NETWORK AGENCY

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ABSTRACT
The question of agency has been neglected in social network research, in part because the structural approach to social relations removes consideration of individual volition and action. But recent emphasis on purposive individuals has reignited interest in agency across a range of social network research topics. Our paper provides a brief history of social network agency and an emergent framework based on a thorough review of research published since 2004. This organizing framework distinguishes between an ontology of dualism (actors and social relations as separate domains) and an ontology of duality (actors and social relations as a mutually constituted) at both the individual level and at the social network level. The resulting four perspectives on network agency comprise individual advantage, embeddedness, micro-foundations, and structuration. In conclusion, we address current debates and future directions relating to sources of action and the locus of identity.

KEYWORDS: Social Networks; Agency; Individual Advantage; Embeddedness; Micro-Foundations; Structuration; Endogeneity; Ontology; Levels of Analysis.

_The tertius plays conflicting demands and preferences against one another and builds value from their disunion._ (R.S. Burt, 1992: 34)

_Cosimo de’ Medici did not design his centralized party, nor did he intend (until the very end) to take over the state... Only very late in the game, we shall argue, did the Medici adaptively learn of the political potential of the social network machine that lay at their fingertips. In almost Hegelian fashion, oligarchs crafted the networks of their own destruction._ (Padgett & Ansell, 1993: 1287)

Social theory has long wrestled with problems of whether and how people take decisions independently of the structures within which they are embedded (see Emirbayer & Mische, 1998, for a review). Karl Marx (1852) noted that people “make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past.” For organizational research, the problem of agency is particularly relevant given the wide range
of choices that modernity offers to individuals (Whittington, 1992). People, it has been suggested, in modern organizations express agency through actions and decisions that recursively modify behavioral routines over time (Barley & Tolbert, 1997), taking advantage of organizational shocks (e.g., Tasselli, 2019) to instantiate change (e.g., Barley, 1986).

But despite widespread attention in organization theory (see the special issue edited by Bouchiki, Kilduff, & Whittington, 1997), the problem of agency has been neglected in organizational social network research, partly as a consequence of the emphasis on the structure of network relationships vis-à-vis the power of individuals. From a structural perspective, the “static position of the actor in the network has been assumed to explain his or her actions in social settings” (Stevenson & Greenberg, 2000: 652). The key assumption is that “people act on all network opportunities” – thus “agency can be ignored because it is coincident with opportunity” (R.S. Burt, 2012: 545). This explaining away of agency is, perhaps, less satisfactory in a field in which a growing interest in social network micro-foundations puts individual action and decision making back into focus (e.g., Tasselli, Kilduff, & Menges, 2015). From this micro-foundational view, emphasis is given to the ways people take action in social networks. Although all network researchers would tend to agree that individuals’ positions in networks reveal “the potential for action” (Stevenson & Greenberg, 2000: 652-653), it is nevertheless clear that “people [not networks] are the source of action” (R.S. Burt, 2012: 545).

Building on this emerging debate in the organizational social network literature, in this paper we address questions concerning the extent to which social capital and its consequences result from actions of purposive individuals (the locus of agency at the individual level) versus resulting from social network phenomena beyond the control of individuals (the locus of agency at the network level). The question concerning network agency, therefore, defines the *locus of action* involving individual choices and structural
patterns of network interaction (e.g., Emirbayer & Goodwin, 1994). Advocates of the structural side of the debate explain that “a rock dropped from the same place in the same way has the same outcomes regardless of whether it was dropped on purpose or by accident” (Borgatti & Halgin, 2011: 1178). But advocates of a micro-foundational perspective see the nodes in social networks not as inanimate lumps but as individuals with motives, cognitions, and personality.

This tension concerning agency has been latent in social network theory since its inception (e.g., Moreno, 1941) but has emerged more recently in leading theoretical approaches to social interactions, including weak tie theory (Granovetter, 1973), structuration theory (Giddens, 1984; Stones, 2005) and structural-hole theory (R.S. Burt, 1992; 2007; 2010). The agency of individuals in social network contexts has been particularly resonant in research that brings the person back into the analysis of social networks (Kilduff & Krackhardt, 1994) through the study of network cognition (e.g., Krackhardt, 1987) and personality antecedents of social network positions (see Kilduff & Buengeler, 2019; Landis, 2016, for reviews). Previous reviews on social networks in organizations have focused on key concepts (Borgatti & Foster, 2003; Kilduff & Brass, 2010), including brokerage (Halevy, Halali, & Zlatev, 2019; Stovel & Shaw, 2012); on the antecedents of social networks (Tasselli et al., 2015), including cognition (Brands, 2013; Smith, Brands, Brashears, & Kleinbaum, 2020) and personality (Landis, 2016; Kilduff & Buengler, 2019); and on network advantage (R.S. Burt, Kilduff, & Tasselli, 2013). The agency issue, and thus the links between network structure and individual action, has rarely surfaced (for partial exceptions, see Gulati & Srivastava, 2014; Kirschbaum, 2019), despite the relevance of agency for network theory (e.g., Emirbayer & Goodwin, 1994) and research at the intra-individual (e.g., Landis et al., 2018), inter-individual (e.g., R.S. Burt, 2012; Quintane & Carnabuci, 2016) and
In this paper, we articulate how agency has been discussed; and, in doing so, we aim to make sense of past theory, and influence the development of future theory. We review, categorize and discuss recent and current research on network agency; we address contemporary debates and issues; and we envisage and discuss future research implications and directions on agency in social networks. We include empirical, conceptual and meta-analytic studies addressing network agency.

Choosing which literature to review. Because our focus is on agency in the context of social network research, we began by including all apparently relevant papers on social networks in organizations published in leading journals in the last fifteen years (2004-2019)\(^1\), and then retaining only papers that addressed network agency. We chose 2004 as the starting point because of the influential review published in that year that touched on issues of agency and structure (Brass et al., 2004). Based on our conceptual focus, we retained only articles that focused on interpersonal networks. Research at other levels of analysis (e.g., inter-organizational) were included only if there were relevant implications for either interpersonal networks or issues related to the locus of action at the interpersonal versus network level. We excluded reviews, commentaries, and methodological papers. We then made our search more comprehensive by reviewing all the reference lists of these and related articles to be sure that we captured intellectual lineages. This iteration provided links to additional, relevant research in management, organization studies, sociology, and social psychology. The final list

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\(^1\) We searched for research on ‘organizational social networks’ published in 12 leading journals in management, organizational psychology, and sociology, reading all the titles and abstracts of the articles published in those journals (Academy of Management Journal, Administrative Science Quarterly, Organization Science, Academy of Management Review, Strategic Management Journal, Management Science, Journal of Management, Journal of Management Studies, Organization Studies, Journal of Applied Psychology, American Journal of Sociology, American Sociological Review). We limited our search to the last 15 years, from 2004 to 2019 (including articles accepted or published online in that year). The result of this first search was a list of 271 papers.
included 236 articles, all summarized and referenced in the Appendix with respect to their implications for agency. Because this is the first review paper concerning network agency in relation to management and organizational research, we also delved into prior research to provide context for contemporary developments.

**Brief History of Network Agency**

There has been longstanding intellectual interest in network agency. Are individuals, in their idiosyncratic differences and choices, in the driving seat? Or do network properties and structures shape the actions and identities of individuals in networks? The intellectual history of free will versus determinism in relation to social theory is covered in depth elsewhere (e.g., Emirbayer & Mische, 1998). Here we trace influences from the social sciences on how network research addresses issues of agency.

**Foundations in social psychology.** The founder of sociometry, Jacob Moreno, was among the first to recognize the embeddedness of individuals in chains of influence. For Moreno, the basic unit of analysis was the “social atom” that consisted of “an individual and the people (near or distant)” to whom the individual “is emotionally related at the time” (Moreno, 1947: 80). Moreno, indeed, may lay claim to have discovered the ego network that is a feature of much research, particularly in large organizations (e.g., R.S. Burt, 2004). In the work of Moreno (1941: 16), social networks are seen as a “catalyzers” leading otherwise “passive agents” to action. In analyzing how behaviors (such as delinquent girls absconding from their group home; Moreno, 1934) resulted from both social network connections within the social atom and individual predispositions, Moreno anticipated the modern debate concerning network structure versus personality explanations for such outcomes (e.g., R.S. Burt, 2012; Kilduff & Lee, 2020).

