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ESSAYS ON INDIVIDUAL PERFORMANCE AND ORGANIZATIONAL NETWORKS

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DISSERTATION OVERVIEW

A key question in the study of organizations is why some individuals perform better than others. Understanding the drivers of individual performance is important because organizations rely heavily on their human resources to build value. Among the different perspectives that have been proposed to explain variance in individual performance, the social network approach has emerged as a widely accepted one. Informal relationships among individuals are seen as a source of both opportunities and constraints. As such, employees' outcomes depend in part on their position in the social network structure. Understanding how informal relationships affect performance requires a theory that explains not only how individuals attain valuable network positions, but also how they take advantage of those positions.

In this dissertation, I propose to answer these questions and further our understanding of the link between individual performance and social networks by analyzing both the evolution of intraorganizational informal ties (Chapter 1) and the mechanisms underpinning the ability of individuals to extract rents from their structural positions (Chapter 2 and Chapter 3).

In the first chapter—co-authored with Giuseppe Soda and Brandy Aven—adopting an organizational design perspective on the evolution of social networks, we design a quasi-experiment to investigate the evolution of informal ties following a managerial intervention that encourages some employees to become key social network players. This study advances our understanding of how individuals move into valuable network positions by illustrating the role that organization design may play in shaping the evolution of social ties.

In the second and third chapter, which focus on the concept of brokerage, I explore two mechanisms that affect individuals' ability to derive advantages from bridging across different groups. Specifically, in the second chapter—co-authored with Giuseppe Soda and Marco

Tortoriello and published in the *Academy of Management Journal*—distinguishing brokerage (structural property of individuals in a network) from brokering (behavioral strategic orientation toward interacting with others), we theorize and find suggestive evidence for the fact that brokers' strategic orientations play an important role in explaining individual performance over and above their structural position. In the third chapter, which is a solo-authored manuscript, disentangling actual and cognitive social structures with respect to brokerage positions, I propose that alters' perceptions of a focal actor's brokerage opportunities play a moderating role in the relationship between individual performance and network positions with higher returns accruing to actual brokers who are misperceived by their alters to occupy dense social networks. Furthermore, I also investigate the role of trust as a mechanism explaining why people who are perceived to have cohesive networks perform better than people perceived to bridge across different groups.

Moving beyond a pure structuralist approach, which assumes that the major determinant of employees' performance rests in the social structure surrounding them, this dissertation sheds light on why some people perform better than others by focusing on processes and socio-cognitive mechanisms associated with attaining and taking advantage of specific network positions.

CHAPTER 1: Monetizing Social Ties: A Quasi-Experiment on the Effects of Monetary Incentives on Informal Knowledge Sharing

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ABSTRACT

Social networks have been shown to play an important role for knowledge sharing—a key driver of organizational success and a source of competitive advantage—by facilitating information flows among individuals. Despite their importance, however, relatively little is known as to whether organizations can directly influence informal networks among employees. In this paper, building on social network theories as well as previous findings regarding the motivational effects of incentives, we explore the extent to which direct interventions in the form of (performance-contingent) monetary incentives may affect employees' position in the informal network. In particular, leveraging longitudinal network data from employees working for a multinational organization, we design and implement a quasi-experiment based on a managerial intervention that incentivizes some employees to increase their prominence as knowledge providers within the informal network. Building on social network theories as well as previous findings regarding the motivational effects of incentives, we develop predictions about the effects of monetary incentives on employees' social networks. We find that monetary incentives are associated with increases in employees' network prominence, and that variations in individuals' networking behavior mediate the link between managerial incentives and network prominence. Our study suggests that although organizations may be effective at directly shaping informal networks, they may also fundamentally change the processes through which people informally connect with one another.

Keywords: organizational networks; informal knowledge sharing; monetary incentives; field quasi-experiment

INTRODUCTION

Knowledge sharing—defined as the process through which one individual is affected by the experience of another—is a key mechanism for organizational success and a source of competitive advantage (Argote & Ingram, 2000; Zander & Kogut, 1995). Because a significant amount of the knowledge that organizations possess is embedded within its individual members, ties among employees represent a key mechanism for disseminating information and expertise (Borgatti & Cross, 2003). Despite the pivotal role of knowledge sharing in the success of organizations, scholars have documented the existence of multiple factors that can impede it, such as geographical distance, organizational subcultures, and differences in professional backgrounds (Hansen, 1999; Katz & Allen, 1982; Tortoriello, Reagans, & McEvily, 2012; Szulanski & Lee, 2018). Thus, a central issue for managers is understanding ways in which knowledge sharing can be encouraged, in the face of interpersonal and organizational barriers that challenge it.

Research on reward systems provides an important framework to understand the processes that might encourage knowledge sharing, especially in the context of formal ties (Lee & Puranam, 2017). For example, monetary incentives can encourage knowledge sharing through formal interactions, such as contributions during work meetings (Bartol & Srivastava, 2002) and contributions to centralized organizational knowledge repositories (Constant, Sproull, & Kiesler, 1996). Although helpful in improving scholarly understanding of the relationship between incentives and knowledge sharing, this stream of research only provides a partial account of the phenomenon. Knowledge sharing is not bound to only *formal* ties, as *informal* ties also play a paramount role in shaping the way in which knowledge spreads among people (Gulati & Puranam, 2009; Hansen, 1999; Krackhardt & Hanson, 1993; He, Li,

Feng, Zhang, & Sturman, 2020). More specifically, in this paper, we conceptualize formal ties as determined by organizational tasks and role interdependencies (Weiss & Jacobson, 1955), and informal ties as emergent interactions informed by interpersonal preferences and behaviors (Kleinbaum, Stuart, & Tushman, 2013; McEvily, Soda, & Tortoriello, 2014). These informal ties, which constitute the organizational social network, have been found to be influential for innovation (Burt, 2004; Reagans & McEvily, 2003), creativity (Perry-Smith, 2006), and the diffusion of best practices (Hansen, 1999). Yet, it is not clear whether introducing monetary incentives might affect knowledge sharing via informal ties, because reward systems can alter motivations to share knowledge and thus can lead to unintended consequences for informal, discretionary relationships (Bandiera, Baranaky, & Rasul, 2009; Gneezy & Rustichini, 2000). Put differently, while the preponderance of knowledge sharing studies have focused on formal ties within organizations, it is unclear if incentives would also produce the desired effects on the creation of informal ties.

A key element underpinning informal knowledge sharing is the motivation of individuals to connect with and provide knowledge to others (Reagans & McEvily, 2003; Reinholt, Pedersen, & Foss, 2011). Indeed, past research shows that central connectors—those who are the go-to person for most of their colleagues—play a central role for organizations because they increase the spread of knowledge (Cross & Prusak, 2002). In addition, providing knowledge to others has been shown to be important not only for the receiver, but also for the giver (Ibarra, 1992; Ibarra & Andrews, 1993; Krackhardt & Porter, 1985). By informally sharing knowledge with other organizational members, individuals engage in conversations in which they are likely to explore problem domains, learn about others' expertise or experiences, and build relationships that they can leverage in the future (Brown & Duguid, 1993).

Given that a critical factor for organizational success rests on employees sharing their knowledge through informal ties, can managers use monetary incentives to directly increase the size of their employees' knowledge provision networks? To answer this research question, we conducted a field quasi-experiment based on longitudinal network data capturing knowledge-sharing informal interactions among 332 employees working for a multinational organization. This research design allowed us to investigate changes in employees' knowledge provision networks following a managerial intervention that altered the variable pay structure of 60 employees, incentivizing them to become key informal providers of knowledge. That is, under this new incentive system, some employees were financially rewarded based on a networking performance indicator—being sought by others for knowledge support—which was not directly under their control. In particular, we refer to this construct as network prominence, which thus captures the extent to which an employee is sought for advice by many others. Additionally, we refer to monetary incentives to indicate pay for performance rewards linked to changes in employees' prominence in the informal knowledge network.

Rewarding employees contingent on others seeking knowledge from them poses a challenge, since those being incentivized have limited control over who comes to them for knowledge. Drawing on research on incentives and social networks, we develop predictions about the effects of monetary incentives on individual network prominence as well as the mechanisms through which incentivized employees may enact their social networks to achieve their objective. Specifically, we argue that incentivized employees should react positively to incentives by creating more knowledge ties with others, trying to maximize the probability of tie reciprocation. Furthermore, given the well-established assumption that individuals have finite "social budgets" that restrict how many network connections they can build and maintain

(Hill & Dunbar, 2003), we contend that incentivized individuals will be more likely to build new ties with "familiar" others—such as friends, those with whom they share common third parties, those who are similar to them, and those who are more physically proximate—because these contacts potentially offer a lower risk of non-reciprocation relative to "unfamiliar" others. Thus, central to our theory is the expectation that reciprocity disproportionately affects the impact of broad incentives on the formation of knowledge-sharing ties. In line with this contention, we observe that incentivized employees increase their prominence in the knowledge provision network and that variance in incentivized employees' network positions can be linked to changes in their networking behavior.

Investigating through a field quasi-experiment whether and how monetary incentives influence individuals' prominence in the knowledge network, this paper makes four main contributions. First, it advances research on intraorganizational knowledge sharing by illustrating the conditions under which organizational members may be more willing to create knowledge-based ties with one another (Borgatti & Cross, 2003; Reagans & McEvily, 2003). Second, it adds to growing research in organization theory and design on the relationship between formal organization and informal social structures, showing the effect that formal features—such as monetary incentives—may have on emergent informal structures (McEvily, Soda, & Tortoriello, 2014; Clement & Puranam, 2017; Yakubovich & Burg, 2019). Third, this paper joins the growing literature in social network research that investigates the role of strategic interventions aimed at shaping informal patterns of interactions (Valente, 2012; Banerjee, Chandrasekhar, Duflo, & Jackson, 2018; Hasan & Koning, 2020). Finally, our theory and results contribute to research on the potentially unintended consequences of incentive designs (Kerr, 1975; Larkin, Pierce, & Gino, 2012; Gubler, Larkin, & Pierce, 2016; Dahl &

Pierce, 2020), showing that while the incentive system was designed to promote explorative networking by organizational members, it actually led to exploitation of pre-existing social structures.

THEORY AND HYPOTHESES

Organizational Efforts to Shape Informal Networks

Organizational research has recognized that informal patterns of interactions among employees are a key mechanism underlying knowledge sharing, and thus represent a source of competitive advantage that is difficult to observe and replicate (Argote & Ingram, 2000). Unfortunately, as aptly pointed out by Krackhardt and Stern (1988: 123) an effective social structure "does not occur naturally, but must be designed consciously and carefully." To facilitate knowledge flows through informal channels and increase employees' network prominence, organizations commonly try to orchestrate emerging interactions through indirect, formal interventions aimed at facilitating tie formation. That is, insofar as organizations have attempted to shape informal ties, they have focused on designing interventions that could indirectly alter the probability of two individuals to connect, such as relocating branches or implementing open space offices. For example, studying employees working for an e-commerce company, Lee (2019) suggests that a reconfiguration in the spatial proximity among employees determines increased informal interactions that is conducive to more exploration. In a similar vein, Van den Bulte and Moenaert (1998) found that communication flows among R&D teams that were previously separated enhanced after their co-location in a new facility. More recently, studying entrepreneurs in India, Hasan and Koning (2020) designed a field experiment to investigate the effect of joint tasks on social networks. They found that formally assigning

individuals to product development teams significantly affected the formation of informal interactions, such as friendship and advice.

Much of the above-mentioned literature portrays organizational interventions to modify social networks as an indirect process, in which informal ties are shaped incidentally. While we agree that research on indirect interventions has greatly increased our understanding of interpersonal dynamics, it is valuable to investigate whether organizations can shape informal knowledge sharing among employees through more direct interventions, such as pay for performance incentives linked to social networks.

Monetary Incentives and Network Prominence

Throughout the literature on informal networks within organization, scholars have found that variation in individuals' positions correspond to different status, power, and resource benefits. For example, employees who bridge disconnected groups within organizations are more likely to be promoted, have better ideas, and receive higher compensation (Burt, 2004). In line with earlier research (Brass, 1984), Krackhardt's (1990) study of a small entrepreneurial firm demonstrated that employees' power corresponds with their network centrality. Individual network positions have also been found to reflect status, where centrality is indicative of rank in a status hierarchy (Podolny, 2001). The underlying assumption of the majority of this research is that knowledge exchanges—facilitated by social network connections—can provide resource advantages and opportunities for individuals within an organizational context (Rodan & Galunic, 2004; Iorio, 2019).

Following these findings, research has sought to determine how individuals come to occupy such beneficial networks positions. The quest for understanding the antecedents of network positions has fueled a long-lasting debate between two schools of thought: one that

emphasizes individual agency, and another that emphasizes structural determinism (Emirbayer & Goodwin 1994; Casciaro, Gino, & Kouchaki, 2014). Individual agency—the idea that individuals play an active role in determining their networks by purposefully creating ties—has focused primarily on individual differences to explore ways in which social actors can enact their social networks (Oh & Kilduff, 2008; Sasovova, Mehra, Borgatti, & Schippers, 2010; Klein, Lim, Saltz, & Mayer, 2004). And although there has been some evidence that suggests that teaching organizational members network concepts, such as brokerage, can improve their individual performance (Burt & Ronchi, 2007), it is not altogether apparent how individuals might change their network positions and increase their network prominence provided that it is not solely determined by them. Indeed, structural determinism—the idea that constraints and opportunities created by the social structure itself leave little room for individual choice in enacting ties—argues that networks fundamentally limit the capacity of any one individual to solely determine her position in that network.

Nevertheless, certain behavioral consistencies that are prevalent within networks suggest that individual may influence the creation of relationship, which may in turn affect their network prominence (Dahlander & McFarland, 2013; Monge & Contractor, 2001). Moreover, the notion that individuals may have an active role in determining their social structures is further corroborated by recent research, which has shown how some social networks configurations—such as brokerage—can be better understood as a process, rather than a static phenomenon, in which individuals strategically create and drop ties to achieve their goal (Obstfeld, 2005; Lingo & O'Mahony, 2010; Obstfeld, Borgatti, & Davis, 2014). In a similar vein, Buskens and Van de Rijt's (2008) game theory study of network dynamics shows that focal actors enact their social structures by occupying specific network positions to optimize their underlying payoff structure.

This line of research shows that what matters with respect to an individual willingness and ability to exert agency is her motivation to do so. In organizational settings, such a motivation to shape structures rests on the fact that employees are rewarded based on the outcomes, or secondary outcomes, stemming from their network prominence (e.g., good ideas, creativity, etc.) rather than their network prominence directly. An important assumption in this line of reasoning is that there is no causal ambiguity in the path between network prominence and positive outcomes, such that employees are assumed to have perfect knowledge about which network position will be more conducive to their success, and will share their networks accordingly. However, a more realistic assumption is that causal attribution biases may limit an individual ability to determine causal paths between informal positions and their relative outcomes. Introducing performance-contingent monetary incentives linked to occupying specific network positions could decrease causal ambiguity, thus increasing employees' motivation to become prominent. Thus, we contend that rewarding employees based on their network prominence increases their overall motivation to achieve this particular position.

Hypothesis 1: Incentivized individuals will increase their social network prominence to a greater extent than non-incentivized individuals.

Networking Mechanisms Linking Monetary Incentives to Network Prominence

In the previous section, we argued that introducing monetary incentives will increase individuals' prominence as knowledge providers in the organizational informal knowledge network. We have not yet explored, however, potential mechanisms of this effect. What do individuals do to achieve their goals? We address this question using a social networks lens, thus investigating the extent to which networking behaviors—defined as individuals' attempts

to develop social ties with others who "have the potential to assist them in their achievements" (Forret & Dougherty, 2004: 420)"—change in response to monetary incentives.

Drawing on Puranam and colleagues' (2012) framework, we argue that rewarding employees through pay for performance incentives linked to indicators that are only partially under, such as in the case of network prominence, represents a condition of *epistemic interdependence*. Specifically, the decision of incentivized individuals to form a new tie or not with a colleague depends on predicting whether that colleague will reciprocate the tie, thus increasing their prominence in the knowledge provision network.[1] As such, incentivized individuals may consider who might be more likely to reciprocate a knowledge tie.

Given the well-established assumption that individuals have finite "social budgets" that restrict how many network connections they can build and maintain (Hill & Dunbar, 2003), we contend that incentivized individuals face a relationship investment problem of how to best allocate their time and interpersonal efforts in order to maximize the probability of achieving their network-based objective. Acknowledging the importance of reciprocation, we theorize that incentivized individuals are more likely to build new ties with "familiar" others, such as friends, those with whom they share common third parties, those who are similar to them, and those who are more physically proximate, because these contacts potentially offer a lower risk of non-reciprocation relative to "unfamiliar" others. In line with the epistemic interdependence perspective (Puranam, Raveendran, & Knudsen, 2012), incentivized actors will rely on relational heuristics to develop predictive knowledge about others' likelihood of reciprocating

[1] According to Puranam and colleagues' (2012) framework, two agents are epistemically interdependent if at least one agent "faces broad incentives" and she is "scheduled to act before knowing the action of the other" (2012: 427). In our context, incentivized actors are rewarded based on the other agents' actions and incentivized actors do not observe others' networking actions before forming new ties. Thus, the optimal action of an incentivized agent depends on a prediction of what the other agent will do.

a tie. Viewed in the language of relationship investment, familiar others provide known payoffs, especially when compared to the uncertain value of establishing new relationships with unfamiliar others. We theorize that, when actors face epistemic interdependence, they will be less likely to invest their finite social budget in unfamiliar, riskier connections.

Our theoretical focus on reciprocity is not incidental. A rich literature on the emergence and evolution of social relationships pinpoints reciprocity as a key mechanism informing human interactions. For example, paraphrasing Cicero, Gouldner states in his foundational work that "there is no duty more indispensable than that of returning a kindness" (1960: 161), thus speaking to the philosophical foundation of reciprocity. Expanding this intuition, Blau argued that reciprocity resides at: "[...] the core of the exchange concept" (1963: 140). More recently, Putnam linked reciprocity to the idea of social capital pointing out that it is the "[…] the touchstone of social capital" (2000: 134). The norm of reciprocity is the key building brick of any social community and molds the *homo reciprocus* (Becker, 1956) who behaves by giving back what received by others in a system of relational "rights and duties" (Gouldner, 1960: 169). Moving from a pure dyadic perspective, Simmel (1950) argued that social equilibrium and cohesion could not exist without "the reciprocity of service and return service," and that "all contacts among men rest on the schema of giving and returning the equivalence."

In sum, although incentivized actors do not have direct control over who comes to them for advice, they may strategically control their knowledge-seeking behavior in search of reciprocation. To minimize the risk on non-reciprocation, they will adopt a set of networking behaviors that we develop below.

Knowledge Outreach. Despite both cognitive and time constraints that place an upper limit on the number of relationships that can be maintained (Roberts, Dunbar, Pollet, & Kuppens, 2009; Dunbar, 2008; Milardo, Johnson, & Huston, 1983), we argue that, on average, incentivized actors should become more proactive and build more informal ties (i.e., knowledge outreach). The formation of network ties ensures that incentivized employees enter the consideration set of other employees. By proactively seeking advice and forming ties, incentivized employees create a conduit of information through which their targets have the possibility to learn about incentivized actors' competencies and knowledge, thus making them aware of the resources that can be accessed by reciprocating (Hasan & Koning, 2019). Knowledge interactions, including asking proactively advice from other, is a way that individuals have also to show their knowledge and expertise. As a rich and influential research stream shows, gaining respectfulness enhances reciprocity (Cialdini, 2003; Lawler, 2001), helpfulness (Settoon & Mossholder, 2002) and commitment to the relationship (Flynn & Brockner, 2003). Thus, entering the consideration set by embracing a more proactive networking behavior is the first stage toward reciprocity. Building ties opens up the possibility that those sought for advice will reciprocate the tie based on the "duties and rights" logic that the norm of reciprocity embodies (Newcomb, 1956; Montoya & Insko, 2008), thus increasing incentivized actors' prominence in the knowledge network. Finally, because knowledge ties are intrinsically instrumental, and thus less characterized by emotional closeness between parties, the constraints on the absolute size of individuals that an ego can maintain should be mitigated (Roberts, Dunbar, Pollet, & Kuppens, 2009), thus making the activation of networking behavior easier. In sum, in a knowledge context we hypothesize that those who seek a lot of others for advice will also be sought more.

Hypothesis 2a: Incentivized individuals will increase their knowledge outreach to a greater extent than non-incentivized individuals.

Hypothesis 2b: Knowledge outreach will mediate the effect between performance-contingent incentives and social network prominence.

Embeddedness. The tendency of individuals to form a relationship if they have common third parties is another important driver triggering tie-formation decisions. This tendency is based on the transitivity principle (Wasserman & Faust, 1994), according to which two individuals are more likely to be connected if they have one or more other acquaintances in common.

A rich stream of research shows that embedded ties—dyadic relations with a shared third party—are more stable over time (Krackhardt, 1998). These particular ties induce trust and commitment in the relationship, creating information redundancy that allows for greater capacity to transmit information (Ter Wal, Alexy, Block, & Sandner, 2016; Uzzi, 1996; Reagans & McEvily, 2003; Aral & Van Alstyne, 2011). Although such a redundancy clashes with efficiency (Burt 1992), it enhances the likelihood of reciprocity. Research on network closure shows that ties cemented through common third parties can be useful because they embody shared norms, common identities, routines, and pre-aligned interests and perspectives (Obstfeld, 2005). Therefore, network ties with common third parties reduce information asymmetries (Krackhardt, 1999) and facilitate the development of trust between parties since they allow the possibility of social sanctioning, thus preventing parties to behave counter-normatively (Buskens, 2002). By choosing alters with common third parties, incentivized individuals increase the chances of engaging in cooperative action and so reduce the risks of non-reciprocation.

Hypothesis 3a: Incentivized individuals will increase the number of knowledge ties with common third parties to a greater extent than non-incentivized individuals.

Hypothesis 3b: Common third parties knowledge ties will mediate the effect between performance-contingent incentives and social network prominence.

Multiplexity. A long research tradition shows the importance of friendship ties in interpersonal dynamics (Casciaro & Lobo, 2008; Krackhardt & Stern, 1988). Granovetter's (1973) idea of tie strength includes both reciprocity and emotional attachment, where the latter constitutes a base of trust and provide individuals support in the face of uncertainty (Casciaro & Lobo, 2008; Krackhardt, 2003). In our research context, given the revised system of incentives, treated individuals will tend to form multiplex ties by pairing knowledge ties with existing friendship ties.

In choosing among contacts, there are at least two mechanisms that would predict that incentivized actors will prefer to form new advice ties with contacts who are also friends. First, incentivized actors may believe that the risk of non-reciprocation is lower among friends than among non-friends, because affective-based ties entail repeated interactions that are conducive to trust and soften perception of competition between parties (Lazega & Van Duijn, 1997; Lazega & Pattinson, 1999).

Second, creating an advice tie with an existing friend transform a single-type relationship into a multiplex one, in the sense that actors "share multiple bases for interaction in a dyad" (Verbrugge, 1979: 1287). Multiplexity—the presence of multiple types of relationships between two actors—is a manifestation of relational pluralism (Shipilov, Gulati, Kilduff, Li, & Tsai, 2014), which has been found to have a positive and linear effect on subsequent tie formation. From a network dynamics standpoint, multiplex ties improve exchange stability among individuals by increasing complex information sharing and reciprocal learning (Rogan, 2014). By virtue of an informational accrual mechanism, multiplex ties provide opportunities for a more

fine-grained understanding of alters' competencies, knowledge, and reliability (Ferriani, Fonti, & Corrado, 2013; Gulati & Gargiulo, 1999). Moreover, multiplex ties have been found to lay at the core of social embeddedness and contribute to increase feelings of reciprocity and trust among parties (Uzzi, 1996). In addition to more accurate information about alters, tie multiplexity also offers a closer and reciprocal monitoring of others' behavior (Ferriani, Fonti, & Corrado, 2013; Aven, Morse, & Iorio, 2019).

Hypothesis 4a: Incentivized individuals will increase their multiplexity of knowledge and affective ties to a greater extent than non-incentivized individuals.

Hypothesis 4b: Multiplexity of knowledge and affective ties will mediate the effect between performance-contingent incentives and social network prominence.

Homophily. A rich research tradition shows that homophily—the tendency for individuals to connect disproportionately with others who are "alike in some designated respect" (Lazarsfeld & Merton, 1954: 23)—is a pervasive mechanism in social networking and applies to numerous types of individual attributes, including sociodemographic characteristics, behaviors, attitudes, and psychological traits (McPherson, Smith-Lovin & Cook, 2001). As aptly pointed out by Rivera and colleagues (2010: 94), "homophily appears to strongly affect attachment because people expect a priori that self-similar alters are more likely to accept them and be trustworthy," thus mitigating potential costs that are associated with making connections. In our research context, incentivized actors may be more likely to form ties with homophilus others because they may hold the belief that their potential contacts could find it easier to reciprocate a tie coming from a similar other than from a dissimilar other. Further, homophily with a potential target improves predictability of behavior, and fosters reciprocity and trusts (Ibarra, 1993; Chiang & Takahashi, 2011). Although the extent to which two individuals are similar to each

other can be assessed along a number of dimensions, past research shows that gender is a particular salient, easy to observe homophily dimension (Ibarra, 1992; Greenberg & Mollick, 2017; Kleinbaum, Stuart, & Tushman, 2013).

Hypothesis 5a: Incentivized individuals will increase knowledge ties with same-gender alters to a greater extent than non-incentivized individuals.

Hypothesis 5b: Knowledge ties with same-gender alters will mediate the effect between performance-contingent incentives and social network prominence.

Propinquity. In addition to relational and assortative mechanisms, propinquity—defined as the tendency of individuals to interact more frequently with others who are physically close to them—is another important mechanism describing tie formation dynamics (Allen & Fustfeld, 1975; Rivera, Soderstrom, & Uzzi, 2010; Reagans, 2011). A great deal of research shows that social relationships are more likely to occur between proximate individual because being proximate encourages chance encounters and opportunities for interaction (Allen & Cohen 1969; Catalini, 2018; Dahlander & McFarland, 2013; Kossinets & Watts, 2006). In addition to increasing the likelihood of tie formation between two individuals, proximity could also affect the extent to which social ties get reciprocated or not. In particular, assuming that reciprocity is a pervasive mechanism of social interactions, lack of reciprocity among peers could be interpreted as a counternormative behavior (Goffman, 1963). Increasing visual contact and the likelihood of interactions between individuals, proximity may work as a control mechanism, making it more difficult for individuals to non-reciprocate a tie. Incentivized actors, therefore, should be more likely to form new ties with physically-close colleagues, as proximity should reduce the risk of non-reciprocation.

Hypothesis 6a: Incentivized individuals will increase knowledge ties with physically close others to a greater extent than non-incentivized individuals.

Hypothesis 6b: Knowledge ties with physically close others will mediate the effect between performance-contingent incentives and social network prominence.

We summarize our hypotheses as well as our theoretical framework in Figure 1.1.

Insert Figure 1.1 about here

METHODS

Research Context

Our research context originates from a large, vertically integrated multinational company (hereafter called "BigCo"). BigCo, which at the time of our data collection had annual net sales of more than $7 billion, is considered the leader in its market. Starting in the early 60s as a small third party producer, BigCo has rapidly grown through an ambitious acquisition strategy that allowed the company to become a top player in its industry in a short period of time.

We conducted our study in the Human Resources (HR) function, which is composed of twelve distinct areas of activities. People working in this function are responsible for all the processes of human capital management, both at global and local level, such as man power planning, budgeting and labor costs, talent acquisition and recruiting, compensation and benefits, career and development, learning, mobility, corporate welfare, organizational climate, internal communication, culture management and diversity, employer branding, people metrics and reporting, IT human resources, industrial relations, organization and workflow design, payroll.

Being a global company, BigCo pursues a people strategy that consists in standardizing processes and spread best practices across its offices, in order to operate as a "community of practices," that is a group of people that learn from each other by interacting regularly. In an annual workshop, the Chief Human Resources Officer (CHRO) explained his view on this point:

"Today I do not have organizational charts. I hope that my collaborators around the world feel part of a network rather than organizational boxes. Such network is a social infrastructure that works together with our formal organization, but it is more flexible and adaptable. The network among us is the agile infrastructure to get our knowledge and our best practices flowing. Thus, this is key for our growth." The decision of the company to introduce monetary incentives based on network metrics was made precisely to increase the willingness of individuals to informally share knowledge, transforming personal knowledge and experience into a "social good," thus making knowledge more readily available to others without imposing strict rules or policies of knowledge exchange.

Experimental Design

We approached the CHRO, in the context of a larger research project, to perform a social network analysis of the HR function. After the first wave of data collection, we prepared a social network report for the CHRO and delivered a presentation about the status quo of the HR function and its network. Following the report, we designed an intervention, in concert with the leaders of the organization, by altering the firm's existing management-by-objectives[2] (MBO) system to include pay-for-performance incentives based on social networks. The intervention targeted only a select group employees, while the remaining members of the HR community kept their traditional incentive system, in which the variable component of the compensation was linked to the achievement of set goals and evaluated with the yearly performance appraisal.

After collecting and analyzing the first wave of network data, we provided the organization with individual-level network metrics, which were used to design the networking objectives (hereafter referred to as the treatment). More specifically, the treatment was tailored to

[2] An MBO is one of the key components of the performance evaluation system, and it goes into the variable pay structure.

be equally challenging and consisted of increasing one's relative network prominence—*indegree* centrality—in the informal advice network. The networking objective was 20 percent of the overall MBO and the total MBO was applied to 30 percent of the annual gross salary. As an example, an employee earning an annual gross salary of $100,000 who reaches her networking objective will earn an additional $6,000.

There are two reasons underlying the decision to use this specific pay for performance. First, although informal knowledge sharing entails both providing and seeking advice (i.e., indegree and outdegree centrality), rewarding employees based on their indegree centrality was the only viable way to set up a system of incentives based on networking performance. Indeed, introducing a pay-for-performance compensation scheme based on employees' knowledge-seeking behavior (i.e., outdegree centrality) would have introduced tremendous individual incentives to game the system: Profit-maximizing employees would simply select every single name in a social network survey roster, thus increasing their knowledge-seeking behavior, to achieve their objective. Second, indegree centrality has several properties that make it a relatively robust measure of centrality, even in the presence of incomplete or imperfect survey response (Costenbader & Valente, 2003; Hasan & Bagde, 2015). Given that a big part of employees' variable payment is contingent on collecting precise relational data, indegree centrality provides a robust measure that could minimize concerns arising from potential low or biased response rates.

