisor. Various measures of supervisor-rated performance were collected annually by the Human Resources department and shared with each employee. These included separate measures for knowledge and skills, business development, client services management, project management, general management, employee leadership, and decision-making. Each of these was measured on a 1 to 5 scale, and the overall average score across the eight measures was calculated. A factor analysis of the eight items using the principal components routine in SPSS indicated that they load as one factor. The factor analysis was conducted for each year that we have performance data. We also tested the reliability of the scales for each year, and found that Cronbach's alpha ranged from 0.815 to 0.893. The scores for each year were then transformed into z-scores, so that in each year a score of zero represented average performance. In order to test for a U-shaped relationship between performance evaluation and reliance on already heavily-utilized ties, we squared the standardized performance feedback variable.

Control variables

In this longitudinal study, we used two kinds of control variables: those dependent on both time and the individual (which we term person controls), and those dependent only on time (termed global controls). Note that, with our fixed-effects models, time-invariant controls such as gender were not used.

Person controls

New incoming ties in prior period: Based on norms of reciprocity (Gouldner, 1960), individuals who often provide others with information may have increased opportunities to obtain information from others in the future. Consequently, we controlled for this variable.

Existing information-getting ties: Having a large number of existing ties may make it easier for a person to make new ties in the next period, and may provide a greater appreciation of the value in doing so. This control can be considered an activity effect (Snijders et al., 2010).

Number of structural holes: We define a structural hole as the lack of a tie between two people who are both contacts of a given individual. Hence, the number of structural holes an individual

has is the number of pairs of contacts who are not connected to each other. The direction of ties between the contacts was ignored. This control was included because structural holes are sources of social capital (Burt, 2005), and it is therefore possible that the number of holes that an individual has will influence subsequent network choices.

Previously unreciprocated ties: An unreciprocated tie occurs when an individual reports receiving information from a contact, but that contact does not report receiving information from the individual. Given norms of reciprocity, it is possible that an individual who seeks information from a contact that does not seek it from the individual could feel uncomfortable, and this would provide an impetus for reducing reliance on this contact or forming new ties with others. Hence, we controlled for this factor.

Transitivity tendency: To account for the transitive processes that are known to influence network change (Festinger, 1957; Heider, 1946), we controlled for an individual's tendency to form new ties with those who are connected to their current alters. This measure was calculated using the *egonet change* routine of Ucinet (Borgatti et al., 2002).

Increasing/decreasing utilization of existing ties: In models predicting increases/decreases in utilization of certain kinds of information-getting ties (e.g., rarely-utilized ties, heavily-utilized ties), we controlled for increases/decreases in ties of all kinds.

Lost ties due to exit: Although the number of people in our sample was relatively stable over time, the set of specific individuals varied over time as some people left the organization and new people joined. Since people might be motivated to replace contacts lost to organizational turnover, we controlled for this variable.

Hierarchical level: In our sample, several employees received promotions and demotions during the study period. Changes in role can have strong effects on a person's instrumental ties (Kleinbaum, 2012) as certain ties "come with" the job. We controlled for this in order to focus on network changes due directly to individual agency.

Global controls

Number of co-located people: Prior research (Festinger, Schachter, & Back, 1950) indicates that individuals are more likely to make new ties with people that are co-located. Therefore, the more people who are located in a particular location, the greater the likelihood that individuals will form new ties based on propinquity alone.

Average performance by location: Average levels of performance can differ between teams, workgroups and locations. This could potentially have an impact on the likelihood of forming new information-getting ties.

Overall network density: Over the six-year study period, we observed changes in the overall number of ties in the information-getting network. To control for this we controlled for *overall network density*, which was measured as the number of ties divided by the number possible, given the number of nodes.

Models

To assess the relationship between performance feedback and subsequent network change, we use negative binomial panel regression models, as our dependent variables (e.g., number of new information-getting ties) are counts. In all cases, we used fixed-effects models in order to control for individual differences that could influence network change, including demographics such as gender, tenure, location, education, and stable personality characteristics such as extraversion (Klein, Lim, Saltz, & Mayer, 2004), neuroticism (Kalish & Robins, 2006), self-monitoring (Mehra,

Table 1. Number of actors and descriptive statistics by year.

Year	# Employees	# Respondents	# of Same Employees as Previous Year	New Employees	Exited Employees	# Ties	Average Ties per Respondent
2004	176	161				10128	63
2005	161	142	133	28	43	11604	82
2006	164	160	127	37	34	12791	80
2007	170	111	138	32	26	9079	82
2008	169	163	140	29	30	13891	85
2009	161	157	139	22	30	14406	92
Average	167	149	135	30	33	11983	81

Note: There are 323 unique individuals in our sample. Of this total, 76 were active employees in all six years.

Table 2. Transition matrix of performance evaluations by quartiles (4th represents highest performance).

	1st	2nd	3rd	4th	Total
1st	49 (52.69%)	24 (25.81%)	16 (17.20%)	4 (4.30%)	93 (100%)
2nd	23 (29.87%)	24 (31.17%)	21 (27.27%)	9 (11.69%)	77 (100%)
3rd	7 (9.46%)	18 (24.32%)	28 (37.84%)	21 (28.38%)	74 (100%)
4th	4 (4.94%)	7 (8.64%)	23 (28.40%)	47 (58.02%)	81 (100%)
Total	83 (25.54%)	73 (22.46%)	88 (27.08%)	81 (24.92%)	325 (100%)

Kilduff, & Brass, 2001), and charisma (Balkundi, Kilduff, & Harrison, 2011). The fixed-effects models allowed us to focus on how individuals reacted over time to positive and negative performance evaluations, rather than making comparisons across individuals. In general, the independent variables in each model were measured at time t, whereas the dependent variable was measured at time $t + 1$.