The tension between internal and external forces as influences on human action was also at the core of Lewin’s (1936) field theory. Lewin emphasized a topological psychology
that examined patterns of interaction between the individual and the social field in which the individual was located. Fritz Heider was influenced by Lewin in focusing on the subjective representation of human experience, but differed from Lewin in working to explain, through the development of balance theory, the dynamics of individual perception of other people’s actions (Heider, 1946; 1958). From Heider’s perspective, people experience a strain toward balance in friendship relations such that when people perceive that their friends are not friends of each other, they may cognitively distort relationships or take action to balance relationships (for an empirical test, see Krackhardt & Kilduff, 1999). If the network relationships in an organization move toward perfect balance, two subgroups emerge within which positive ties predominate and between which negative ties separate, irrespective of people’s volition and even of their cognitive awareness (Cartwright & Harary, 1956). This intuition inspired recent research on the structural implications of network change (Tasselli & Caimo, 2019) and on the dynamics of between-group conflict and negative ties (Labianca, 2014).

**Foundations in anthropology.** The major influence of anthropology has been in the area of network cognition. A basic interest in anthropology concerns the accuracy of informant recall of interpersonal relations such as communication ties. Anthropologists showed that people are frequently inaccurate in recalling their recent interactions (see Bernard, Killworth, Sailer, & Kronenfeld, 1984, for a review). But people are relatively accurate at reporting the enduring sets of relationships within which they are embedded (Freeman, Romney, & Freeman, 1987), even though they tend to over-estimate their own centrality in, for example, department friendship networks (Kumbasar, Batchelder, & Freeman, 1994). These combined results raise the question of the extent to which people’s attitudes and behaviors are influenced by their daily interactions (even though they tend to forget these meetings); or whether it is their remembered and familiar relationships that
contribute to attitudes and behaviors such that they overestimate the extent of social support for their initiatives. The focus on network cognition that was pioneered by anthropologists has become a significant strand of social network research in organizational settings (see Brands, 2013, for a review).

Another focus of anthropological network research concerns how roles are shaped by social interactions (Nadel, 2013). For example, the work of Elizabeth Bott (1957) showed that working class married couples in London tended to enact traditional gender roles with each other when wives were embedded in networks of family and neighbors; and husbands were embedded in networks of work and friends. But when these couples were moved out of their familiar social contexts to another part of London where prior social bonds were unavailable, role relationships changed toward mutual dependence on each other and gender equality. Agency, in terms of the daily enactment of obligations and norms, changed as the embeddedness in external social relations diminished.

**Foundations in sociology.** In sociology, the towering figure for network research, is Georg Simmel who articulated key concepts, including tertius gaudens – the broker who gains from others’ lack of connection; the distinction between dyads and triads in terms of, for example, majority influence; and the positive effects of conflict relationships (see Coser, 1998). Recent research has developed ideas of brokerage to contrast different types of agency (Long Lingo & O’Mahony, 2010). The tertius gaudens keeps people apart or bridges between them (R.S. Burt, 1992) thereby gaining advantages including good ideas, whereas the tertius iungens brings interested parties together in the furtherance of project completion (Obstfeld, 2005).

There is also a lively debate concerning Simmelian brokerage, a structure in which an individual is a member of two or more cliques. The Simmelian broker is variously described as paralyzed by the competing demands of rival cliques (Krackhardt, 1999) or active in
engendering innovation across boundaries (Vedres & Stark, 2010). A recent reconciliation of different perspectives proposed and found that the extent to which individuals were effective in the Simmelian broker role depended on the fit between their personality and the network structure in which they were embedded (Tasselli & Kilduff, 2018).

In the Simmelian perspective, there is an emphasis on action. The broker seizes opportunities and shapes others’ behaviors. But in much of the traditional sociological research on networks, agency at the level of individuals is absent. Instead the focus is on how “relationships structure resource allocation under conditions of scarcity” (Wellman & Berkowitz, 1988: 6). Agency is seen to rest on the “interlock and interaction of objectively definable social relationships” (Boorman & White, 1976: 1442). The study of the individual is considered a “dead end” (Mayhew, 1980: 335), and the social network approach is defined as a “scientific revolution” (Berkowitz, 1982: 150) incommensurable with other perspectives that incorporate an active role for individuals. Following this “anti-categorical imperative” (Emirbayer & Goodwin, 1994: 1414), structurally informed network researchers have tended to dismiss the study of individual attributes because of measurement difficulty (e.g., Pfeffer, 1983) or irrelevancy (e.g., McPherson, Popenlarz & Drobnic, 1992). The micro-foundations movement in organizational social network research has contested the absence of agency at the individual level (e.g., Tasselli et al., 2015).

Modern developments. A growing body of research has brought the ‘person back in’ to the study of social networks in the form of antecedents of structural positioning. These antecedents include demographic factors (e.g., Ingram & Morris, 2007; Jehn & Mannix, 2001), organizational roles and actions (e.g., Tasselli, 2015), personality (for a recent meta-analysis, see Fang et al., 2015), cognition (e.g., Brands & Kilduff, 2013) and genetics (e.g., S. A. Burt, 2008, 2009; Fowler, Dawes, & Christakis, 2009). This recent agentic trend in social network research (e.g., R.S. Burt et al., 2013) altered the landscape such that articles positing
personality effects on brokerage are now published even in sociology journals (e.g., R.S. Burt, 2012). But this still leaves an unsatisfactory dualism between individuality, representative of the ‘push’ factor of motivation from within, and social networks, representative of the ‘pull’ factor of structures of opportunity from without. In considering agency it is also helpful to incorporate a relational approach that views social life as a dynamic interplay of idiosyncratic individuals constrained and enabled through their social network ties (Kilduff, Tsai, & Hanke, 2006).

**NETWORK AGENCY: AN EMERGENT FRAMEWORK**

Network agency represents “an analytical category in its own right,” as it involves consideration of the “embedded process of social engagement” through which individuals act and interact in organizations (Emirbayer & Mische, 1998: 962-3). This attention to the locus of action entails the balance between actors and social contexts in the development of action. Relevant research investigates how individual (e.g., Sasovova et al., 2010), team (e.g., Schulte et al., 2012) and organizational (e.g., Clement et al., 2018) actions either affect or are affected by network structures (e.g., Gulati & Srivastava, 2014; Vedres & Stark, 2010) and by the nature and strength of the ties (e.g., McFayden, Semadeni, & Cannella, 2009; Ryan, 2016); and how these patterns influence important work-related outcomes including creativity (e.g., Perry-Smith & Mannucci, 2017), innovation (e.g., Obstfeld, 2005), trust (e.g., Levin & Cross, 2004), performance (e.g., Fang et al., 2015), and opportunity recognition (e.g., Landis et al., 2018).

Despite its relevance, the concept of agency has often “maintained an elusive, albeit resonant, vagueness” in social network research (Emirbayer & Mische, 1998: 962). Part of this vagueness results from the emphasis of most network research on the composition, functioning, and consequences of structured patterns of interactions at the expense of any consideration of individual attributes, motives, or dispositions (Kilduff & Tsai, 2003). But the
understanding of agency in organizational social networks cannot be limited to the analysis of structural properties of the network. The definition of agency as the locus of action includes two interwoven dimensions, the *locus*, i.e. the level of analysis in which networking activity is located, and the *nature of agency*, i.e. the nature of the interplay between subjects and structure from which action is generated. Agency requires a framework that strikes a balance between individual and network loci (Emirbayer & Goodwin, 1994).

In reviewing the corpus of research on network agency, we surfaced consistent distinctions with respect to *ontology*, i.e., the nature of the relationship between actors and network structure; and with respect to *analytical level*, distinguishing between the individual (i.e., ego) level and the network level. These distinctions build on early work in the realm of sociometry (Moreno, 1937), in which the distinction was drawn between people and networks as mutually evolving systems; and people and networks as ontologically distinct realms; and in which there was also a parallel phenomenological emphasis on whether ego or the network was the locus of analysis.

Thus, we distinguish an ontology of *dualism*, which treats actors and social relations as separate domains, from an ontology of *duality*, which considers actors and social relations as mutually constituted systems (e.g., Sonenshein, 2016). The emergent organizing framework incorporates four perspectives on network agency at two levels of analysis (ego, social network) crossed with two levels of ontology (dualism, duality) as shown in Figure 1. In the Appendix, we classify all reviewed articles into the four perspectives, and we highlight the main relevance of each article for network agency.