We considered employees that were selected for the revised MBO program as the treatment group and employees that were not included in the revised MBO program as the control group. Employees were not randomly assigned to experimental conditions, but rather selected based on organizational covariates. After interviewing the CHRO, however, we were

able to understand the rationale that was used during the assignment phase and control for these factors in our statistical analyses. In particular, balancing formal and informal elements, the CHRO selected employees who were high in organizational rank, perceived to be socially prominent, and working outside the United States. There are at least two reasons underlying this decision. First, because the goal of the organization was to encourage knowledge sharing within the HR community, selecting senior, more prominent managers would increase the odds of a successful initiative because such individuals may be not only more likely to provide useful knowledge, but also more likely to be professionally aligned with the nature of the revised system of incentives. Second, linking a sizeable portion of employees' variable compensation to networking metrics has important implications from a perceived justice point of view, as individuals have limited direct control over relational dynamics. Thus, by carefully selecting employees for the revised system of incentives, the organization may limit the possibility of employees perceiving a goal to be outside their locus of control.

Although an ideal research design would have randomly assigned employees to experimental conditions, in our setting there were organizational concerns that prevented us from doing so. For these reasons, we refer to our study as a quasi-experiment rather than a field experiment. The conceptual construct of quasi-experiment applies to a variety of studies that "resemble randomized field experiments but lack the researcher control or random assignment characteristic of a true experiment" (Remler & Van Ryzin, 2010). These are typically observational studies in which there is no random assignment to treatment or control, but the researcher may control the assignment to the treatment condition or may know the factors that were used to assign individuals to conditions.

Network Data

To test whether introducing incentives affects individuals' prominence in the informal advice network, we analyze data on the networks of employees working for a multinational organization. The population consists of all employees working for the global HR function and data was collected over 17 months. During this period, we collected data at two points in time: before and after the introduction of the revised MBO system. Besides data on demographic variables, the organization provided us with names of employees who were selected for the intervention. We also conducted several open-ended interviews with the HR chief and the top management team which helped us better understand the organization and its key processes.

In addition to the intervention and demographic data, we surveyed employees about their social networks. Specifically, we collected network data using a free-choice-aided name generator (Wasserman & Faust, 1994), in which we asked respondents to fill in the names of people to whom they turned for advice on work-related issues. In particular, we asked: "Please choose the people to whom you turn to seek advice on work-related issues." Employees also reported people with whom they were friends. As employees started typing the first letters of their contacts' name or surname, the online survey tool suggested the names of employees matching the letters inserted. Each survey took an average of twenty minutes to complete and yielded response rates of 79% and 80% in Time 1 and Time 2, respectively. To be able to compute variables capturing changes in individuals' egonetwork, we then excluded employees who were not in both waves of the survey, yielding a sample size of 332 individuals. Out of this 332 employees, 60 received the revised MBO program. This approach allows us to have full data for both network predictors and criterion variables.

Measures

Dependent Variable. Our dependent variable measures a focal employee's change in prominence in the knowledge network following the managerial intervention (i.e., Time 2 –

Time 1). We capture social network prominence using *indegree centrality*, which is a count of the number of employees who go to a focal actor for informal advice on work-related problems.

Independent Variable. The primary independent variable for our analyses is a dummy variable, *pay for performance (PFP)* incentive, which was coded as one if an employee was selected to receive the revised MBO program, and zero otherwise.

Mediators. To test our hypotheses about the mechanisms linking monetary incentives to network positions, we created a number of variables capturing changes in focal actors' ego-network size and composition. Because we are interested in understanding whether individuals react to incentives by altering their networking behavior, we created our mediating variables based on changes in individuals' ego-network outgoing ties. To create the variable *outreach change*, for each employee we first counted the number of colleagues she sought advice from on work-related problems after the intervention, and subtracted this value from the number of colleagues she sought advice from before the intervention, thus obtaining a change score. In a similar vein, *multiplex ties change* is a difference in the number of alters in a focal actor's knowledge network that she listed as friends. That is, we capture changes in the degree to which an individual seeks knowledge-related support from alters with whom she has a friendship tie. Specifically, we asked the following question in the survey: "Please choose the people who you consider good friends." Thus, this variable ranges from negative values in case a focal actor seeks lees knowledge from friends, to positive values in case of increased multiplexity. *Embedded ties change* captures the delta in the number of alters a focal actor has in common with the individuals she seeks advice from. That is, this variable takes negative values when a focal actor decreases advice seeking from alters with whom she has common third parties, and positive values in case of increased knowledge seeking from shared connections. Similarly,

homophilous ties is a variable capturing the number of alters in a focal actor's knowledge ego-network who share her same gender. Thus, *homophilous ties change* measures the delta before and after the intervention. Finally, we measured the distance in (thousands of) miles between a focal actor and all those alters she seeks advice from. To do so, we first calculated the geographical distance among a focal actor and her alters' office locations, using information we received from the organization itself. In particular, we first geocoded each of the 57 office locations in our dataset assigning latitude and longitude coordinates. Then, we computed physical distances between any two employees' locations using the Stata package geodist, which computes geodetic distances (i.e., the length of the shortest curve between two points along the surface of a mathematical model of the earth). In other words, if we think about alters as knowledge providers, this variable captures how far away any employee goes to acquire informal knowledge. Thus, the variable *distance ties change* captures the change score in the sum of the distance, summed across alters, before and after the intervention.

Controls. We also include a set of control variables to account for factors that could simultaneously affect our dependent and independent variables. In particular, we controlled for a set of variables—organizational rank, perceived social prominence, and working outside the United States— that informed the CHRO's treatment-assignment decision. We use *organizational rank*, which is an ordinal variable with six levels (1 = Top Executive, 2 = Director, 3 = Manager, 4 = Associate Senior, 5 = Associate, and 6 = Assistant), *network size at Time 1*, which is a proxy for perceived social prominence before the intervention, and *working in the U.S.*, which is a dummy variable that takes value one if an employee works in a U.S. office, and zero otherwise. Controlling for *organizational rank* is important because employees higher in the organizational rank may be sought for informal advice more often than employees at lower

levels. Controlling for pre-intervention network size allows to take into account path dependency mechanisms (Ahuja, Soda, & Zaheer, 2012), while including a dummy for employees working in the U.S. allows to control for dependencies in the error term arising from geography. In addition to these variables, we also include additional demographic controls that we obtained from the company, such as gender, internal tenure, and working experience. *Male* is a dummy variable that takes value one for male employees and zero otherwise. *Company tenure* captures how long an employee has worked for the organization. Starting from employees' hiring dates, which we received from the organization itself, we calculated how many days elapsed from the first day at work until the survey was administered. We then converted days to years dividing the number by 365. *Working experience* is an ordinal variable measuring the experience employees have accumulated in their professional careers. It has the following six levels: 1 = 0-2 years; 2 = 3-5 years; 3 = 6-10 years; 4 = 11-15 years; 5 = 16-20 years; 6 = more than 20 years. We received information about employees' working experience from the organization itself. Finally, when estimating the effects on network prominence of our ego-network composition mediators—that is, change scores for *embedded ties*, *multiplex ties*, *homophilous ties*, and *distance ties*—we controlled for *outreach change*, thus allowing a more clean comparison of ego-network compositions over time by netting out the mere effect of having larger ego-networks.

Estimation Approach

Because our theory seeks to explain not only how monetary incentives affect prominence, but also the mechanisms through which incentivized individuals change their network position, we used mediation analysis to test our hypotheses. Specifically, we tested whether changes in a focal actors' tie formation mediate the relationship between pay for performance incentives and network prominence, which would suggest that networking behavior is a primary factor in explaining the influence of monetary incentives on centrality. We tested this relationship using

parametric regression models and bootstrapped bias-corrected confidence intervals based on 1000 replications for the indirect effects (Preacher & Hayes, 2004).

Because employees were not randomly assigned to experimental conditions, we took steps to address potential selection concerns. First, we ran a probit model to estimate the probability of being treated as a function of employees' covariates (Heckman, 1979). Then, we used the parameter estimates obtained by this treatment equation to compute the inverse Mills ratio (IMR) for each observation and entered this ratio as a control into our models estimating differences in networking behavior and prominence between treated and control employees. Table 1.1 shows descriptive statistics for the treated and control groups, and Table 1.2 shows the results of a probit regression predicting the likelihood of receiving the treatment as a function of individual-level covariates. In particular, Model 1 shows the association between treatment assignment and those covariates indicated by the CHRO. All coefficients are statistically significant and have anticipated signs. Model 2 also includes additional observable covariates in our dataset that we thought might also predict assignment to conditions, such as gender, company tenure, and working experience. These variables are not statistically significant and do not substantially improve the predictive power of the model.

Insert Table 1.1 and Table 1.2 about here

RESULTS

Table 1.3a reports descriptive statistics and correlations for all variables. Although all analyses are based on change scores, pre- and post-intervention network variable descriptive statistics are nevertheless reported in Table 1.3b to convey a clearer picture of the data.

Insert Table 1.3a, Table 1.3b, and Table 1.4 about here

Table 1.4 shows the results of our models. In particular, Panel A tests our first hypothesis, which predicted that monetary incentives would be associated with increases in

employees' prominence in the knowledge network. Model 1 reports a model without controls, showing a statistically significant and positive effect of monetary incentives on network prominence ($\beta = 2.85$, $p < 0.001$). That is, holding everything else constant, moving from the control to the experimental condition is associated with a 2.85 increase in indegree centrality in the knowledge provision network. This result holds when all control variables are added to the model, as shown in Model 2 ($\beta = 2.78$, $p < 0.001$).

In Panel B, we begin to explore the mechanisms that could account for such a positive association. We do so by looking at whether treated employees tend to expand their knowledge outreach to a greater extent than employees in the control group (H2a), and whether engaging in more active knowledge-seeking behavior operates as a mechanism linking monetary incentives to changes in network prominence (H2b). Supporting Hypothesis 2a, Model 3 shows that monetary incentives have a positive and statistically significant association with knowledge outreach ($\beta = 2.91$ $p = 0.002$). In model 4, we find that knowledge outreach increases network prominence ($\beta = 0.08$, $p = 0.015$). Further, we tested whether knowledge outreach mediated the relationship between the treatment condition and network prominence. As shown in Panel B, the 95-percent bias-corrected confidence interval for the size of the indirect effect excluded zero (0.021, 0.625), suggesting that increases in knowledge outreach mediated the link between our variables of interest, thus supporting Hypothesis 2b.

Model 5 and 6 in Panel C test whether treated employees restructure their ego-networks by increasing embedded ties, and whether such a reconfiguration of ties increases their network prominence. Supporting Hypothesis 3a, Model 5 shows that the effect of pay for performance on embedded ties is positive and statistically significant ($\beta = 10.59$, $p < 0.001$), suggesting that, compared to the control group, treated employees tend to form more knowledge-seeking tie with

embedded alters. In model 6, we find that change in embedded ties increases network prominence ($\beta = 0.091$, $p < 0.001$). Then, we tested whether a change in embedded ties mediated the relationship between the treatment condition and network prominence. More specifically, we estimated the indirect effect of monetary incentives via embedded ties on our dependent variable, indegree centrality. As shown in Panel C, the 95-percent bias-corrected confidence interval for the size of the indirect effect excluded zero (0.467, 1.716), thus supporting H3b and suggesting that seeking knowledge from embedded ties results in increased network prominence.

Model 7 and 8 in Panel D test the effect of multiplex ties. Model 7 shows that the estimated coefficient of pay for performance on change in multiplex ties is positive and statistically significant ($\beta = 1.071$, $p = 0.001$), thus supporting Hypothesis 4a. That is, incentivized employees tend to restructure their ego-network to include more multiplex ties compared to employees in the control group. Next, we sought to explore whether changes in multiplex ties mediate the link between incentives and centrality. In Model 8, we find that change in multiplex ties is associated with increases in network prominence ($\beta = 0.206$, $p = 0.039$). Further, the 95 percent bias-corrected confidence interval for the size of the indirect effect excluded zero (0.007, 0.654), thus providing suggestive evidence that seeking knowledge from friends is associated with higher indegree centrality.

Model 9 and 10 test the effect of homophily. Contrary to our predictions (H5a and H5b), we do not find an effect of pay for performance on gender homophily ($\beta = –0.43$, $p = 0.119$). That is, incentivized employees do not increase the extent to which they seek knowledge from same gender alters after the intervention. In line with this result, Panel E shows that gender homophily does not mediate the relationship between monetary incentives and network

prominence, as the bias-corrected confidence interval for the size of the indirect effect includes zero (–0.003, 0.492).

Finally, in Model 11 and 12 in Panel F we look at the effects of propinquity. Hypothesis 6a proposed that incentivized employees are more likely to seek knowledge from physically close alters, which in turn should result in increases network prominence (H6b). The direct effect of pay for performance is not statistically significant (β = 1.267, p = 0.187 in Model 11), suggesting that incentivized employees do not change the composition of their ego-networks to reduce physical distance from their contacts. Additionally, the bias-corrected confidence interval for the size of the indirect effect includes zero (–0.265, 0.040), indicating that treated individuals do not seem to leverage this mechanism of tie formation more than control group employees. Thus, neither Hypothesis 6a nor Hypothesis 6b are confirmed. Put differently, our results suggest that gender homophily and propinquity do not inform treated actors' decisions to restructure their egonetworks.

Robustness checks

Omitted Variable Bias. We run additional tests to check the extent to which our findings could be vulnerable to unobserved heterogeneity between monetary incentives and indegree centrality. Although unlikely, the CHRO might have been subconsciously biased in his assignment decision. In our specific case, it could be that an unmeasured individual characteristic, like a psychological trait, might be correlated with both being assigned to the experimental condition and the likelihood to be sought to for knowledge, thus biasing our results. For example, individuals high in extraversion could be more likely to be selected for the treatment and, at the same time, more likely to receive knowledge ties from others.

We decided to perform a Generalized Sensitivity Analysis (henceforth GSA) to assess the extent to which our estimates are sensitive to unobserved heterogeneity (Harada, 2012). GSA starts from the residuals of the outcome model of interest to generate multiple "pseudo-unmeasured" variables that change the test statistics of the independent variable of interest (in our case, monetary incentives). Through a series of sensitivity parameters, GSA aims at capturing the amount of correlation an omitted variable should have with a predictor and predicted variable in order to make the predictor no longer significant at the conventional level of 0.05. The output of the analysis consists of a graph of correlations with the independent variable (treatment) distributed on the x-axis and correlations with the dependent variable (indegree centrality) distributed on the y-axis. A contour line provides a graphical benchmark of how strongly correlated a confounding effect would need to be with both the independent and dependent variables of interest simultaneously in order to impair the causal association between the two.

Insert Figure 1.2 about here

Figure 1.2 depicts the results of a sensitivity analysis for the effects of monetary incentives on network prominence in the knowledge provision network. In this graph, we show *organizational rank* as a filled-in square to ease the interpretation of the analysis. We know that *organizational rank*, if left out, is a clear confounder causing endogeneity: it correlates positively with being assigned to the treatment condition and it could also affect informal knowledge sharing dynamics. Figure 1.2 indicates that for an omitted variable to impair the causal relationship between predictor and outcome, its correlation with these two variables would have to be more than double the correlation with organizational rank. Although this is theoretically

possible, it is also quite unlikely, thus providing support for the robustness of our findings to the risk of omitted variable bias.

Networking Disengagement. Finally, to rule out a potential alternative explanation according to which monetary incentives change both volume and composition of knowledge networks not due to increases in treated individuals' networking effort, but due to decreases in control individuals' effort (i.e., networking disengagement), we calculate the average number of outgoing ties before and after the managerial intervention for both groups. Unreported analyses indicate that both treated and control groups increase knowledge outreach, suggesting that our results are not driven by a decrease in networking effort from the control group. Such an increase may reflect the general tendency of social networks to become denser over time (i.e., densification; Lambiotte, Krapivsky, Bhat, & Redner, 2016); a tendency that, in our case, was amplified by high levels of social stability due to low turnover between waves of data collection within our population.

DISCUSSION

It is a truism that organizations benefit from knowledge exchange among their members and that a pervasive flow of knowledge is a key mechanism to scale up individuals' knowledge to a collective good. It is also well recognized that the emerging informal network of interactions operating "behind the chart" may largely influence and shape both the quantity and the quality of knowledge exchanges within organizations (Krackhardt & Hanson, 1993). Moreover, organizations can leverage internal networks to accelerate behavior change and diffusion of innovations (Valente, 2012). In this paper, we contribute to scholarly understanding of knowledge sharing and network dynamics by addressing the key question of whether and how informal knowledge interactions may be directly influenced by organizational decision makers

(Yakubovich & Burg, 2019; Hasan & Koning, 2020; Valente, 2012). In answering this question, our study also explores how managerial interventions may alter individual networking and shape informal, emerging patterns of interactions among organizational members (McEvily, Soda, & Tortoriello, 2014). In particular, trying to offer an accurate understanding of the divergences and convergences between individual behavior and what organizational choices prescribe, we give renewed attention to the long-lasting conceptual debate in organization and network theory counterpoising agency to structure (Giddens, 1976; Ranson, Hinings & Greenwood, 1980; Stevenson & Greenberg, 2000; Ahuja, Soda, & Zaheer, 2012).[3] In doing so, we also answer recent calls for greater emphasis on understanding networking processes vis-à-vis network structural properties (Bensaou, Galunic, & Jonczyk-Sédès, 2014; Casciaro, Gino, Kouchaki, 2014) as well as the mechanisms by which actors exert agency (Gulati & Srivastava, 2014).

In showing that individuals react to performance-based monetary incentives to improve their network centrality in the knowledge provision network, our research provides suggestive evidence for the idea that managerial interventions can differentially enable certain kinds of networking behavior and encourage forms of relational commitment that can converge with or diverge from organizational purposes. Individual agency—the ability to enact relational spaces by undertaking purposive actions that advance self-interest—is well investigated in network research (Coleman, 1990; Burt, 1992; Emirbayer & Goodwin, 1994; Ahuja, Soda, & Zaheer, 2012; Casciaro, Gino, & Kouchaki, 2014). For example, Burt's (1992) seminal work on the social structure of competition highlights the entrepreneurial role of network actors in generating valuable structural configurations. However, as argued by Burger and Buskens (2009), while the

[3] This issue is addressed in several foundational contributions of organization theory, such as Merton, 1940; Selznick, 1943; Gouldner, 1954; Blau, 1963; Crozier, 1964.

idea of structural entrepreneurship implies that individuals attempt to self-select into beneficial positions, the micro-level mechanisms leading to this structural outcome remain largely unclear.

We contribute to this discussion by disentangling how the inducements generated by managerial interventions interplay with agency of incentivized individuals, who deliberately change their portfolio of ties to maximize benefits. In particular, it is important to notice that, albeit incentivized individuals are more active in their networking efforts, their actions are not exercised in a *vacuum* but rather unfold in a social space that may provide opportunities and constraints to those actions (Tasselli, Kilduff, & Menges, 2015). More specifically, our findings suggest that individuals not only engage in a more intense relational proactivity aimed at creating new ties (i.e., knowledge outreach), but also focus their networking efforts by targeting alters who are already part of their social space (i.e., friends, those with common alters, and multiplex ties). Put differently, incentivized individuals seem to focus their instrumental action on the closer social context that arguably they see as a "resource," which can be harnessed more effectively (Gulati & Srivastava, 2014). Our theory and results are suggestive of the fact that the social space in which individuals are plunged—composed of friends, common alters, and multiplex ties—provides them with opportunities for network action while, at the same time, imposes constraints on that action (Stevenson & Greenberg, 2000; Rivera, Soderstrom, & Uzzi, 2010). As such, this argument is in line with Blau's (1994) theory of the structural context of action as well as with the idea of "constrained agency" proposed by Gulati and Srivastava (2014).

Drawing on past research that suggests a complex interplay between agency and structure, in which these forces are "simultaneously exogenous and endogenous" (Gulati & Srivastava, 2014: 7), our contribution also takes on the challenge of discussing the outcomes and

consequences of this intertwined relationship. Specifically, our research can foster novel discussion on the consequences, and the potential tradeoffs, arising from stimulating agency through monetary incentives in a social context, such as intraorganizational networks, characterized by norms and pre-existing relationships. We believe that this is an important, potentially overlooked, argument in a scholarly debate that is mainly focused on investigating how structure shapes behavior, relegating our understanding of how agency operates within a social context to an ancillary role. In particular, building on Gulati and Srivastava's (2014: 7) work conceptualizing social networks as a "set of resources that are accessible to actors," we argue that focal actors take advantage of their existing social structures when exerting agency triggered by incentives. This is evident in our results showing that incentivized individuals harness their actual ties—both instrumental and affective, as well as direct and indirect—as a resource when engaging in purposive networking. Interestingly, physical proximity and homophily do not seem to follow this logic, as they are not leveraged by incentivized individuals in their networking actions.

Furthermore, we argue that the tension between the stimulus to individual networking and the opportunities and constraints originating from social structures could generate outcomes that may be only partially aligned with the purposes of the organization. In our experimental setting, although the goal of the revised system of incentives was to enhance knowledge sharing within the organization, we find that incentivized individuals "localized" their increased networking efforts by connecting with those who were proximate to them in the social space. In particular, incentivized individuals reshaped the composition of their informal knowledge networks by deepening their existing ties, overlapping instrumental and affective ties, and increasingly relying on transitivity in the formation of new ties. As such, despite the original

purpose of the organization was to use monetary incentives to guide agency and transform knowledge sharing into a "community of practice"—in which knowledge sharing is globally-oriented, more pervasive, and cuts across formal boundaries—the creation of a market for social ties rendered employees' networking efforts more entrenched in their existing social space.

Finally, our study advocates for the importance of developing broader theories that encompass different levels of analysis (Klein, Dansereau, & Hall, 1994; Coleman, 1990). In particular, our work can be conceptualized according to Coleman's (1990) seminal theoretical framework on the relationship between macro-level outcomes and micro-level action, and vice versa. Indeed, the introduction of performance-contingent monetary incentives represents a macro-level action designed by the organization to achieve a macro-level outcome—the creation of a community of practice. This particular macro-level action determined changes in attitudes at the micro-level, as incentivized individuals became more willing to enact their social space. Increased willingness to exert agency triggered specific individual (micro-level) networking behavior, leading incentivized individuals to selectively target their contacts. And, as theorized by Coleman, this ultimately led to specific macro-level structural configurations in the informal knowledge network, that is, the derivation of "macro-outcomes from combinations of individuals' actions" (1990: 19). As explained before, however, insofar as individuals leveraged their existing networks to achieve their objective, the transition from micro-level action to macro-level outcomes through the aggregation of individual networking behavior may have been misaligned with the original purpose of the organization.

Organization and network scholars have fueled a long-lasting debate on agency vis-à-vis structure, focusing on the extent to which actors can exercise agency in the face of structural constraints. Contributing to recent research on the co-existence between agency and structure

(Tasselli, Kilduff, & Menges, 2015; Gulati & Srivastava, 2014), we advanced a theory of constrained agency, in which individuals enact their social space by harnessing the opportunities within their existing networks.

Managerial Implications

Beyond our theoretical contributions, two key managerial implications should be highlighted. First, past research shows that women tend to suffer a gender disadvantage with respect to social capital, because, holding constant social structures, they extract less benefits from their positions than their male counterparts (Burt, 1998; Lutter, 2015). Our research suggests that monetary incentives may be an important tool to mitigate this particular gap. Indeed, insofar as monetary incentives increase employees' network prominence—irrespective of gender—organizations motivated to reduce gender penalties could modify their compensation schemes by systematically targeting women in the allocation of incentives.[4]

Second, although our findings suggest that organizations can encourage the creation of informal ties, thus directly increasing the density of their informal knowledge networks, it is important to ensure that incentive systems are aligned with organizational goals. This is important to notice, since global increases in network density may conceal significant variation at the local level. That is, just as an organization may increase its network density by encouraging employees to create ties across departments, another organization may become globally denser as a result of more knowledge ties within already highly-siloed departments. The benefits of these configurations are contingent on the specific goal the organization is trying to achieve. In our context, by amplifying the effect of such processes as embeddedness and multiplexity, pay for performance incentives may encourage the formation of ties among people

[4] We have estimated models with an interaction term between monetary incentives and gender but the relative coefficient was not statistically significant.

who are more likely to be alike and possess similar knowledge, potentially reducing social learning across groups and fostering the creation of echo chambers (Aven & Zhang, 2016; Krackhardt & Hanson, 1993; Szulanski & Lee, 2018). The question, then, is how to set up a system of incentives that is in sync with company goals.

Limitations and Future Research

Despite its strengths, our work has limitations that present avenues for future research. First, although we took steps to statistically account for differences between experimental conditions, only randomized controlled trials can definitively rule out endogeneity concerns. Sacrificing internal validity, however, this study allowed us to investigate our research question in a naturally-occurring environment, thus increasing the generalizability of our findings.

Second, our research design cannot control for the presence of spillover effects, occurring when the treatment affects employees beyond those being selected. Nevertheless, we contend that the presence of potential spillover effects renders our test more conservative because estimated differences between the treatment and control groups would have been even more accentuated in the absence of contamination. In addition to their methodological ramifications, spillover issues may provide interesting theoretical hypotheses that could be explored in further research. For example, what would happen if incentives were to be made public, such that everyone would have accurate information on who is incentivized? Would awareness of such incentives breed suspicions of inauthenticity toward treated employees, thus limiting alters' willingness to reciprocate interactions?

Third, our arguments on the effect of performance-contingent monetary incentives focus on the idea that treated individuals become more proactive in their networking behavior, thus increasing the volume and composition of their informal ties. That is, proactivity is triggered by

a situational stimulus. We do not investigate, however, the possibility of heterogeneous treatment effects based on individual differences. In particular, a large stream of research on organizational behavior and social psychology has started to investigate the role of proactive personality in the development of social capital (Crant, 2000; Thompson, 2005; Parker, Williams, & Turner, 2006; Parker & Collins, 2010). Future research should investigate whether proactive personality interacts with organizational incentives to explain variance in networking behavior.

Finally, our network variables are based on employees' survey responses, and thus potentially prone to recall bias—a lingering issue in studies employing survey instruments (Bernard, Killworth, & Sailer, 1982). Future research may seek to replicate our findings by capturing informal ties through objectively-measured interactions, such as email exchanges or RFID tags.

Conclusion

Knowledge sharing through informal ties is a key means through which organization can leverage their collective expertise and learning (Argote & Ingram, 2000; Zander & Kogut, 1995). Despite the importance of informal ties for organizational success, prior research has provided little insights to organizational decision makers with respect to the possibility of directly influencing such ties. Our results demonstrate that organizational interventions can directly shape social networks, albeit they may also trigger ripple effects fundamentally changing basic network evolution dynamics. Knowledge sharing is one of many outcomes affected by informal ties. Future research might examine how performance-contingent monetary incentives might affect organizational learning, policy adoption, and innovation diffusion.

CHAPTER 2: Harvesting Value from Brokerage: Individual Strategic Orientation, Structural Holes, and Performance[*]

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ABSTRACT

In this paper, we explore the mechanisms underpinning returns to brokerage positions by considering the role of individuals' strategic orientation toward brokering. We conceptualize individuals' strategic orientations in terms of arbitraging versus collaborating behaviors enacted when occupying a brokerage position. Leveraging a novel dataset collected in a global consumer product company, we theorize and find evidence for the fact that arbitraging and collaborating orientations have differential effects on the relationship between brokerage and performance, significantly impacting on individuals' ability to extract value from brokerage. We discuss the implications of these findings for the structural analysis of informal networks in organizations.

Keywords: social networks, networking orientations, individual performance

INTRODUCTION

The role of brokers—individuals positioned in-between unconnected others—has been widely investigated by organizational and social network scholars interested in understanding how network advantages are distributed in social structures. Starting from triads of actors (Simmel, 1950), a rich research stream has focused on the importance of being at the center of an "open" triad (Gould & Fernandez, 1989; Granovetter, 1973) in order to benefit from the information, control, and referral advantages provided by access to otherwise disconnected nodes (Burt, 1992). However, the structural emphasis on positions in a network of relationships has obscured the mechanisms through which actors "harvest the value buried in structural holes" (Burt, 2004: 60). In particular, as recent theoretical and empirical contributions have aptly pointed out, there is a growing consensus that while brokerage positions provide opportunities to individuals (Burt, 1997), their motivation, intent, and intensity of brokering can vary (Stovel & Shaw, 2012; Obstfeld, Borgatti, & Davis, 2014).

Indeed, while brokerage and brokerage analysis has been primarily preoccupied with the structural underpinnings of network advantages, a complementary view has recently emerged according to which brokerage may be not only a structural characteristic of individuals' positions in the network, but also a set of behaviors through which individuals mobilize the resources accessed through ties and pursue the structural opportunities afforded by their network position (Kellogg, 2014; Bensaou, Galunic, & Jonczyk-Sédès, 2014). This paper contributes to this stream of research by considering not only brokerage as a structural property describing individuals' position in the network, but also the strategic orientation toward brokering that allows these individuals to mobilize knowledge and informational resources when occupying a brokerage position. We define the strategic orientation toward brokering as being either a

tendency to arbitrage resources among one's direct connections, or a tendency to collaborate, creating opportunities to cooperate and integrate resources owned by direct connections. We call the first case an "arbitraging" broker to indicate a tendency to exploit informational asymmetries offered by the broker's structural position amid disconnected others. We call the second case a "collaborating" broker to indicate a tendency to link disconnected others in a manner that favors open and complete information-sharing among all parties involved. An arbitraging orientation doesn't necessarily require that disconnected alters be unaware of one another; they may simply be focused on their task, without any mutual adjustment or direct coordination. In fact, an arbitraging broker is capable of recombining alters' knowledge resources in ways that directly benefit from alters being disconnected. Conversely, a broker with a collaborating orientation plays a connecting role between alters, actively and openly sharing information across structural hole(s) in her network, transparently crediting others' ideas, and making efforts to promote coordination and mutual adjustment among network members.

The idea of looking at "how brokers broker" (Carnabuci & Quintane, 2016) draws on a rich debate that distinguishes between actors' strategies to leverage the persistence of disconnections and informational gaps among unconnected others, from strategies that favor enlistment and connection of individuals, seeking knowledge integration and coordination among the unconnected others. While both tendencies might favor a broker in the position of a third party among disconnected others (Kellogg, 2014; Bensaou, Galunic, & Jonczyk-Sédès, 2014), in this paper we develop and test a theory showing the impact of different strategic orientations on the relationship between brokerage and performance. Our explicit focus on individuals' performance contributes to the nascent stream of research on networking behaviors

by identifying strategic orientation as one reason why "there is wide variance in the extent to which individuals benefit from bridging structural holes" (Burt, 2012: 587).

Our efforts to theoretically distinguish individuals' structural position from their strategic orientation begins by acknowledging that social structures and individual's networking behaviors aren't necessarily isomorphic (Brass & Burkhardt, 1993). Network structures are an outcome of interdependent actions by multiple agents, such that the motivations, strategies, and behavioral orientation of a single focal actor cannot fully account for the shape of the network structure in which that actor is embedded.