Results

Table 1 provides descriptive statistics for all variables across the six time periods. The overall number of employees within the IT group was relatively constant throughout the six-year time period, ranging from 161 in 2009 to 176 in 2004. There was continual change in personnel over the period, with an average of 33 people exiting and 30 people joining the group each year. The average number of ties per respondent was lowest in 2004 (63 ties), rising to 82 in 2005 and up to 92 in 2009. We detail aggregated changes in performance evaluations in Table 2 in the form of a transition matrix of performance feedback quartiles. Although close to 60% of individuals who received an evaluation in the top quartile received a subsequent rating in this same upper quartile, there was quite a bit of up and down movement in the bottom three quartiles.

Overall descriptive statistics and Pearson correlations for the cases and variables used in the analysis are detailed in Table 3.[3] On average, each person in the analysis had 75.31 contacts from whom they sought information in varying frequencies. The high value reflects the knowledge-intensive character of the setting. The average number of ties formed with new information sources per respondent across the time periods was 17.91. The average number of contacts with whom the respondent increased interaction frequency (18.19) was similar to the average number with whom they decreased frequency (16.54). The average number of heavily-utilized contacts with whom respondents reported increasing interactions (1.26) was similar to the number they decreased

Table 3. Descriptive statistics and correlations of actors and network characteristics (2004−2009).

	Variable	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	New information-getting ties	17.91	16	0	102	1																		
2	New information-getting ties in prior period	.	.	.	.	−0.09	1																	
3	New incoming information-getting ties in prior period	16.19	15.82	0	102	−0.08	1	1																
4	Increasing utilization of existing ties	18.19	14.68	0	94	−0.04	0.15***	0.14**	1															
5	Increasing utilization of ties in prior period	.	.	.	.	−0.20***	−0.04	−0.03	0.08	1														
6	Increasing utilization of already heavy-utilized ties	1.26	3.11	0	34	0.08*	0.13**	0.12**	0.50***	0.13**	1													
7	Decreasing utilization of existing ties	16.54	14.04	0	90	−0.19***	0.01	0.01	−0.13***	0.59***	−0.03	1												
8	Decreasing utilization of ties in prior period	.	.	.	.	−0.10*	−0.19***	−0.19***	0.43***	−0.13***	0.14***	0.05	1											
9	Decreasing utilization of rarely-utilized ties	1.98	4.73	0	49	−0.19*	0.03	0.03	−0.07	0.38***	0.32***	0.77***	0.08	1										
10	Number of structural holes	704.11	812.46	0	4451	−0.21	0.15**	0.13***	0.41***	0.49***	0.28***	0.51***	0.31***	0.44***	1									
11	Existing information-getting ties	75.31	38.26	1	174	−0.31***	0.34***	0.33***	0.55***	0.55***	0.30***	0.55***	0.42***	0.44***	0.79***	1								
12	Previously unreciprocated ties	0.22	0.14	0	1	−0.13**	0.24***	0.22***	0.15***	−0.01	0.05	0.04	0.07	0.02	−0.15***	0.22***	1							
13	Transitivity tendency	0.97	0.16	0	1	0.18***	−0.32***	−0.26***	0.02	−0.05	0.03	−0.06	0.001	−0.02	−0.07	−0.24***	−0.25***	1						
14	Hierarchical level	1.51	0.83	1	4	0.02	0.01	0.04	0.21***	0.22***	0.24***	0.23***	0.22***	0.21***	0.52***	0.4***	−0.01	−0.02	1					
15	Number of co-located people	22.53	11.02	1	41	0.04	0.03	0.07***	0.22***	0.17***	0.13***	0.22***	0.17***	0.16	0.28***	0.31***	0.02	0.05	0.15***	1				
16	Average performance by location	3.62	0.16	3.16	3.94	−0.14**	0.09	0.10*	0.03	0.14***	0.06	0.03	−0.08	0.10	0.14**	0.13**	−0.32***	0.02	0.07	0.07	1			
17	Overall network density	0.46	0.09	0.3	0.57	−0.24***	−0.06	−0.05	0.29*****	0.29***	0.06	0.21***	0.14***	0.12	0.26***	0.38***	−0.14***	0.07	−0.05	0.07*	0.20***	1		
18	Lost ties due to exit	12.02	7.23	0	43	−0.28***	0.43***	0.38***	0.50***	0.38***	0.30***	0.41***	0.30***	0.36***	0.69***	0.90***	0.29***	−0.32***	0.39***	0.27***	0.13**	0.24***	1	
19	Supervisor performance evaluation	0	1	−4.44	2.94	−0.04	0.02	0.05	0.08	0.06	0.07	0.05	0.001	0.12	0.17***	0.20***	−0.10*	0.001	0.06	0.04	0.28***	0.001	0.16***	1
20	Supervisor performance evaluation squared	0.99	1.61	0	19.68	−0.05	−0.01	0.001	−0.03	−0.07	0.02	−0.06	0.001	−0.01	−0.05	−0.11	−0.04	−0.01	−0.11	−0.01	−0.01	0.001	−0.10	−0.05

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 4. Fixed-effects negative binomial regression models predicting new information-getting ties (formation of social capital).