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Figure 1 about here

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Network ontologies investigate the relation between actors and social structures. The first two perspectives that we review (individual advantage and embeddedness views of agency) both feature an ontology of dualism. The network is seen not as an intrinsic component of individual identity and action, but as a structural arena that helps gain and maintain advantage (e.g., Quintane & Carnabuci, 2016), or that enables and constrains individual action (e.g., Tortoriello, McEvily, & Krackhardt, 2014). Dualism is evident whether or not structural positions are occupied by individuals pursuing individual advantage (as suggested by structural-hole theory, R.S. Burt, 1992); or whether or not individuals benefit from serendipitous embeddedness (as in the case of weak ties bridging between community structures, Granovetter, 1973).

In contrast, micro-foundational and structuration perspectives conceive actors and networks as a duality such that the social network is both “structuring and being structured” by actors who are “suffused” within social contexts (Michel, 2014: 1097). Recalling the ontological distinction established by Moreno (1941) concerning the ‘pull of the situation’ and the ‘push of individuality’, these two forces are conceptually separate according to dualism perspectives, whereas they mutually influence each other according to duality perspectives.

In our organizing framework, the emphasis on ontology is balanced by a parallel emphasis on the level of analysis, the locus of action. Both individual advantage and micro-foundational views of agency are phenomenologically ego-oriented. From an individual advantage perspective, the focus is on the extent to which ego leverages network position in search of advantage (e.g., R.S. Burt, 1992). By contrast, embeddedness and structuration perspectives are network-oriented, such that the locus of action is mainly at the level of network components and dynamics, rather than at the level of individual members.

Four Perspectives on Network Agency
We conducted a comprehensive and systematic review of the social network literature, classifying each source material as dealing with agency in at least one of the four different ways summarized in Figure 1 (see also the Appendix). Thus, articles were classified as treating agency in terms of (I) individual advantage; (II) network embeddedness; (III) micro-foundations; and (IV) structuration process. For each perspective on agency, we review and discuss the results of our analysis of the literature.

I. Agency as Individual Advantage

From this perspective on agency, the locus of action is at the individual level, whereas the network, in its components, is the structural platform in which localized action is formed (Simmel, 1950). Opportunity and motivation are “one and the same” (R.S. Burt, 1992: 36): People manage networking opportunities that are structurally provided by the social and organizational context, such that they can build and extract value from their social connections (R.S. Burt, 1992: 34). Individuals are propelled into network positions because of anticipated beneficial outcomes, such that “actions are ‘caused’ by their (anticipated) consequences” (Coleman, 1986: 1312). In turn, people’s actions coalesce in higher network level configurations through individual processes that cannot simply be captured analyzing structural properties of the network (e.g., Stevenson & Greenberg, 2000).

The foundations of this research tradition date back to Simmel (1950, first published, 1908), with his emphasis on the micro-dynamics of strategic interaction among individuals who know each other well and who interact in close proximity. From this view, individuals forge, shape and arrange networking interactions in order to achieve personal and organizational advantage (e.g., R.S. Burt et al., 2013). This view, which occupies a prominent role in organizational social network research, characterizes leading approaches to social interaction, including theory and research on structural holes (e.g., R.S. Burt, 2004; 2007), individual centrality (e.g., Barsness, Diekmann, & Seidel, 2005; Mehra et al., 2006) and
strategic action in networks (e.g., Battilana & Casciaro, 2012; Stevenson & Greenberg, 2000).

**Advantage as spanning structural holes.** Structural-hole theory and research has shown vigorous evolution since its earlier articulation (R.S. Burt, 1982). In the earlier work the emphasis (borrowing from Simmel, 1955) was on the extent to which actors achieved autonomy by occupying positions that had many conflicting group affiliations. Prefiguring the later emphasis on how diverse contacts reduced constraint, the autonomy argument emphasized how "the pattern of relations defining the network position 'frees' occupants of the position from constraint by others" (R.S. Burt, 1982: 922). In the later development of this argument, as it affected the interpersonal relations that form the opportunity for agency, the emphasis changed from structural positions (occupied by structurally equivalent actors – R.S. Burt, 1982) to individual persons; and from freedom from constraint to the contrast between constraint on the one hand and control on the other (R.S. Burt, 1992). More recently, the micro-macro dynamic has, following empirical results (R.S. Burt, 2007), encompassed ego within the restricted focus of his or her direct contacts, thereby eschewing implications concerning the much wider community (R.S. Burt, 2010).

With respect to how agency is considered within structural-hole theory, there is a developing emphasis on differences among individuals' ability to recognize and take advantage of structural hole positioning (R.S. Burt, 2005: 23). People display consistency across situations in whether they build closed or open social networks, and this consistency in networking style is strongly suggestive of individual agency in network construction. Achievement is determined by the individual's role experience and the individual's role-specific network (R.S. Burt, 2012). Network brokers, who span across the gaps in social structure, are "highly mobile relative to the bureaucracy" in providing faster and better solutions for organizational problems (R.S. Burt, 1992: 116).
The agentic potential to gain advantages by spanning network holes may provide incentives for people to relate to others for personal gain rather than on the basis of liking. Thus, strategic social networking emerges as an important explanatory mechanism of changes in the social fabric and cohesion of organizations and societies (Buskens & van de Rijt, 2008). But we should recall Simmel's (1955) warning that a triad tends to resolve itself into a coalition of two against one (see also Tasselli & Kilduff, 2018; Tortoriello & Krackhardt, 2010), a warning that lends emphasis to research on triads that emphasizes the extent to which the broker acts not as an exploiter but as a matchmaker. The matchmaker, or tertius iungens, brings parties together for mutual gain and for the good of the organization (e.g., Obstfeld, 2005), thereby establishing a networking pattern that leads to advancement for the broker (Kleinbaum, Stuart, & Tushman, 2013).

Brokers connect individuals not only within but also across organizational units and communities (Fernandez & Gould, 1994) with generally positive results: A study of all telephone calls for a given month (Eagle, Macy, & Claxton, 2010) across the UK showed that socioeconomic opportunities within a community increase with the number of structural holes in the ego networks of the members. Further, to the extent that brokers connect people across (rather than within) organizational boundaries, their spanning of structural holes relates positively to creativity and quality of their decision-making (Zou & Ingram, 2013).

The organizational landscape changes quickly in terms of structural-hole opportunities appearing and disappearing (R.S. Burt, 2002). In the Italian television production industry, structural holes spanned by production-team members in the past had no significant effects on current performance (Soda, Usai, & Zaheer, 2004). The benefits to the individual of spanning across structural holes need to be balanced, therefore, against the costs of a continual search for new opportunities. If opportunities change quickly, there are benefits to being connected within a cohesive group, given that cohesion speeds the transfer of timely
information and resources (Aral & Van Alstyne, 2011). Further research is needed to understand the extent to which opportunities arising from spanning structural holes are short-lived (e.g., R.S. Burt, 2002) and thus need to be quickly regenerated in order to maintain structural advantage (e.g., R.S. Burt & Merluzzi, 2016; Zaheer & Soda, 2009).

**Advantage as network centrality.** Keeping the focus on individual advantage and extending the range of individual activity beyond the ego network, the individual can be evaluated with respect to how central he or she is in larger network structures (e.g., Mehra, Kilduff, & Brass, 2001). Some individuals are more popular than others in terms of having more connections (i.e., degree centrality), whereas other individuals are more central in terms of acting as hubs for information or resource exchange or as go-betweens for people lacking direct connections with each other (i.e., betweenness centrality – Freeman, 1977).

The specific social network positions individuals occupy can have major consequences for the macro environment of which they are part. For example, an individual can wield influence over the whole network with even a few connections if these connections are to well-connected people, that is, if the individual’s eigenvector centrality is high (Bonacich, 1987). Some individuals are influential through their official positions as leaders (e.g., Tasselli, 2015), but the question remains as to whether leadership is boosted by occupation of advantageous network positions. The evidence suggests that teams perform better to the extent that team leaders are central in instrumental networks (Balkundi & Harrison, 2006). And such team-leader centrality boosts performance of the team in part because central team leaders are seen by team members as charismatic (Balkundi, Kilduff, & Harrison, 2011). Recent research on leader centrality is interested in connecting the micro-layer of ego’s interaction with the macro-layer of organizational performance. A study conducted on 600 from the Forbes list of the largest U.S. industrial and service firms showed that CEOs' advice networks mediate the effects of governance factors on firm performance (McDonald,
Khanna, & Westphal, 2008). Future research can investigate whether and how leader centrality coevolves with social structure, thereby contributing to the firm’s centrality in the surrounding business environment (e.g., Tasselli et al., 2015).