Distinguish between social structure and an individual's orientation toward brokering is also important because "networks lay out the space of social action" (White, 2008: 8). Within that space we observe variations in the strategies and actions of individuals to mobilize the resources available in their network. Thus, we attempt to enhance scholarly understanding of network advantages by developing a theory of network structure and strategic orientation alignment (or lack thereof), and by showing the different performance effects of an arbitraging versus a collaborating orientation.

We test our theory using a unique dataset consisting of network data and the strategic orientation toward brokering of the individuals working in the Human Resources (HR) function of a large, global consumer-product organization. Findings reveal that while there is a positive main effect of brokerage[5] on individuals' performance evaluations, this main effect is significantly moderated by individuals' strategic orientation toward brokering. An orientation that favors uniting, enlisting, and connecting unconnected individuals (i.e., a collaborating

[5] In the rest of the paper, we refer to *brokerage* to indicate its traditional structural interpretation (Burt, 1992; Burt, 2007) and to *brokering strategic orientation* (or a *strategic orientation toward brokering)* to indicate the tendency of individuals to adopt an arbitraging or collaborating strategy with their direct contacts.

strategic orientation) significantly decreases the positive impact of brokerage on performance compared to an orientation that favors maintaining disconnections among others (i.e., an arbitraging strategic orientation).

THEORY DEVELOPMENT

One of the main tenets of organizational network research is that actors' position in the overall network structure critically matters for their performance (Tortoriello & Krackhardt, 2010; Gargiulo, Ertug, & Galunic, 2009; Uzzi, 1996). In particular, a dominant perspective in the field of network studies has identified a brokerage position as providing benefits and performance advantages to individuals spanning holes in the social structure (Burt, 2004; Burt, 2000; Burt, 1992).

While this positive association is well established across a variety of empirical settings, less is known about what drives variation in returns to brokerage. For instance, plots showing the traditional negative relationship between network constraint (as the opposite of brokerage) and performance (e.g., Burt, 2012: 547) also show how widely this relationship varies across different actors occupying comparable structural positions. Put differently, holding constant the extent to which two actors occupy comparable brokerage positions in their respective networks, there is still notable variation in the extent to which those positions yield performance advantages. Over time, research has identified a broad set of non-structural contingencies that moderate the relationship between brokerage and performance, including job rank or number of peers (Burt, 1997; Podolny & Baron, 1997), the type of knowledge available to individuals (Mors, 2010; Reagans & McEvily, 2003; Tortoriello, 2015), past professional experiences (Fleming, Mingo, & Chen, 2007), national and organizational culture (Xiao & Tsui, 2007), network context and objectives (Soda & Zaheer, 2012; Ahuja, 2000), time (Baum, McEvily, & Rowley, 2012; Zaheer & Soda, 2009; Soda, Usai,

& Zaheer, 2004), cognitive styles (Carnabuci & Diószegi, 2015), and individual psychological traits (Mehra, Kilduff, & Brass, 2001).

Nevertheless, most of these contingencies and their effects on performance still reflect a purely structural logic, according to which both the main effect (i.e., network position) and any moderators (e.g., job rank, knowledge, psychological traits, etc.) cannot credibly explain *variation in individuals' networking actions* when those individuals occupy the same structural position. In particular, contingent factors investigated by the previous literature do not account for how individuals *act* while mobilizing the resources accessed through their network ties. Yet, as observed by Burt (2012: 587) "There is wide variance in the extent to which individuals benefit from bridging structural holes. Some benefit a great deal. Others benefit not at all." We argue that one explanation of these unequal returns can be found in the fact that individuals might be animated by different motives, beliefs, and values when it comes to networking, which translate into different strategic approaches to brokerage. In particular, individuals facing the same set of opportunities offered by structurally similar positions might decide to behave differently, and this behavioral variation could determine variation in the extent to which they extract rents from their network position.

Structural positions and strategic orientations

One possible way to qualify the variation observed in returns to brokerage could be to consider, along with brokerage as a structural property of an individual's network, the extent to which individuals act like *arbitraging brokers* or *collaborating brokers*. For instance, a broker can actively try to take advantage of the opportunities offered by disconnects in her network in terms of vision, information, and control, and to exploit gaps among connections by arbitraging the flow of resources across those gaps. Conversely, she can try to bring her contacts together and thereby

close the informational gaps among them, trying to generate collaborative behaviors that integrate diverse contributions (Stovel & Shaw, 2012). These two poles or "dualities" of brokering behaviors are not new to the field; what we refer to as an arbitraging broker indicates the conventional, often assumed behavior of a broker as a network entrepreneur who, by being active in different social circles, benefits from unique access to diverse sources of knowledge and information (Burt, 1992). A similar idea is what Kellogg defines as the "buffering" practices of a broker who: […] bridge[s] different groups with disparate expertise, meanings, and status" (2014: 4). What we refer to as a collaborating broker is a broker who, instead of leveraging informational gaps and asymmetries in her network to her own advantage, strives to connect her contacts to induce cooperation and promote mutual adjustment among them. Obstfeld (2005) for instance referred to this type of brokering by labelling the corresponding orientation "*tertius iungens.*" Recently, Spiro and colleagues proposed a dynamic view of this type of brokering orientation named a "matchmaking brokerage," in which "ego introduces or otherwise makes possible a tie from one alter to another" (Spiro, Acton, & Butts, 2013: 131). Relatedly, Kellogg (2014: 915) conceptualized cooperating as a "connecting practice" of brokers aimed at transferring, translating, and transforming knowledge. From these foundations, we aim to understand how differences in behavioral orientations might explain variation in the extent to which brokerage positions predict individuals' performance.

The fact that network research has so far overlooked the possibility that individuals occupying the same brokerage positions might have different strategic orientations toward brokering, and that these orientations might play a moderating role in the relationship between structure and performance, is a legacy of the "historical dominance" of the structural approach to brokerage. The dominant assumption of this stream of research has been that, when spanning a

hole (or disconnect) in the social structure, a typical strategic broker would leverage the vision and control benefits of her position to reap advantages from others' lack of connection. However, some individuals might choose not to act as an arbitraging broker even when given the opportunity—doing nothing to leverage a disconnection they span (Obstfeld, Borgatti, & Davis, 2014). It follows that, automatically inferring behavioral orientations from structural positions may obscure the mechanisms through which network benefits and advantages accrue to individuals (Obstfeld, Borgatti, & Davis, 2014.).

We expand on these insights by focusing on the potential for an alignment (or misalignment) between brokerage and a strategic orientation towards brokering. In particular, we ask if a broker is better off when she acts as a collaborating broker or as an arbitraging broker. Our theory suggests that pairing a brokerage position with an arbitraging orientation will be more beneficial for individuals' performance, whereas a brokerage position paired with a collaborating orientation will be less advantageous. Based on this logic, we refer to a brokerage–arbitraging pairing as benefitting from an "alignment" between structural position and strategic orientation, and a brokerage–collaborating pairing as suffering from a lack of alignment between the same components.

Alignment (misalignment) between brokerage and individual strategic orientation

Making a distinction between the strictly structural patterns of interaction traditionally associated with brokerage and how a broker brokers (arbitraging or collaborating) is necessary to advance our understanding of network advantages (Salancik, 1995). In organizational contexts, the characteristics of an individual's network do not necessarily reflect that individual's strategic orientation. It is certainly reasonable to hypothesize that individuals with an arbitraging orientation could try to shape their social space to maintain disconnects among their contacts; at the same

time, individuals who prefer a collaborating strategic orientation could try to shape their social space to promote network closure. However, beyond individuals' preferences and orientations, organizational networks are complex configurations that emerge from the interdependencies of several factors only partially under the direct control of ego (Brass & Burkhardt, 1993). Building on these premises, we expect network structures to emerge from the complex interplays of several factors that include individuals' orientations and actions, but are not limited to them. Our research focus is on how brokers displaying different strategic orientations (toward arbitraging or toward collaborating) benefit differently from the opportunities and advantages a brokerage position provides.

Alignment: Brokerage and an Arbitraging Strategic Orientation. Rather than assuming the primacy of networking strategies over structural opportunities (or vice versa), our theory is premised on the importance of an alignment between the two. Our approach is consistent with Burt's (1992) assertion that certain entrepreneurial behaviors are more likely to yield brokerage advantages: "When you take the opportunity to be the *tertius* [*gaudens*], you are an entrepreneur… a person who generates profits from being between others" (Burt, 1992: 79). Indeed, our argument is that brokerage opportunities can be more effectively leveraged by (and hence afford greater benefits to) individuals whose strategic orientation is aligned with the mechanisms underpinnings the theory of brokerage. Below we focus on two such mechanisms proposed as explanations for the relationship between brokerage and performance: vision and control.

From a structural perspective one of the main advantages that brokerage offers to actors is a vision of opportunities, knowledge and information that would otherwise remain unseen. In fact, irrespective of strategic orientation, positions that offer preferential access to others' resources increase the broker's probability of deriving individual benefits. Moreover, the benefits a broker

derives from a vision advantage can be amplified by a consistent arbitraging orientation. Arbitraging brokers are more likely to strive to access, control, and use others' knowledge and information in a proprietary fashion. In this way, they tend to maximize the acquisition of relevant knowledge and information accessed through their network of contacts, avoid sharing this knowledge and information with others, and try to directly benefit from their integration. This orientation is exemplified by technology brokers: actors who actively seek out diverse knowledge bases (for instance, leveraging ties spanning across multiple disconnected industries and markets), which are then recombined and integrated into new solutions and innovations (Hargadon, 2003). In our research context (the Human Resources function of a large global company), one illustration of actively seeking out diverse sources of knowledge, to then recombine and integrate them into something new, comes from the manager appointed to implement new company-wide "welfare solutions." Company welfare solutions are the supplementary social benefits and social services a company provides to workers in addition to their salary. The manager in charge of this task shared the following comment:

> For the contract renewal, the goal I had was to deliver to employees an innovative supplementary package consisting of services and benefits for an overall market value of about 10 million Euros. […] The CEO wanted something really innovative and appealing for our employees. The simple rule I adopted to accomplish this task was to start talking with colleagues located in different parts of the organization. Thus, I got in touch and chatted extensively with my colleagues from Australia to China, Russia, the USA, and Brazil, asking a simple question: What kind of benefits would you offer? I was the center of conversation and at the end on my desk I had dozens of ideas and suggestions. […] My strategy was similar to solving a puzzle in which you don't have the pieces. By collecting individually all the pieces from my colleagues I was the only one having a 360° view of the problem. In 2013, not only did I win the company innovation award for the new welfare package I introduced, but [the new welfare package] also got massive newspaper coverage for the company.

As illustrated by this quote, an arbitraging broker orientation enhances the inherent vision benefits of brokerage as actors strive to access a wide variety of information, and to recombine and integrate diverse sources of knowledge, in order to accomplish their tasks.

Another important advantage traditionally associated with brokerage positions is control. Individuals spanning holes between disconnected others can benefit from the "tension" associated with this disconnect. Primarily, a broker, by virtue of her position, can choose among different options when the content of the relationships with the brokered parties is identical. For instance, an individual with multiple job offers, or a buyer selecting among different sellers, can pick and choose the most convenient option. Second, even when the content of the relationship between a broker and her connections is different, a broker can enjoy control benefits by acting as an intermediary between different parties. Brokered parties lacking direct access to one another would come to depend on the broker as the intermediary of their relationship, allowing the broker to create and capture value by acting as the link between the parties involved (Fernandez-Mateo, 2007). In addition, brokers enjoy a structural source of power when their position gives them influence over other organizational members. As Pfeffer argues, "Authority and responsibility are vested in positions and one's ability to broker is affected significantly by where one sits in the structure of interactions" (Pfeffer, 1992: 76). To illustrate this point, Pfeffer uses the example of how purchasing agents standing between engineering and production scheduling, marketing, and outside vendors rely on their rules and procedures to exercise power over departments and divisions that might have a higher formal status and authority in the organization.

To fully exploit these structural sources of power, brokers with an arbitraging strategic orientation can actively manage disconnects that exist among their network of contacts. Padgett and Ansell (1993), in their historical account of the rise of the Medici family during the

Renaissance in Italy, identified the "robust action" of the Medici family as a key reason for their success. The Medici family took advantage of their position at the center of the hub-and-spoke system connecting them to most other Florentine families to frame the same issue in different ways to different audiences (multi-vocality), without publicly advocating any specific goal or objective. Applying Machiavelli's principle of *divide et impera* (divide and conquer), this power system allowed the Medici to successfully navigate the political landscape of Florence and exploit the lack of communication among the other families by playing "conflicting demands and preferences against one another [to build] value from their disunion," while at the same time "displaying different beliefs and identities to each contact" (Burt, 2000: 354).

To summarize, we expect that actions consistent with an arbitraging strategic orientation would allow individuals to actively exploit informational and control opportunities offered by brokerage positions thus reinforcing the positive relationship between brokerage and performance.

Misalignment: Brokerage and a Collaborating Strategic Orientation. There are also individuals whose orientation toward brokering does not necessarily align with the prescriptions of traditional structural analysis. In particular, there are individuals who occupy a brokerage position *without* behaving like arbitraging brokers—individuals who, instead, exhibit a tendency "toward connecting people in one's social network by either introducing disconnected individuals or facilitating new coordination between connected individuals" (Obstfeld, 2005: 102; Kellogg, 2014). These individuals act in a way that might reduce, rather than enhance, their ability to achieve the benefits traditionally associated with brokerage. That is, they act as collaborating rather than arbitraging brokers.[6]

[6] A full discussion of why individuals embrace one of these orientations rather than the other, although important, is beyond the scope of this paper. Still, one can think of several reasons for it. For instance, actors may differ in terms of their short-term (or long-term) objectives, or they might be interested in pursuing more individualistic (collectivistic) goals, or they might have different perceptions of the risks

What happens when individuals occupying a structural position of brokerage do not act as arbitraging brokers, and instead act to unite, integrate, and bring together the contributions of their contacts? Are they better off or worse off in terms of their individual performance? We argue that a collaborating strategic orientation is "misaligned" with occupying a brokerage position—that is, it will weaken the positive performance effect traditionally associated with brokerage positions.

The knowledge opportunities available to a broker through the distribution of her network ties should, in principle, motivate that broker to maintain bridging ties (Lingo & O'Mahony, 2010). A long research tradition shows that, indeed, these opportunities beget performance advantages (Burt, 2004). However, as structure does not necessarily predict behavior (Obstfeld, Borgatti, & Davis, 2014), individuals in a brokerage position might still decide to unite and collaborate with their contacts, *de facto* trying to transform structural disconnections among other individuals in their network (i.e., their alters) into a more balanced and symmetric network context, and in the process reshaping the broker's opportunities for arbitrage. For instance, when alters are structurally disconnected, it might be hard for the broker to mobilize and leverage the knowledge distributed across alters, as can be done in a tightly coupled and cohesive network (Harryson, Dudkowski, & Stern, 2008). If the knowledge that alters provide is too diverse (Mors, 2010), there might be incentives for the broker to integrate those contributions to facilitate knowledge recombination (Obstfeld, 2005). When this happens, however, it is not obvious that the broker could still directly benefit from the diversity of knowledge and opportunities her brokerage position gave her vision over. Rather, a broker who spreads information among alters ceases to have the unique vision advantages that would otherwise be the broker's prerogative. In this case, the broker's performance

(benefits) involved in implementing a particular strategy. They might also be operating in an organizational context in which one orientation "works better" than the other. Whatever the root causes might be, our stance here is that while network structure might encourage the emergence of certain patterns of behavior, it does not guarantee them.

benefits might quickly become diluted. Collaborating strategies enacted by a broker tend to redistribute informational advantages among a brokers' direct connections, and this might introduce obstacles to individuals' ability to unilaterally benefit from their position of being a broker among disconnected others. In our research context, the following anecdote offers an interesting case of how a broker's collaborating approach led to negative performance consequences for the broker. A direct report to the company's Human Resources chief was appointed to propose a new "competence mapping system" for two main and distinct functional areas: supply chain and ICT. During a preliminary interview,[7] he related the following account:

> As the person with formal responsibility for this task, I have started the project meeting with my HR colleagues, clarifying goals, sharing ideas and the way to proceed. I spent hours codifying and transcribing the interviews I personally conducted with the functional managers of ICT and Supply Chain, and I then made them available in a repository on the intranet I personally created and shared with my colleagues. In the end, during the presentation of the new competence mapping system to the steering committee, it emerged that I played only "an ancillary role" in this task and no specific merits were attributed to me. The icing on the cake was when, after the presentation my boss came to me and told me: "My expectation was that you should have been *the* leading player in this initiative, not just one of many who took part in it." I know that I've paid a price for this.

Similar to what happens with vision advantages, a collaborating strategic orientation could reduce a broker's control advantages. In fact, while potentially useful information might still accrue to the collaborating broker—for instance, because of her structural position she might learn about opportunities before others can—the control benefits might be reduced dramatically by actions aimed at closing gaps among individuals. As convincingly put by Burt: "Information benefits of structural holes might come to a passive player, but control benefits require an active

[7] The two managers providing the first and second quote are both brokers in structural terms (top decile in the distribution of our brokerage measure) although they clearly have different strategic orientations toward brokering.

hand in the distribution of information" (Burt, 1992: 79). Thus, if this "active hand" goes in the direction of socializing informational advantages and inhibiting individualistic strategies, the control benefit a broker is presumed to enjoy over otherwise-disconnected nodes could vanish. Indeed, a collaborating strategic orientation implies actions that are diametrically opposite to those that beget the power and arbitrage benefits of brokers. As a result, whenever a broker decides to implement collaborating strategies, a misalignment is introduced between that broker's structural opportunity and her individual behavior. This misalignment will severely reduce the structural rents provided by brokerage, while at the same time increasing the costs of coordination and collaboration among otherwise disconnected others. In particular, brokers enacting collaborating strategies will see their vision advantages seriously reduced, and their control advantages *de facto* nullified, by refusing to play their direct contacts against one another.

Furthermore, the collaborating broker might end up assuming the burden of coordination costs across open triads without then enjoying the greater trust and fine-grained knowledge benefits of closure a tight network provides. Indeed, while a broker might strive to bring her contacts together in a way that forges cooperation and shared relationships among all parties, whether or not the previously disconnected parties would agree to join forces and begin a stable form of collaboration remains an empirical question. Put differently, it cannot be ruled out that, in spite of the collaborating orientation of the broker and her efforts to bring disconnected parties together, her network might nevertheless remain open. This paradoxical situation—brokerage without its typical advantages, and with the addition of coordination costs—is a form of misalignment that will likely hurt the individual performance of the collaborating broker.

Summing up, we expect that collaborating brokers are less oriented toward creating or maintaining other's dependencies through information control and arbitrage, and they are also less

inclined to extract personal profits from the knowledge they access by virtue of their structural position. By the same token, we also expect that actions consistent with an arbitraging strategic orientation would allow individuals to actively exploit informational and control opportunities offered by brokerage positions thus reinforcing the positive relationship between brokerage and performance compared to individuals who forgo exploiting structural asymmetries. As a consequence of the reasoning regarding the effects of brokering orientations on the relationship between brokerage and performance, we hypothesize the following.

> *Hypothesis: The positive relationship between brokerage and performance is contingent upon individuals' strategic orientations toward brokering. In particular, brokers with an arbitraging strategic orientation are expected to perform better than brokers with a collaborating strategic orientation.*

EMPIRICS

Research Site

We conducted our network survey in the Human Resources (HR) function of a large, vertically integrated, global consumer product company. The company, which has annual net sales of more than $7 billion, is considered the leader in its market. Starting in the early 60s as a small third party company producing frame components, it has rapidly grown through an ambitious acquisition strategy that allowed it to become a top player in its industry in a relatively short period of time. It has been profitable for a number of years and currently it is listed on two financial markets. At the time of data collection, the HR function was organized into twelve distinct areas of activity and employed more than 400 individuals, 73% of whom were women, scattered across five continents. Specifically, the geographical distribution of employees was the following: 26% in Europe, 43% in North America, 20% in Asia, 10% in Latin America, and 1% in Africa. In terms

of age, 52% of respondents indicated they were born between 1946 and 1965; 32% were born between 1966 and 1976; and 16% were born between 1977 and 1994. This research site is well-suited for studying the returns to brokerage. Indeed, with different areas of expertise and different geographically distinct units, brokerage is likely to yield important vision and control advantages.

Data

Network data were collected online using a free-choice-aided name generator; that is, we asked respondents to fill in a bar with the names of people to whom they turned for advice on work-related issues. As the respondents started typing the first letters of their contacts' name or surname, the on-line survey tool suggested the names of Human Resources employees matching the letters inserted, easing the task of selecting the list of alters.

We captured strategic orientations toward brokering using a scenario-based visual scale (Mehra et al., 2014). The survey was pre-tested with a pilot study involving a limited number of people from the upper-level management team. Given the complexity of the data collection process originating from the geographic dispersion of the HR employees, we took several steps to ensure a good response rate for the survey. Specifically, in order to avoid respondents' privacy concerns, the survey was sent out from a University address and hosted on a third-party, online platform. The survey package included a personalized invitation e-mail and a cover letter from the HR chief introducing the study and advising the respondent that results would be anonymous. Furthermore, we conducted multiple follow-ups with non-respondents. The survey yielded a response rate of about 83%, with 381 completed surveys out of 460 potential participants. The maximum number of names recalled was 35 (M = 4.12, SD = 3.96). In addition to this network data, we obtained demographic data about respondents from the company's archive. In particular, we enriched the

survey dataset with information on years of experience, scope of the role, geographic region, unit, HR area, and performance evaluations.

Despite the high response rate, we examined our survey data for the risk of non-response bias. First, we ran a t-test considering demographic variables (age, education, tenure, job rank, organization) for respondents vs. non-respondents, and observed no discernible differences. Second, we conducted a wave analysis comparing the same variables for early (1st week) vs. late (4th week) respondents (Rogelberg & Stanton, 2007). The assumption is that the group of late respondents will be more similar to the non-responding group than to the group of early respondents. An analysis of variance (ANOVA) of the difference in means for the two groups for the demographic variables showed that the hypothesis of differences in means could all be rejected.

Dependent Variable: Individuals' Performance Evaluations. Throughout the years, the company has devised a thorough management-by-objectives evaluation process based on a set of Key Performance Indicators (KPI) used to evaluate each employee's performance. The basis for the performance evaluation is primarily the individual's contributions and does not formally refer to team or collective performance aspects. More specifically, supervisors' performance evaluation focuses on the following elements: task accomplishments, ability to generate novel solutions, contribution to the improvements and innovation of HR practices, preferably with global impact. The evaluation process is conducted annually and we obtained the performance assessment for all study participants directly from the company. According to this data, 5% of the employees were evaluated as below average (low performance), 70% as average (good performance), and 25% as above average (outstanding performance)[8].

[8] We obtained performance evaluation for 356 individuals in our sample.

Explanatory Variables: Brokerage. We measured brokerage using Burt's (1992) measure of effective size. Conceptually, effective size measures the amount of non-redundancy in an actor's network, and it is given by the number of people a focal actor is connected to, minus the redundancy in that actor's network. Formally:

$$\textit{Effective size for ego} = \sum_j \left[1 - \sum_q p_{iq} m_{jq} \right]$$

This measure considers all the *j* contacts that actor *i* has, and the amount of redundancy defined in *i*'s network (*q* being every third person other than *i* or *j* in *i*'s ego network) as a function of the relationships among all alters in *i*'s network. The quantity ($p_{iq}m_{jq}$) captures the level of redundancy between *i* and a particular alter, *j*. The term p_{iq} is the proportion of actor *i*'s relations that are spent with alter *q*, and m_{jq} is the marginal strength of contact *j*'s relation with common-third-party *q* (basically *j*'s interaction with *q* divided by *j*'s strongest interaction with any other third party). The sum of the product $p_{iq}m_{jq}$ measures the portion of *i*'s relation with *j* that is redundant to *i*'s relation with other direct connections. Individuals with high effective size scores tend to be connected to mostly non-redundant alters, while individuals with low scores on this measure tend to be connected to alters who are themselves connected (i.e., who are redundant contacts for the focal actor *i*).

Strategic Orientations toward Brokering. In order to operationalize individuals' strategic orientation toward brokering, we used a scenario-based visual scale. In particular, we first had all respondents read a short story to expose them to the same situation (Cavanagh & Fritzsche, 1985). The story described a simple scenario in which, to accomplish an important organizational task, respondents needed specific knowledge and expertise from two contacts who were not in touch with one another. The actual text was:

> *Consider the situation in which you have been appointed to accomplish an <u>important organizational task</u>. This task requires specific knowledge that you don't have, but two of your contacts (let's call them Mike and Jenny) do have. Mike and Jenny do not know each other or, if they do, they don't usually work together; however, thanks to your credibility, you are in a position to ask Mike and Jenny for help, and access their knowledge and expertise.*

Although we were primarily interested in the distinction between collaborating and arbitraging strategic orientations, following Obstfeld, Borgatti, and Davis (2014: 142) categorization of brokering actions we presented respondents with three distinct options. Option *A* described a strategic orientation toward "uniting" or bringing together the two contacts who would otherwise remain disconnected (collaborating orientation); Option *B* described a strategic orientation toward "exploiting" or unilaterally taking advantage of the disconnect between the two knowledge sources (arbitraging orientation); and Option *C* described a strategic orientation toward openly relaying information to the disconnected parties which is akin of what Obstfeld and colleagues (2014: 141) called a "conduit brokering orientation." These three options were graphically captured on a visual scale in Figure 2.1. We then asked respondents the following question: "Broadly speaking, how would you ***<u>act</u>*** in order to accomplish your task? Please use 1, 2, and 3 to rank your preferences (1= most preferred; 3 = least preferred) about the three options below."

<u>Insert Figure 2.1 about here</u>

A short story such as this one is useful to succinctly describe a situation that would otherwise require a complex and possibly hard-to-understand explanation, and it is also useful to deal with sensitive topics that might result in social desirability biases (Finch, 1987). Describing a strategic orientation toward brokering graphically can further help respondents to visualize and compare different strategic options, allowing them to reveal a preference among networking styles that would be hard to capture otherwise.

To assess individuals' strategic orientation toward brokering, we took into account the ordering of the preferences for the proposed scenarios, considering the first choices of respondents (i.e., the scenario ranked as number one by each respondent). This approach yielded the following distribution: collaborating was indicated as the preferred strategic orientation 85% of the time; arbitraging was preferred 11.5% of the time; and the *conduit* orientation was preferred only 3.5% of the time. The rank ordering of preferences was chosen in a way not to force respondents to select one strategic orientation while ignoring the others, but to provide a relative assessment of individuals' preferences toward different strategic orientations. A close look at the distribution of individual preferences across these three options provided face validity to this measurement strategy. For instance, in 90% of the cases in which respondents indicated their *most preferred* option was a collaborating strategic orientation, they also indicated that the arbitraging *orientation* was their *least preferred* option. Similarly, in 93% of the cases in which respondents indicated their *most preferred* option was an arbitraging strategic orientation, they also indicated a collaborating orientation was their *least preferred* option. Put differently, these two brokering orientations tended to be seen by respondents in our sample as the opposite ends of a continuum. This intuition was confirmed by the results of a dependency test considering the distribution of most-preferred/least-preferred options for which the chi-squared statistic was equal to 314.68, which is highly significant ($p < 0.001$).

Given this distribution of preferences, we initially created one dummy variable called Strategic Brokering Orientation coded as 1 if arbitraging brokering orientation was the first choice and 0 if collaborating brokering orientation was the first choice. Also, in order to consider the 12 observations for which conduit orientation was indicated as preferred by respondents, we redistributed these values to either arbitraging or collaborating based on the second pick indicated

by respondents[9]. This variable was used as a moderator in the relationship between brokerage and performance.

To refine our findings we also investigated the separate effects of arbitraging vs. collaborating strategic orientation in different models. We accomplish that by creating two dummy variables to identify individuals' strategic orientation as preponderantly collaborating (1 if collaborating was first choice and zero otherwise) or preponderantly arbitraging (1 if arbitraging was first choice and zero otherwise). This approach was made possible by considering the conduit brokering orientation as a reference, or excluded category[10]. We also used these variables as moderators in the relationship between brokerage and performance.

Control Variables. To establish the validity of our findings over and above possible alternative explanations, we used several control variables in our statistical analysis. These variables were selected to account for additional factors that could have impacted individuals' performance evaluation. A first set of controls took into account the organizational and work context. Specifically, we controlled for an individual's job rank expressed in terms of rank distance from CEO position (i.e., lower scores meaning fewer steps away from the top, meaning higher job ranks), level of education expressed in terms of the highest degree obtained (ranging from bachelor's degree to Ph.D. degree), and professional experience expressed in terms of years of tenure at the company. Consistent with previous research in this area, we considered these variables as proxies for individual skills and ability. In addition, we considered geographical and

[9] Based on this logic, a respondent who indicated conduit = 1 and arbitraging = 2 would have her preference coded as an arbitraging strategic orientation, whereas a respondent who indicated conduit = 1 and collaborating = 2 would have her preference coded as a collaborating strategic orientation. In this way, we obtained a dichotomous variable capturing the arbitraging orientation as the opposite of the collaborating orientation.

[10] Lacking the excluded category (conduit strategic orientation), collaborating and arbitraging strategic orientations would simply be one the opposite of the other, making it econometrically impossible to have both dummies in the same model.

business specificities by including a regional categorical variable indicating the office where the individual worked (Africa, Asia-Pacific, Europe, Far East, Latin America, North America), along with an indicator variable to identify his or her line of business (eleven different categories such as "HR management," "Talent development," "Training programs," "Compensation and mobility" to name a few) which we used to cluster standard errors in our analysis.

Analysis

We tested our theory using ordered probit models with robust standard errors predicting individuals' performance evaluations. Descriptive statistics and correlations are reported in Table 2.1, and results of the ordered probit regressions are presented in Table 2.2. In all models we clustered standard errors by the functional areas to which individuals belonged to address possible co-dependencies driven by the fact that respondents were assigned to the same organizational function.

Insert Tables 2.1 and 2.2 about here

Model 1 of Table 2.2 presents control variables. Models 2 through 4 introduce the main effects of brokerage, and strategic orientation toward brokering. Model 5 tests the interaction term between brokerage and individuals strategic orientation toward brokering. Models 6, 7, and 8 replicates the analysis conducted in earlier models considering separately the effects of collaborating vs. arbitraging strategic orientation. Finally, Models 9 and 10 test the interaction effects confirming, respectively, the negative moderating effect of a collaborating orientation on the relationship between non-redundant ego networks and performance, and the positive moderating effect of an arbitraging strategic orientation on the relationship between non-redundant networks and performance.

Among the control variables, we observed consistent and positive effects for Asia Pacific and Latin America, indicating that individuals located in those geographical areas tended to enjoy higher performance ratings and levels of education (individuals with higher levels of educations tended to also have higher ratings). Job rank (reverse coded) was negatively correlated with performance ratings, suggesting that highly ranked individuals tended to receive better evaluations on average.