	Model 1	Model 2
Performance feedback		
Supervisor performance evaluation		0.152** (0.055)
Person controls		
New information-getting ties added in prior period	0.0001 (0.004)	0.0001 (0.004)
New incoming information-getting ties in prior period	–0.004 (0.006)	–0.004 (0.006)
Increasing utilization of existing ties	0.016** (0.005)	0.016** (0.005)
Decreasing utilization of existing ties	0.008 (0.006)	0.008 (0.005)
Lost ties due to exit	0.018 (0.018)	0.020 (0.018)
Existing information-getting ties	–0.033*** (0.006)	–0.035*** (0.006)
Number of structural holes	0.0001 (0.0001)	0.0001 (0.0001)
Previously unreciprocated ties	0.598 (0.482)	0.530 (0.483)
Transitivity tendency	15.738 (1007.82)	15.846 (1110.43)
Hierarchical level	0.299** (0.103)	0.295*** (0.103)
Global controls		
Number of co-located people	0.017 (0.011)	0.016 (0.011)
Average performance by location	–0.775** (0.411)	–0.948* (0.413)
Overall network density	8.582* (4.107)	8.666* (4.123)
Constant	–14.481 (1077.827)	–13.883 (1110.43)
Log likelihood	–529.10	–525.31
Wald chi2	113.43	129.61
N	274	274

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
Note: Entries represent parameter estimates; standard errors are in parentheses.

interactions with (1.98). We also controlled for the number of ties lost due to people leaving the network (average of 12.02).

In Model 1 of Table 4 we detail the effects of a variety of control variables on new tie formation. We found that individuals with more existing information-getting ties were less likely to seek out new information-getting partners ($b = -0.033$, $p < .001$), which suggests that there is a cost to maintaining multiple relationships. We also found that the coefficient for increased utilization of existing information-getting ties was positive and significant ($b = 0.016$, $p < 0.01$), indicating that, in general, when people increased their utilization of existing ties, they also sought out new ties. Finally, we found a positive and significant relationship between hierarchical level (a time-variant variable in this study) and number of new ties ($b = 0.299$, $p < 0.01$). Model 2 shows that the more positive the performance feedback that an individual receives, in the form of supervisor evaluations, the more new ties—sources of social capital—they form ($b = 0.152$, $p < 0.05$), providing support for Hypothesis 1. In results not presented, our findings were consistent when using a higher threshold for what counted as a tie (i.e., greater than or equal to 2). We also conducted multi-level analyses to rule out the possibility that clustering at the level of location or manager was biasing our results. No such bias was found.

Hypothesis 2 predicted that lower performance feedback would result in the reduced utilization of rarely-tapped social capital. Model 1 of Table 5 shows the effects of just the control variables on decreased utilization of rarely-accessed information-getting ties. Model 2 indicates a negative and significant relationship between performance feedback and the number of rarely-utilized information-getting ties with decreased interaction ($b = -0.179$, $p < 0.01$). In other words, getting negative feedback is associated with a reduced utilization of rarely-tapped social capital providing support

Table 5. Fixed-effects negative binomial regression models predicting decreasing utilization of rarely-utilized ties (decreased utilization of rarely-used social capital).

	Model 1	Model 2
Performance feedback		
Supervisor performance evaluation		–0.179** (0.066)
Person controls		
Decreasing utilization of ties in prior period	0.0001 (0.004)	–0.0001 (0.004)
New incoming information-getting ties in prior period	–0.009 (0.006)	–0.011 (0.006)
Increasing utilization of existing ties	–0.004 (0.005)	–0.004 (0.004)
Decreasing utilization of existing ties	0.033*** (0.005)	0.035*** (0.005)
New information-getting ties	–0.003 (0.005)	–0.002 (0.005)
Lost ties due to exit	–0.011 (0.018)	–0.011 (0.018)
Existing information-getting ties	0.010 (0.007)	0.010 (0.007)
Number of structural holes	–0.0001 (0.001)	–0.0001 (0.001)
Previously unreciprocated ties	–1.150* (0.578)	–1.039 (0.551)
Transitivity tendency	0.150 (0.366)	0.014 (0.355)
Hierarchical level	0.022 (0.107)	0.028 (0.105)
Global controls		
Number of co-located people	–0.020 (0.012)	–0.021 (0.012)
Average performance by location	0.466 (0.420)	0.646 (0.409)
Overall network density	–4.521 (4.456)	–4.229 (4.308)
Constant	1.778 (2.787)	1.259 (2.703)
Log likelihood	–390.49	–387.02
Wald chi^2	242.71	259.00
N	245	245

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
Note: Entries represent parameter estimates; standard errors are in parentheses.

for Hypothesis 2. Additional analyses (available from the authors) did not find any significant relationship between performance feedback and decreased usage of heavily-utilized ties, indicating it was the usage of rarely-utilized ties that was primarily being altered.

In Table 6 we present results predicting increasing utilization of specific information contacts. Hypothesis 3 predicted that performance feedback and social capital utilization follow a curvilinear U-shaped relationship, such that both exceptionally high and low performance evaluations lead individuals to increase utilization of the information contacts they already rely on most heavily. In Model 1 we specify the control variables. We found that individuals higher in the hierarchy increased their reliance on a greater number of already heavily-utilized ties than other IT department members ($b = 0.295$, $p < 0.05$). Results in Model 2 include our hypothesized variables and indicate a curvilinear relationship between performance feedback valence and further reliance on already heavily-utilized contacts ($b = 0.080$, $p < 0.05$)—social capital they already rely on most heavily—providing support for Hypothesis 3. See Figure 1 for a plot of this relationship. As an aside, additional analyses did not find any significant relationship between performance feedback and increased reliance on rarely-utilized information sources, making it clear that it was only already heavily-utilized ties that were being further utilized.