**Advantage as taking strategic action.** A focus on agency as individual advantage implies tracing action and interaction back to individuals, and then tracing interpersonal advantage from the individual level to progressively higher levels of structural interaction. Recent work shows that being connected to other well-connected people has little benefit for ego (e.g., R.S. Burt, 2007), such that network advantage mainly lies in ego’s direct network (R.S. Burt, 2010). There is growing emphasis on people "who can speak to your virtues" (R.S. Burt, 1992: 15), and thus on benefits that flow from the immediate set of contacts around the individual rather than from secondary and more distant contacts. Network advantage would seem to depend more on ego’s ability to activate personal contacts rather than on ego’s placement within structures that involve indirect and less controllable connections. Activated networks are defined as subsets of ego’s networks that are “continuously reconstructed depending on the situation” (Perry-Smith & Mannucci, 2017: 67). Interestingly, in this activation process individuals can rely not only on ties that are already present and available, but also on latent (Mariotti & Delbridge, 2012) and dormant ties (Levin, Walter, & Murnighan, 2011), opening up reflection on the nuanced interplay between ‘activity’ and ‘memory’ as the key drivers of individual (e.g., Levin & Walter, 2018) and organizational (e.g., Tasselli, 2019) network advantage.

Recent research has given attention to the strategies that people employ when networking, focusing on the underlying agency mechanisms involved. Using a grounded theory approach, a qualitative network study on a sample of service professionals revealed different types of strategic players. These included devoted players who were actively engaged in pursuing network advantage; purists who disliked and tended to avoid
networking; and players who were selective in their networking activities. These networking strategies seemed to be independent of the networking positions that people occupied (Bensaou, Galunic, & Jonczyk-Sédès, 2014).

II. Agency as Network Embeddedness

From this second perspective, the emphasis is on networks as entities enabling and constraining “social behavior and social change” (Wellman, 1983: 157). This view emphasizes how individuals' personal and organizational decisions are explicable by their embeddedness in social and societal contexts (e.g., Granovetter, 1985; Vedres & Stark, 2010). The foundations of this research tradition date back to Durkheim’s work (1951, first published in 1897), which focused on the structural, distant influences that affect the outcomes not just of individuals but also of local networks and larger social communities. People in Durkheim's account were portrayed as fortunate or unlucky recipients of social and cultural influence. In this perspective, the locus of action resides at the network level, such that networks exert effects on the individuals beyond the reach of their propensities or wills (see Brass et al. 2004, for a review of network embeddedness at different levels of analysis; and Chua, Ingram, & Morris, 2008, for how individuals’ network embeddedness affects how much others trust them). As in the individual advantage view, individuals and networks are treated as separate ontological domains.

As evidenced in the quote at the beginning of this paper, the celebrated account of how Cosimo de’ Medici managed social networks to the advantage of his family in 15th-century Florence attributes apparently strategic action to network positioning rather than to the actions or strategies of individuals. Cosimo’s location in "contradictory networks" induced what the authors referred to as his "robust action" (Padgett & Ansell, 1993). From an embeddedness perspective, “others' locked-in interactions generate a flow of collective behavior that just happens to serve one's interests” (Padgett & Ansell, 1993: 1260).
The embeddedness argument is central to research on weak ties (Granovetter, 1973) with its emphasis on serendipitous interactions surprising individuals with unsought for opportunities. More recently, research has emphasized structural properties of networks including network cohesion (e.g., Tortoriello, Reagans, & McEvily, 2012), homophily (e.g., Ertug et al., 2018), clustering properties (e.g., Kilduff et al., 2008), transitivity (e.g., Tasselli & Caimo, 2019), core-periphery structures (e.g., Cattani & Ferriani, 2008), and density (e.g., Gargiulo, Ertug, & Galunic, 2009). Here we focus on embeddedness as the influence of structures at the community and local network levels on individual action.

Community structures influencing the individual. From an embeddedness view of agency, distant structural influences affect the individual’s experience of the network, such that individuals’ distinctive social identities emerge from participation in community structures (Warner & Lunt, 1941). Thus, from a weak-tie perspective, “the personal experience of individuals is closely bound up with large-scale aspects of social structure, well beyond the purview or control of particular individuals” (Granovetter, 1973: 1377). Novel opportunities and resources become available not through the local, closely-knit relationships of friendship and kinship, but through ties that bridge to distant communities (Granovetter, 1973; 1983) or parts of the organization (Tasselli, Zappa, & Lomi, in press).

Local processes, such as the creation or deletion of weak ties, contribute indirectly to opportunities for individuals through the formation of small worlds (e.g., Watts, 2004) -- i.e., clustered groups connected by short path-lengths (Robins, Pattison, & Woolcock, 2005) -- and other global network structures. Changes in local networks shape individuals’ opportunities by altering global network connectivity. Thus, in respect to agency, a view of community embeddedness has a double focus: A micro focus on the strength of the direct tie between the individual and that individual's contacts within and beyond the workplace; as
well as a more macro focus on the *structure of ties* across the whole community of interests that constitutes the modern firm.

**Local structures influencing the individual.** From an embeddedness perspective, local network structures exert influence on individual action and interaction (e.g., R.S. Burt, 2010). These local structures feature dyadic, triadic and extra-triadic relationships.

*Dyads.* The dyad is the smallest relationship unit, and it is from dyadic relationships that larger network structures are formed. A first question of interest for agency is: How are dyads formed? Are they created through the action of purposeful individuals, or through the action of inter-individual social forces? Research has shown that dyadic relationships form when people who share values, personalities (Duck & Spencer, 1972), or salient demographic characteristics (Mehra, Kilduff, & Brass, 1998), meet each other either through social activities (Feld, 1981) or through geographic proximity (Festinger, Back, & Schacter, 1950). Thus, within organizations, dyadic relationships form when individuals share common interests, when they interact in the same places, and when they are placed in the same organizational units (Kleinbaum, Stuart, & Tushman, 2013). The emphasis in this research is less on the importance of individual agency and more on the happenstance of shared similarity among people who find themselves proximate.

Further, among those who are proximate, the tendency is for individuals to form relations with others who share attributes that happen to be rare in that social context (Mehra, Kilduff, & Brass, 1998). Thus, two “African Americans in a crowd of whites will tend to notice and identify with each other because of their common race; however, when in a group of other African Americans, the same two people are unlikely to notice or identify with each other” (Mehra et al. 1998: 442). The homophily tendency drives people together in ways that are less about personal agency and more about social context. Even when people try to be agentic in pursuit of meeting diverse others, they tend to find themselves falling back on
existing dyadic relationships rather than making new connections (Ingram & Morris, 2007). And powerful people, who experience themselves as agentic, tend to misperceive the social world of influence relationships (Simpson et al., 2011), leading powerful people to "fill in the blanks" (Freeman, 1992) by perceiving connections not present in reality. A paradox of power is that the powerful are agentic in the pursuit of opportunity but are unable to perceive the network opportunities that are available (Landis et al., 2018).

**Triads.** Sociologists have long been fascinated by the triad because it incorporates richer possibilities of micro-macro extension than the dyad (e.g., Caplow, 1956). The basic distinction is between open and closed triads. An open triad offers the opportunity for the connected member to play the role of *tertius gaudens*: The third party who draws advantage from the quarrel of two disconnected others (Simmel, 1955). This constitutes the structural premise of structural-hole theory and research, as discussed above. By contrast, the embeddedness perspective on agency emphasizes the closed triad – i.e. a three-person clique (a Simmelian triad) that tends to suppress individual interests, reduce individual power, and moderate conflict between the three individuals (Krackhardt, 1998). Closed triads promote accountability because individuals behaving badly toward each other are monitored by third parties (Simmel, 1955). Closed triads also promote community-level social capital through the establishment of collaborative group norms (Coleman, 1988). As the prevalence of such closed triads increases in an organization, it is hypothesized that unethical behavior decreases (Brass, Butterfield, & Skaggs, 1998). And when closed triads are cyclic – i.e., each actor gives resources to the second actor and receives resources from the third actor – they can facilitate knowledge transfer and cooperation in organizations (e.g., Tasselli & Caimo, 2019).