As can be seen in Models 2–4, having a non-redundant network was positively associated with individuals' evaluations, as expected, but the main effect for individuals' strategic orientations was not (although positive as expected). Consistent with our hypothesis, Model 5 indicates that brokers with an arbitraging strategic orientation toward brokering perform better than brokers with a collaborating strategic orientation toward brokering. Furthermore, considering separately the effects of arbitraging vs. collaborating orientations (Models 9 and 10) corroborates the findings presented in Model 5. In particular, as illustrated graphically in the plots reported in Figure 2.2, 2.3a, and 2.3b, and consistent with what hypothesized having a collaborating (arbitraging) strategic orientation decreases (increases) the advantages of a brokerage position, compared to having an arbitraging (collaborating) strategic orientation.

Our findings were also stable when using different estimation techniques. For instance, we obtained substantively similar results when estimating our regressions using a GLM model with a probit specification predicting the probability of high vs. low performance (i.e., using a dichotomous description of the dependent variable where a value of one indicates a greater-than-average performance, and zero otherwise). Also, no discernible differences were observed when estimating our models using a simple OLS regression. Furthermore, the Brant test of the parallel

line/proportional odds assumptions for the results presented in Table 2.2 was not significant, suggesting that the parallel line assumption holds in our ordered probit analysis.

The stability of our findings across different estimation techniques was intuitively corroborated by the plots showing the actual data distribution and fitted regression line expressing the relationship between brokerage and performance, distinguishing between collaborating and arbitraging strategic orientations (Figure 2.2). Visually, the slope of the fitted line for the arbitraging strategic orientation is significantly steeper than the slope for the collaborating strategic orientation.

Insert Figure 2.2 about here

Analytically, the effects of the interaction terms reported in Model 9 and Model 10 are also statistically significant over a meaningful range of the values observed for effective size as it can be seen in Figure 2.3a and Figure 2.3b reporting the results of margins analysis (Brambor, Clark, & Golder, 2006; Hoetker, 2007; Zelner, 2009), the confidence intervals for the marginal effects of collaborating brokerage (Figure 2.3a) stop overlapping for values of effective size greater than 0.6 in the plot, which amounts to approximately 59% of the observations. Similarly, as seen in Figure 2.3b, the confidence intervals for the marginal effects of arbitraging brokerage stop overlapping for values of Effective Size greater than 1.2 in the plot, which corresponds to approximately 33% of the observations.

Although the pseudo-R^2 values of our models are relatively low, the Wald test suggests a statistically significant improvement in model fit determined by the introduction of the theoretically relevant variables (i.e., brokerage and the interaction terms). Indeed, the magnitude of our coefficients also suggests a substantive role of strategic orientation toward brokering in

determining brokers' expected performance levels. In Table 2.3, we estimate the size effect of the interaction terms on the likelihood of observing a given performance level for a broker.

Insert Table 2.3 about here

In particular, based on this table, the size of the coefficients of the interaction terms can be interpreted as follows. Having an arbitraging brokering orientation (first row of the table) makes an individual who occupies a brokerage position 3% less likely to have a below-average performance, 10% more likely to have an average performance (although this result is not statistically significant), and 14% more likely to have an above-average performance. Instead, having a collaborating brokering orientation (second row of the table) makes a broker 2% more likely to have a below-average performance (although this result is not statistically significant), 14% more likely to have an average performance, and 16% less likely to have an above-average performance.

Insert Figures 2.3a, and 2.3b about here

Robustness Checks: Endogeneity of Brokerage, Size vs. Structure, and Temporal Stability of Strategic Orientations

***Endogeneity*.** Given the cross-sectional nature of our dataset, one could plausibly argue that it is not the fact of occupying a brokerage position that leads to better performance, but rather that better performance allows individuals to move, over time, into more advantageous brokerage positions. If better performance implies higher brokerage scores, then our effort to explain performance variation in network advantages could be severely undermined. To limit concerns about the possible endogenous nature of brokerage we adopted a two-stage least square procedure using as an instrument for brokerage the number of employees assigned to a given country. Greater geographical operations should offer more opportunities to form non-redundant network

connections (i.e., larger, non-redundant networks) to individuals in that country. At the same time, it is not obvious that operating in a country with larger operations should increase the performance evaluations of the employees working in that country.[11] Consequently, we used this instrument to run a two-stage least squares model. The results of this robustness check are consistent with those presented in Table 2.2.[12] Clearly instrumenting brokerage does not amount to ruling out the risk of endogeneity even if brokerage performance effects are still there. Lacking the counterfactual of an exogenous shock, or the possibility to manipulate network structures in an experimental setting, we still need to be cautious about the possible risks of endogeneity when interpreting our findings.

Another confounding effect, for instance, could be the presence of an unobserved omitted variable that spuriously affects the relationship between brokerage and performance. Trying to lessen this concern, following the approach proposed by Imbens (2003) and recently implemented by others (Wang, 2014; Dahlander, O'Mahoney, & Gann, 2014) we performed a generalized sensitivity analysis (GSA) to check how strongly correlated a possible omitted variable must be with both performance and brokerage before the effect of brokerage on performance disappears. In this analysis, which is based on an extension of Imbens (2003) as implemented by Harada (2012), we observed that the existence of an omitted variable that would cancel the effects of brokerage on performance can be considered as highly unlikely.[13]

Size vs. Structure. Since the brokerage measure used in the analysis (effective size) is normally highly correlated with the number of contacts an individual has (degree centrality), we

[11] Empirically, we also observed that the number of employees in a given country is positively associated with brokerage, but not significantly associated with individual performance.
[12] The results of the 2SLS procedure are available upon request. Also available upon request are the results of the analysis estimating ordered probit models with endogenous regressors implemented in the 'cmp' Stata module (Roodman, 2011) which yielded entirely consistent results to those presented in Table 2.2.
[13] The results of this analysis are available upon request.

also wanted to establish that the observed effects were due to the network structure being sparse rather than to its sheer size in terms of number of contacts. As the level of correlation between degree centrality and effective size was too high in our case, due to multicollinearity issues, we could not have both terms in the same equation (Haunschild & Sullivan, 2002). Thus, to determine if the effects observed in our models are due to the structural configuration of an individuals' ego-network, or just to its degree, we re-ran all of our models using different measures of brokerage. In particular, we re-ran our models using ego-betweenness instead of effective size, and including degree centrality as an additional control and obtained results that are fully consistent with those presented in Table 2.2.[14]

Temporal Stability of Strategic Orientations. One last point we would like to discuss to further qualify our findings is the relative temporal stability of individuals' strategic orientation toward brokering. In fact, to the extent that an orientation toward brokering is unstable and volatile, the legitimacy of the conclusions reached in this study could be called into question. To address this issue, we used data collected approximately one and a half years after our first round of data collection on the same sample of participants. In this second round of data collection we administered a survey containing the scale developed and validated by Obstfeld (2015) to capture individual's tendency toward collaborating and uniting their contacts (what he calls *tertius iungens* strategic orientation). To the six items included in Obstfeld's validated scale, we added three additional items to capture individuals' tendency to act as arbitraging brokers, keeping apart and benefitting from the disconnections between their contacts. Items and factors loading are reported in Table 2.4.

Insert Table 2.4 about here

[14] Available upon request.

One of the reasons for using a different instrument in the new round of data collection was to establish the convergent validity of the strategic orientation measures obtained with the visual scale in the first round of data collection. Of the 356 participants for which we had complete data in the first round, 232 also completed the survey administered in the second round. This means we could rely on 65% of the original sample to assess the stability of collaborating and arbitraging strategic orientations. A principal component factor analysis performed on the data collected at Time 2 revealed the existence of two factors with eigenvalues greater than one that mapped to the collaborating and arbitraging orientation constructs, respectively. We averaged the six items mapping to the collaborating factor and the three items mapping to the arbitraging factor to measure, respectively, the collaborating and arbitraging strategic orientations of respondents in our sample taken at Time 2. We then ran additional statistical tests to determine the extent to which individuals with a collaborating (arbitraging) brokering orientation at Time 1 also exhibited a collaborating (arbitraging) brokering orientation at Time 2. Results are reported below in Figure 2.4. Comparing the values obtained in the Time 2 measurement of collaborating vs. arbitraging brokering orientations, we observed that respondents who reported a collaborating orientation at Time 1 scored significantly higher on the collaborating scale at Time 2 (i.e., 4.08 out of 5 vs. 3.89 out of 5, significant at the standard 5% confidence interval, $p = 0.013$) than they did on the arbitraging scale at Time 2. Similarly, respondents who reported an arbitraging orientation at Time 1 scored significantly higher on the arbitraging scale at Time 2 (i.e., 3.13 out of 5 vs. 2.87 out of 5 significant at the standard 5% confidence interval, $p = 0.025$) than they did on the collaborating scale at Time 2.

Insert Figure 2.4 about here

A χ^2 test of independence between orientations at Time 1 and orientations at Time 2 is consistent with the findings reported in Figure 2.4, suggesting that individuals' orientation toward brokering are significantly correlated over time.

DISCUSSION

Reflecting on the cumulative body of knowledge on network advantages, Burt argued that while "there is abundant and accumulating empirical evidence of returns to brokerage, evidence on the mechanisms is not abundant" (Burt, 2007: 60). This sentence is the premise of, and the inspiration for, what we tried to accomplish in this paper. In particular, we proposed that individual tendencies to enact arbitraging or collaborating strategies when brokering should interact in meaningful ways with the advantages traditionally associated with brokerage positions. Considering individuals' strategic orientations in the context of the brokerage positions occupied by individual actors is consistent with what proposed by Mischel and colleagues (2002) in their theory of "behavioral signatures." By incorporating the situation into the search for consistency of behaviors, individuals can be "characterized not only by stable individual differences in their overall levels of behavior, but also by distinctive and stable patterns of situation-behavior relations" (Mischel, Mendoza-Denton, & Shoda, 2002: 51). Hence, we think of strategic orientations as a way of characterizing individuals' tendency to arbitrage resources or to openly collaborate with their network connections. Leveraging a unique dataset that measured organizational members' structural positions as well as their strategic orientation toward brokering, we showed that the main positive effect of brokerage on individual performance is enhanced by an arbitraging strategic orientation and hampered by a collaborating strategic orientation.

Our approach allowed us to tease apart the two primary inputs to network advantages: brokerage as the structural position that individuals occupy in a network, and brokering as the strategic orientation that guides their networking actions (Obstfeld, Borgatti, & Davis, 2014). Thus, we were able to move beyond the assumption that a social structure either reflects or predicts the action of actors embedded in that structure. This is in line with Granovetter's (1985: 487) foundational idea that "actors do not behave or decide as atoms outside a social context" and also Burt's (2012: 544) insight that "networks do not act. Networks are the residue of people spending time together […] can facilitate or inhibit action, but people are the source of action."

Building on these premises, and taking into account that network positions are the result of complex interactions among individuals (Ahuja, Soda, & Zaheer, 2012), we conceptually and empirically separated individuals' orientation toward brokering from their structural position. This allowed us to identify a distinct theoretical mechanism that explains variation in the effects of brokerage on individual performance: the alignment (or misalignment) between structural position and an individual's orientation toward brokering. In this way, we tried to reconcile a pure structuralist approach, offering strong arguments and empirical evidence about brokerage advantages, with a behavioral and strategic approach that considers networks as spaces where individual actions aim to mobilize resources held by others (in our context, knowledge and information). Since brokerage theory suggests that benefits to the broker are created by disconnects among alters, a broker with an arbitraging strategic orientation—who leverages the informational gaps among unconnected alters—is behaving consistently with the prediction of structural theory. This consistency, or alignment, should provide an "extra" benefit to an arbitraging broker. In our theory and empirical test, we look at the benefits of individuals who show consistency between the structural position they occupy and their networking strategy and actions. Relative to others,

these individuals achieve higher performance because they are both structurally favored and they take advantages of their position by acting strategically to spillover and recombine others' knowledge and information. Our empirics also show that, relative to arbitraging brokers, a broker with a collaborating strategic orientation—one who favors enlisting and connecting individuals, thus seeking integration and coordination among unconnected others—systematically achieves lower performance levels. It is reasonable to speculate that while an arbitraging broker is able to draw the informational and knowledge rents to its own advantage, a collaborating broker tends to socialize more and thereby redistribute advantages to its alters, in turn suffering lower gains in personal performance. Moreover, this organizational actor will end up incurring coordination costs that, together with failing to exploit the opportunities her structural position offers, will substantially reduce the performance benefits normally attributed to brokerage.

There is also a more subtle logic underpinning the moderating effects of a brokering strategic orientation on the relationship between brokerage and performance, and it is one of "acceptance." One of the reasons why brokers have a higher performance level is because they are often a source of new ideas (Burt, 2004)—that is, access to knowledge and information diversity can give brokers a "competitive advantage in seeing good ideas" (Burt, 2004: 356). However, before a broker can convert new ideas into actual performance benefits, she has to be accepted as a source of good ideas by a target audience. Acceptance is the result of a dynamic process in which the broker acts strategically: presenting and framing the new idea differently to different audiences, appealing to their specific needs, obtaining their buy-in and, most of all, preserving the ownership of the idea. A broker with an arbitraging strategic orientation by framing, adapting, and translating the idea to different audiences in a way to make it appealing to their specific needs will preserve ownership of the idea and push it forward. Conversely, a broker with a collaborating strategic

orientation by socializing the content of the newly acquired knowledge and information, and involving different constituencies at once in the process, might end up losing ownership of that content trying to accommodate diverging views and opinions. The efforts of collaborating brokers to build consensus while keeping together a broad, diverse, and loosely connected coalition may ultimately incur steep coordination costs. These costs might both dilute the structural advantages of being a broker and make it more difficult to win recognition and agreement from network alters.

This paper makes important contributions to our understanding of how network advantages accrue to individuals in a network. Primarily, our results suggest that network structure and network behavior can complement one another (or not), an insight that enhances our understanding of the mechanisms linking network position and performance. In fact, by moving from the traditional structural explanation for network advantages, we were able to identify the *strategic orientation toward brokering* as a novel and critical contingency in the relationship between network position and performance outcomes. Thus, our theory and findings suggest that the well-established discussion on the relative contributions of individual actions and social structures, which has been mainly limited to tie formation and network dynamics (Ahuja, Soda, & Zaheer, 2012), should also be extended to the discussion of performance consequences. Second, while confirming that network structure can provide individuals with opportunities to improve their performance, we identified individual strategic orientation as a possible explanation for how brokerage opportunities in a network translate (or not) into concrete performance benefits. This means that instead of comparing the arbitraging and collaborating strategies in abstract terms, we brought both to bear on the issue of how individuals benefit from brokerage. Thus, in addition to objective individual attributes such as job grade, position in the formal organization, experience, and expertise (McEvily, Soda, & Tortoriello, 2014), and in addition to the subjective psychological

traits and/or individual experiences, such as self-monitoring, identity, affect, or cognitions (Ibarra, Kilduff, & Tsai, 2005), we believe that the development of theories on network advantage would be substantially enriched by continuing to explore the role and impact of individuals' strategic orientation.

LIMITATIONS AND FUTURE RESEARCH

Our study is not without limitations. Most significantly, our cross-sectional design could overlook critical process dimensions that might simultaneously influence individuals' strategic orientations and structural positions. For instance, why would someone with a collaborating brokering orientation span structural holes in the first place? And how stable are strategic orientations toward brokering over time, particularly if we take into account longer periods? If they do change, at what point would a broker stop acting as an arbitraging broker to become a collaborating one, or vice-versa? These are critical aspects of the proposed relationship between structural positions and individuals actions that we could not directly address given the nature of our data and research design.

Our approach aimed at capturing individuals' behavioral preferences when facing a scenario in which they occupy a structural brokerage position. As a consequence, we designed our brokering orientations options thinking of mostly stable patterns of situation–behavior relations (Mischel, Mendoza-Denton, & Shoda, 2002). However, the degree to which these orientations are stable and independent or context-specific cannot be conclusively determined with our data. Several contextual factors can play a role in explaining the rate of adoption and change of orientations over time. For instance, factors such as organizational or national culture and values can make some behavioral orientations more socially desirable than others, and thus they can influence the distribution of individuals' preferences among orientations toward brokering (Xiao

& Tsui, 2007). Moreover, alters' characteristics can induce structural brokers to adopt one orientation instead of another (Lingo & O'Mahony, 2010). However, considering the data we collected at two points in time (two years) and the intertemporal consistency between our visual, scenario-based measures and a more traditional measure of individuals' orientations toward brokering is that individuals' preferences toward brokering orientations tend to be relatively stable.

We also observed empirically that these preferences do not vary across the relevant organizational and demographic dimensions we took into account (in particular across sub-functions, geographical locations, experience, education, and job rank). We obviously do not consider the empirical evidence obtained through these side analyses to be exhaustive and/or definitive enough to make an absolute statement about the nature, origins, and dynamics of individuals' strategic orientations. To the contrary, we believe there is a need for additional research to address these issues, and particularly the relationship between individuals' personality traits and their behavioral orientation toward brokering.

There are also important boundary conditions to the validity of our proposed theory. For instance, a context geared toward the generation of innovative practices, where individual contributions matter, could reward arbitraging strategies more for individuals who occupy positions that benefit from a privileged flow of knowledge. Different organizational contexts could instead be more rewarding for a different strategic orientation. This is not to say that formalized organizational norms would always be perfect predictors of the distribution of individuals' orientations. While it is difficult for us to speculate about what drives variation in the distribution of brokering orientations, one could reasonably imagine that the tension between formalized vs. emergent organizational norms could end up shaping individuals' orientation toward brokering.

By showing the important performance implication of these individual orientations, we hope that our study will spur interest and promote research on their antecedents.

Regarding the performance implications of orientations toward brokering, it bears repeating that we examined intra-organizational relationships in a context with relatively stable employment histories, within a single division of a single company. The importance of alignment between network structure and a strategic orientation toward brokering could possibly be a result of the constraints that individuals face in such an environment. For instance, in a stable context, a purposive arbitraging broker might create extra value by controlling informational resources and leveraging opportunities for arbitraging knowledge, resources, and information. However, in a more dynamic professional environment, creating connections among otherwise-disconnected others could be an important method for building consensus and jump-starting new initiatives, such that a collaborating orientation toward brokering would be more beneficial in relative terms (Obstfeld, 2005). How the interplay between structural position and individual strategic orientation changes in more volatile contexts (i.e., high-turnover organizations) is an open question that our study cannot address. Similarly, one might observe different results associated with collaborating and arbitraging brokering orientations depending on specific organizational cultures (Xiao & Tsui, 2007). More collectivistic cultures could encourage and reward collaborating orientations, while more individualistic, ego-centric cultures could encourage and reward more arbitraging orientations. Each of the limitations identified above reinforces the importance of future research to identify conditions that currently limit the generalizability of our findings.

Our research endeavor has been one of the first to rely on a scenario-based visual scale to measure important network characteristics (Mehra et al., 2014) and, in our particular case, the way individuals act on one strategic orientation or the other. While we could provide at least some

suggestive evidence about the fact that our measure seems to capture key aspects of the tension between arbitraging and collaborating strategic orientations, the novelty of our approach and the lack of cumulative research probing the validity and reliability of this type of measure suggest that some caution is warranted when interpreting our findings. For instance, a useful extension of the scenario-based approached we used in this paper, could be to present respondents with multiple, different scenarios to assess how their orientations changes when facing different hypothetical situations (Burt, 2012).

Finally, future studies could also investigate how the interplay between brokerage, strategic orientation, and performance varies across time. Similarly, extending our investigation on the role of strategic orientation toward brokering to include organizational and individual characteristics such as gender, job rank, or organizational culture, would help to further refine the basic insights we've offered with this study. Explicitly considering variation in individuals' strategic orientation, along with variation in their structural position, promises to reveal important new information about how network structures form, evolve, and affect meaningful organizational outcomes.

CHAPTER 3: Brokers in Disguise: The Interplay of Actual Brokerage and Socially Perceived Brokerage on Individual Performance

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ABSTRACT

Recent research suggests that actors with an open network face an *idea-action* tradeoff: Increases in the ability to generate innovative ideas might come at the cost of a decreased ability to implement them. By linking otherwise disconnected individuals, brokers are exposed to non-redundant information that can be recombined in novel ways. Those that are being brokered, however, may develop a belief that the broker is not "one of them," thus triggering skepticism of the broker's motives that can hinder brokers' ability to get their ideas accepted. Integrating insights from cognitive social structures into structural holes theory, I argue that others' perceptions of a focal actor's brokerage opportunities constitute a critical contingency underlying network advantage. Using a multimethod approach—including a field study in a global consulting firm headquartered in the U.S. and a preregistered experiment—I find that individuals spanning structural holes perform better when their colleagues perceive them to have closed rather than open networks, and that trust is the underlying mechanism driving this effect.

Keywords: social networks, brokerage, cognitive perceptions, network advantage

INTRODUCTION

Decades of research in organizational theory and social capital have shown us that individuals derive advantages from the networks in which they are embedded (Granovetter, 1973; Burt, 1992; Lin, 1999). A central debate about the structural underpinnings of network advantage revolves around which network configuration provides greater benefits to social actors. One of the most contentious issues in linking social structure to positive outcomes has been whether advantages are more likely to accrue to individuals who have open, sparse networks rich in structural holes or closed, dense networks characterized by many redundant ties. Open networks are traditionally associated with information advantages in the form of access to diverse information, which has been shown to be a very important driver for generating novel ideas (Burt, 2004; Ahuja, 2000; Zaheer & Soda, 2009). In contrast, closed networks are thought to facilitate trust and consensus formation, which are critical when trying to implement novel ideas within an organizational context (Coleman, 1988; Obstfeld, 2005). Juxtaposing these two schools of thought highlights an apparent paradox related to spanning structural holes: brokers are better at generating ideas experiencing a higher "risk of a productive accident" (Burt, 2010: 5), but they are less likely to implement such new ideas. This is exactly what Fleming, Mingo, and Chen (2007) find in their longitudinal study of U.S. utility patents and inventors: spanning structural holes was associated with a higher probability of generating novel ideas, but ideas were more likely to be implemented and used again if they originated from a cohesive network. Shedding light on this tradeoff is key to understanding network advantage, since achieving superior performance is a function of both dimensions.

Indeed, recent research on brokerage seems to suggest the existence of an *idea-action* tradeoff associated with spanning structural holes (Obstfeld, 2017). On the one hand, by being

located at the interface of different social domains, people with open networks have opportunities for accessing different ideas and combining them in new ways. On the other hand, by lacking a cohesive group around them, the same individuals may incur penalties because their unconnected contacts may develop a belief that the broker is not "one of them," thus triggering skepticism of the broker's motives, which would make it difficult to mobilize and coordinate resources to get ideas accepted (Stovel & Shaw, 2012).

The question, then, is how network brokers can gain acceptance for novel ideas they may have generated as a result of connecting different pockets of a network. In attempting to answer this question, past research has mainly emphasized the importance of creating hybrid social structures that strike a balance between network cohesion and range (Reagans & Zuckerman, 2001; Reagans & McEvily, 2008; Soda, Usai, & Zaheer, 2004; Aven & Hillman, 2018). In a similar vein, other studies have shown that brokers need to be reputable in order for their new and possibly risky ideas to be accepted (Hillman & Aven, 2011; Burt & Merluzzi, 2014). Other research has emphasized the importance of brokers' individual differences such as cognitive styles (Carnabuci & Dioszegi, 2015), cognitive motivation (Anderson, 2008), and attention to information (Rhee & Leonardi, 2018).

While this research has made some progress, it has neglected the role that alters' perceptions of a focal actor's social network might play in explaining differences in idea acceptance rates, and, as a consequence, unequal returns to brokerage. In other words, I argue that the emphasis on *broker-centric* explanations of the association between structural holes and performance has limited our theoretical understanding of brokerage by a priori ruling out the possibility of having *alter-centric* accounts of the phenomenon (cf., Hahl, Kacperczyk, & Davis, 2016; Kleinbaum, Jordan, & Audia, 2015; Podolny, 2001). This is unfortunate especially

because social networks are inherently relational, with individual outcomes originating from the interplay of both the focal actors' and alters' behaviors.

The way in which individuals perceive others' social networks can enrich our understanding of alternative mechanisms that may drive unequal returns in the context of brokerage. A large stream of research on cognitive social structures and social network perceptions shows that individuals are generally inaccurate in perceiving social structures, creating cognitive representations of social networks that are quite different from actual networks (Krackhardt, 1987; Brands & Kilduff, 2013; Brashears, 2013). These findings imply that social networks coexist in two different but related states, so that every actor can be categorized along two dimensions of brokerage: *actual* and *socially perceived*. The former dimension stems from the "real" network, whereas the latter is the result of alters' perceptions of a focal actor's brokerage opportunities (Brands & Kilduff, 2013). Building on research on structural holes (Burt, 1992), social capital (Coleman, 1988), and cognitive social structures (Krackhardt, 1987), I argue that actors' performance is a function of both actual and socially perceived brokerage. On the one hand, by spanning structural holes in the actual network, brokers receive valuable inputs—such as information and knowledge—which are essential during the *idea generation* phase, when actors' success depends on the ability to effectively explore solution spaces and develop innovative ideas. On average, structural holes are likely to provide an advantage in this phase.

In contrast, by being perceived as individuals who bridge across different groups, brokers may lack social resources—such as relational trust and legitimacy—which are essential during the *idea acceptance* phase, when actors' success depends on the ability to effectively mobilize resources to gain acceptance for their ideas (Baer, 2012; Keum & See, 2017). On average, being

perceived as someone who spans structural holes may be a liability rather than an advantage in this phase. Put differently, disentangling actual and perceived social structures with respect to brokerage positions, I theorize that alters' perceptions of a focal actor's brokering opportunities play a moderating role in the relationship between structural holes and performance with higher returns accruing to brokers who are *misperceived* by their alters to occupy dense social networks.

I test my arguments with two studies. First, using survey data on advice networks among employees working for a U.S. consulting firm, I estimate the probability of an employee being evaluated as high performer as a function of both her actual and socially perceived brokerage. Findings reveal that although bridging structural holes has a positive main effect on individual achievement, brokers do better when they are perceived by others to be embedded in cohesive social networks, as this increases the extent to which they are trusted by others. Second, to further nail down causal mechanisms, I run a preregistered experiment in which I use a vignette scenario to manipulate social network perceptions and see their causal impact on trust and idea acceptance.

THEORY DEVELOPMENT

Brokerage, closure, and individual performance

A great deal of research shows that occupying social network positions rich in structural holes enhances individuals' performance by granting individuals informational and control benefits (e.g., Burt, 1992; Burt, 2004; Granovetter, 1973). Because information and opinions are assumed to be more homogenous within than between groups (Aral & Van Alstyne, 2011), individuals that can reach unconnected contacts are exposed to a diverse range of views and ideas that are hardly accessible to those embedded within cohesive networks (Granovetter, 1973). Having access to such a heterogeneous set of information is a key mechanism linking

brokerage to individual outcomes because, by facilitating individuals to envision novel combinations of seemingly unrelated ideas, it fosters the idea-generation process (Burt, 2004; Tortoriello, 2015; Goldberg, Srivastava, Manian, Monroe, & Potts, 2016). Being able to come up with novel ideas is a prerequisite for individual performance, especially in knowledge-intensive industries where employees constantly face situations that require out-of-the-box thinking (Hargadon & Sutton, 1997). A variety of studies from different settings support the view that individuals spanning structural holes tend to be more innovative than peers embedded in closed network positions. For example, supply chain managers in a multinational company who had open networks were more likely to come up with innovative ideas compared to employees with few brokerage opportunities (Burt, 2004). In a similar vein, looking at engineers working in a software company in South Korea, Rhee and Leonardi (2018) found that employees with less constrained networks were able to produce more innovative ideas than peers with highly constrained ones. In summary, this line of research on brokerage as a source of social capital is rooted in the ideas that informal network ties function as channels or "pipes" through which information and ideas flow (Podolny, 2001). Being exposed to non-redundant channels, therefore, increases individuals ability to produce new, valuable outputs given a set of informational inputs.

Recent research shows, however, that the same structural configuration that helps individuals to come up with innovative ideas may be a liability when organizational actors need to convince others to accept their proposal (Obstfeld, 2017; Perry-Smith & Mannucci, 2017; Stovel & Shaw, 2012). This line of work on the negative effects of brokerage on idea acceptance maps into the idea of informal ties as "prisms," in which perceptual cues stemming from networks become an important element to assess organizational actors (Podolny, 2001). As

pointed out by Burt and Merluzzi (2016: 369), “there is an element of trust required to accept a proposed new idea or way of thinking.” While structural holes provide advantages in detecting and developing good ideas, brokers need to make sure that others accept their proposals. Although there are many factors, such as hierarchy and status, that can help reduce the skepticism and resistance with which new ideas are often met, the configurations of informal ties around a focal actor proves to be an important asset to gain acceptance (Obstfeld, 2005; Centola & Macy, 2007). For example, Podolny and Baron (1997) found that structural holes in an individual’s buy-in network, which comprises informal relationships required to garner support for an innovation, were associate with lower individual returns. Being able to get new ideas accepted is inherently a socio-political process in that it requires multiple people to agree on the value of a given idea (Baer, 2012; Damanpour, 1988). 3). Convincing different people to agree on the value of an idea may be easier insofar as those in charge of evaluating an idea perceive the proponent to be one of them, and thus deemed as a trustworthy contact. Indeed, the literature on boundary spanners and brokerage (Krackhardt, 1999; Xiao & Tsui, 2007) argues that individuals reaching across different groups are more likely to face contacts that may be suspicious about their activities in that such contacts may believe that their needs “are receiving less attention from the boundary spanner than someone else’s needs” (Podolny & Baron, 1997: 676). In short, network closure around focal actors’ social structures should be associated with a higher probability to gain acceptance for their ideas due to increased trust between the parties.

Insofar as prior research shows that both brokerage and closure provide different advantages to organizational actors, network researchers have suggested different strategies to solve the tradeoff between brokerage and closure. In their study of entrepreneurial teams in Russia, Aven and Hillman (2018) show that, when the level of analysis moves from individuals

to teams, it is possible to strike a balance between open and closed networks by jointly considering the social networks of founders. In a similar vein, looking at corporate R&D teams, Reagans and Zuckerman (2001) show that it is possible to get the benefits of both brokerage and closure by having global structural holes and local cohesion. Remaining at the individual level of analysis, Burt and Merluzzi (2016) incorporate time to solve the inherent tradeoff between accessing novel information and developing a reputation for being a trustworthy contact to get new ideas or way of thinking accepted by others. They find that higher returns are associated with period of deep engagement in a group (i.e., closure), followed by a period of connecting across groups (i.e., brokerage), and so on—a construct that they name "network oscillation."