Alternative mechanisms

In this paper we explain network changes as a result of individual decisions induced by unfolding events. However, we recognize the possibility of alternative mechanisms that could also explain

Table 6. Fixed-effects negative binomial regression models predicting increasing utilization of already heavily-utilized ties (increasing utilization of frequently-used social capital).

	Model 1	Model 2
Performance feedback		
Supervisor performance evaluation		–0.082 (0.074)
Supervisor performance evaluation squared		0.080* (0.037)
Person controls		
Increasing utilization of ties in prior period	0.003 (0.004)	0.004 (0.004)
New incoming information-getting ties in prior period	–0.003 (0.006)	–0.030 (0.004)
Increasing utilization of existing ties	0.019** (0.006)	0.018** (0.006)
Decreasing utilization of existing ties	–0.012 (0.008)	–0.013 (0.007)
New information-getting ties	0.006 (0.006)	0.008 (0.005)
Lost ties due to exit	–0.031 (0.022)	–0.030 (0.023)
Existing information-getting ties	0.009 (0.007)	0.008 (0.006)
Number of structural holes	–0.0001 (0.0001)	–0.0001 (0.0001)
Previously unreciprocated ties	–0.743 (0.703)	–0.940 (0.703)
Transitivity tendency	–0.006 (0.463)	–0.043 (0.458)
Hierarchical level	0.295* (0.135)	0.335* (0.135)
Global controls		
Number of co-located people	–0.028 (0.015)	–0.029 (0.016)
Average performance by location	–0.028 (0.521)	–0.306 (0.522)
Overall network density	3.223 (5.446)	2.256 (5.365)
Constant	0.608 (3.398)	1.485 (3.418)
Log likelihood	–313.94	–311.40
Wald chi2	85.34	93.09
N	243	243

Note: Entries represent parameter estimates; standard errors are in parentheses.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

our pattern of findings. For instance, it is possible that—through gossip and other processes—an individual who received a positive performance evaluation could subsequently become more visible in the workplace and be seen as a more desirable interaction partner by others. This in turn could make their attempts to form ties with others more likely to succeed and therefore result in more new ties (Hypothesis 1). Likewise, an individual who received a negative performance evaluation might become stigmatized and less attractive to others in the network, making their attempts to make new ties more difficult and leading a selection of their existing ties to shy away from them (Hypothesis 2). This mechanism of attraction could lead to a similar pattern of findings of network evolution as the one we actually observed, and yet would not involve motivational differences in agency on the part of the focal actor, as we have theorized. However, an implication of this alternative mechanism is that individuals receiving positive performance evaluations would become attractive partners to others and therefore receive more *incoming* ties. But, as shown in Table 7, there was no significant relationship between performance feedback and the subsequent number of new incoming ties ($b = 0.002$, p n.s.). This suggests that it was not changes in the attractiveness of the focal individual as a result of a performance evaluation that was driving network evolution.

We also tested models (available upon request) that ruled out self-categorization theory as an alternative explanation for our findings (i.e., the mechanism proposed by McDonald & Westphal, 2003). Specifically, we found no relationships between negative performance feedback and increased utilization of contacts within the same function or location nor decreased utilization of contacts in different functions or locations.

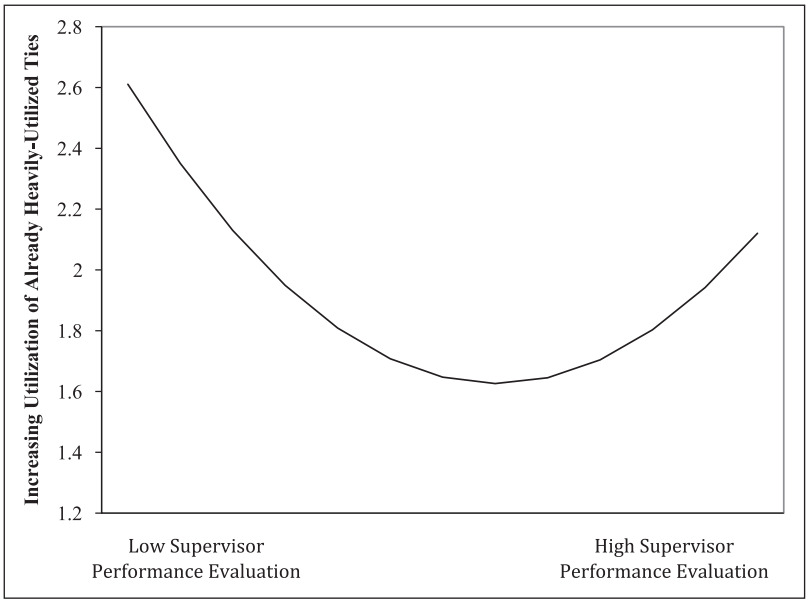

Figure 1. Relationship between supervisor performance evaluation and increasing utilization of already heavily-utilized ties.

Table 7. Fixed-effects negative binomial regression model predicting new incoming information-getting ties.