An emerging stream of research of interest from an embeddedness view of agency builds on the work of Simmel and further theoretical elaboration by Krackhardt (1998; 1999) to investigate Simmelian ties, i.e., ties between two people who are both linked to a common
third person; and Simmelian brokers, who occupy positions in two or more cliques. Strong Simmelian ties facilitate cooperation across departmental boundaries and lead to innovation (Tortoriello & Krackhardt, 2010). Simmelian brokers are known as “multiple insiders” because of their activities connecting across otherwise closed social groups (Vedres & Stark, 2010). This burgeoning interest in the constraints and opportunities associated with Simmelian ties and brokers brings the triad into the forefront of network research.

**Extra-triadic level.** The social interactions of individuals, and the subsequent formation of dyads and triads, contribute to the emergence, at the network level, of structural forms that, in turn, have consequences for individual agency. Basic network-level concepts include density and centralization. The density of social ties refers to the proportion of possible ties within the social network that are completed (Kilduff & Tsai, 2003). High levels of network density within an organizational network facilitate structures of cooperation (Coleman, 1990), whereas low levels of network density facilitate structural opportunities for brokerage (R.S. Burt, 2005).

With respect to agency, the density of ties within an ego network affects the individual's ease of knowledge transfer (Reagans & McEvily, 2003) and the individual's task mastery (Morrison, 2002). Teams that exhibit dense friendship networks or dense instrumental networks tend to perform strongly (Balkundi & Harrison, 2006). Network density also relates to other aspects of performance: A study of 300 groups across 100 organizations showed that workgroup friendship density predicted interpersonal citizenship behavior (Chung, Park, Moon, & Oh 2011). However, teams that exhibit high density of hindrance relationships (i.e., relationships that hinder people from doing their work) tend to perform poorly (Sparrowe, Liden, Wayne, & Kraimer, 2001). Further, average tie strength interacts with network density in explaining knowledge creation such that individuals who
maintain mostly strong ties with coworkers who have themselves a sparse network are more likely to create new knowledge (McFayden, Semadeni, & Cannella, 2009).

Another aspect of network structure that influences the agency of interacting individuals is the extent to which the network is centralized around one or a few people. Greater network centrality negatively affects work group performance (Grund, 2012; Sparrowe et al., 2001). An alternative way of assessing centrality of the network involves measuring the extent to which the network exhibits a dense, cohesive core and a sparse, unconnected periphery (Borgatti & Everett, 2000). A study of awards in the creative world of Hollywood movies found that that individuals who constructed teams that combined peripheral and core members benefited from unusual ideas from the periphery combined with legitimacy and influence from the core (Cattani & Ferriani, 2008).

In a similar fashion, teams who produce Broadway musicals are affected by the system-level extent of clustering and connectivity (i.e., small worldedness) among creative artists: Team performance increases up to a threshold of industry-wide small worldedness, after which the positive effects decline (Uzzi & Spiro, 2005). The small world pattern of informal communication (dense islands of close relations joined by sparse ties) is associated, within organizations, with the mechanistic mode of organizing that segments and channels transactions through structural differentiation, hierarchical decision-making and formalized rules (Shrader, Lincoln, & Hoffman, 1989). Note, however, that, if we take the team itself as the unit of analysis, then centrality within the wider network of teams or business units relates positively to team (Balkundi & Harrison, 2006) and business unit (Tsai, 2001) performance.

II. Agency as Micro-Foundations

A third, micro-foundational view of agency emphasizes the extent to which differences in networking behaviors and in the resulting structural configurations can be traced to differences in interacting individuals (Kilduff & Lee, 2020). From a micro-foundational view,
people and networks represent a duality: There is a reciprocal influence between the actors and the situations they structurally occupy in the network. The foundations of this relatively recent research tradition can be found in the move to go beyond the anti-categorical imperative of sociologically-informed structural approaches (e.g., Wellman, 1988) and to bring individuals back in to social network research (e.g., Kilduff & Krackhardt, 1994). The success of this burgeoning research perspective is shown by the increasing number of special issues (e.g., Casciaro et al., 2015, in *Organization Science*), symposia at major conferences (e.g., Tasselli et al., 2016; 2020), review articles (e.g., Landis, 2016; Tasselli et al., 2015), and meta-analyses (e.g., Fang et al., 2015). Key research questions from this perspective concern the extent to which network positions (e.g., centrality, brokerage) and network properties (e.g., homophily, open and closed triads) that constitute the micro components of larger network structures are explained by individual differences. The locus of action, from this perspective, resides at the individual level, such that individuals, in their idiosyncratic differences, form the analytical sources of action (R.S. Burt et al., 2013).

A characteristic that explains the recent development of this micro-foundational perspective is the consistent interest in how psychological traits affect important outcomes that include performance (e.g., Fang et al., 2015), charisma (e.g., Brands, Menges, & Kilduff, 2015) and trust (e.g., Tasselli & Kilduff, 2018). Relevant individual differences include demography (e.g., Belliveau, 2005) personality (e.g., Fang et al., 2015; Klein et al., 2004; Kleinbaum, Jordan, & Audia, 2015; Sasovova et al., 2010), motivation (e.g., Reinholt, Pedersen, & Foss, 2011), cognition (e.g., Brands & Kilduff, 2013) and genetics (e.g., S.A. Burt, 2008, 2009). Because the micro-foundations of social networks have been extensively reviewed (e.g., Kilduff & Lee, 2020; Tasselli et al., 2015), in this section we provide a streamlined account of recent developments in relation to agency.
Networks in the mind. How the individual perceives the network (e.g., Janicik & Larrick, 2005) and how others use networks to appraise individuals (e.g., Kilduff & Krackhardt, 1994) are two central questions for research on network agency. With respect to perceptions of networks, a recent review examined systematic biases in individuals’ perceptions (Brands, 2013). Because social networks are complex phenomena, the individual tends to simplify cognitive representations of social network relationships by, for example, assuming that two friends of the same person will themselves be friends (Krackhardt & Kilduff, 1999); and by misperceiving a complex network as a small world in which people are cognitively classified into clusters that are inter-connected through the interactions of prominent people across the clusters (Kilduff, Crossland, Tsai, & Krackhardt, 2008). Linking with others distant from ourselves may require greater agency, in terms of time and effort, than our cognitive representations lead us to believe.

Related to the individual’s tendency to cognitively fill in the blanks in social networks (Freeman, 1992), research (Flynn, Reagans, & Guillory, 2010) shows that people with strong need for closure tend to assume their own social contacts are connected to each other even when this is not the case; and these high-need-for-closure people are also inclined to misperceive friendships among others of the same racial category. So, individual perceptions of social networks tend to be more structured than is the case in actuality. To the extent that perceptions become reality (Thomas & Thomas, 1928), social network perceptual biases may therefore contribute to greater connectivity.

We discussed above the importance of structural-hole spanning for individuals in organizations. Recent network research suggests that some individuals are disadvantaged by biased perceptions of their network roles. Women, relative to men, are systematically under-perceived in their occupation of brokerage roles in organizations (Brands & Kilduff, 2013). Biased perceptions of network structures, from an agentic perspective, are not innocent
mistakes: They have consequences for people's careers, whether the bias is directed against the individual's ego network or against the network surrounding an alter. Indeed, under threat of losing employment, low-status people (relative to those of high-status) disadvantage their search for information and resources by activating smaller and tighter subsections of their networks (thereby restricting potential job opportunities – Granovetter, 1973) (Smith, Menon, Thompson, 2012).

Recent research shows the connection between network perceptions and the emergence of informal leadership in groups and organizations. At the individual level, people tend to use a linear ordering schema, i.e., a pecking order (De Soto, 1960), to process information about leadership interaction in the workplace; and when they experience leadership attributions to be inconsistent with that schema, individuals reduce the associated cognitive inconsistency by changing leadership attributions (Carnabuci, Emery, & Brinberg, 2018). At the group level, perceptions of competence and warmth among members explain patterns of leadership formation such as the extent to which emergent leadership structure is centralized or shared (DeRue, Nahrgang, & Ashford, 2015). These studies examine the extent to which agency, in terms of the dynamic interplay between individual cognition and interpersonal structure, affects leadership emergence.