In this work, I propose a novel theoretical framework that can shed additional light on the micro underpinnings of network advantage by integrating structural and cognitive theories (Burt, 1992; Krackhardt, 1987). This possibility rests on the fact that individuals' inaccuracy in detecting others' social structures allows varying levels of decoupling between actual and socially perceived network positions. But before I can explicitly integrate the structuralist and cognitive perspectives to study how individual benefit from their networks, a discussion of existing literature on network cognitions is in order.

Actual networks and cognitive networks

Past research shows that being able to accurately detect informal structures underpins a number of individual outcomes, such as power (Krackhardt, 1990) and positive reputation in exchange relationships (Flynn, Reagans, Amanatullah, & Ames, 2006). Yet, individuals are generally inaccurate in perceiving social networks, creating cognitive representations of informal structures that are often quite different from real ones (Krackhardt & Kilduff, 1999; Casciaro, 1998). Recent research suggests that such a lack of accuracy in perceiving networks is even

amplified when people are asked to identify higher-order features of a network—such as the extent to which others function as a bridge among groups—instead of lower-order ones—such as single ties (Mehra et al., 2014).

There are at least three factors responsible for the mismatch between actual and perceived networks. First, there is an inherent complexity in encoding and simultaneously retrieving information about multiple ties (Brashears, 2013), especially in the realm of human relationships, where interactions dynamically evolve as a result of different stimuli (Ahuja, Soda, & Zaheer, 2012). Second, individual differences might introduce biases limiting individuals' ability to "seeing things clearly" (Casciaro, 1998). In a series of laboratory experiments, Flynn and colleagues (2010) show that people who are high in need for closure tend to perceive networks as having more transitivity than they actually have. In a similar vein, people with a strong need for achievement tend to more accurately perceive instrumental and affective networks than people with a weak need for achievement. And having a high need for affiliation also increases accuracy in perceiving affective relationships (Casciaro, 1998). Third, some intrinsic features of the actual network might also create mismatch between reality and perceptions. For example, research shows that the number of ties an individual has is a strong predictor of accuracy, such that central actors are able to create cognitive representation of social structures that are more closely related to actual ones (Casciaro, 1998). And Krackhardt and Kilduff (1999) show that individuals exaggerated the degree of balance in close and distant ties, but not ties at intermediate distance, thus suggesting that social distance is an important element informing network perceptions.

In summary, this line of research furthers our understanding of cognitive social structures by illuminating the upstream antecedents of individuals' inaccuracy in recalling social networks.

And it suggests that social networks might lead a "double life" (Mehra et al., 2014: 312), with actual and perceived relationships often diverging from one another.

However, such an emphasis on investigating how individuals perceive and cognitively represent the social networks that surround them has ended up limiting our understanding of the downstream consequences of network perceptions on individual outcomes (Brands, 2013). Indeed, insofar as organizational researchers have investigated how cognitive perceptions of networks affect behavior and outcomes, they have looked at network accuracy and outcomes at the level of a focal actor (Krackhardt, 1990). That is, most research has looked at the existence of correlational evidence at the individual level between being accurate in perceiving networks and outperforming others. An interesting theoretical and empirical question, however, is looking at whether alters' cognitive representations of an ego's social networks affect ego's performance.

A socio-cognitive approach to network advantage

I argue for the value of considering the interplay between the two dimensions of brokerage, actual and socially perceived, and suggest that organizational members can indirectly benefit from their misalignment by offsetting the advantages (and disadvantages) of actual brokerage against those of socially perceived brokerage. The informational advantages of brokerage can be fully reaped if counterbalanced by the identity benefits of socially perceived closure. More specifically, actual networks rich in structural holes provide access to novel, non-redundant information which can potentially translate into superior performance, provided that brokers succeed in convincing others about the value of their ideas. An important element of this line of reasoning is that being perceived to have closed network is as good as having closed networks. A great deal of research has demonstrated that perceptions of social structures, rather than actual structures per se, drive human behavior and evaluations (Brands & Kilduff, 2013;

Hahl, Kacperczyk, & Davis, 2016). For example, in their investigation of actual and perceived network relationships among managers working for a small entrepreneurial firm, Kilduff and Krackhardt (1994) found that perceived network relations were better predictor of individual achievement than actual network relations.

Insert Figure 3.1 about here

Figure 3.1 depicts my conceptual framework. The axes represent the two dimensions of brokerage originating from integrating structural holes theory with cognitive social structures. Quadrants II and III represent cases where organizational actors are actually embedded in cohesive structures and are either perceived by others to have a closed network, *Overt Closure*, or to have an open network, *Closure in Disguise*. Individuals in these positions, in other words, are either embedded in cohesive social structures—both in terms of actual networks and networks as perceived by others—or embedded in cohesive social structures while being perceived to bridge across different groups. Overt-closure actors (Quadrant II) enjoy the advantages of being perceived to occupy a cohesive local network, which confers acceptance and trust within the organization. At the same time, their structural position makes them less likely to gain access to non-redundant information. Closure-in-disguise actors (Quadrant III) experience a double disadvantage because they lack access to non-redundant information and, at the same time, they suffer from an identity and trust point of view because others perceive them to be in different groups. From a theoretical point of view, however, because both positions lack access to non-redundant information, which is key to generating novel ideas, we should expect no differences in terms of individual outcomes between these two quadrants. Indeed, trust-related advantages in the form of ease to get ideas accepted, which is a function of having socially perceived closure, are contingent on having novel ideas in the first place. It is also interesting to

note that, disregarding the role of cognitive perceptions, most research on social networks has implicitly assumed organizational actors to follow in the overt closure quadrant.

In contrast, Quadrants I and IV, which are the main focus of my research, represent cases where organizational actors have open structures in the actual network and are either perceived by others to have a closed network, *Brokers in disguise*, or to have an open network, *Overt brokerage*. Individuals in these positions are either spanning structural holes while being perceived to be embedded in cohesive social structures or linking otherwise unconnected others—both in terms of actual networks and networks as perceived by others.

Overt-brokerage actors (Quadrant IV) are at greater risk of producing novel ideas and of having access to unique information; however, because they are socially perceived to be in different groups at the same time, new ideas produced by them are likely to be regarded with suspicion and disregard by their peers. Being perceived to bridge across different groups might trigger skepticism of the broker's motives, thus hindering brokers' ability to gain acceptance for their ideas. On the other hand, brokers-in-disguise actors (Quadrant I) enjoy the informational benefits of brokerage, while their socially perceived closure insulates them from experiencing the deleterious effects of being perceived as untrustworthy or nakedly self-serving (Stovel and Shaw, 2012). Again, disregarding the role of cognitive perceptions, past research has implicitly assumed organizational brokers to follow in the overt brokerage quadrant. And it has argued that the negative identity effect stemming from having open networks are mainly context-dependent. For example, looking at Chinese managers working in the information technology industry, Xiao and Tsui (2007) find that structural holes tend to be detrimental to employees' career development. That is, all managers spanning structural holes are socially perceived to have open networks and individual outcomes are negatively correlated with brokerage insofar as the

negative identity effects of "standing on two boats" at the same time offset the positive informational benefits of having diverse knowledge (Xiao & Tsui, 2007: 5).

In this work, integrating structural holes theory with cognitive social structures as well as theoretically distinguishing idea generation from idea acceptance, I argue that the negative identity effects of having open networks are a function of social perceptions: they only materialize when brokers are socially perceived to have open networks. Overall, my arguments suggest:

> *Hypothesis 1: Socially perceived brokerage negatively moderates the positive association between actual brokerage and individual performance, with lower returns accruing to brokers who are socially perceived to have open networks.*

As mentioned before, the negative moderation effect of socially perceived brokerage on employees' performance stems from the fact that others may perceive individuals spanning structural holes not to be "one of them." Because brokers that are seen to have open networks are by definition perceived to be embedded in multiple groups at the same time, this might have consequences on their trustworthiness (Stovel & Shaw, 2012). There are at least two reasons that would predict that people will exhibit lower trust toward others perceived to have open networks. First, perceiving someone to be caught in different groups might limit others' ability to make attributions about her motives and intentions (Perrone, Zaheer, & McEvily, 2003). People may perceive brokers, connected to groups with potentially competing expectations, to have more autonomy and an increased ability to exercise individual discretion. Being able to predict how others will behave is a key feature of trust, which some scholars have characterized as a "positive assumption about the motives and intention of another party" because it represents an "expectation that others will act in a way that serves, or at least is not inimical to, one's interests"

(McEvily, Perrone, & Zaheer, 2003: 93). Second, perceiving someone to bridge across groups could reduce others' expected ability to effectively supervise and punish bad behaviors through social sanction mechanisms (Coleman, 1988; Greif, 1993). Low levels of trust from others are likely to decrease an individual's ability to harvest the resources necessary to get organizational buy-in and gain acceptance for novel ideas (Baer, 2012). And in an organizational context this is likely to negatively affect individual performance. I therefore postulate that being perceived to have a network rich in brokerage opportunities will negatively impact one's trustworthiness, thereby lowering performance evaluations. In contrast, individuals who are perceived to have a closed network will experience a reinforcing path that positively affects performance evaluations. More formally, I hypothesize that:

Hypothesis 2: Trustworthiness mediates the negative effect of socially perceived brokerage on individual performance.

OVERVIEW OF STUDIES

In two studies, I examine how and why actual brokerage and socially perceived brokerage affect network advantage. I predict that, holding brokerage opportunities fixed, employees who are perceived to be embedded in dense social networks will achieve superior outcomes through mechanisms rooted in trust. In the first study, I used field data to show the interplay of actual and socially perceived brokerage on individual performance and provide suggestive evidence of trust as the underlying mechanism. Because of the cross-sectional nature of the data, I cannot determine causality in my investigation of trust as the pathway through which network perceptions affect achievement. To address this issue, and to confirm that people who are perceived to have open networks are trusted less by others, I conducted a preregistered online experiment in which I randomly assigned participants to conditions that simulated

perceptions of fictitious targets having open versus closed social networks in the workplace. Replicating the field result, I show causally that individuals perceived to bridge across different groups are not only trusted less, but also less likely to have their ideas accepted by others.

STUDY 1: Field data on how actual and socially perceived brokerage affect performance

Research setting and data

The research site for this study was a global consulting firm headquartered in the United States (hereafter called "the company" to preserve anonymity). Founded more than 50 years ago, the company is a leading player in its industry and operates in different practice areas. This empirical setting is well suited to study returns to brokerage for multiple reasons. Because the company serves clients in such dynamic and fast-moving industries as Health Care, Entertainment, and Technology, employees cannot rely on off-the-shelf solutions when engaging clients: successful performance requires the ability to both generate and get novel ideas accepted by peers. Furthermore, in interviews, employees stressed that the company has a collegial, collaborative culture that emphasizes the importance of interpersonal relations within the workplace, both as a value in itself and as a means of increasing employee performance. With a company culture centered on both interdisciplinary collaboration across the enterprise and collegiality, brokerage and closure are likely to be needed and rewarded, thus providing an interesting setting to put my theory to an empirical test.

I tested my hypotheses using data from all 191 employees working in the company Health Care practice, which is based in both the U.S. and Europe. I gathered data from two primary sources. First, after signing the company's non-disclosure agreement, I accessed demographic data on employees, such as gender, age, job ranks, educational background and industry experience, from company records. Second, I administered an online survey over ten

days to collect data on my explanatory variables such as relational data and social perceptions of brokerage. Participation was voluntary, and I assured participants that I would use the results only for research purposes without revealing their identities. One hundred fifty five employees out of 191 completed the survey, yielding a response rate of 81.2 percent. Using demographic information on all invited employees, I performed a non-response bias analysis comparing the 36 nonrespondents to the 155 who responded. A logit model, with the dependent variable taking value one in case of no response and zero otherwise, showed that the probability of an employee's responding did not relate to any of the available demographic variables.[15]

To collect social networks data, I provided each employee with a complete list of all other employees and asked them to tick their contacts, an approach known as the "roster method" (Wasserman & Faust, 1994). To analyze the association between brokerage and individual performance, I focus on advice interactions because these ties are key conduits of information within organizations (Podolny, 2001), and have been found to influence performance (Burt, 2004). In particular, I asked the following question: "Please select the names of the people to whom you turn for work-related advice." I accompanied this question with a list containing the names of all employees (in alphabetical order). I asked respondents to tick next to the names of their colleagues, indicating their sources of advice. I also asked respondents to answer the following question: "Please select the names of the people that come to you for work-related advice." The triangulation of these two separate but related network questions allows me to create an actual advice network by drawing an advice tie between two individuals, A and B, if and only if A says that she goes to B for advice and B says that A comes to her for advice. This

[15] I have complete data on all variables for 114 individuals who thus composed my final sample. Missing values are due to isolate nodes in the network for which is not possible to compute brokerage measures. All analyses are performed on this complete sample.

approach is different from symmetrizing a directed network in that the directionality of interactions is preserved (Krackhardt, 1987). This procedure is a very important element needed to test my theory, which looks at the interplay of actual and socially perceived network positions on individual performance. Because research shows that imposing a limit on the number of nominated contacts can introduce measurement error (Holland & Leinhardt, 1973), I allowed respondents to select as many names as they wished. The density computed on the "unconfirmed" advice network is 4 percent, and it drops to 1.4 percent when only "confirmed" ties are included. After freely selecting the names of all their advice contacts, the web-based survey prompted respondents to fill out a network visual scale, which I used to collect social perceptions of brokerage opportunities (Mehra et al., 2014). The operationalization of this construct, as well as the logic underlying its use, are fully explained in the next section. The survey also included items to capture relational data on trust, which I used to test my mediation hypothesis.

Measures

Individual performance. The dependent variable in my study was employees' performance evaluation, which has been widely used as outcome of interest in network brokerage studies (Mehra, Kilduff, & Brass, 2001; Burt, 2004; Soda, Tortoriello, & Iorio, 2018). In my research setting, employees work in small teams for projects that usually last for a couple of months and span different industries. They are assessed by their supervisor through a performance calibration process in which managers come together to discuss the performance of employees and achieve agreement on performance appraisal ratings. Such a collective discussion regarding performance allows supervisors to have new insight into the performance of employees and reduce potential bias. Further, because all employees are evaluated on the same

criteria, performance calibration effectively differentiates high performers from average or poor performers so that high performers can be rewarded and retained. At the end of this process, employees receive one of three feedback messages: needs development, on track, and high performer. I obtained performance evaluation data from the company itself for 152 out of 191 employees. Missing data are due to either interns not staying in the company long enough to be assessed or employees being very high in the corporate ranking (i.e., practice group president or vice presidents) such that a formal performance calibration process is not conducted. In my sample, three employees received a "needs development" performance evaluation, 63 employees were evaluated to be "on track," and 86 employees were evaluated to be "high performer." As a result of such a distribution of ratings, I decided to create a dummy variable, *high performer*, which takes value one if an employee is a high performer and zero otherwise. Importantly, employees' performance evaluations were collected approximately six months after the web survey was administered, thus reducing concerns of simultaneity between variables.

Actual brokerage. I calculated an individual's brokerage opportunities in the actual network using the *EgoBetweenness* routine in UCINET 6.654 (Borgatti, Everett, & Freeman, 2002; Sasovova, Mehra, Borgatti, & Schippers, 2010). This measure captures the betweenness centrality of a focal actor in her ego network, being the sum of the proportion of times that focal actor lies on the shortest path between each pair of alters. Specifically, the contribution of each pair of alters to a focal actor's *EgoBetweenness* score is as follows: For alters who are directly connected to each other there's a contribution of 0; For alters who are connected to each other only through ego there's a contribution of 1; For alters who are connected through ego and one or more other alters there's a contribution of 1/k, where k is the number of nodes which connects

that pair of alters. That is, *EgoBetweenness* is a continuous variable that takes high values when a focal actor is the only intermediary between pair of alters in her ego network.

This measure of brokerage is appropriate to test my theory for two reasons. First, I am interested in a focal actor's local network, rather than her position in the global structure, because research shows that brokerage benefits are dramatically concentrated in the immediate network around a person (Burt, 2007). Second, my theoretical framework revolves around access to novel information by means of exposure to non-redundant contacts, rather than control over information flows by means of occupying central positions in the overall network.

Socially perceived brokerage. Capturing social network perceptions is a non-trivial task. Standard techniques to collect cognitive network data require each respondent to report on her perceptions of every possible pair in the sample. And, as aptly pointed out by Krackhardt, "in cases where the bounded network is reasonably large, the task may be virtually impossible" (1987: 114). In my setting, with a sample size of 191 individuals, each respondent should provide information on 36,481 dyads. Because this approach was not viable, I decided to capture social perceptions of brokerage opportunities using visual network scales (Mehra et al., 2014; Soda, Tortoriello, & Iorio, 2018). Visual network scales focus on social networks as mental creations and use pictorial representations of network configurations to collect respondents' perceptions of social networks. More specifically, respondents are presented with stylized depictions of social network structures and are asked to judge, using a numeric scale, the extent to which their perceptions of network configurations match the proposed stylized networks. Such an approach allows researchers to inquiry respondents directly about a particular network characteristic of interest "rather than soliciting responses at the level of dyadic ties and then inferring the network characteristic of interest" (Mehra et al., 2014: 317). And because I am

interested in capturing social perceptions of a particular network feature, brokerage opportunities, this approach is appropriate to test my theory.

After filling out the advice name-generator question, respondents landed in a new webpage of the survey in which they were prompted to familiarize themselves with the social network concepts of brokerage and closure. In particular, they saw the following figure.

Insert Figure 3.2a about here

Next, for each selected alter, I showed respondents a slider question type, having one of two possible network configurations on each side functioning as visual anchor: the one on the left represented a closed, dense network with eight alters that were fully connected to each other as well as to the focal actor; the one on the right represented an open, sparse network with eight alters that were fully disconnected from each excepted for the ego (i.e., star-like graph). For each of the slider-type questions, I told respondents that the person to be evaluated was at the center of the network and that she was the target for which I wanted to collect respondents' perceptions on the level of interconnectedness among her advice contacts.

Insert Figure 3.2b about here

An example might help clarifying such an operationalization. Assume that respondent A selects three people as advice contacts, B, C, and D. If A perceives B to have a closed advice network, she drags the slider handle to the left to match that perception. If A perceives C to have an open advice network, she drags the slider handle to the right to match that perception. If A perceives D to have neither an open or closed advice network, she keeps the slider handle in the middle point, which was the starting point and anchored with the word "mixed." I preferred not to have any visual cue for this middle point because, holding constant ego density, a focal actor's ego network can be arranged in multiple ways, potentially introducing noise. Dragging the slider

handle completely to the left corresponds to a numerical value of 0, keeping it in the middle corresponds to a numerical value of 50, and dragging the slider handle completely to the right corresponds to a numerical value of 100. Then, for each target *j*, I simply averaged across all respondents *i*'s to obtain my variable of interest, *socially perceived brokerage*, which is continuous variable ranging from 0 to 100.[16]

Actual and perceived brokerage interaction. To test my interaction hypothesis, I first mean-centered, and then multiplied, actual brokerage and socially perceived brokerage creating a new variable labeled *actual and perceived brokerage interaction.*

Trustworthiness. I measured the extent to which an individual is trusted by her contacts using a reputational measure of trust. Specifically, using an item from Krackhardt and Hanson's (1993) work on intraorganizational networks, I asked respondents the following question: "Whom do you trust to keep in confidence your concerns about a work-related issue?" Similarly to my other relational items, I accompanied this question with a list containing the names of all employees, asking respondents to select the names of their colleagues. *Trustworthiness* is a count of how many people indicated that they trusted a given actor. This variable is continuous, potentially ranging from 0 (no one in the company trusts the focal actor) to 190 (everyone in the company trusts the focal actor).

Control variables. I controlled for a number of demographic, organizational, and structural covariates that might provide alternative explanations for the hypothesized effect of actual and perceived social structures on individual's performance evaluation. Demographic variables include gender, race, and level of education. Controlling for gender is important because it may affect how individuals are evaluated (Lyness & Heilman, 2006), selection into

[16] Results are consistent when using the median value to aggregate others' social perceptions.

actual brokerage positions (Ibarra, 1997), and social perceptions of brokerage opportunities as females might be perceived to be more communal and less agentic than males (Brands & Kilduff, 2013; Scott & Brown, 2006). Thus, I included a dummy variable, *male*, to control for gender. I controlled for race, by including the dummy variable *white*, because past research indicates that white and minority managers tend to have different social network configuration that result in differences in advancement potential (Ibarra, 1995). *Education* was included mainly because it may affect individuals' ability to generate innovative ideas (Scott & Bruce, 1994) and because it can be considered a proxy for an individual's underlying cognitive ability. In particular, *education* is a categorical variable with five levels (1 = Other; 2 = High school or equivalent; 3 = Bachelor's degree; 4 = Master's degree; and 5 = Professional degree or Doctoral degree).

Organizational variables include job tenure and hierarchical position. I included a control for *industry experience*, measured as the number of years, because such experience may affect both employees' performance (Sturman, 2003) and ability to occupy brokering positions (Mehra, Kilduff, & Brass, 2001). I also controlled for employees' *hierarchical position*, which was measured on a nine-point scale (1 = lowest level, 9 = highest level) following the company's career system, because past research shows that it affects both brokerage opportunities and individual performance (Ibarra & Andrews, 1993). In a similar vein, employees high in the organizational hierarchy may be perceived by their colleagues to span more structural holes than they actually do due to the very nature of the tasks associated with their job descriptions.

I included a number of structural variables to account for possible confounders stemming from the configuration of different network structures. Past research suggests that an employee's friendship network is an important determinant of both instrumental and affective support that

may enhance performance (Brass, 1984). To account for this, I collected data on each employee's friendship network using a roster method and created a variable, *number of friends*, that captures the size of an employee's ego network. Specifically, I asked the following question: "Whom do you consider a personal friend?" Because people's perceptions of who sees them as a friend are not always accurate (Krackhardt & Kilduff, 1999), I followed past research and draw a friendship tie between two actors only if both actors reported it (Balkundi, Kilduff, Barsness, & Michael, 2007). I controlled for *number of advice ties* in a focal actor's ego network in order to isolate the effect of brokerage from the simple effect of having more contacts. I also included a covariate to capture the *number of weak components* in a focal actor's advice ego network. Indeed, holding constant network size as well as brokerage opportunities, alters in an ego network might be structurally organized in different cliques. Figure 3.3 explains why it is important to control for this construct. Both ego networks have a size of six and a density of 0.40. In both networks actor *A* has an ego betweenness score of 9. However, in Figure 3.3 Panel A alters are organized into two weak components, whereas in Figure 3.3 Panel B alters are organized into three components. And this difference might inform both how actor *A* is socially perceived in terms of brokerage and her performance (Krackhardt, 1999).

Insert Figure 3.3 about here

Finally, because social perceptions of brokerage might be driven by homophily with respect to such demographics as gender, race, and country of origin between a focal actor and her contacts, I control for *ego-alter homophily*. This is a composite variable capturing the percentage of homophilous alters, ranging from 0 (all alters different from ego) to 1 (all alters similar to

ego). Specifically, such a covariate is the average of three values: ego-alter homophily in terms of gender, race, and country of origin.[17]

Estimation approach

I estimated a linear probability model (LPM) in which being evaluated as *high performer* was the dependent variable. The linear model yields estimates that are easier to interpret than those of a logit specification especially with respect to interaction terms (Ai & Norton, 2003), but it has two drawbacks. First, it imposes heteroskedasticity in the errors, a concern that I addressed by using robust estimates of the standard errors (Angrist & Pischke, 2008). Second, it may generate predicted values that may be greater than 1 or lower than 0. However, such values are not a concern when the purpose of the model is simply to estimate the marginal effect of an independent variable on an outcome of interest, averaged across the distribution, as in my case (Wooldridge, 2002).

Given that employees work in different countries, I used cluster-robust standard errors at the country level to account for possible unobserved differences in performance ratings across offices that may persist despite the performance calibration process (Wooldridge, 2002). It is important to notice that such standard errors have the double property of being both heteroskedastic- and cluster-robust (Cameron & Miller, 2015). Further, results are unchanged even when using country fixed effects along with heteroskedastic-robust standard errors.

As robustness check, I also estimated my models using a Heckman sample section approach to model missing values in my outcome of interest (Heckman, 1979). Because all results hold, I present LPM models because they are easier to interpret.[18]

[17] Results are consistent when these three terms are introduced separately in the regression model. I used a composite measure to save degrees of freedom while controlling for homophily mechanisms.
[18] The results of this analysis are available upon request.

RESULTS

Table 3.1 presents mean, standard deviations, and correlations among the variables. It is worth noting that actual brokerage and socially perceived brokerage are weakly and negatively correlated (ρ = –0.08), lending additional support to the idea that individuals cannot accurately perceive social structures (Krackhardt, 1987; Casciaro, 1998). Two points merit further attention. First, although some papers find a positive correlation between actual and perceived networks, those studies are based on tie–to–tie correlations, that is, the extent to which a perceiver accurately detects a set of ties in the actual underlying structure.[19] In my case, I am interested in exploring whether individuals can accurately perceive higher-order features of focal actors' structural configurations, such as brokerage vs. closure, which is an even more challenging task. This is in line with recent research on network cognitions, which suggests that "seeing the trees (i.e., ties) does not mean that one sees the forest (i.e., larger network configurations, such as bridging positions)" (Mehra et al., 2014: 5). Second, research shows that direct contacts—those one step away from a target—tend to see more transitivity in their contacts' ties (Krackhardt and Kilduff, 1999), thus potentially explaining the negative correlation coefficient. The fact that *actual brokerage* is positively correlated to *number of advice ties* (ρ = 0.68, $p < 0.05$), *number of weak components* (ρ = 0.31, $p < 0.05$), and *hierarchical position* (ρ = 0.24, $p < 0.05$) underscores the importance of controlling for hierarchy and size.

Table 3.2 presents my analyses shedding light on the role that cognitive social perceptions of brokerage have in explaining unequal returns to brokerage. Models 1–5 are nested: Model 1 estimates a specification including only control variables; Model 2 adds the

[19] Even when looking at tie-to-tie correlations some studies show very low (and not significant) correlations between actual and perceived networks (see for example Brands and Kilduff, 2014: Table 3).

effects *actual brokerage*; Model 3 adds the effects of *socially perceived brokerage*; Model 4 jointly adds the effect of *actual brokerage* and *socially perceived brokerage*; and Model 5 adds the interaction term, which is my core variable of interest. When estimating Model 5, I mean-centered *actual brokerage* and *socially perceived brokerage* to facilitate the interpretation of coefficients. Model 1 shows that among all control variables, only organizational variables explain variance in individual performance. *Hierarchical position* increases the likelihood to be a high performer ($B = 0.058$, $p = 0.037$), whereas *industry experience* reduces it ($B = –0.010$, $p = 0.034$). Model 2 introduces the effect of *actual brokerage*, which is positive and statistically significant, suggesting that spanning structural holes in the company helped people achieve high performance evaluations ($B = 0.003$, $p = 0.001$). Model 3 introduces the main effect of *socially perceived brokerage* on individual performance. The statistically significant and negative coefficient indicates that being perceived as someone who spans structural holes reduces employees' performance ($B = –0.002$, $p = 0.027$). Model 4 jointly introduces *actual brokerage* and *socially perceived brokerage*, which remain strong predictors of performance ($B = 0.003$, $p = 0.001$; $B = –0.003$, $p = 0.017$). The inclusion of these two dimensions of brokerage significantly improves the overall fit of the model, as the difference in the Akaike Information Criterion (AIC) between Models 4 and the baseline Model 1 is greater than 2 ($\Delta AIC = 161.14 – 158.89 = 2.25$). Model 5 introduces my core variable of interest, *actual brokerage* × *socially perceived brokerage*. Consistent with Hypothesis 1, the coefficient of such an interaction term is statistically significant and negative ($B = –0.001$, $p = 0.007$), showing that actual brokers who are socially perceived to have open networks perform worse than actual brokers who are socially perceived to have closed networks. Importantly, introducing the multiplicative term between actual and perceived brokerage substantially improves model fit, as indicated by the fact that the

difference in AIC between Models 5 and Model 4 is greater that 2 (ΔAIC = 158.89 – 155.31 = 3.58).

Insert Table 3.2 about here

Because the significance of the interaction term cannot, alone, confirm whether my hypothesis is supported (Brambor, Clark, & Golder, 2006; Hoetker, 2007), I visualized the interactive effect between *actual brokerage* and *socially perceived brokerage* on employees' performance. Figure 3.4 shows a two-dimensional interaction plot representing the predictive margins obtained from Model 5. The vertical (y) axis shows an employee's predicted performance and the horizontal (x) axis shows employees' actual brokerage scores (i.e., EgoBetweenness). The two intersecting lines show the expected performance, with all other variables held constant at their average, for people who are 1SD below and above the mean of *socially perceived brokerage* observed in my sample. One SD above the mean of *socially perceived brokerage* indicates people who are socially perceived to be embedded in open structures; one SD below the mean of *socially perceived brokerage* indicates people who are socially perceived to be embedded in cohesive structures. Standard errors, represented by vertical lines, are shown at 95 percent confidence levels. The figure shows that the effect of open networks on employees' performance is contingent on social perceptions of brokerage opportunities—namely, increases in the number of structural holes lead to superior outcomes provided that brokers are misperceived by others to be embedded in cohesive networks.

Insert Figure 3.4 about here

Robustness checks

I performed a number of additional robustness checks on the main results shown in Table 3.2 Model 5. First, I ran my models using logistical regression (Table 3.A1, Model 1 to 3). The

direction and statistical significance of the coefficients remain largely unchanged. Model 1 shows that *actual brokerage* has a main positive effect on e*mployees' performance* ($B = 0.0215$, $p = 0.055$), Model 2 shows that *socially perceived brokerage* has a main negative effect on employees' performance ($B = –0.012$, $p = 0.007$), and Model 3 shows that the mean-centered multiplicative term between actual and socially perceived brokerage has a negative effect on employees' performance ($B = –0.007$, $p = 0.001$).

Second, although local betweenness is a widely used measure of network brokerage (Everett & Borgatti, 2005; Sasovova, Mehra, Borgatti, & Schippers, 2010), I also estimated my models using the alternative measure of betweenness centrality which is measured considering also those ties that extend beyond a focal actor's ego network (Freeman, 1977). My results, displayed in Table 3.A1 Model 4 to 6, hold. The main effect of betweenness centrality on *employee's performance* is positive and statistically significant (Model 4, $B = 0.0003$, $p = 0.003$), while the interaction of *actual brokerage* and *socially perceived brokerage* became even more statistically significant (Model 6, $B = –0.0001$, $p < 0.001$).

Third, I conducted an analysis with country fixed effects (Table 3.A1, Model 7 to 9). This allows to statistically control for unobserved heterogeneity at the country level, such as cultural differences, that might affect both employees' performance and network perceptions. When country fixed effects are included in the analysis, Model 7 shows the main effect of *actual brokerage* remains positive and statistically significant ($B = 0.004$, $p = 0.028$), while the main effect of *socially perceived brokerage* in Model 8 becomes not significant ($B = –0.003$, $p = 0.52$). In addition, with respect to conditional and interaction effects, Model 9 shows that *actual brokerage* ($B = 0.056$, $p = 0.028$), *socially perceived brokerage* ($B = –0.011$, $p = 0.035$) and the

actual brokerage × *socially perceived brokerage* interaction term remain statistically significant and in the same direction ($B = –0.001$, $p = 0.037$).