	Model 1
Performance feedback	
Supervisor performance evaluation	0.002 (0.035)
Person controls	
New information-getting ties in prior period	0.001 (0.003)
New incoming information-getting ties in prior period	–0.023*** (0.004)
Increasing utilization of existing ties	0.006* (0.003)
Decreasing utilization of existing ties	0.006* (0.003)
Lost ties due to exit	0.008 (0.010)
Existing information-getting ties	–0.001 (0.003)
Number of structural holes	–0.0001*** (0.0001)
Previously unreciprocated ties	0.882 (0.306)
Transitivity tendency	0.582 (0.237)
Hierarchical level	0.021 (0.065)
Global controls	
Number of co-located people	–0.002 (0.007)
Average performance by location	0.221) (0.228)
Overall network density	30.380*** (2.385)
Constant	–0.772** (551.33)
Log likelihood	–424.01
Wald chi2	283.93
N	274

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
Note: Entries represent parameter estimates; standard errors are in parentheses.

Post-hoc dyadic analysis

We also investigated dyadic factors that might influence changes in social capital creation in our sample. Using the multiple regression quadratic assignment procedure (Dekker, Krackhardt & Snijders 2007; Krackhardt 1987) we analyzed the formation of new ties in a subset of our data using Ucinet (Borgatti et al., 2002) (results not presented in this manuscript). We found a general tendency for new ties to form between individuals located in the same geographic region, consistent with the laws of propinquity (Allen, 1977; Festinger et al., 1950) and homophily (McPherson, Smith-Lovin, & Cook, 2001). We found a similar effect for job function. However, these homophily effects were negatively moderated by the sender's performance, meaning that the positive relationship between similarity of region or function and forming ties was reduced when the person forming the ties had a higher performance evaluation. In short, high performers were more likely to form boundary-spanning ties. In addition, we found a general tendency for top performers to form more new ties than others. These results are consistent with our actor-level fixed effect models.

Discussion

In our six-year study of a global engineering firm, we found evidence that annual performance evaluations—an environmental event that triggers individual decisions related to goal-setting behaviors—affects how individuals create and utilize social capital within the organization. In general, when an individual receives positive feedback, they expand and deepen their utilization of social capital. One way they do this is by forming new ties to information sources. Another way is by increasing the frequency of interaction with existing information sources, which serves a double purpose of strengthening their relationship and extracting additional benefit from it. In contrast, when an individual receives negative performance feedback, they make fewer new information-getting ties and reduce interaction with infrequently-utilized ties. In addition, they rebalance their social capital portfolio by increasing their utilization of heavily-used ties.

Our results show some consistency with McDonald and Westphal's (2003) research on how CEOs utilize their social capital. They showed that CEOs of poor-performing firms had a tendency to rely on the advice of other CEOS who were friends, from the same functional background, or in the same industry. Overall, this tendency towards homophily resulted in less change in corporate strategy and ultimately low firm performance. Consistent with their results, we show that an employee who receives a poor performance evaluation tends to avoid making new ties and tends to redistribute their utilization of social capital from less frequently-used ties to those they have previously relied on more heavily. In addition, we show that when the same employee receives a positive performance evaluation they will make more new ties and increase their utilization of frequently-used ties.

The pattern of results we obtained is consistent with the idea that positive and negative performance feedback affects a person's self-efficacy, in turn affecting how they manage their contacts. When an individual receives positive feedback, it is as if their confidence grows and they are more expansive in the way they utilize their social capital. When an individual receives negative feedback, they increase their reliance on a limited set of valuable sources, while cutting back on interactions with others, as if they have less confidence in managing their overall network of contacts. In other words, they appear to take defensive action and reallocate their social capital away from the risks of new and rarely-used ties toward the familiarity of well-worn, frequently-accessed ties. The assumption here is that new ties require effort to form, and rarely-used ties contain some uncertainty about the quality of information obtained from them. This is perhaps not surprising but is rarely stated in the social capital literature, where the implicit assumption is often that more is always better.

More broadly, we see performance feedback as only one of the environmental stimuli that can explain network change. Existing research already identifies many factors that determine whom an individual will view as an eligible or attractive network contact (e.g., Barabási & Albert, 1999; Festinger, 1957; Festinger et al., 1950; Gouldner, 1960; McPherson et al., 2001). But these factors are "always on," so to speak, exerting a constant pull like gravity on a boulder at the top of a mountain. What is missing from much of the existing research on network antecedents is the event or stimulus that gets the boulder moving. In this paper we study in some detail how an event such as a performance appraisal triggers dynamics of social capital creation and utilization.

A popular call in the network literature for many years now has been that we must inject more agency into network theorizing (Brass, Galaskiewicz, Greve, & Tsai, 2004; Kilduff & Brass, 2010). Network thinking, according to its critics, assumes unchanging networks of ties among identical actors who passively receive the benefits (and constraints) of their perpetual position (Borgatti, Brass, & Halgin, 2014). Whatever one thinks about the accuracy of these claims in general, the present paper is about agency and network dynamics. But to be very clear, there are many different concepts of agency (Emirbayer & Mische, 1998). Whereas for some, agency implies willful action, for others the existence of individual differences is sufficient, even if these differences are unchanging demographic or personality characteristics. In our study, the conceptualization of agency occupies a kind of middle ground; we ignore (and specifically control for) differences across individuals and look at the changes individuals make over time in how they create and utilize their social capital. At the same time, however, the trigger for these changes is in some part exogenous to the individual—an environmental event to which the individual then actively responds. We note also that the term "dynamics" typically connotes simple formation and dissolution of ties. To that conception we add an additional dimension, which is varying utilization of existing ties. We feel that in many organizational and small group contexts, where each individual is at least aware of most others, it is changes in the amounts of interaction and flow that is the most relevant network dynamic.