**Personality and agency.** Despite the occasional voice lamenting the possible contamination of structural research through consideration of the attributes of individuals (e.g., Mayhew 1980), the social network tradition has incorporated individuals' personalities into its analyses from the beginning. One of the pioneers of network research -- Theodore Newcomb -- discovered that authoritarians (distinguished by their negative views toward foreigners, their acceptance of the attitudes of those in power, and their beliefs against gender equality -- Adorno et al., 1950) tend to overestimate the extent to which others to whom they are attracted share their views and reciprocate their liking (Newcomb, 1961). Ronald Breiger,
besides contributing to the structural revolution in network research (Breiger, 1974; White, Boorman, & Breiger, 1976), also initiated innovative research on personality from the structural perspective. The research investigated whether there was a match between people identified on the basis of structural analysis (who tended to have ties to the same other people) and people identified on the basis of personality orientation (identified on the basis of reports from trained observers) (Breiger & Ennis, 1979). The results demonstrated the duality of social life in that individuals’ identities incorporated both dispositional and relational aspects.

Drawing from sociological traditions, social network analysis has often conflated individuality with the notion of social personality, a concept that finds its roots in the work of Simmel (1971) and concerns the ways in which an individual's participation in social activities differentiates that person from others. The assumption is that the dispositions of individuals reflect the structural positions that they occupy – a notion inspiring a view of “network-related personality,” according to which “a person’s social environment elicits a specific personality” (R.S. Burt, 1992: 262).

There have been, therefore, two quite different approaches to personality and networks of interest for agency, one involving inherent traits (the tradition of personality psychology) and the other involving socially ascribed traits (the tradition of sociology -- e.g., Gordon, 1947). Current personality approaches emphasize the importance of self-monitoring (Fang et al., 2015; Kilduff & Buengeler, 2019). Self-monitoring refers to the extent to which individuals shape their attitudes and behaviors to the requirements of different social situations (Snyder, 1979). High self-monitors tend to occupy and move into brokerage positions (e.g., Mehra et al., 2001; Oh & Kilduff, 2008; Sasovova et al., 2010) and gain career and performance advantages (Kilduff & Day, 1994).
The Big Five personality traits have less influence on social network outcomes than self-monitoring (Fang et al., 2015). For example, all five traits together explain less than 2 percent of the extent to which people occupy central positions in instrumental and liking networks (Klein et al., 2004). It seems that individual differences that help explain social network outcomes are most effective when they have specifically a network implication. Thus recent work showed that blurtatousness – the extent to which people tend to blurt out whatever is on their minds – helps explain why Simmelian brokers, especially if they are high self-monitors, are trusted by their work colleagues (Tasselli & Kilduff, 2018). Another paper extended our understanding of the effects of self-monitoring on brokerage by positing and showing that the effects are amplified in those high self-monitoring individuals who are perceived by others as empathic (Kleinbaum et al., 2015).

A question of interest for further research on the micro-foundations of network agency concerns whether occupation of structural positions affects individuals’ personality orientations, as anticipated in the social personality tradition. Previous research showed that leaders’ charisma (a personality dimension evaluated by the reports of subordinates) was socially attributed by followers, such that leaders who were more central within their team advice networks tended to be seen as charismatic by subordinates (Balkundi et al., 2011).

There is growing evidence that personality changes over time and in reaction to events (Tasselli, Kilduff, & Landis, 2018). Does the experience of specific social network positions foster patterns of personality change that can eventually affect organizational outcomes? This speculation has not been matched so far by empirical research.

IV. Agency as Structuration.

A structuration view of agency conceives organizations as networks of relations in permanent states of flux and transformation. From this view, individual and network agencies mutually constitute each other, such that “the structural properties of social systems are both
the medium and the outcome of the practices that constitute those systems” (Giddens, 1979: 69). The locus of action resides at the level of those macro-structures that capture both structural and individual properties. This vision of agency has inspired post-structuralist approaches, including structuration theory (e.g., Barley, 1986; Berends, van Burg, & van Raaij, 2011) and actor-network theory (Latour, 1999). These varying approaches are similar in arguing that elements in the social world, including structure and action, exist in constantly shifting networks of relationships, and that organizations are systems of interdependences in permanent states of transformation (e.g., Alcadipani & Hassard, 2010). The emphasis is on mutual constitution (networks and individuals mutually structuring each other’s identities and meanings, e.g., White, 2008) to interpret the dynamic interplay of people and networks.

Although this research perspective is under-represented in organizational network research, relative to the other three perspectives discussed above, it has recently gained scholarly attention (see Appendix). Notably, this perspective has inspired work on multiplexity that starts from three assumptions: (a) organizations are embedded in different kinds of relationships; (b) these relationships are interdependent; and (c) this interdependence influences organizations (Shipilov, 2012). Relatedly, research on relational pluralism examines “the extent to which a focal entity (a person, a team, or an organization) derives its meaning and its potential for action from relations of multiple kinds with other entities” (see the Special Topic Forum in the Academy of Management Journal; Shipilov et al., 2014: 449).

Topics of interest within the structuration perspective include the nuanced relationships between human and non-human actors (such as robots or technological devices) in modern organizations. Agency from this perspective involves formalized or emergent structures of negotiated interaction with technologies that both enable and constrain individual choices (e.g., Sayes, 2014). Further research is needed on narrative networks (e.g., Padgett, 2018) and, more broadly, on cultures (e.g., Srivastava & Banaji, 2011), as collective semantic
repositories of identities and meanings upon which individualized and collective interactions are forged (e.g., Lomi, Tasselli, & Zappa, 2017). There is also potential for further work examining how lay people, relying on implicit theories, construe different components of networks (e.g., Kuwabara, Hildebrand, & Zou, 2018).

**Relational structuration.** From a structuration perspective (Giddens, 1984), people create the structures that enable and constrain their actions. Thus, there is a clear link between the micro activities of individuals and the macro social structures that achieve an apparently objective facticity. This insight has rarely been applied to organizational social networks (but see Barley, 1986, for an exception). Future research, therefore, is needed concerning how individuals’ actions help form and reform the structural features of social networks that have energized much research activity on phenomena as diverse as small worlds, core/periphery structures, and centralization. We need to know more about how people are complicit in the creation of network arrangements within which their actions become embedded.

A structurationist study of how inter-organizational networks and interpersonal networks interacted over time, for example, showed that structures were both the medium and the outcome of action (Berends et al., 2011). Given the current interest in the dynamics of social networks (e.g., R.S. Burt & Merluzzi, 2016), future research can help examine how the social network activities of individuals contribute to macro level network change, which, in turn, affects individuals’ outcomes (e.g., Lomi & Stadtfeld, 2014).

**Cultural structuration.** This emerging stream of research examines the processes by which interacting individuals “shape shared meaning systems out of ‘heterogeneous bits of culture’” (Weber & Dacin, 2011: 289), including “local practices, discourse, repertoires, and norms” (Pachucki & Breiger, 2010: 206) that are initially created by independent actors (van Wijk et al., 2013). This work builds on earlier recognitions that “a social network is a
network of meanings" (White, 1992: 67) and that discursive "narratives" and "stories" are among the key elements of social life (Emirbayer & Goodwin, 1994: 1437).

According to this approach, cultural elements, including discourse and language, interweave with structural elements in shaping patterns of inter-subjective interaction. Relevant research examines conversations (Castilla, 2005), narrative networks (Pentland & Feldman, 2007) and organizational vocabularies (Lowenstein et al., 2012; Tasselli et al., In press) as instruments for understanding the meta-cognitive flux behind the formation and maintenance of structural patterns.

We still lack a full integration of these cultural elements in the analysis of organizational social networks. But the analysis of vocabularies promises to increase our understanding of coordination and cultural alignment within and across organizations (Basov, in press). For example, a recent study of managers within a multi-unit organization investigated whether interpersonal interaction drives cultural similarity in the vocabularies that managers use, or whether the causal arrow is from vocabulary use to interpersonal interaction. The results showed that the relations between networks and vocabularies were contingent on the formal structure of the organization, such that, within subunits, interpersonal interaction led to higher vocabulary similarity over time, whereas, between subunits, the sharing of similar vocabularies made managers more likely to interact (Tasselli et al., In press). Future work is needed to incorporate the “study of meaning [as a] significant foundation for a networked theory of social life” (Kirchner & Mohr, 2010: 556).