Fourth, to ensure that my results are not driven by a few influential observations, that is observations with high leverage (h) and large residuals (r), I run a post-estimation analysis on my fully-specified model by computing the DFITS statistic (Welsch & Kuh, 1977), which allows to detect points that have disproportionate effects on regression estimates. Specifically, DFITS is a scaled difference between predicted values for the i^{th} case when the regression is fit with and without the i^{th} observation. Formally:

$$DFITS_i = r_i \sqrt{\frac{h_i}{1 - h_i}}$$

An observation is considered to be influential when its DFITS value is greater than $2\times\sqrt{k/n}$ (where k and n indicates the number of regression variables and observations, respectively). In my dataset, this analysis shows that there are only six observations that qualifies as influential. And removing these observations left unaltered the direction and significance of my estimates of interest, thus providing suggestive evidence that my results are robust to influential points (Table 3.A1 Model 10).

Mechanism testing: An initial exploration

Hypothesis 2 suggests that being perceived to have a network rich in brokerage opportunities will negatively impact individuals' trustworthiness, in turn lowering performance evaluations. This hypothesis corresponds to a simple mediation model, presented in Figure 3.5, according to which *socially perceived brokerage* affect *employees' performance* through the intervening variables of *trustworthiness*. I used structural equation modeling (SEM) with bootstrapped standard errors and bias-corrected confidence intervals to estimate the indirect

effects of *socially perceived brokerage* on *employees' performance*. I decided to use SEM, over regression-based path analysis such as PROCESS (Hayes, 2013), for two reasons. First, unlike regression-based approaches that require complete data, SEM are more flexible in the presence of missing data, allowing researcher to use more sophisticated procedures, such as full-information maximum likelihood (FIML), that do not require dropping observations or imputing values (Hayes, Montoya, & Rockwood, 2017). Second, SEM solves an entire systems of equations simultaneously through iterations, rather than estimating the parameters of each equation independently, an approach that reduces concerns of correlated error terms across equations (Shaver, 2005).

Insert Figure 3.5 and Table 3.3 about here

The results of the theoretical mediation model presented in Figure 3.5 are displayed in Table 3.3. The first step simultaneously examines each of the relationships between the variables in the mediation path via a series of regressions (*a*, *b*, and *c'* in Figure 3.5). First, consistent with Model 3 in Table 3.2, a regression of *employees' performance* on *socially perceived brokerage* shows that being perceived to bridge structural holes has a negative direct effect on individual performance (path *c'*: $B = -0.0054$, $p = 0.004$). Second, a regression of *trustworthiness* on *socially perceived brokerage* indicates that that people who are perceived to have more open networks receive fewer nominations in the relational trust network, thus being perceived are less trustworthy (path *a*: $B = -0.0775$, $p < 0.001$). Third, consistent with my theory, a regression of *employees' performance* on *trustworthiness* shows a positive association between the two variables suggesting that being perceived to be trustworthy translates to increased performance (path *b*: $B = 0.0229$, $p < 0.001$).

With each of the relationships between the variables in the mediation path established, the next step in testing the mediation model involves examining whether the indirect effect of *socially perceived brokerage* via *trustworthiness* is significantly different from zero, i.e., testing the significance of $a \times b$ in Figure 3.5. A bootstrap sample of 5,000 replications indicated that zero fell outside the 95-percent bias-corrected confidence interval (CI, which ranged from –0.0056 to –0.0008) providing support for Hypothesis 2 testing the mechanism underlying the negative moderation effect found in Hypothesis 1. This analysis also shows the total effect to be statistically significant (B = –0.0072, p = 0.031), while the direct effect becomes marginally significant (B = –0.0054, p = 0.108) showing that the effect of *socially perceived brokerage* statistically unfolds through its indirect channel.[20] These results are also corroborated by the fact that, when including *trustworthiness* in Model 3 Table 3.2, the main effect of *socially perceived brokerage* on performance becomes non-significant.

Discussion

Study 1 revealed that actual and socially perceived brokerage interacted such that actual brokers perceived to have more constrained networks were more likely to be evaluated as high performer than did brokers perceived to have less constrained networks. Importantly, the negative effects on socially perceived brokerage on performance unfolded through differences in trustworthiness of focal actors. These findings provide two important contributions: first, my

[20] To rule out alternative mediators and causal models (Fiedler, Harris, & Schoot, 2018), I run an alternative model having status as mediator (i.e., socially-perceived brokerage → status → performance). Indeed, status—prestige and respect that a party has in the eyes of others—could be another mechanism through which network perceptions affect performance. Bridging across groups could lead others to grant lower status to brokers. Status was measured with a reputational item adapted from Krackhardt (1990). Respondents selected the names of perceived high-status employees from a roster, with an individual's total sum of preferences representing her status score. A bootstrap sample of 5,000 replications indicated that zero fell inside the 95-percent confidence interval (CI, which ranged from –0.004 to 0.0003), thus ruling out this alternative causal model and lending further support to my hypothesized mechanism.

contingency argument helps explaining unequal returns to brokerage (Burt, 2004). While research shows that, on average, brokers do better than non-brokers, there is a huge variation in the extent to which individuals are able to extract advantages from their bridging positions. Second, this work sheds light on some of the mechanisms underlying network advantage. Being exposed to non-redundant information is a necessary but not sufficient condition for network advantage. In order to implement innovative ideas, brokers need to coordinate and mobilize resources (Obstfeld, 2005). And such activities that are likely to be influenced by the extent to which individuals are trusted by others (Granovetter, 1985; McAllister, 1995), which tends to be associated with socially perceived closed local structures.

Three challenges remain from this study, especially with respect to the observed mediation results. The most problematic one involves reverse causality. Namely, trusting others may lead observers to perceive them to have closed networks. Because my field data is a cross-sectional data set, I cannot rule out this alternative explanation in this study. To strengthen causal claims, the next study complements the cross-sectional survey with a controlled laboratory experiment that randomly manipulates network perceptions of targets in a sample of online participants.

A second limitation of Study 1 is that I cannot distinguish between the different components of trust. Research seems to converge on the notion that there are three main factors that determine perceived trustworthiness for another party: ability, benevolence, and integrity (Mayer, Davis, & Schoorman, 1995). Ability is the extent to which someone is trusted because she has skills, competencies, and characteristics that enable her to have influence within some specific domain. Benevolence is the extent to which a person is believed to want to do good to the trustor, aside from an egocentric profit motive. Integrity involves a person believing that the

trustee adheres to a set of principles that the she finds acceptable. I designed the next study to directly measure these three levels of ability-, benevolence-, and integrity-based trust that an individual expects from a target perceived to have an open versus closed network. The use of a more robust, validated measure of trust also allows me to strengthen my findings from Study 1.

A third concern is that the dependent variable used in the field study—which is an overall individual performance assessment—is an indirect measure of someone's ability to get organizational buy-in for her ideas. Study 2 directly measures whether people are more likely to back-up ideas from targets perceived to have closed versus open social networks. Finally, the next study also provides initial evidence about the validity of my visual network scale by directly showing that people perceptions about others' social networks can be adequately captured through the use of such a visual measure.

STUDY 2: Manipulating social perceptions of brokerage

To test the causal mechanisms underlying the link between social perceptions of networks, trust, and idea implementation, I used a vignette experiment to manipulate respondents' perceptions about the network configuration of a fictitious individual. In particular, I randomly assigned participants to one of two conditions: one in which they read about a person that they perceive has an open network, and another in which that network is closed. Then, I asked participants to report on their levels of ability-, benevolence-, and integrity-based trust toward the individual presented in the vignette. Random assignment with respect to the perceived network condition allows me to address reverse causality between perceptions and trust, one of the limitations in the field analysis. If perceiving someone to have an open network plays a causal role, then randomly assigning people to perceived-open or perceived-closed networks

should lead to differences in the extent to which they trust that person. To address the other concerns arising from Study 1,

I also measure respondents' willingness to support that person's ideas in order to perform a mediation analysis and estimate the indirect effects of trust on this dependent variable.

Method

Recruitment. I recruited 219 people from Amazon Mechanical Turk (MTurk) to participate in a six-minute online study (median completion time 5.65 minutes) in exchange for $0.60. Participants were told that the study would help to understand how people perceive and experience different types of interpersonal interactions that occur in the workplace. For this study, I preregistered the hypotheses, the intended statistical analyses, the planned sample size, and the a priori exclusion criteria, on the *AsPredicted* website. To ensure high-quality data, participants qualified only if they were native speakers of English, located in the United States, and had an approval rate above 95 percent for their previous "Human Intelligence Tasks" (HITs) on MTurk. Among them, 69.86 percent self-identified as White/Caucasian, 15.53 percent as Black/African American, 6.85 percent as Hispanic/Latino, 4.57 percent as Asian, 2.28 percent as American Indian/Native American, and 0.91 percent as Other. In accordance with the preregistration exclusion criteria, 35 respondents were excluded from the study either for failing an attention check or writing nonsense or gibberish responses to the questions about the hypothetical scenario[21], leaving 184 participants for the purpose of data analyses (M_{age} = 35.20, SD_{age} = 10.07; 33.2 percent female).

Procedures and Materials. I manipulated perceptions of others' social network structural configuration by asking participants to read a brief scenario about a hypothetical workplace

[21] Results are consistent even when these careless participants are included in the sample.

situation. To reinforce the manipulation, I also asked respondents to write a short paragraph about what they read in the passage. Specifically, participants were randomly assigned to read and write about one of the two following conditions:

> You have been hired as a manager at a small-to-moderate sized company. The company has offices in different cities and has a corporate culture that encourages both collegiality and interdisciplinarity.
>
> After a few months spent in the organization, you perceive that one of your connections, Andrea, interacts with colleagues that generally communicate with one another (/do not communicate with one another). That is, you perceive that Andrea has developed a dense (/sparse) professional network in which people really communicate with each other (/do not communicate with each other), and are directly interconnected (/but are only interconnected via Andrea).
>
> Please take a moment to consider Andrea's professional network, and write two to four sentences about Andrea's network.

I opted to use a gender-neutral name because research shows that people may perceive male and female social networks differently (Brands & Kilduff, 2013). I also made sure to mirror the conditions of my field study by referring to the company as valuing both collegiality and interdisciplinarity.

Next, respondents completed a trust scale assessing their levels of ability-, benevolence-, and integrity-based trust toward Andrea (Mayes, Davis, & Schoorman, 1995). Sample items for ability-based trust included: “Andrea is very capable of performing his/her job” and “Andrea has much knowledge about the work that needs to be done.” Cronbach's alpha for this scale was .91. Sample items for benevolence-based trust included: “Andrea really looks out for what it’s important to me” and “Andrea would not knowingly do anything to hurt me.” Cronbach's alpha for this scale was .90. Finally, sample items for integrity-based trust included: “I never have to

wonder whether Andrea will stick to his/her word" and "Andrea's actions and behaviors are very consistent." Cronbach's alpha for this scale was .89. I also added the single-item trust measure used in Study 1 and asked respondents to indicate their agreement or disagreement, on a scale from 1 (strongly disagree) to 5 (strongly agree), with the following statement: "I trust Andrea to keep in confidence my concerns about a work-related issue." The order of these four instruments used to measure trust was randomized in the survey to prevent order effects.

Finally, I used three items adapted from Baer (2012) to measure the extent to which respondents would support Andrea's ideas, thus capturing the idea implementation component underlying differential returns to brokerage. The three items, measured on a scale from 1 (strongly disagree) to 5 (strongly agree), were: "I would support Andrea's ideas for further development," "I would support Andrea in transforming his/her ideas into usable products, processes, or procedures," and "I would support Andrea's attempts to implementing ideas at the company." Cronbach's alpha for this scale was .89.

Manipulation Check and Validity of Visual Network Scale. I used two scales to check the effectiveness of my vignette manipulation. First, respondents rated on a five-point scale the degree to which they strongly disagree (1) or strongly agree (5) with the following two statements "Andrea contacts generally don't interact with each other" and "Andrea's contacts generally do interact with each other." The order of the questions in the survey was randomized to prevent order effects. The experimental manipulation worked as predicted. With respect to the first statement, an independent-samples t-test shows that there was a significant difference in the scores for open-perceived (M = 4.31, SD = 1.12) and closed-perceived (M = 1.56, SD = .95) conditions; $t(182) = -17.83$, $p < 0.001$. Thus, compared to the other group, respondents reading about Andrea having a sparse network, agreed to a greater extent that his/her contacts did not

interact with each other. In a similar vein, with respect to the second statement, an independent-samples t-test shows that there was a significant difference in the scores for open-perceived (M = 1.78, SD = 1.26) and closed-perceived (M = 4.47, SD = .94) conditions; $t(182) = 16.36$, $p < 0.001$. Thus, compared to the other group, respondents reading about Andrea having a sparse network, disagreed to a greater extent that his/her contact did interact with each other. Similar results are obtained when analyzing the visual network scale used in Study 1, which was a slider-type question ranging from 0 (image of a fully closed network around an actor, slider to the left) to 100 (image of a fully open network around an actor, slider to the right). Specifically, an independent-samples t-test shows that there was a significant difference in the scores for open-perceived (M = 80.59, SD = 29) and closed-perceived (M = 18.42, SD = 27.91) conditions; $t(182) = -14.80$, $p < 0.001$. Thus, compared to the other group, respondents reading about Andrea having a sparse network, moved to a greater extent the slider to the right toward the hub-and-spoke image.

Results

I performed a mediation analysis to causally test whether trust mediates the relationship between perceiving someone to have an open network and the willingness to support her ideas. I tested this relationship using the criteria prescribed by Baron and Kenny (1986) while using bootstrapping to compute indirect effects (Preacher & Hayes, 2004). Table 3.4 shows the results of the mediation analyses. In accordance with my study preregistration, in all regression I controlled for respondents gender, age, years of work experience, race, and employment type. In my first regression, I used *socially perceived brokerage*—in which the variance was exogenously introduced by my experimental condition—as the independent variable (1 = perceived-open, 0 = perceived-close) and the likelihood of *supporting Andrea's ideas* as the dependent variable. As

expected, this relationship was significant and negative ($B = -0.51$, $p < 0.001$). Respondents reading about Andrea having an open network were less likely to give her support and buy-in for her ideas.

In the second set of regressions, I tested the relationship between *socially perceived brokerage* and the different components of trust—*ability*, *benevolence*, and *integrity*. All these relationships were significant and negative ($B_{ability} = -0.48$, $p < 0.001$; $B_{benevolence} = -0.57$, $p < 0.001$; $B_{integrity} = -0.56$, $p < 0.001$) indicating less trust toward Andrea when s/he was perceived to have an open network than when s/he was perceived to have a closed one.[22]

In the final step, I included *socially perceived brokerage* and all components of trust as independent variables and the likelihood of *supporting Andrea's ideas* as the dependent variable. Supporting my mediation hypothesis ($\Delta R^2 = 0.52$, $p < 0.001$), the path between *socially perceived brokerage* and likelihood of *supporting Andrea's idea* became insignificant ($B = -0.04$, $p = 0.65$) when the direct effect of *ability* ($B = 0.46$, $p < 0.001$) *benevolence* ($B = 0.05$, $p = 0.53$) and *integrity* ($B = 0.39$, $p = 0.004$) were included in the regression.

Insert Table 3.4 about here

To further test my model and compute indirect effects, I run a multiple mediation model which allows me to test the extent to which each measured components of trust mediates the effect of my network perception manipulation on the dependent variable in the presence of other variables in the model (Preacher & Hayes, 2008). Results (obtained with 5,000 samples) indicated that the total indirect effect of my network perception manipulation on the likelihood of *supporting Andrea's ideas* was significant (95-percent bias-corrected CI = –0.67, –0.26). The

[22] These relationships remain statistically significant and negative even when running a structural equation model with all three dependent variables regressed at the same time on the experimental condition dummy and the controls.

bootstrapping procedure also revealed that, as expected, the indirect effect of my manipulation was significant through *ability* (95-percent bias-corrected CI = –0.42, –0.10), and *integrity* (95-percent bias-corrected CI = –0.42, –0.06). Instead, *benevolence* (95-percent bias-corrected CI = –0.13, 0.05) was not a significant mediator in this multiple mediation model[23]. To strengthen the results from Study 1, I also run a simple mediation model using the single-item measure of trust. A bootstrap sample of 5,000 replications indicated that zero fell outside the 95-percent bias-corrected confidence interval (CI, which ranged from −0.35 to −0.08) proving further support for trust as significant mediator.

To summarize, these results provide causal support for Hypothesis 2 suggesting that trust fully mediates the relationship between perceptions of brokerage and individual achievement through increased likelihood of getting organizational buy-in for ideas.

Discussion

Replicating Study 1's proposed mechanism accounting for variance in the returns to brokerage, Study 2 shows that people who are perceived to bridge across different group are trusted less and, as a result, encounter more challenges in getting their ideas supported by others, whereas people who are perceived to be embedded in cohesive networks are trusted more, a condition which increases their ability to get buy-in for their ideas. These effects emerged in a controlled setting where everything was hold constant except for network perceptions, thus strengthening the internal validity of my claims.

[23] Benevolence-based trust was, however, a significant mediator in a simple mediation model of the effects of *socially perceived brokerage* on the likelihood of *supporting Andrea's ideas*.

These quantitative results are further corroborated by anecdotal evidence emerging from the writing task that participants were asked to perform. One respondent in the open-perceived network, when elucubrating on Andrea's network, wrote:

> *Andrea is creating something that seems a bit unfair because she is always the person that people communicate with. She can twist what one person says and such. I don't think it is fair like this. It is almost as if she is creating a monarchy where everyone reports to her.*

Another participant in the same condition wrote:

> *Seems like she's tried to bully them in some way to only communicate with her and no one else. Maybe she's working on a project in which she wants to control information so that no one outside her little group can get to. In this way, she can get credit for information that is supplied to her that won't show up on anybody else's project. If this is actually the way she is, then she really has no morals and I'm guessing will take all the credit herself and not give any credit to her group.*

Importantly, Study 2 also distinguishes between the different components of trust showing that ability-, and integrity-based trust seem to be the main pathways through which perceptions of others' social network configurations affect individual achievement. Study 2 also provides validity for the visual network scale used in the field study, as respondents facing different network configuration stimuli demonstrated their ability to correctly categorize targets along a visual continuum ranging from closure to brokerage.

GENERAL DISCUSSION

Individual achievement in knowledge-intensive settings depends on being able to both generate innovative ideas and mobilize resources to get the buy-in from multiple constituents, which is largely a socio-political process (Baer, 2012). But the conditions favoring idea creation are often in contrast with those favoring idea acceptance, a phenomenon that has been termed idea-action tradeoff (Obstfeld, 2017). Past research on organizational social networks found that individuals spanning structural holes have an advantage in generating innovative ideas, while they may be worse off during the implementation phase, which is likely to benefit from closed networks of tightly interconnected contacts that can grant political support. The apparent tradeoff between these two network configurations has fueled a long-lasting debate about the social structure of network advantage (Coleman, 1988; Burt, 2004). In this paper, I have proposed a theoretical framework that can mitigate such a tradeoff. Prior work has provided evidence for different strategies to solve the tradeoff between brokerage and closure, such as extending the level of analysis to teams (Aven & Hillman, 2018; Reagans & Zuckerman, 2001) or moving from a static to a dynamic view of social capital (Burt & Merluzzi, 2016; Soda, Usai, & Zaheer, 2004).

Contributing to these integrative attempts, my multimethod study integrated cognitive social structures into structural explanations of social capital. Notably, such a perspective allows to understand how it is possible to simultaneously benefit from brokerage and closure within an individual level of analysis, instead of resorting to teams or time. In particular, I showed that brokerage and closure can coexist at the same time—namely in the actual structure and in the minds of who is perceiving—thus moving beyond the traditional way of thinking about these two dimensions as mutually exclusive. Building on research about cognitive social structures

showing that individuals are inaccurate in perceiving social networks, especially when it comes to higher-order constructs such as others' bridging scores, I posit that the interplay between actual and socially perceived brokerage plays an important role in qualifying how social networks provide advantages to individuals. While having a network rich in structural holes helps individual in generating innovative ideas (Burt, 2004), being perceived by others to be embedded in a cohesive network increases trust which, in turn, affect employees' performance through an increased ability to mobilize resources and coordinate. This is in line with Burt's (2000: 398) arguments recognizing that "while brokerage across structural holes is the source of added value, closure can be critical to realizing the value buried in the structural holes."

By proposing a mediation model for the effects of cognitive perceptions of network structures on individual performance, this paper also systematically tests the mechanisms through which closure creates social capital (Coleman, 1988). Although many researchers invoke trust to explain how advantages accrue to individuals embedded in closed networks, very little work has directly tested such a mechanism. In this paper, I add to this literature by running a field study and a preregistered experiment to causally show that individuals who are perceived to bridge across different groups are seen as less trustworthy and, as a result, less able to act on their ideas. Most notably, I show that social perceptions are a key driver when it comes to predict individuals' ability to mobilize resources and coordinate. This finding is in line with past research on the importance of network perceptions for individual achievement. For example, Kilduff and Krackhardt (1994) found that cognitive perceptions of social connections were important predictors of individual performance over and above objectively measured social structures. In a similar vein, investigating the relationship between network cognition and the behavior of teams and individuals, Brands and Kilduff (2013) suggested that the way in which

people perceive others' structural positions is an important determinant of individual and team outcomes.

This paper also makes important contributions to our understanding of unequal returns to brokerage (Burt, 1992). Past research has adopted a contingency view of social networks exploring how network benefits depend on various critical contingencies, such as individuals' need for cognition (Anderson, 2008), role with exchange partners (Gargiulo, Ertug, & Galunic, 2009), cognitive style (Carnabuci & Dioszegi, 2015), attention allocation (Rhee & Leonardi, 2018), self-monitoring (Mehra, Kilduff, & Brass, 2001), and strategic orientations toward brokerage (Soda, Tortoriello, & Iorio, 2018). The present study contributes to this growing body of research in at least two ways. First, I show that social perceptions of brokerage opportunities are a novel and critical contingency in the relationship between network structure and performance outcomes. Second, moving away from traditional ego-centric explanations of network advantages, I was able to identify an alter-centric explanation, in the form of social perceptions of brokerage opportunities, as a novel and critical contingency explaining unequal returns to brokerage (Podolny, 2001; Kleinbaum, Jordan, & Audia, 2015; Hahl, Kacperczyk, & Davis, 2016).

In addition to contributing to the contingency view of social networks, the present study adds to the literature on cognitive perceptions by utilizing visual network scales that can aid researchers in their effort of collecting responses about cognitive structures (Mehra et al., 2014). Indeed, one of the major obstacles to run studies about network perceptions consists in the difficulty of collecting data for large networks (Krackhardt, 1987). The use of visual network scales, that can be tailored to fit researchers' interest, is a promising solution that opens up new research opportunities.

Limitations and future research

Despite its strengths, my research also has some limitations that point to potential avenues for future research. First, although Study 2 allowed me to make causal claims about the mechanism linking social perceptions of brokerage to idea implementation—a key dimension underlying individual performance—I focused on intentions to support colleagues' ideas rather than actual behavior, and thus further research might consider behavioral indicators. Second, with respect to Study 1, although the research site allowed me to capture extremely rich information on employees' informal relationships, my data are observational and cross-sectional. And such a research design limits the possibility to draw causal chains between variables of interest due to potential endogeneity concerns. For example, it might be that employees' performance affects actual social networks, through internal mobility (Kleinbaum, 2012). In a similar vein, as mentioned before, the cross-sectional design of the study could overlook critical processes that might simultaneously influence employees' actual positions and performance, such as personality traits. In order to eliminate these concerns, an ideal study would look for exogenous sources of variation that affect actual networks. For example, researchers may use natural experiments in organizational settings, such as changes in offices layout that rewire social networks (Lee, 2019), to obtain instrumental variables that can break the dependencies among independent variables and error terms.

To the best of my knowledge, this research has been one of the first to rely on visual network scales to measure social perceptions of network characteristics. Indeed, most work in this stream of research uses visual network scales to focus on self-perceptions of network positions (Mehra et al., 2014). Insofar as this approach allows to conduct large-scale studies on social network cognitions, its novelty and the lack of cumulative research probing the validity

and reliability of this type of measure suggest that some caution is warranted when interpreting my findings. For instance, future research could present respondents with both visual network scales and traditional CSS survey tool (i.e., Krackhardt, 1987) to assess how the two instruments relate to each other.

There are also a number of potential boundary conditions surrounding my theory that will be important to test in future research. For example, the organization I have studied has a corporate culture that places a premium on collaboration and cooperation, a condition that is mirrored in the experimental study. While such a characteristic is typical of most organizations, it would be interesting to consider whether these results hold in less cooperative settings. Indeed, one of the main arguments for the negative interaction between actual and socially perceived brokerage is rooted in trust and support among individual actors (Aven, Morse, & Iorio, 2019). However, in competitive professional environments with limited interdependences among organizational actors, trust and support may not be important mechanisms needed to obtain consensus and jumpstarting new initiatives, such that an overt broker—someone bringing structural holes in the actual network while being perceived to do so—would face little to no liabilities. Similarly, future research could analyze whether the interplay between actual and perceived structural positions on individual performance would be stronger in collectivistic cultures (Xiao & Tsui, 2007). Testing my hypotheses across multiple organizations and cultures would be important to understand these scope conditions of my arguments.

The specific function that a broker performs might also serve as a boundary condition on the findings presented in this study (Gould & Fernandez, 1989). For example, if we think about brokerage in pure economic terms, where brokers are intermediaries that provide a service to parties by absorbing frictions and facilitating transactions (Stovel & Show, 2012), individuals

perceived to bridge across gaps in the structure may not incur into vicious cycles of reduced trustworthiness. Put differently, when a broker is manifestly functioning as a market maker, and brokered parties acknowledge the added value provided by a neutral, honorable middleman, I do not expect social perceptions of brokerage to have a negative effect on individual achievement.

Finally, the degree of radicalness of new ideas could determine the extent to which being a brokers in disguise is more advantageous (Sgourev, 2013). Some new ideas are more risky than others, thus they may require more trust in the broker for others to accept and support their ideas. A straightforward extension of this study would be to investigate possible antecedents of the mismatch between actual and socially perceived network positions. Although I focused on the consequences of such a mismatch on employees' performance, it would be interesting to examine the extent to which brokers can purposefully alter others' perceptions of their social network image. And I believe that research on personality would be particularly suited to shed light on why some brokers are perceived to be embedded in closed network. Past research on individual differences has shown that, for example, people who engage in self-impression management tactics are successful in shaping others' perceptions of their qualities (Harris, Kacmar, Zivnuska, & Shaw, 2007). In a similar vein, the dark triad of personality—narcissism, Machiavellianism, and psychopathy—could be an important factor determining how brokers might affect others' perceptions of their brokerage opportunities. By showing the important performance implication of a mismatch between actual and socially perceived network positions, I hope that my study will spur interest and promote research on its antecedents.

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TABLES

Table 1.1 Descriptive Statistics of Pre-Treatment Individual-Level Variables for the Treatment and Control Group

Variable	Treated group		Control group	
	Mean	**S.D**	**Mean**	**S.D.**
Organizational Rank[+]	2.43	0.98	4.00	1.07
Network Size	12.22	7.14	4.82	4.64
Working in the U.S. (0/1)	0.35	0.48	0.44	0.50
Male (0/1)	0.48	0.50	0.22	0.42
Company Tenure (years)	6.48	4.72	8.60	7.92
Working Experience	3.08	1.28	2.82	1.45
Number of Observations	60		272	

[+] Reverse-Coded Variable.

Table 1.2 Estimates of a Probit Model Predicting Assignment to Treatment Condition as a Function of Pre-Treatment Individual-level Covariates (N = 332)

Variable	**Model 1**	**Model 2**
Organizational Rank [+]	–0.67***	–0.65***
	(0.13)	(0.13)
Network Size	0.07***	0.08***
	(0.02)	(0.02)
Working in the U.S.	–0.57*	–0.55*
	(0.26)	(0.27)
Male		0.15
		(0.21)
Company Tenure (Years)		–0.04
		(0.02)
Working Experience		–0.003
		(0.11)
Constant	0.89	1.03
	(0.48)	(0.61)
Pseudo R^2	0.38	0.40
Log-likelihood	–97.21	–94.58

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

Robust Standard Errors are in Parentheses.

[+] Reverse-Coded Variable.