In this study, we have focused on the social access of key resources needed to accomplish work, namely, information. We did not study other resources, but have no reason to believe that the dynamics we observe would not apply to other resources as well, such as sharing the workload. So, for example, we would expect that when a person receives a low performance evaluation they will be less likely to seek help from those who have rarely or never helped them in the past, and will tend to seek more help from those they have depended on before. We note in passing that we are agnostic with respect to the nature of the underlying social tie that makes access to resources possible. In different situations, it may be trust, friendship, political alliance or extortion that does the job. Indeed, this is another area in which agency plays a role, as individuals seek to develop different relationships with different people.

Implications for management

Performance reviews are a common way of giving employees feedback about their work, but, as we have seen in this study, they can be counterproductive. Basic psychological processes such as we have outlined can result in an employee being their own worst enemy. Instead of focusing solely on competencies such as skills, customer service, decision-making, and project management, managers would find it advantageous to take into account the benefits of social capital. Discussing strategies for improving competencies such as knowledge acquisition through increasing creation and utilization of social capital would likely help all employees, especially those who are given negative performance evaluations. To highlight its importance, social capital could also be explicitly measured in performance evaluations (Cross et al., 2001).

Our findings suggest that it is important that, when an individual receives negative feedback, they be encouraged to expand their networks to access new social capital and to better use existing social capital rather than to limit themselves to a network composed of a small number of colleagues. Mentorship and training programs (Burt & Ronchi, 2007) could be one way to help an individual who receives a low performance review avoid constraining their social capital options. In addition, managers can play an important role by introducing their staff to others, especially colleagues in other locations. Likewise, including an employee with a low performance evaluation on cross-functional or cross-regional project teams can quickly broaden an individual's social capital (Cross, & Thomas, 2009). Managers can also provide travel budgets to facilitate face-to-face interaction, rather than just relying on virtual technology to foster social capital utilization. Individuals can also help themselves by asking colleagues about others with relevant skills and then reaching out to these individuals.

Limitations

Collecting data annually over a six-year period allowed us to answer various calls in the literature for examining network change using longitudinal data (Brass et al., 2004; Kilduff & Brass, 2010). We recognize, however, that there are certain limitations in this work. First, we have only looked at one department in one organization. This limits our ability to make general statements based on the findings, and begs replication in a different setting. Second, we were not able to measure the ties that people had to other individuals outside the department. This introduces noise into our models because an individual who responds to feedback by, say, adding new ties outside the organization would not be coded as such in our data, reducing our apparent predictive accuracy. Third, the data were collected through surveys, which brings in an element of subjectivity to the measures. Fourth, we have only examined the impact of performance evaluations on one type of network interaction—obtaining information. There are other types of relevant interactions that could be examined, such as sharing work, providing emotional support, and so on. Finally, based on prior research, we assume that positive performance evaluations contribute to self-efficacy, but a fuller test of our theory would entail an independent measure of self-efficacy. Indeed, this provides an opportunity for developing a self-efficacy scale that is specifically designed to measure self-efficacy in the arena of networking behaviors, such as creating ties and negotiating requests for help and information. Ideally, respondents would be asked to answer the self-efficacy scale at each time point in which network data were gathered. This would allow for a co-evolution model of performance feedback, self-efficacy, and social capital dynamics to be tested.

Conclusion

A large body of work has identified the benefits of social capital. Whether through serendipity or design, individuals form and maintain relationships that prove useful later on, such as when they are able to call on another's knowledge to get things done. Most work in the social capital area has focused broadly on the benefits of social capital rather than the way it is developed or how it is utilized. The present study looks not only at new tie formation but also at changes in which ties are tapped more often for information. We view this as the result of an ongoing decision-making process in which individuals respond to feedback about their performance in the organization by making adjustments in their patterns of social capital formation and utilization. We hope others will continue this line of work, particularly with regard to examining additional triggers for social capital dynamics.

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Notes

1. This difference in focus and scope makes their use of the term "potential network" somewhat confusing in our context, as for us the potential network is properly the set of all individuals in the firm that the focal actor has yet to form ties with.
2. We also investigated the possibility of non-response bias based on 2007 performance feedback, our key independent variable. Results from a t-test indicated no significant difference between respondents and nonrespondents.
3. We used the maximum number of appropriate cases for each analysis, so the *n* slightly varies across models (i.e., fixed-effects models do not include cases with all-zero outcomes across panels).

References

Ahuja, G., Soda, G., & Zaheer, A. (2012). The genesis and dynamics of organizational networks. *Organization Science*, *23*, 434–448.

Allen, T. J. (1977). *Managing the flow of technology: Technology transfer and the dissemination of technological information within the R & D organization*. Cambridge, MA: MIT Press.

Balkundi, P., Kilduff, M., & Harrison, D. A. (2011). Centrality and charisma: Comparing how leader networks and attributions affect team performance. *Journal of Applied Psychology*, *96*, 1209–1222.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*, 122–147.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*, 1–26.

Bandura, A., & Jourden, F. J. (1991). Self-regulatory mechanisms governing the impact of social comparison on complex decision making. *Journal of Personality and Social Psychology*, *60*, 941–951.

Barabási, A. L., & Albert, R. (1999). Emergence of scaling in random networks. *Science*, *286*(5439), 509–512.

Baron, R. A. (1988). Negative effects of destructive criticism: Impact on conflict, self-efficacy, and task performance. *Journal of Applied Psychology*, *73*, 199–207.