**Agency Revisited**

The social network research program is the site of contention between different approaches. From one perspective, social network analysis constitutes a paradigm shift away from conventional social science (Hummon & Carley, 1993), whereas others see the social network approach as a set of methods in the absence of distinctive theory (Granovetter, 1979;
Salancik, 1995). For some, network research means rejecting consideration of individuals completely in favor of group-level metrics (Mayhew, 1980). Ranged against these tendencies have been efforts to connect network research to organizational theory and behavior so as to expand rather than seal off the social network research program (e.g., Burt, 1992). And, it is argued, the exclusion of individuals from the social network research program has never made sense in organizational theory and research at either the level of persons or the level of firms (Kilduff & Brass, 2010; Tasselli et al., 2015).

At the heart of these different claims about social network research is the question of agency. To make sense of the trajectory of contestations about social network analysis, we introduced in this paper a sense-making framework that distinguishes two ways of thinking about the nature of social network effects across two levels of analysis. For each research endeavor, we ask whether the effects of action involve actors and their networks as separate entities or as mutually constituting each other. And we question whether the locus of action is at the individual level or at the level of network structure. The four perspectives outlined in Figure 1 capture distinctive approaches within the history of network research in organizational studies. These approaches include those that focus on individual advantage, embeddedness, micro-foundations, and structuration.

Our review shows that dualism, the treatment of actors and networks as separate ontological domains, is dominant in the social network research program. Much less evident are duality approaches that treat actors and networks as mutually constituted. Why does the left hand side of Figure 1 dominate the approaches on the right of the figure? The dominance of the individual advantage and embeddedness perspectives is perhaps unsurprising if we take into account the origins of these two perspectives in sociological research traditions that exert continuing influence. Individual advantage, featuring purposeful social interactions with closely knit others, dates back to the influential work of Georg Simmel (1950), which
emphasizes the micro dynamics of strategic interaction among people working in close proximity. The embeddedness perspective dates back to one of the founders of sociology as a distinctive discipline – Emile Durkheim (1951) – and emphasizes the network structures and distant influences that inhibit and facilitate the outcomes not just of individuals but also of communities. The other two perspectives (micro-foundational and structuration), although less evident in our review overall, have gained popularity recently. The micro-foundational view emphasizes the individual correlates of social interaction, whereas the structuration view focuses on networks as collective entities in states of flux and transformation. Both approaches, in addressing agency in new ways, expand the menu of opportunities for social network research.

In our review, we identified a number of papers informed by more than one perspective. Combined approaches are possible because organizational social network research, across the different perspectives, derives from shared assumptions underlying a fertile and evolving research program (e.g., Kilduff et al., 2006). In terms of areas that require further research, we point, in our discussion below, to questions concerning where the impetus for network activity comes from – i.e., the source of action; and to questions concerning where individual identity derives from – i.e., the locus of identity.

CURRENT DEBATES AND FUTURE DIRECTIONS

What is the Source of Action?

Understanding agency implies investigating the source of action – the impetus behind patterns of social action and interaction. The individual advantage perspective (quadrant I in Figure 1) emphasizes purposeful individuals striving for achievement. By contrast, the embeddedness view (quadrant II in Figure 1) focuses on social structure as enabling and constraining action. Those views compete on whether people or networks drive action. The tension between the two leading perspectives is intrinsic to social network theory and
provides opportunities for new research directions. Specifically, there is emerging research interest on the source of action as dependent on relational versus behavioral components of interpersonal interaction (e.g., R.S. Burt, 1982); and on action as deriving from networks rich in structural holes versus embedded social networks.

**Networking behavior versus structural position.** The upsurge in research on agency as individual advantage includes a renewed attention to brokerage behavior in contrast to brokerage position (e.g., Halevy et al., 2019). Brokerage behavior involves agentic activities such as bridging behavior (e.g., spanning across structural holes) and connecting behavior (e.g., bringing people together) (e.g., Quintane & Carnabuci, 2016). Successful brokers tend to engage in these different types of brokerage depending on the requirements of the task (e.g. Long Lingo & O’Mahony, 2010) and depending on their strategic orientation toward brokering (e.g., Soda, Tortoriello, & Iorio, 2018).

Emphasis on behavior rather than position entails considering the contingencies that reduce individual advantage (e.g., Soda, Stea, & Pedersen, 2019). For example, women and men differ in how they construe brokerage in friendship networks, and this difference helps to account for gender differences in the performance of network brokers (Brands & Mehra, 2019). Future research can build on the growing interest in the downsides of brokers’ behaviors (e.g., Xiao & Tsui, 2007) to examine whether brokerage causes collateral damage to exploited colleagues; and the ways in which open and closed networks function to control such deviations from expected brokerage behavior (R.S. Burt et al., 2019).

**Holeyness versus embeddedness.** A related debate straddles the individual advantage and embeddedness approaches to agency. This debate concerns the extent to which open or closed networks, i.e., networks rich in structural holes versus networks constraining the individual (e.g., R.S. Burt, 2005), provide structural opportunities for action. Structural-hole theory has found wide applicability in organizational network research in part because of its
depiction of brokerage as an agentic activity in which people negotiate between the "pulsing swirl of mixed, conflicting demands" for personal advantage (R.S. Burt, 1992: 33). Brokers are people with entrepreneurial personalities who thrive on advocacy and change (R.S. Burt, Jannotta, & Mahoney, 1998). At the same time, structural-hole theory attributes motivation and outcomes not to individuals but to embeddedness in structural positions. It is structural holes that generate opportunities, benefits, and information, not the people who happen to temporarily occupy the structural-hole positions (R.S. Burt, 1992: 30). So the question is raised, from the perspective of the source of action, how much do individuals matter relative to social structure in affecting networking outcomes (R.S. Burt, 2010)?

The answer is not straightforward. Despite the appearance of agentic individuals in structural-hole theory, for example, the emphasis is mainly on structural holes as strong situations that "force" occupants to develop the cognitive and emotional skills required for communication between colleagues who disagree with each other (R.S. Burt, 2010: 224). So there is a clear rejection of a purely individual view of agency. Individuals are modeled as responding cognitively and emotionally to the social contexts in which they find themselves. Another reading of structural-hole theory is that people with the appropriate cognitive and emotional skills (e.g., self-monitoring: Kilduff & Buengeler, 2020) sort themselves into brokerage positions that, in turn, help them to benefit from these positions (see the discussion in Smith, Brands, Brashears, & Kleinbaum, 2020), a position aligned, perhaps, with a structuration approach (quadrant IV in Figure 1). In this account, individuals who occupy network positions, spanning across structural holes for example, are matched to coordination-focused jobs for which their skills and their networks prepare them, and in which their skills and networks are likely to flourish (Kleinbaum & Stuart, 2014).

One question for future research concerns how much network "holeyness" is optimal? If there are too many structural holes across the network, network members have difficulty
coordinating, but if there are too few structural holes, network members are at low risk for new ideas (cf. R.S. Burt, 2004). An empirical investigation of 19 teams in a wood products company found that a moderate level of structural holes in teams was positively associated with team performance (Balkundi, Kilduff, Barsness, & Michael, 2007). However, further research in a pharmaceutical company (19 teams) and a video-game company (27 teams) showed that the group mean of structural holes was negatively and significantly related to job satisfaction and job performance despite structural-hole spanning by individuals relating positively to performance by those individuals (Bizzi, 2013). So, the debate concerning the micro versus the macro level outcomes of structural holes continues (Ibarra et al., 2005).

Building on the possibility that agency derives from a mix of openness and closure in a person’s network (e.g., R.S. Burt, 2005), recent longitudinal evidence suggests that, within rapidly changing environments, advantage accrues to individuals who pursue "punctuated brokerage," a network oscillation pattern characterized by intermittent brokering with periods in between when brokers retreat within cohesive networks (R.S. Burt & Merluzzi, 2016). Instead of imagining certain people as engaged in the nonstop pursuit of individual advantage, this new research pictures effective brokers intermittently rebuilding reputation and trust. This dynamic revision to the individual advantage perspective on brokerage requires further research to understand whether brokers themselves modify the network structures within which they pursue opportunity; or whether the network changes that they foster push these brokers to modify their behaviors, a perspective aligned with a structuration perspective.