Table 1.3a Descriptive Statistics and Correlations among Variables of Interest (N = 332)

Variable		Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	*Indegree Change*	1.88	3.41	1												
(2)	*Pay for Performance (1/0)*	0.18	0.39	0.32	1											
(3)	*Outreach Change*	1.11	5.29	0.19	0.13	1										
(4)	*Multiplex Ties Change*	0.63	2.08	0.24	0.27	0.50	1									
(5)	*Embedded Ties Change*	10.08	30.55	0.38	0.27	0.85	0.55	1								
(6)	*Homophilous Ties Change*	0.58	3.12	0.08	0.07	0.87	0.45	0.43	1							
(7)	*Distance Ties Change* ▪	0.74	7.01	0.07	0.12	0.65	0.35	0.34	0.51	1						
(8)	*Organizational Rank* +	3.72	1.22	–0.24	–0.50	–0.06	–0.10	0.24	–0.07	0.02	1					
(9)	*Working in the U.S. (1/0)*	0.42	0.50	0.11	–0.07	0.10	0.04	–0.11	0.13	–0.08	–0.02	1				
(10)	*Network Size (Time 1)*	6.15	5.90	0.17	0.48	–0.04	0.15	–0.37	–0.03	–0.02	–0.48	0.11	1			
(11)	*Male (1/0)*	0.27	0.45	0.10	0.22	0.04	0.12	0.02	0.00	0.04	–0.24	–0.02	0.25	1		
(12)	*Company Tenure (Years)*	8.22	7.49	–0.05	–0.11	–0.01	0.00	–0.04	0.01	–0.04	0.02	0.00	–0.02	–0.02	1	
(13)	*Working Experience*	2.86	1.43	–0.06	0.07	–0.01	0.01	–0.13	0.00	–0.02	–0.23	–0.09	0.12	0.08	0.64	1
(14)	*inverse Mills ratio*	1.94	0.91	–0.23	–0.56	–0.01	–0.12	0.24	–0.01	–0.02	0.88	0.20	–0.67	–0.31	0.28	–0.06

+ Reverse-Coded Variable. ▪ Measured in 1000 miles. Correlations greater than |.10| are statistically significant at $p < 0.05$

Table 1.3b Descriptive Statistics of Social Network Variables at Time 1 and Time 2 (N = 332)

	Time 2		Time 1		
Variable	**Mean**	**S.D.**	**Mean**	**S.D.**	**Change (T2 – T1)**
Indegree	5.35	5.97	3.46	4.62	1.88
Outreach	4.54	5.79	3.43	3.98	1.11
Multiplex Ties	1.42	2.27	0.79	1.35	0.63
Embedded Ties	20.25	35.32	10.17	17.69	10.08
Homophilous Ties	2.94	3.24	2.36	2.09	0.58
Distance Ties	3.26	8.56	2.52	7.04	0.74

Table 1.4 The Effects of Monetary Incentives on Indegree through Outreach, Embeddedness, Multiplexity, Homophily, and Propinquity (N = 332)

	Panel A: Effects of Pay for Performance on Social Network Prominence											
	DV: Indegree Change						**DV: Indegree Change**					
	Model 1 (H1)						**Model 2 (H1)**					
Variables	β	Robust SE	t	P > |Z|	95% CI		β	Robust SE	t	P > |Z|	95% CI	
Pay for Performance	2.849	0.570	5.000	0.000	1.728	3.970	2.775	0.723	3.840	0.000	1.353	4.197
Organizational Rank $^{+}$							1.361	1.189	1.140	0.253	–0.979	3.700
Network Size (Time 1)							–0.197	0.115	–1.710	0.088	–0.424	0.030
Working in the U.S.							2.372	1.002	2.370	0.018	0.401	4.344
Male							–0.152	0.516	–0.290	0.769	–1.166	0.863
Company Tenure							0.145	0.073	1.990	0.047	0.002	0.288
Working Experience							–0.373	0.163	–2.290	0.023	–0.692	–0.053
inverse Mills ratio							–3.310	2.107	–1.570	0.117	–7.456	0.836
Constant	1.368	0.181	7.570	0.000	1.012	1.723	2.873	1.105	2.600	0.010	0.700	5.047
R^2				0.10						0.16		
F				24.98***						6.34***		

	Panel B: Effects of Pay for Performance on Social Network Prominence through Outreach											
	DV: Outreach Change (H2a)						**DV: Indegree Change**					
	Model 3						**Model 4**					
Variables	β	Robust SE	t	P > |Z|	95% CI		β	Robust SE	t	P > |Z|	95% CI	
Pay for Performance	2.911	0.938	3.100	0.002	1.065	4.756	2.537	0.574	4.420	0.000	1.407	3.667
Outreach Change							0.082	0.034	2.440	0.015	0.016	0.148
Organizational Rank $^{+}$	1.473	1.589	0.930	0.355	–1.653	4.600	1.240	0.960	1.290	0.197	–0.648	3.128
Network Size (Time 1)	–0.322	0.164	–1.960	0.051	–0.645	0.001	–0.171	0.100	–1.710	0.087	–0.367	0.025
Working in the U.S.	2.798	1.471	1.900	0.058	–0.097	5.693	2.143	0.892	2.400	0.017	0.388	3.899
Male	0.154	0.738	0.210	0.835	–1.297	1.605	–0.164	0.445	–0.370	0.712	–1.039	0.711
Company Tenure	0.107	0.103	1.040	0.299	–0.095	0.309	0.136	0.062	2.190	0.029	0.014	0.258
Working Experience	–0.043	0.280	–0.150	0.878	–0.593	0.507	–0.369	0.169	–2.190	0.029	–0.701	–0.037
inverse Mills ratio	–3.066	2.899	–1.060	0.291	–8.770	2.638	–3.059	1.752	–1.750	0.082	–6.506	0.387
Constant	1.058	1.704	0.620	0.535	–2.294	4.410	2.787	1.028	2.710	0.007	0.764	4.810
R^2				0.053						0.171		
F				2.26*						7.39***		

Indirect Effect (H2b)	β	95% Bias-Corrected CI	
PFP → Outreach → Indegree	0.238	0.021	0.625

	Panel C: Effects of Pay for Performance on Social Network Prominence through Embedded Ties											
	DV: Embedded Ties Change (H3a)						DV: Indegree Change					
	Model 5						Model 6					
Variables	β	Robust SE	t	P > |Z|	95% CI		β	Robust SE	t	P > |Z|	95% CI	
Pay for Performance	10.594	2.544	4.160	0.000	5.589	15.598	1.573	0.540	2.910	0.004	0.510	2.636
Embedded Ties Change							0.091	0.012	7.890	0.000	0.068	0.114
Organizational Rank $^{+}$	25.229	4.252	5.930	0.000	16.864	33.594	–1.055	0.927	–1.140	0.256	–2.878	0.769
Network Size (Time 1)	–1.263	0.441	–2.860	0.004	–2.131	–0.395	–0.056	0.092	–0.610	0.545	–0.238	0.126
Working in the U.S	15.349	3.953	3.880	0.000	7.571	23.126	0.747	0.837	0.890	0.373	–0.899	2.394
Male	–0.314	1.971	–0.160	0.874	–4.191	3.564	–0.136	0.408	–0.330	0.740	–0.938	0.667
Company Tenure	1.447	0.275	5.270	0.000	0.906	1.987	0.004	0.059	0.070	0.941	–0.112	0.121
Working Experience	–0.933	0.747	–1.250	0.213	–2.403	0.537	–0.284	0.155	–1.830	0.068	–0.589	0.021
Outreach Change	4.875	0.149	32.790	0.000	4.582	5.167	–0.362	0.064	–5.640	0.000	–0.488	–0.235
inverse Mills ratio	–42.540	7.760	–5.480	0.000	–57.807	–27.274	0.810	1.679	0.480	0.630	–2.493	4.113
Constant	–16.376	4.555	–3.600	0.000	–25.338	–7.414	4.276	0.961	4.450	0.000	2.385	6.168
R^2			0.798						0.306			
F			141.02***						14.14***			
Indirect Effect (H3b)							β				95% Bias-Corrected CI	
PFP → Embedded Ties → Indegree							0.964				0.467	1.716

	Panel D: Effects of Pay for Performance on Social Network Prominence through Multiplex Ties											
	DV: Multiplex Ties Change (H4a)						DV: Indegree Change					
	Model 7						Model 8					
Variables	β	Robust SE	t	P > |Z|	95% CI		β	Robust SE	t	P > |Z|	95% CI	
Pay for Performance	1.071	0.321	3.340	0.001	0.439	1.702	2.317	0.581	3.990	0.000	1.174	3.460
Multiplex Ties Change							0.206	0.099	2.070	0.039	0.010	0.401
Organizational Rank $^{+}$	0.730	0.536	1.360	0.175	–0.325	1.785	1.090	0.958	1.140	0.256	–0.794	2.974
Network Size (Time 1)	–0.015	0.056	–0.280	0.783	–0.125	0.094	–0.168	0.099	–1.690	0.092	–0.363	0.027
Working in the U.S.	0.463	0.499	0.930	0.354	–0.518	1.444	2.048	0.889	2.300	0.022	0.299	3.797
Male	0.097	0.249	0.390	0.696	–0.392	0.586	–0.184	0.443	–0.420	0.678	–1.055	0.687
Company Tenure	0.043	0.035	1.250	0.213	–0.025	0.111	0.127	0.062	2.060	0.041	0.005	0.249
Working Experience	–0.020	0.094	–0.210	0.834	–0.205	0.166	–0.365	0.168	–2.180	0.030	–0.695	–0.035
Outreach Change	0.189	0.019	10.070	0.000	0.152	0.226	0.043	0.038	1.120	0.262	–0.032	0.118
inverse Mills ratio	–1.083	0.979	–1.110	0.269	–3.009	0.843	–2.837	1.746	–1.620	0.105	–6.272	0.599
Constant	–0.813	0.575	–1.420	0.158	–1.943	0.317	2.954	1.026	2.880	0.004	0.935	4.973
R^2			0.307						0.182			
F			15.87***						7.15***			
Indirect Effect (H4b)							β				95% Bias-Corrected CI	
PFP → Multiplex Ties → Indegree							0.22				0.007	0.654

	Panel E: Effects of Pay for Performance on Social Network Prominence through Homophilous Ties											
	DV: Homophilous Ties Change (H5a)						DV: Indegree Change					
	Model 9						Model 10					
Variables	β	Robust SE	t	P > |Z|	95% CI		β	Robust SE	t	P > |Z|	95% CI	
Pay for Performance	–0.430	0.275	–1.560	0.119	–0.971	0.111	2.369	0.567	4.180	0.000	1.253	3.485
Change Homophilous Ties							–0.391	0.114	–3.410	0.001	–0.616	–0.166
Organizational Rank [+]	0.540	0.460	1.170	0.241	–0.365	1.445	1.451	0.946	1.530	0.126	–0.411	3.313
Network Size (Time 1)	–0.054	0.048	–1.140	0.256	–0.148	0.040	–0.192	0.098	–1.960	0.051	–0.385	0.001
Working in the U.S.	0.819	0.428	1.910	0.056	–0.022	1.660	2.463	0.883	2.790	0.006	0.726	4.201
Male	–0.416	0.213	–1.950	0.052	–0.835	0.004	–0.327	0.440	–0.740	0.459	–1.193	0.540
Company Tenure	0.042	0.030	1.410	0.160	–0.017	0.100	0.152	0.061	2.490	0.013	0.032	0.273
Working Experience	0.017	0.081	0.210	0.833	–0.142	0.176	–0.362	0.166	–2.180	0.030	–0.689	–0.036
Change Outreach	0.516	0.016	32.060	0.000	0.484	0.547	0.283	0.068	4.190	0.000	0.150	0.416
inverse Mills ratio	–1.216	0.839	–1.450	0.148	–2.867	0.435	–3.535	1.729	–2.040	0.042	–6.936	–0.133
Constant	0.139	0.493	0.280	0.778	–0.831	1.108	2.841	1.012	2.810	0.005	0.851	4.832
R^2			0.772						0.200			
F			121.46***						8.04			
Indirect Effect (H5b)							β				95% Bias-Corrected CI	
PFP → Homophilous Ties → Indegree							0.168				–0.003	0.492

	Panel F: Effects of Pay for Performance on Social Network Prominence through Distance Ties											
	DV: Distance Ties Change (H6a)						DV: Indegree Change					
	Model 11						Model 12					
Variables	β	Robust SE	t	P > |Z|	95% CI		β	Robust SE	t	P > |Z|	95% CI	
Pay for Performance	1.267	0.959	1.320	0.187	–0.619	3.153	2.585	0.576	4.490	0.000	1.452	3.717
Distance Ties Change							–0.038	0.033	–1.130	0.260	–0.103	0.028
Organizational Rank [+]	2.525	1.602	1.580	0.116	–0.627	5.678	1.335	0.963	1.390	0.167	–0.559	3.230
Network Size (Time 1)	–0.131	0.166	–0.790	0.431	–0.458	0.196	–0.176	0.100	–1.760	0.079	–0.372	0.020
Working in the U.S.	–0.379	1.490	–0.250	0.799	–3.310	2.552	2.129	0.892	2.390	0.018	0.374	3.884
Male	–0.153	0.743	–0.210	0.836	–1.615	1.308	–0.170	0.445	–0.380	0.703	–1.045	0.705
Company Tenure	0.074	0.104	0.710	0.477	–0.130	0.277	0.139	0.062	2.240	0.026	0.017	0.261
Working Experience	0.122	0.282	0.430	0.665	–0.432	0.676	–0.364	0.169	–2.160	0.031	–0.696	–0.033
Outreach Change	0.873	0.056	15.580	0.000	0.763	0.983	0.115	0.044	2.580	0.010	0.027	0.202
inverse Mills ratio	–3.445	2.925	–1.180	0.240	–9.199	2.308	–3.189	1.755	–1.820	0.070	–6.641	0.263
Constant	–3.114	1.717	–1.810	0.071	–6.491	0.263	2.670	1.033	2.580	0.010	0.637	4.702
R^2			0.454						0.175			
F			29.69***						6.78***			
Indirect Effect (H6b)							β				95% Bias-Corrected CI	
PFP → Distance Ties → Indegree							–0.048				–0.265	0.040

All tests are two tailed; [+] Reverse-Coded Variable. • Measured in 1000 miles; Bias-Corrected CI are based on 1,000 bootstrap replications; *** $p < .001$

Table 2.1 Descriptive Statistics, Including Means, Standard Deviations, and a Correlation Matrix (*N* = 356)

		Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	Performance	2.23	0.52									
(2)	Effective Size [a]	1.01	0.76	0.16*								
(3)	Strategic Brokering Orientation (1 = arbitraging, 0 = collaborating)	0.13	0.34	0.02	–0.12*							
(4)	Collaborating Brokering Orientation	0.85	0.36	0.00	0.14*	–0.95*						
(5)	Arbitraging Brokering Orientation	0.12	0.32	–0.01	–0.11*	0.92*	–0.87*					
(6)	Organization	6.20	3.22	0.00	–0.21*	0.15*	–0.18*	0.15*				
(7)	Job Rank	1.42	0.48	–0.12*	0.00	–0.03	0.05	0.01	–0.50*			
(8)	Professional Experience	6.16	1.68	0.05	0.12*	0.02	–0.01	–0.03	0.11*	–0.12*		
(9)	Level of Education	2.57	1.68	0.07	–0.08	–0.11*	0.13*	–0.13*	0.02	–0.09	0.24*	
(10)	Region	5.16	1.77	–0.07	0.13*	–0.22*	0.25*	–0.19*	–0.46*	0.42*	–0.06	0.06

* $p < .05$; [a] Logged variable

Table 2.2 Results of ordered probit regression predicting individuals' performance evaluation (N = 356)

	Model									
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Effective size [a]		0.265**		0.290**	0.255**			0.267**	0.586**	0.229**
		(0.093)		(0.090)	(0.086)			(0.087)	(0.188)	(0.087)
Strategic brokering orientation (1 = arbitraging, 0 = collaborating)			0.054	0.113	−0.143					
			(0.163)	(0.147)	(0.236)					
Effective size × Strategic brokering orientation (1= arbitraging, 0 collaborating)					0.330*					
					(0.140)					
Collaborating Orientation toward Brokering						0.008		−0.049	0.198	−0.043
						(0.160)		(0.210)	(0.285)	(0.210)
Arbitraging Orientation toward Brokering							0.004	−0.017	−0.056	−0.304
							(0.153)	(0.185)	(0.198)	(0.186)
Effective size × Collaborating Orientation toward Brokering									−0.361**	
									(0.116)	
Effective size × Arbitraging Orientation toward Brokering										0.375**
										(0.121)
Organization	−0.038*	−0.011	−0.039*	−0.02	−0.018	−0.038*	−0.038*	−0.012	−0.008	−0.01
	(0.019)	(0.011)	(0.019)	(0.017)	(0.017)	(0.019)	(0.019)	(0.012)	(0.012)	(0.012)
Job rank	−0.291*	−0.234*	−0.297*	−0.239+	−0.238+	−0.290*	−0.292*	−0.237+	−0.234+	−0.238+
	(0.114)	(0.118)	(0.129)	(0.130)	(0.132)	(0.127)	(0.130)	(0.131)	(0.134)	(0.132)
Experience (years)	0.005	−0.013	0.005	−0.015	−0.016	0.006	0.006	−0.013	−0.016	−0.015
	(0.044)	(0.047)	(0.045)	(0.047)	(0.048)	(0.045)	(0.043)	(0.049)	(0.050)	(0.051)
Education	0.039	0.063+	0.04	0.065*	0.063*	0.039	0.039	0.064*	0.062+	0.062+
	(0.028)	(0.036)	(0.026)	(0.030)	(0.031)	(0.026)	(0.026)	(0.032)	(0.033)	(0.033)
Asia–Pacific	0.615***	0.617***	0.620***	0.593**	0.643**	0.612***	0.615***	0.630**	0.649**	0.681**
	(0.147)	(0.163)	(0.165)	(0.222)	(0.221)	(0.171)	(0.151)	(0.206)	(0.224)	(0.207)
Europe	0.737**	0.659+	0.738*	0.618	0.675	0.735*	0.737**	0.669+	0.694	0.734+
	(0.284)	(0.36)	(0.298)	(0.402)	(0.420)	(0.302)	(0.286)	(0.399)	(0.445)	(0.429)
Far East	0.150+	0.273**	0.168	0.328*	0.339*	0.145	0.151	0.298+	0.265	0.310+
	(0.090)	(0.103)	(0.142)	(0.151)	(0.160)	(0.174)	(0.131)	(0.177)	(0.212)	(0.185)
Latin America	0.460*	0.560**	0.465*	0.489+	0.543+	0.458*	0.461*	0.575**	0.596*	0.632**
	(0.216)	(0.173)	(0.232)	(0.270)	(0.281)	(0.229)	(0.215)	(0.210)	(0.234)	(0.224)
North America	0.429*	0.415*	0.442*	0.364	0.434	0.426*	0.430*	0.434+	0.477+	0.510+
	(0.174)	(0.194)	(0.195)	(0.285)	(0.292)	(0.209)	(0.182)	(0.245)	(0.271)	(0.262)
Constant cut 1	−1.69***	−1.21***	−1.69***	−1.29***	−1.26**	−1.68***	−1.69***	−1.24**	−1.00*	−1.22**
	(0.332)	(0.348)	(0.334)	(0.379)	(0.397)	(0.399)	(0.329)	(0.408)	(0.487)	(0.422)
Constant cut 2	0.602	1.088**	0.605	1.041*	1.076*	0.608	0.602	1.057**	1.303**	1.089*
	(0.376)	(0.365)	(0.380)	(0.422)	(0.443)	(0.432)	(0.374)	(0.406)	(0.495)	(0.425)
Pseudo R–squared	0.021	0.036	0.022	0.04	0.042	0.021	0.021	0.036	0.039	0.039
ll	−268.05	−254.43	−268.02	−262.98	−262.28	−268.05	−268.05	−254.42	−253.57	−253.63
AIC	556.105	526.866	556.032	545.955	544.567	556.103	556.105	526.831	525.136	525.261
Wald test	–	8.04**	0.11	17.88**	5.56*	0.01	0.01	20.64***	9.71**	9.60**

Note: All the models have robust standard errors clustered for functional area (standard errors in parentheses),+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Wald test computed with respect to model 1 for models 2, 3, 4, 6, 7, 8. Wald test computed with respect to model 4 for model 5. Wald test computed with respect to Model 8 for models 9, 10.

[a] Logged variable

Table 2.3 Magnitude effects of estimates: Brokers performance as a function of their strategic orientation toward brokering

	Likelihood of observing a below−average performance	Likelihood of observing an average performance	Likelihood of observing an above−average performance
Arbitraging brokering orientation	–0.03*	0.10	0.14*
Collaborating brokering orientation	0.02	0.14*	–0.16*

Table 2.4 Results of factor analysis of strategic orientation toward brokering scale

Item	Collaborating Brokerage: Factor 1	Arbitraging Brokerage: Factor 2
I forge connections between different people dealing with a particular issue (CB)	**.567**	.069
I introduce two people when I think they might benefit from becoming acquainted (CB)	**.708**	−.112
I believe meetings and open discussions are time consuming (AB)	.228	**.567**
I introduce people to each other who might have a common strategic work interest (CB)	**.682**	−.128
I point out the common ground shared by people who have different perspectives on an issue (CB)	**.686**	.062
I see opportunities for collaboration between people (CB)	**.639**	.079
If I believe it is not essential, I do not introduce people to each other (AB)	−.371	**.584**
I will try to describe an issue in a way that will appeal to a diverse set of interests (CB)	**.432**	.396
I like meeting people separately and recombining their insights on my own (AB)	−.077	**.786**

(CB) = *Collaborating Brokerage*, (AB) = *Arbitraging Brokerage*.
Kaiser−Meyer−Olkin Measure of sampling adequacy = .726
Bartlett's test of sphericity, $p < .005$

Table 3.1 Descriptive statistics and correlations, Study 1 (N = 114)

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10	(11)	(12)
(1) High performer (1/0)	0.59	0.49												
(2) Actual brokerage	9.50	26.85	0.07											
(3) Socially perceived brokerage	41.93	13.94	–0.17	–0.08										
(4) Trustworthiness	3.73	3.45	0.14	0.42	–0.31									
(5) Number of advice ties	4.98	4.43	0.07	0.68	–0.20	0.44								
(6) Number of weak components	1.63	1.37	0.15	0.31	–0.13	0.19	0.59							
(7) Number of friends	1.96	2.16	0.08	0.18	–0.24	0.32	0.53	0.37						
(8) Ego-alter homophily	0.70	0.14	–0.11	–0.04	0.18	0.09	–0.07	0.04	–0.01					
(9) White (1/0)	0.72	0.45	–0.11	0.08	0.06	0.24	0.11	0.04	0.01	0.41				
(10) Male (1/0)	0.50	0.50	0.07	0.13	–0.04	0.05	0.07	–0.06	0.01	–0.04	0.06			
(11) Education	3.94	0.88	0.05	0.14	–0.01	0.06	0.20	0.11	0.04	–0.04	–0.09	0.15		
(12) Hierarchical position	3.93	1.97	0.07	0.24	–0.22	0.54	0.28	0.05	0.07	0.00	0.15	0.21	0.37	
(13) Industry experience (years)	8.33	8.39	–0.10	0.12	0.09	0.37	0.07	–0.18	–0.11	0.11	0.31	0.10	–0.14	0.54

Table 3.2 Estimates from a LPM regression predicting employees' performance, Study 1 (N = 114)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.688	0.764	0.750	0.720	0.794
	(0.474)	(0.503)	(0.480)	(0.504)	(0.485)
Number of advice ties	–0.016	–0.033*	–0.017	–0.034	–0.054*
	(0.006)	(0.013)	(0.007)	(0.013)	(0.014)
Number of weak components	0.031	0.027	0.033	0.029	0.052
	(0.038)	(0.030)	(0.040)	(0.033)	(0.033)
Number of friends	0.012	0.020	0.009	0.017	0.019
	(0.015)	(0.020)	(0.013)	(0.018)	(0.019)
Ego-alter homophily	–0.339	–0.354	–0.315	–0.328	–0.407
	(0.450)	(0.441)	(0.462)	(0.454)	(0.431)
White	–0.007	–0.014	0.005	0.012	0.020
	(0.084)	(0.085)	(0.091)	(0.093)	(0.089)
Male	0.076	0.061	0.073	0.059	0.062
	(0.038)	(0.036)	(0.039)	(0.036)	(0.031)
Education (reference = Other)					
High school	0.349	0.367	0.416	0.437	0.527
	(0.311)	(0.315)	(0.327)	(0.329)	(0.301)
Bachelor's degree	–0.025	–0.002	0.007	0.032	0.034
	(0.322)	(0.324)	(0.317)	(0.318)	(0.302)
Master's degree	0.026	0.045	0.061	0.081	0.092
	(0.347)	(0.354)	(0.343)	(0.349)	(0.332)
Doctoral or Professional degree	–0.049	–0.030	0.001	0.023	0.014
	(0.302)	(0.315)	(0.293)	(0.305)	(0.290)
Hierarchical position	0.058*	0.059*	0.053*	0.053*	0.059*
	(0.021)	(0.022)	(0.018)	(0.019)	(0.016)
Industry experience (years)	–0.010*	–0.010	–0.009*	–0.008	–0.010*
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Actual brokerage		**0.003*** **		**0.003*** **	**0.005****
		(0.000)		**(0.000)**	**(0.001)**
Socially perceived brokerage			**–0.002***	**–0.003***	**–0.011*****
			(0.001)	**(0.001)**	**(0.001)**
Actual brokerage × Socially perceived brokerage					**–0.001****
					(0.000)
R^2	0.053	0.068	0.056	0.071	0.100
AIC	161.14	159.33	160.74	158.89	155.31

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Robust standard errors clustered at the country level in parentheses

Table 3.3 SEM mediation results, Study 1 (N = 114)

Panel A: Direct Effects [a]						
Structural	β	Robust std. err.	Z	P > |Z|	95% CI	
Trustworthiness ←						
Socially perceived brokerage (path *a*)	–.0775	.0104	–7.42	.000	–.0979	–.0570
Employees' performance ←						
Trustworthiness (path *b*)	.0229	.0046	4.99	.000	.0139	.0319
Socially perceived brokerage (path *c'*)	–.0054	.0019	–2.90	.004	–.0091	–.0018
Panel B: Indirect Effects [a]						
Structural	β	Robust std. err.	Z	P > |Z|	95% CI	
Employees' performance ←						
Socially perceived brokerage (path *ab*: Hypothesis 2)	–.0018	.0004	–4.10	.000	–.0026	–.0009
Panel C: Total Effects [a]						
Structural	β	Robust std. err.	Z	P > |Z|	95% CI	
Trustworthiness ←						
Socially perceived brokerage (path *a*)	–.0775	.0104	–7.42	.000	–.0979	–.0570
Employees' performance ←						
Trustworthiness (path *b*)	.0229	.0046	4.99	.000	.0139	.0319
Socially perceived brokerage (path *c*)	–.0072	.0019	–3.72	.000	–.0110	–.0034
[a] *All tests are two tailed; robust standard errors are clustered at the country level; the systems of equations is estimated using a maximum likelihood with missing values (mlmv) model*						
Panel D: Bootstrap Standard Errors and Bias-Corrected Confidence Intervals [b]						
	β	Bootstrap std. error	Z	P > |Z|	Bias-corrected 95% CI	
Direct effect (path *c'*)	–.0054	.0034	–2.13	.108	–.0167	–.0035
Indirect effect (path *c* – *c'* = *ab*)	–.0018	.0008	–1.61	.033	–.0056	–.0008
Total effect (path *c*)	–.0072	.0033	–2.15	.031	–.0179	–.0052
[b] *Results based on 5,000 replications*						

Table 3.4 Mediation analyses, Study 2 (N = 184)

	Dependent Variables						
	Ability	**Benevolence**	**Integrity**	**Idea Support**	**F**	**R^2**	**ΔR^2**
Mediation Analysis,							
Step 1:							
Perceived brokerage (1/0)				−0.51***		0.125	
Female (1/0)				−0.12			
Age (years)				−0.01			
Work Experience (years)				0.02			
Constant				5.28***			
Mediation Analysis,							
Step 2a:							
Perceived brokerage (1/0)	−0.48***					0.152	
Female (1/0)	0.11						
Age (years)	−0.01						
Work Experience (years)	0.01						
Constant	4.99***						
Mediation Analysis,							
Step 2b:							
Perceived brokerage (1/0)		−0.57***				0.135	
Female (1/0)		−0.11					
Age (years)		0.01					
Work Experience (years)		−0.01					
Constant		3.91***					
Mediation Analysis,							
Step 2c:							
Perceived brokerage (1/0)			−0.56***			0.156	
Female (1/0)			−0.07				
Age (years)			0.01				
Work Experience (years)			−0.01				
Constant			3.69***				
Mediation Analysis,							
Step 3:							
Perceived brokerage (1/0)				−0.04	122.12***	0.645	0.52
Ability				0.46***			
Benevolence				0.05			
Integrity				0.39**			
Female (1/0)				−0.14			
Age (years)				−0.01*			
Work Experience (years)				0.02*			
Constant				1.34***			

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. All models include fixed effects for respondent's race (one of six categories) and employment type (one of four categories). These coefficients are not reported to save space. Standard errors were computed using the robust specification.

Table 3.A1 Robustness of results to additional model specifications, Study 1

Variable	Model 1[a]	Model 2[a]	Model 3[a]	Model 4[b]	Model 5[b]	Model 6[b]	Model 7[c]	Model 8[c]	Model 9[c]	Model 10[d]
Constant	1.4414	0.7091	1.5077	0.7673	0.6454	0.7240	0.9593^{+}	0.8194	0.9639^{+}	0.6607*
	(2.2994)	(1.9991)	(2.0932)	(0.5125)	(0.4757)	(0.4872)	(0.4937)	(0.4755)	(0.4887)	(0.2063)
Number of advice ties	–0.1798*	–0.0765*	–0.2663***	–0.0347*	–0.0167^{+}	–0.0402^{+}	–0.0347	–0.0146	–0.0541*	–0.0680*
	(0.0896)	(0.0337)	(0.0750)	(0.0131)	(0.0069)	(0.0174)	(0.0215)	(0.0179)	(0.0256)	(0.0194)
Number of weak components	0.1330	0.1513	0.2780	0.0311	0.0333	0.0483	0.0349	0.0428	0.0617	0.0549
	(0.1373)	(0.1740)	(0.1549)	(0.0301)	(0.0403)	(0.0371)	(0.0502)	(0.0521)	(0.0482)	(0.0363)
Number of friends	0.0928	0.0388	0.0932	0.0232	0.0094	0.0199	0.0171	0.0066	0.0176	0.0222
	(0.0941)	(0.0507)	(0.0880)	(0.0213)	(0.0125)	(0.0214)	(0.0259)	(0.0243)	(0.0255)	(0.0220)
Ego-alter homophily	–1.7888	–1.5097	–2.0894	–0.3565	–0.3150	–0.3402	–0.2729	–0.2190	–0.2892	–0.4735
	(2.0686)	(2.0699)	(2.0112)	(0.4512)	(0.4623)	(0.4354)	(0.3898)	(0.4190)	(0.3991)	(0.4308)
White	0.1040	0.0387	0.0866	0.0061	0.0054	0.0086	0.0155	–0.0058	0.0034	0.0119
	(0.3905)	(0.4047)	(0.4122)	(0.0844)	(0.0907)	(0.0841)	(0.1141)	(0.1176)	(0.1123)	(0.0739)
Male	0.2693^{+}	0.3405^{+}	0.2788^{+}	0.0577	0.0734	0.0786	0.0942	0.1016	0.0939	0.0601
	(0.1572)	(0.1764)	(0.1508)	(0.0378)	(0.0388)	(0.0409)	(0.1046)	(0.1041)	(0.1030)	(0.0395)
Education (reference = other)										
High school	1.6430	1.8454	2.4664*	0.3184	0.4157	0.6321	0.5971	0.6216	0.7699	0.7508*
	(1.2841)	(1.4010)	(1.2361)	(0.3207)	(0.3267)	(0.3547)	(0.5641)	(0.5369)	(0.5799)	(0.2921)
Bachelor's degree	–0.0105	0.0324	0.1310	–0.0071	0.0074	0.0261	–0.0644	–0.0151	0.0314	0.2519
	(1.2968)	(1.2940)	(1.2223)	(0.3285)	(0.3168)	(0.3027)	(0.4331)	(0.4200)	(0.4322)	(0.1366)
Master's degree	0.2191	0.2843	0.4523	0.0400	0.0606	0.0917	–0.0123	0.0378	0.0793	0.3381
	(1.4039)	(1.4061)	(1.3309)	(0.3601)	(0.3430)	(0.3250)	(0.4194)	(0.4059)	(0.4183)	(0.1682)
Doctoral or Profes. degree	–0.1079	0.0135	0.1037	–0.0368	0.0007	0.0165	–0.0892	–0.0183	0.0130	0.1735
	(1.2320)	(1.1858)	(1.1547)	(0.3190)	(0.2929)	(0.2847)	(0.4438)	(0.4418)	(0.4527)	(0.1951)
Hierarchical position	0.2554*	0.2250**	0.2590***	0.0596*	0.0526*	0.0510*	0.0613	0.0531	0.0595	0.0781
	(0.1059)	(0.0837)	(0.0729)	(0.0209)	(0.0182)	(0.0163)	(0.0530)	(0.0546)	(0.0582)	(0.0455)
Industry experience (years)	–0.0449*	–0.0356**	–0.0414*	–0.0101*	–0.0087*	–0.0099*	–0.0120	–0.0097	–0.0107	–0.0222
	(0.0191)	(0.0113)	(0.0185)	(0.0037)	(0.0028)	(0.0030)	(0.0124)	(0.0123)	(0.0140)	(0.0116)
Actual brokerage	**0.0215^{+}**		**0.0286*****	**0.0003****		**0.0003**	**0.0036***		**0.0060****	**0.0051**
	(0.0111)		**(0.0071)**	**(0.0000)**		**(0.0002)**	**(0.0016)**		**(0.0022)**	**(0.0032)**
Socially perceived brokerage		**–0.0123****	**–0.0603*****		**–0.0025***	**–0.0066****		**–0.0030**	**–0.0113***	**–0.0152****
		(0.0047)	**(0.0114)**		**(0.0008)**	**(0.0009)**		**(0.0046)**	**(0.0053)**	**(0.0031)**
Actual brokerage × Socially perceived brokerage			**–0.0070****			**–0.0001*****			**–0.0012***	**–0.0022****
			(0.0020)			**(0.0000)**			**(0.0006)**	**(0.0004)**
R^2 or Pseudo R^2	0.0554	0.0436	0.0814	0.0732	0.0559	0.0964	0.0882	0.0707	0.1178	0.1725
AIC	151.73	153.51	147.83	158.63	160.74	155.74	182.77	184.94	183.02	140.85
N	114	114	114	114	114	114	114	114	114	108

$^{+}$ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$; Robust standard errors clustered at the country level in parentheses (except for models [c]); All interaction terms are mean centered.