Borgatti, S. P., Brass, D. J., & Halgin, D. S. (2014). Social network research: Confusions, criticisms, and controversies. In S. P. Borgatti, D. J. Brass, D. S. Halgin, G. Labianca, & A. Mehra (Eds.), *Research in the sociology of organizations*, vol. 40 (pp. 1–29). Bingley, UK: Emerald Publishing.

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). *Ucinet for Windows: Software for social network analysis*. Harvard, MA: Analytic Technologies.

Brass, D. J. (1981). Structural relationships, job characteristics, and worker satisfaction and performance. *Administrative Science Quarterly*, *26*, 331–348.

Brass, D. J. (1984). Being in the right place: A structural analysis of individual influence in an organization. *Administrative Science Quarterly*, *29*, 518–539.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal*, *47*, 795–817.

Brown, S. P., Ganesan, S., & Challagalla, G. (2001). Self-efficacy as a moderator of information-seeking effectiveness. *Journal of Applied Psychology*, *86*, 1043–1051.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, *110*, 349–399.

Burt, R. S. (2005). *Brokerage and closure: An introduction to social capital*. Oxford, UK: Oxford University Press.

Burt, R. S., & Ronchi, D. (2007). Teaching executives to see social capital: Results from a field experiment. *Social Science Research*, *36*, 1156–1183.

Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory approach to human behavior*. New York: Springer-Verlag.

Cross, R., & Cummings, J. N. (2004). Tie and network correlates of individual performance in knowledge-intensive work. *Academy of Management Journal*, *47*, 928–937.

Cross, R., & Parker, A. (2004). *The hidden power of social networks: Understanding how work really gets done in organizations*. Boston, MA: Harvard Business School Press.

Cross, R., Parker, A., Prusak, L., & Borgatti, S. P. (2001). Knowing what we know: Supporting knowledge creation and sharing in social networks. *Organizational Dynamics*, *30*, 100–120.

Cross, R. L., & Thomas, R. J. (2009). *Driving results through social networks: How top organizations leverage networks for performance and growth*. San Francisco, CA: Jossey-Bass.

Davenport, T. H., & Beck, J. C. (2001). *The attention economy: Understanding the new currency of business*. Boston, MA: Harvard Business School Press.

Dekker, D., Krackhardt, D., & Snijders, T. A. B. (2007). Sensitivity of MRQAP tests to collinearity and autocorrelation conditions. *Psychometrika*, *72*, 563–581.

Emirbayer, M., & Mische, A. (1998). What is agency? *American Journal of Sociology*, *103*, 962–1023.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.

Festinger, L., Schachter, K. W., & Back, S. (1950). *Social pressures in informal groups: A study of human factors in housing*. Stanford, CA: Stanford University Press.

Fisher, C. D., & Ashkanasy, N. M. (2000). The emerging role of emotions in work life: An introduction. *Journal of Organizational Behavior*, *21*, 123–129.

Gist, M. E., & Mitchell, T. R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. *Academy of Management Review*, *17*, 183–211.

Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American Sociological Review*, *25*, 161–178.

Grant, A. (2013). *Give and take: A revolutionary approach to success*. New York: Viking.

Gulati, R., & Srivastava, S. B. (2014). Bringing agency back into network research: Constrained agency and network action. In D. J. Brass, G. Labianca, A. Mehra, D. S. Halgin, & S. P. Borgatti (Eds.), *Research in the sociology of organizations*, vol. 40 (pp. 73–93). Bingley, UK: Emerald Publishing.

Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*, *44*, 82–111.

Hansen, M. T., Podolny, J. M., & Pfeffer, J. (2001). So many ties, so little time: A task contingency perspective on corporate social capital in organizations. In K. S. Cook & J. Hagan (Eds.), *Research in the sociology of organizations*, vol. 18 (pp. 21–57). Greenwich, CT: JAI Press.

Heider, F. (1946). Attitudes and cognitive organization. *Journal of Psychology*, *21*, 107–112.

Hogg, M. A., & Abrams, D. (1993). Towards a single-process uncertainty-reduction model of social motivation in groups. In M. A. Hogg & D. Abrams (Eds.), *Group motivation: Social psychological perspectives* (pp.173–190). New York: Harvester-Wheatsheaf.

Karl, K. A., O'Leary-Kelly, A. M., & Martocchio, J. J. (1993). The impact of feedback and self-efficacy on performance in training. *Journal of Organizational Behavior*, *14*, 379–394.

Kijkuit, B., & van den Ende, J. (2010). With a little help from our colleagues: A longitudinal study of social networks for innovation. *Organization Studies*, *31*, 451–479.

Kalish, Y., & Robins, G. (2006). Psychological predispositions and network structure: The relationship between individual predispositions, structural holes and network closure. *Social Networks*, *28*, 56–84.

Kilduff, M., & Brass, D. J. (2010). Organizational social network research: Core ideas and key debates. *Academy of Management Annals*, *4*, 317–357.

Klein, K. J., Lim, B. C., Saltz, J. L., & Mayer, D. M. (2004). How do they get there? An examination of the antecedents of centrality in team networks. *Academy of Management Journal*, *47*, 952–963.

Kleinbaum, A. M. (2012). Organizational misfits and the origins of brokerage in intrafirm networks. *Administrative Science Quarterly*, *57*, 407–452.

Kluger, A. N., & DeNisi, A. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin*, *119*, 254–284.

Krackhardt, D. (1987). Predicting with networks: Nonparametric multiple-regression analysis of dyadic data. *Social Networks*, *10*, 359–381.

Krackhardt, D. (1992). The strength of strong ties: The importance of philos in organizations. In N. Nohria & R. G. Eccles (Eds.), *Networks and organizations: Structure, form, and action* (pp. 216–239). Boston, MA: Harvard Business School Press.

Leary, M. R., & Atherton, S. C. (1986). Self-efficacy, social anxiety, and inhibition in interpersonal encounters. *Journal of Social and Clinical Psychology*, *4*, 256–267.

Lee, C. (1984) Accuracy of efficacy and outcome expectations in predicting performance in a simulated assertiveness task. *Cognitive Therapy and Research*, *8*, 37–48.

Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology*, *14*, 319–340.

Lin, N. (1999). Building a network theory of social capital. *Connections*, *22*, 28–51.

Lin, N. (2001). *Social capital: A theory of social structure and action*. New York: Cambridge University Press.

Lin, N., Cook, K., & Burt, R. S. (Eds.) (2001). *Social capital theory and research*. New Brunswick, NJ: Transaction Publishers.

Lindsley, D. H., Brass, D. J., & Thomas, J. B. (1995). Efficacy-performing spirals: A multilevel perspective. *Academy of Management Review*, *20*, 645–678.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice-Hall.

Lord, R. G., Diefendorff, J. M., Schmidt, A. M., & Hall, R. J. (2010). Self-regulation at work. *Annual Review of Psychology*, *61*, 543–568.

March, J. G. (1999). A learning perspective on the network dynamics of institutional integration. In M. Egeberg & P. Laegreid (Eds.), *Organizing political institutions* (pp. 129–155). Oslo, Norway: Scandinavian University Press.

Marsden, P. V. (2005). Recent developments in network measurement. *Models and Methods in Social Network Analysis*, *8*, 30–53.

Maurer, I., Bartsch, V., & Ebers, M. (2011). The value of intra-organizational social capital: How it fosters knowledge transfer, innovation performance, and growth. *Organization Studies*, *32*, 157–185.

McDonald, M. L., & Westphal, J. D. (2003). Getting by with the advice of their friends: CEOs' advice networks and firms' strategic responses to poor performance. *Administrative Science Quarterly*, *48*, 1–32.

McPherson, M., Smith-Lovin, L., & Cook, J. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, *27*, 415–444.

Mehra, A., Kilduff, M., & Brass, D. J. (2001). The social networks of high and low self-monitors: Implications for workplace performance. *Administrative Science Quarterly*, *46*, 121–146.

Menon, T., & Smith, E. B. (2014). Identities in flux: Cognitive network activation in times of change. *Social Science Research*, *45*, 117–130.

Mizruchi, M. S., & Stearns, L. B. (2001). Getting deals done: The use of social networks in bank decision-making. *American Sociological Review*, *66*, 647–671.

Mueller, J. S., & Kamdar, D. (2011). Why seeking help from teammates is a blessing and a curse: A theory of help seeking and individual creativity in team contexts. *Journal of Applied Psychology*, *96*, 263–276.

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

Sasovova, Z., Mehra, A., Borgatti, S. P., & Schippers, M. C. (2010). Network churn: The effects of self-monitoring personality on brokerage dynamics. *Administrative Science Quarterly*, *55*, 639–670.

Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization and model. *Psychological Bulletin*, *92*, 641–669.

Schlenker, B. R., & Leary, M. R. (1985) Social anxiety and communication about the self. *Journal of Language and Social Psychology*, *4*, 171–192.

Simon, H. A. (1971). Designing organizations for an information-rich world. In M. Greenberger (Ed.), *Computers, communications, and the public interest* (pp. 37–52). Baltimore, MD: Johns Hopkins University Press.

Smith, E. B., Menon, T., & Thompson, L. (2012). Status differences in the cognitive activation of social networks. *Organization Science*, *23*, 67–82.

Snijders, T. A., van de Bunt, G. G., & Steglich, C. E. G. (2010). Introduction to stochastic actor-based models for network dynamics. *Social Networks*, *32*, 44–60.

Sparrowe, R. T., Liden, R. C., Wayne, S. J., & Kraimer, M. L. (2001). Social networks and the performance of individuals and groups. *Academy of Management Journal*, *44*, 316–325.

Stajkovic, A. D., & Luthans, F. (1998). Self-efficacy and work-related performance: A meta-analysis. *Psychological Bulletin*, *124*, 240–261.

Staw, B. M., Sandelands, L. E., & Dutton, J. E. (1981). Threat rigidity effects in organizational behavior: A multilevel analysis. *Administrative Science Quarterly*, *26*, 501–524.

Taylor, M. S., Locke, E. A., Lee, C., & Gist, M. E. (1984). Type A behavior and faculty research productivity: What are the mechanisms? *Organizational Behavior and Human Performance*, *34*, 402–418.

Wellman, B. (2002). Little boxes, glocalization, and networked individualism. In M. Tanabe, P. van den Besselaar, & T. Ishida (Eds.), *Digital cities II: Computational and sociological approaches* (pp. 10–25). Berlin, Germany: Springer.

Wood, R., & Bandura, A. (1989). Social cognitive theory of organizational management. *Academy of Management Review*, *14*, 361–384.

Wood, R. E., & Locke, E. A. (1987). The relation of self-efficacy and grade goals to academic performance. *Educational and Psychological Measurement*, *47*, 1013–1024.

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