[a] Logistical regression; [b] LPM with actual brokerage measured with betweenness centrality; [c] LPM with country-fixed effects (not displayed) and heteroskedastic-robust standard errors; [d] LPM excluding influential observations ($n = 6$).

FIGURES

Figure 1.1 Theoretical Model

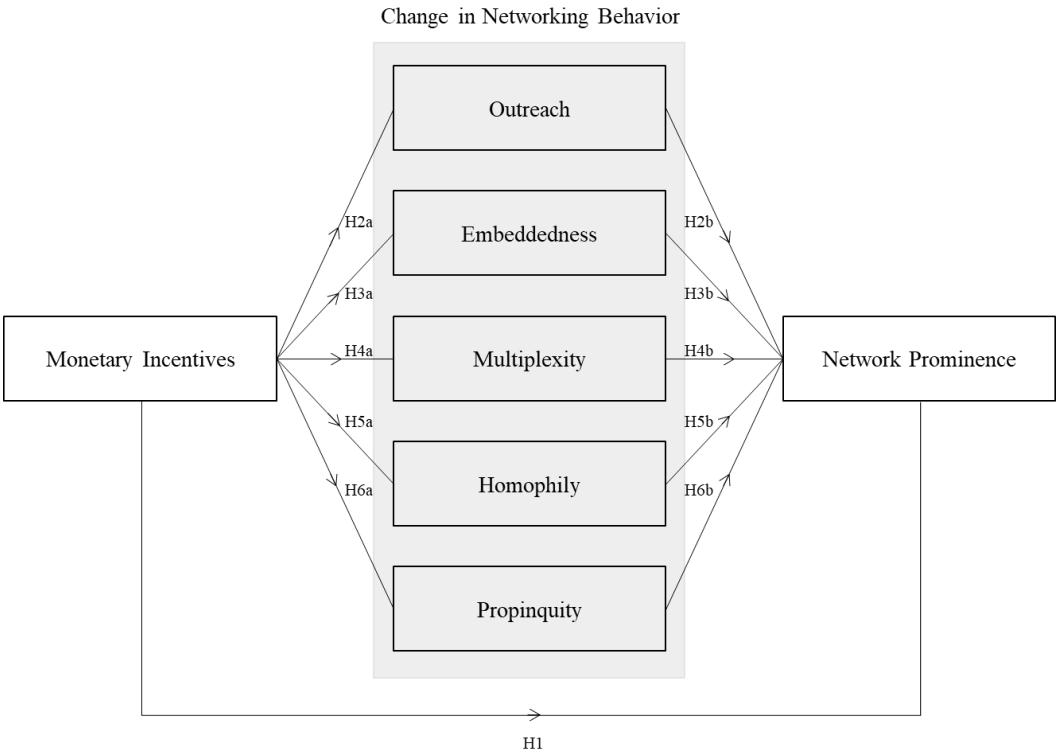
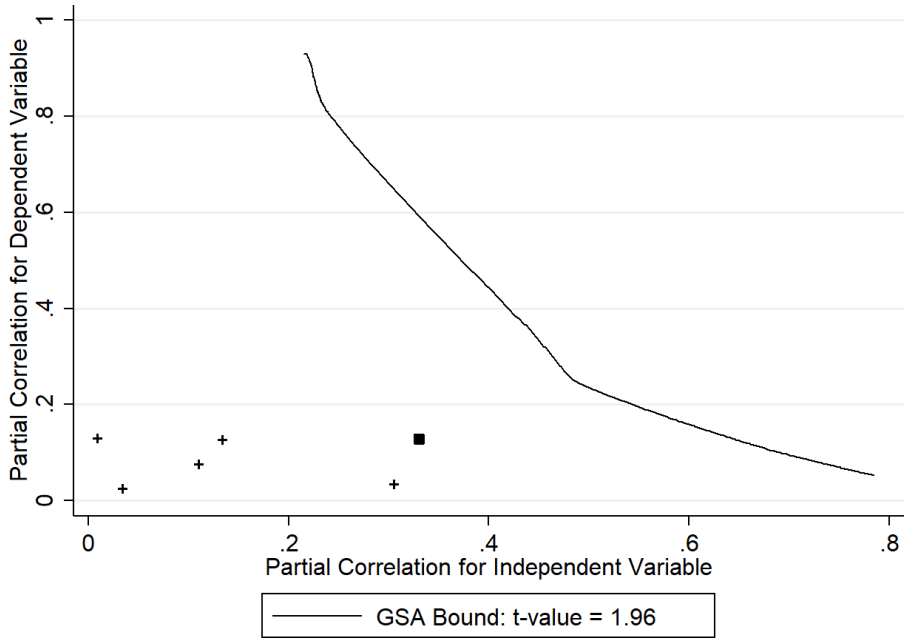


Figure 1.2 Generalized Sensitivity Analysis Plot



The graph plots two elements: the points representing the correlations of the covariates in Model 2, excluding the inverse Mills ratio, with the treatment (monetary incentives) on the x-axis and the outcome (i.e., indegree centrality) on the y-axis, and a contour curve representing the threshold of these correlations for an omitted variable, beyond which the coefficient of monetary incentives becomes non-significant at the $p < 0.05$ level in a two-tailed test. The figure shows that all of the covariates used in our model fall well below this curve. For a potential confounder to impair our findings its correlation with these dependent and independent variables would have to be more than double the correlation with organizational rank (filled-in square).

Figure 2.1 Scenario−based visual scale capturing strategic orientations toward brokering

A. I would make efforts to involve them, get them in touch, organize and plan meetings in order to work all together and exchange the knowledge.

B. I think that working with both of them together is redundant and inefficient. I would act as an integrator, meeting them separately and then recombining their insights.

C. I would work with Mike and Jenny separately. At the same time I would both communicate transparently to whom I am working with and attribute knowledge and ideas to their owner.

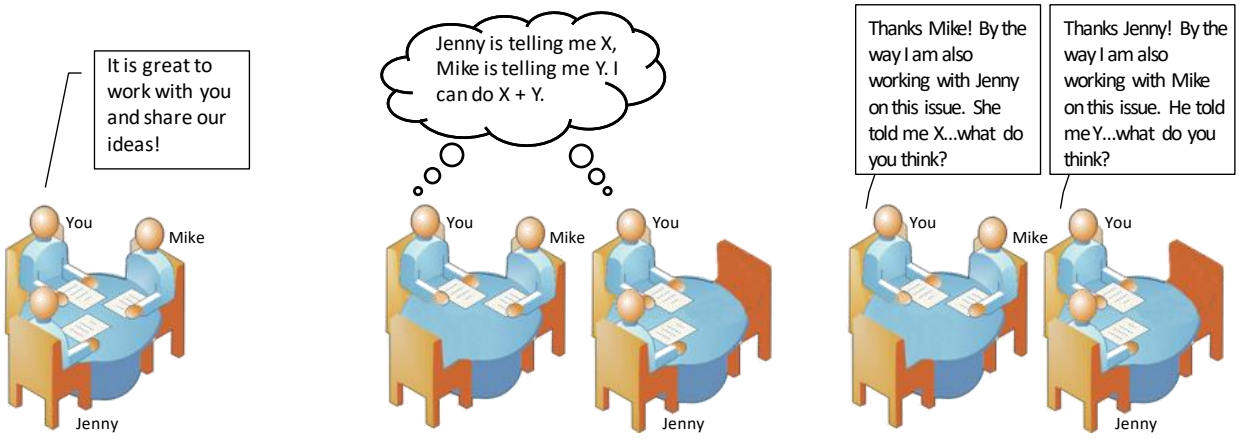


Figure 2.2 Relationship between brokerage and performance distinguishing between collaborating and arbitraging strategic orientations

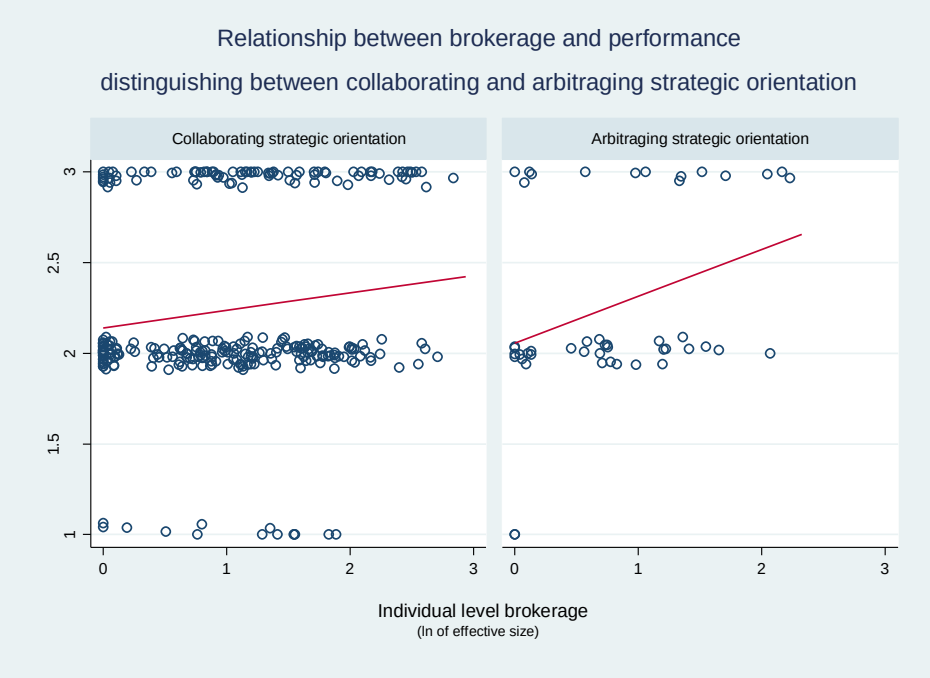


Figure 2.3a Simple slope analysis of effective size on individual performance taking into account brokers' collaborating strategic orientation

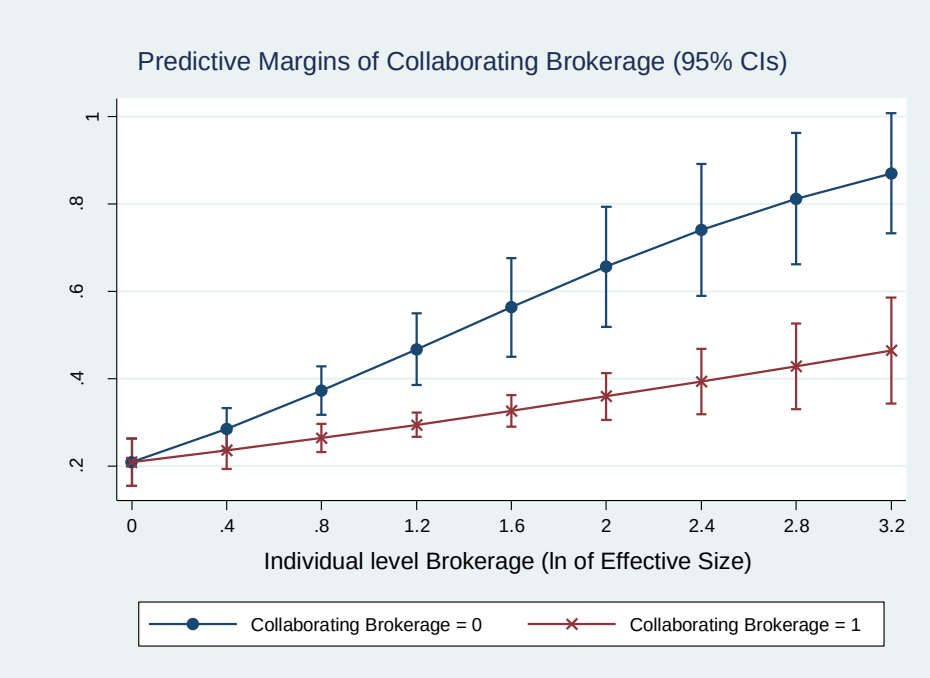


Figure 2.3b Simple slope analysis of effective size on individual performance taking into account brokers' arbitraging strategic orientation

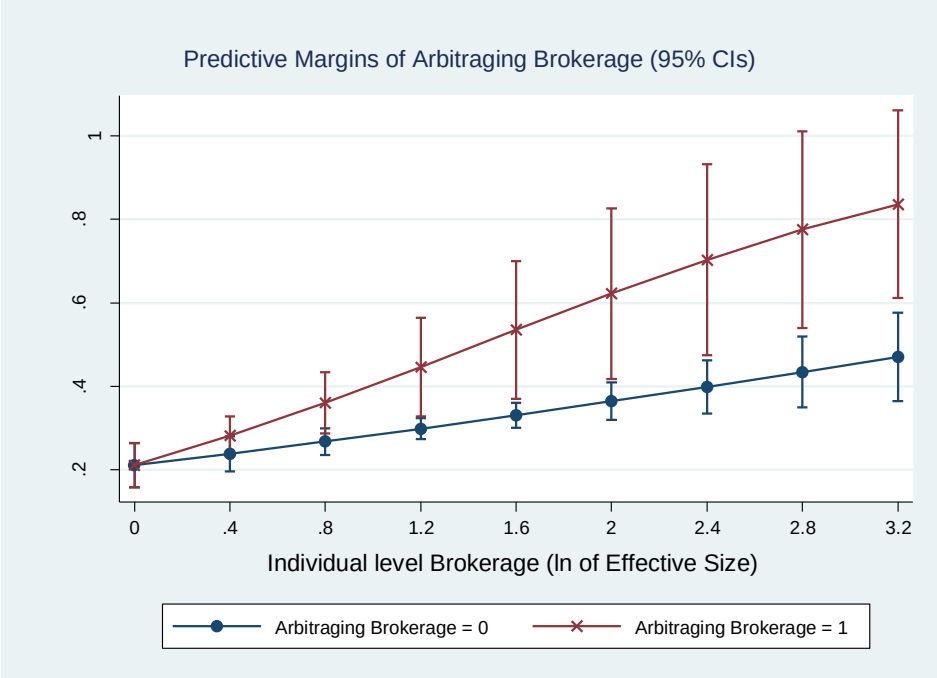


Figure 2.4 Convergent Validity/Stability of brokerage behavioral orientations from Time 1 to Time 2

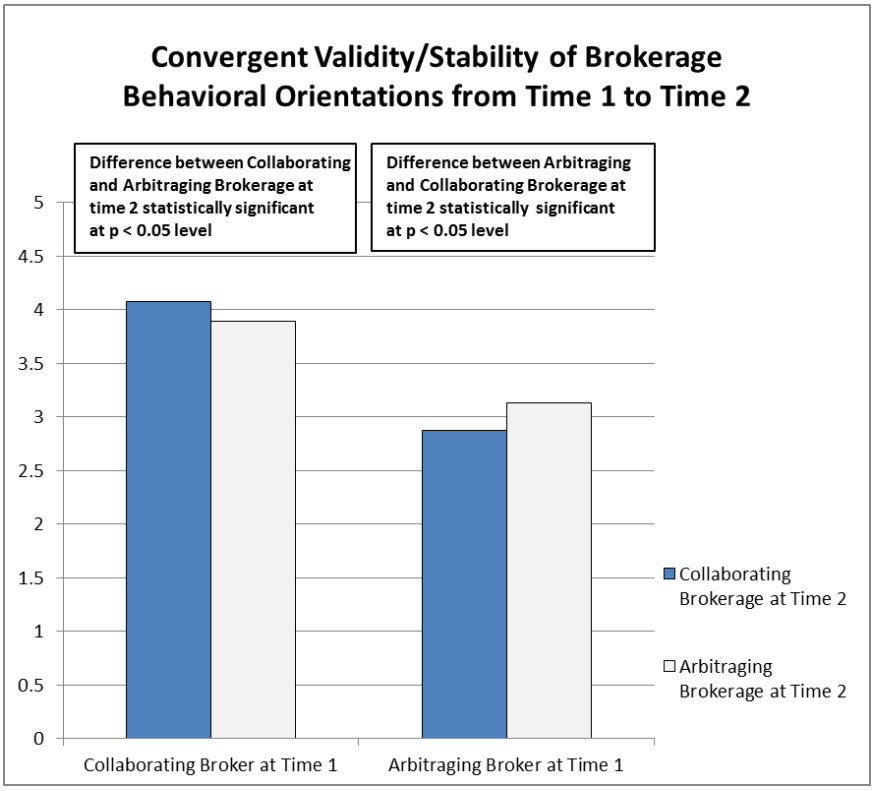


Figure 3.1 Two-by-two matrix disentangling actual brokerage and socially perceived brokerage

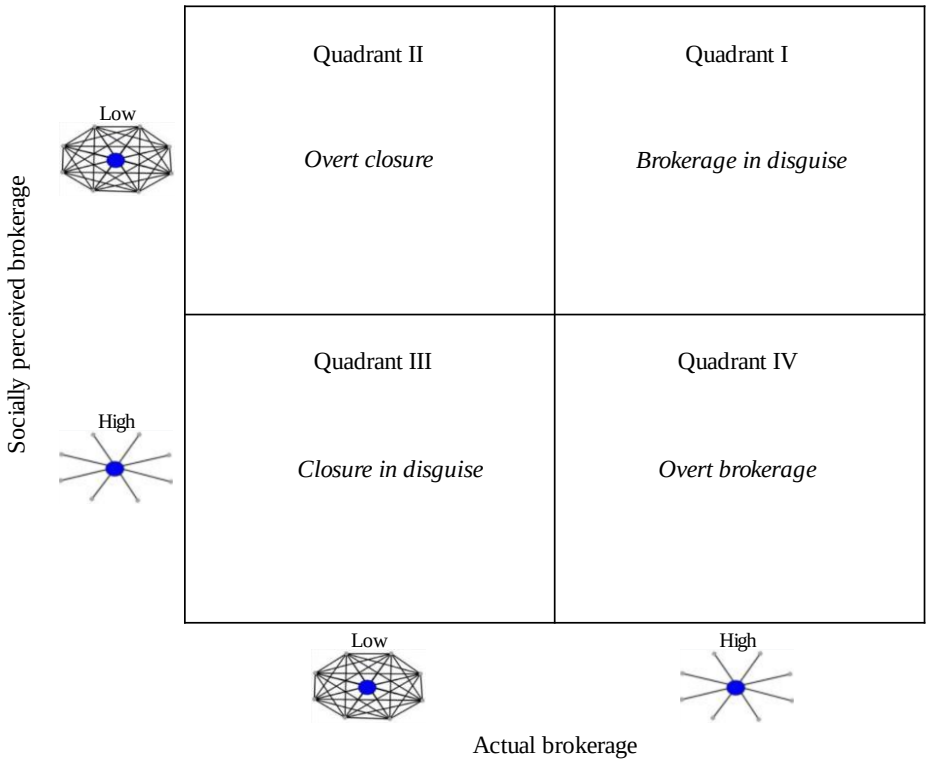


Figure 3.2a Description of dense and sparse network configurations using visual network scales

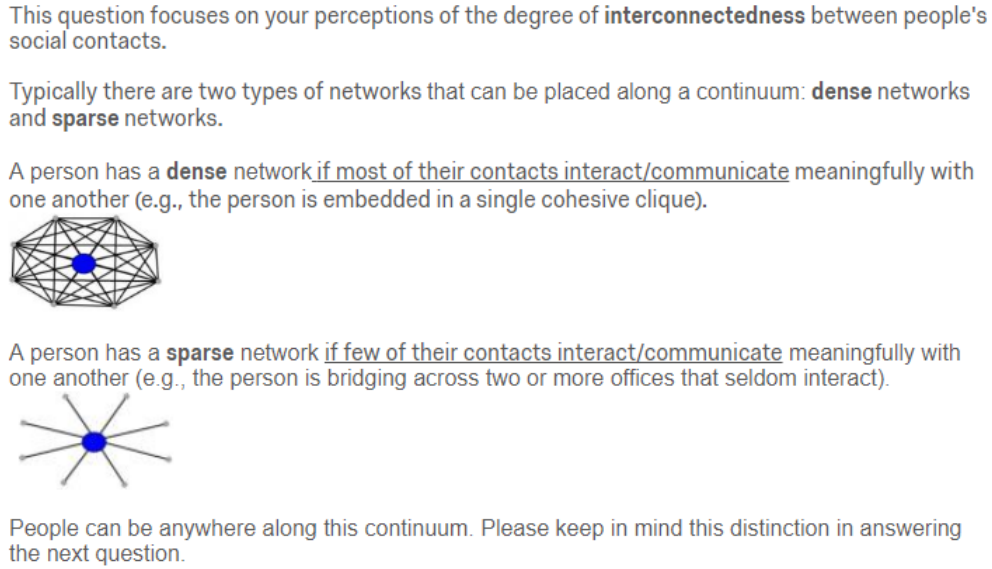


Figure 3.2b Visual scale to capture *social perceptions of brokerage*

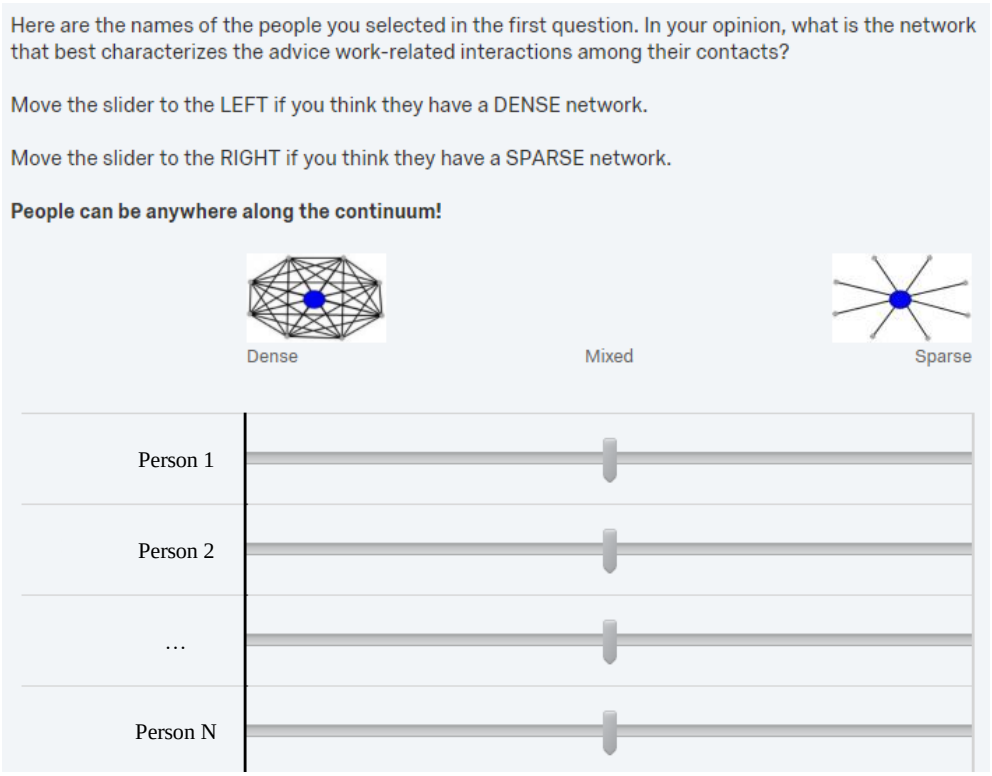
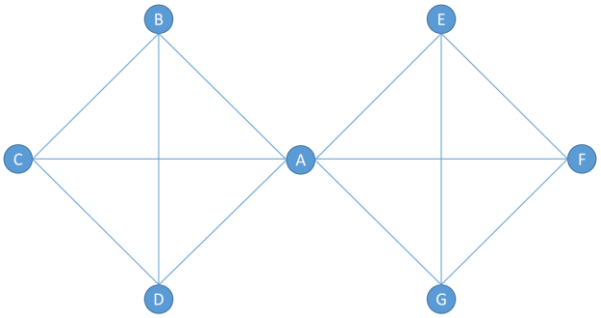


Figure 3.3 Different component configurations, holding brokerage, size, and density constant

Panel A

(Size = 6; Density = 0.4; A's ego betweenness = 9; Number of weak components = 2)



Panel B

(Size = 6; Density = 0.4, A's ego betweenness = 9; Number of weak components = 3)

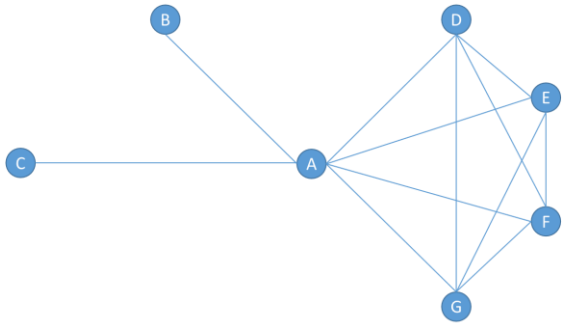


Figure 3.4 Marginal effect of actual brokerage on individual performance, at varying levels of socially perceived brokerage

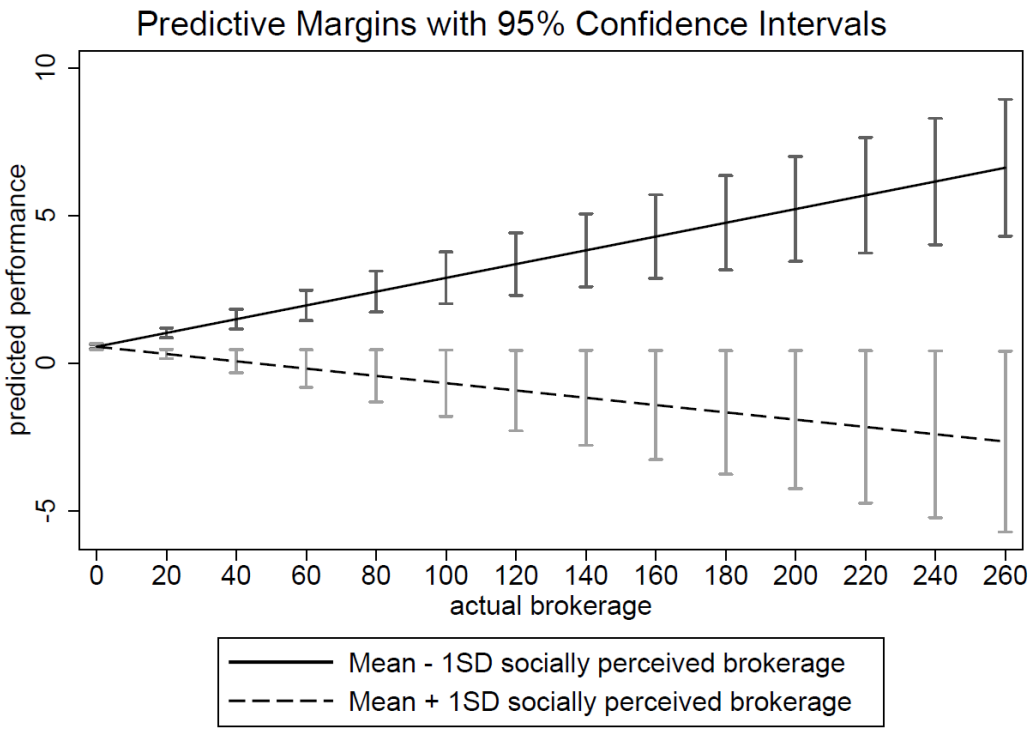
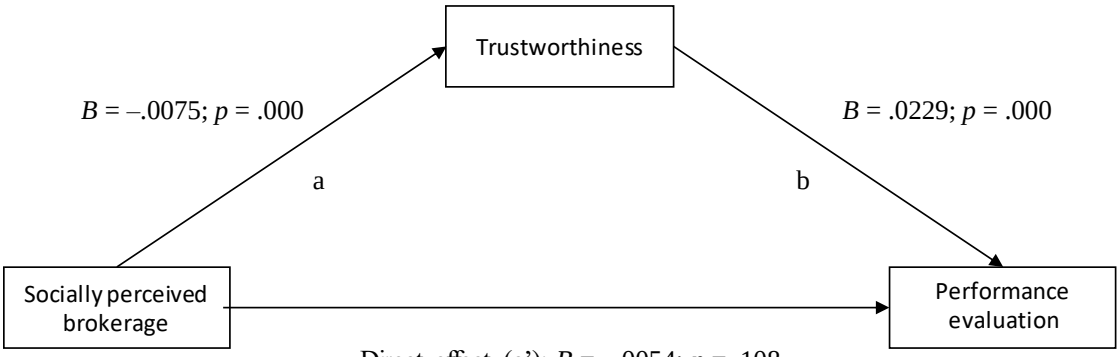


Figure 3.5 Theorized and estimated mediation model linking socially perceived brokerage to individual performance (Hypothesis 2)



Direct effect (c'): $B = -.0054$; $p = .108$

Indirect effect (c – c' = ab): $B = -.0018$; $p = .033$

Total effect (c): $B = -.0072$; $p = .031$