**What is the Locus of Identity?**

We began the paper with questions related to the two perspectives on the left side of Figure 1: Whether agency resides in individual distinctiveness; or whether agency resides in the network properties and structures that shape personalities and cognitions. Shifting the
research emphasis from the left to the right side of the figure, these questions open opportunities for understanding how individual attributes affect the positions that people occupy in social networks (e.g., Klein et al., 2004; Mehra et al., 2001; Sasovova et al., 2010), and how relationships affect the development of personality (e.g., Mund & Neyer, 2014; Neyer et al., 2014). Human personality, according to accumulating research, cannot be relegated to the immutable role of an independent variable (Tasselli et al., 2018). Rather, personality, and, therefore, a person’s identity, are antecedents of network embeddedness; but personality and identity are also likely to change as individuals experience the tensions and opportunities of network positions such as brokerage. From a micro-foundational perspective, future work is needed to understand how network structures and individual dispositions influence each other in a dynamic interplay of structural and individual adjustment (Schulte et al., 2012).

Recent research along these lines examined how the embeddedness of individuals in social relations explain outcomes such as loneliness (Cacioppo, Fowler, and Christakis, 2009), happiness (Fowler et al., 2009), and identity change (White, 2008). A separate stream of research emphasizes that the network properties that give organizations their distinctiveness derive, in part, from the psychological processes and traits of those people who compose the network (e.g., R.S. Burt et al., 2013). Further research could examine further how the interaction between person and context shapes individuals’ identities and network properties. Emphasis on the locus of identity requires bridging the tension between egos and alters in analyzing egos’ agencies; investigating the topological dualities of individual identity, including the tensions between cognitive and real networks, and between past and present relationships; and, in general, addressing issues of network endogeneity.

**Ego versus alters.** Traditionally, agency is attributed to individuals, as captured in the perspectives in the top row of Figure 1. But the network perspective alerts us to social
structures that restrict and facilitate the individual’s interests, as depicted in the perspectives in the bottom row of Figure 1. There is growing interest in the interplay between the psychology of ego (the focal actor at the center of the network) and alters (those connected to ego in the network) in understanding a) network formation (e.g., Kleinbaum, et al., 2015; and b) outcomes, including creative behavior and innovation (e.g., Grosser, Venkatramani, & Labianca, 2017). The assumption of this research is that, because the network is intrinsically a relational construct (e.g., Borgatti et al., 2009), network opportunities are conferred by the actions of others as much as by the agency of the focal individual. People benefit or suffer from the connections they attract from others who bring with them their own network configurations. The organizational consequences of connections are often beyond the local reach of individuals (e.g., Oh & Kilduff, 2008).

An altercentric approach to the study of social networks (e.g., Kleinbaum et al., 2015) can help balance the role and identities of both egos and alters in influencing network functioning by investigating, for example, whether the personalities of others play a significant role in the formation of ego’s social world (e.g., Mund & Neyer, 2014). This debate also raises further questions concerning how much agency idiosyncratic individuals exert in network formation and change. If trust is conferred on people as a result of how well their personalities match the networks they occupy (e.g., Tasselli & Kilduff, 2018), then the individual’s agency is likely to be less than might otherwise be expected. Further work is needed to understand the circumstances under which network patterns reflect network emergence in the absence of agency (e.g., Mark, 1998) versus network patterns reflecting purposeful individual agency (e.g., Stevenson & Greenberg, 2000).

Perceived versus actual networks. Network accuracy is often seen as helping individuals notice opportunities (e.g., Krackhardt, 1990). This accuracy perspective is aligned with the individual advantage quadrant of Figure 1. Neglected in this research, however, is
the possibility, aligned with the structuration perspective (quadrant IV of Figure 1), that network perceptions, accurate or not, create the realities that they prefigure. This possibility was suggested in the Thomas theorem (if people define situations as real, they are real in their consequences – Thomas & Thomas, 1928; also in Merton, 1995), and is related to research on the self-fulfilling prophecy (Merton, 1948). As applied to network research, there is an opportunity to investigate misalignments in network perceptions as leading indicators of network change. Rather than seeking to correct individuals’ mistaken network perceptions, therefore, as prescribed in prior research and advice to practitioners (e.g., Krackhardt & Hanson 1993), individuals can be made aware of the possibility that environments can be enacted through purposeful efforts (e.g., Weick, 1979) so that actual relationships can catch up with perceptions. Network misalignment, therefore, could be re-categorized as a form of cognitive social capital that has the potential to be converted into actual social capital.

**Past versus present ties.** We also envisage research aimed at analyzing whether time represents a network catalyst that affects our understanding of the agency relationships summarized in Figure 1. People establish network contacts at time 1 that have varying effects at time 2. Some of these effects may promote individual advantage, whereas others may contribute to reinforcing systems of domination, as theorized in the structuration perspective (Giddens, 1984). People who behave agentically in the present, enjoying the freedom to forge and terminate ties, might, in fact, be embedded in networks of past ties that constrain or facilitate action. Such a view would combine individual advantage with embeddedness perspectives on action.

Relevant research focuses on the functioning and importance of dormant ties -- strong and weak— on knowledge and social capital (Levin et al., 2011; Walter, Levin, & Murnighan, 2015). This research suggests that reconnecting with “former ties, now out of touch,” is useful in providing agentic individuals with diverse knowledge (Levin et al., 2011:}
923). But to what extent do these dormant ties represent embedded sources of constraint? Future research is needed to investigate the often hidden but self-perpetuating influence of ghost ties from the past on opportunities in the present (Kilduff et al., 2006). And, expanding the menu of research options to the right part of Figure 1, more research is needed to understand whether psychological characteristics of individual actors can help explain the extent to which those actors succeed in leveraging in the present networking opportunities re-emerging from the past.

**Person versus context.** More generally, the tensions between ego and others, between actual and cognitive networks, and between present and past ties, imply a broader and more general tension between individual and social context in defining the locus of identity. An example of this tension between structural embeddedness and micro-foundational agency is provided by the example of Cosimo de’ Medici (Padgett & Ansell, 1993). Cosimo can be said to have lacked agency because his behaviors and pronouncements derived from the wishes and actions of others. Cosimo had no grand plan in place for the rise of the Medicis. The success of the family resulted from the combination of his particular obliging personality and the network activities of others.

This example calls for future research examining the coevolution of individuals and social networks (see bottom right quadrant of Figure 1). We need to know more about how the social structures that constrain and enable action emerge from actors’ individual characteristics and behaviors (e.g., Tasselli et al., 2015). Relevant research explores whether network structures and actors’ behavior influence each other in a dynamic interplay of structural and individual adjustment (e.g., Schulte et al., 2012). Given the current interest in the dynamics of social networks, future research can help examine how the social network activities of individuals contribute to macro-level network change that affects individuals’ outcomes (Kossinets & Watts, 2009).
Network endogeneity. This has been described as a “massive” problem for social network research but also one that, despite the use of fixed effects and instrumental variables, is unlikely to be solved in any field of human enquiry (Borgatti, Brass, & Halgin, 2014: 20).

Endogeneity arises in social network research because “actors are not randomly assigned to positions” (Borgatti, Brass, & Halgin, 2014: 20). Actors’ individual characteristics, behaviors and actions affect the occupation of positions that, in turn, exert influence on personal identities and opportunities for action. Structural research (represented by the left part of Figure 1) tends to neglect the endogeneity issue. By treating social networks as given, the focus is on the benefits (individual advantage quadrant) and constraints (embeddedness quadrant) that result from the occupation of given positions. The question of why certain individuals, and not others, occupy network positions is simply not considered. Moving to the right part of Figure 1, the micro-foundational perspective (Quadrant III in Figure 1) partly addresses the endogeneity issue, recognizing that “network structure is not a given in the sense of an exogenous variable” (Borgatti & Halgin., 2011: 1178) but is explained by the attributes of interacting individuals (e.g., Fang et al., 2015; Tasselli et al., 2015). New theory from this micro perspective opens up discussion of endogeneity by, for example, suggesting that psychological attributes that are traditionally treated as stable, such as personality, can change over time as social network positions change (e.g., Tasselli et al., 2018). The structuration perspective fully engages with endogeneity (Quadrant IV in Figure 1) by treating purposive action as “embedded in concrete, ongoing systems of social relations” (Granovetter, 1985: 487); and treating social structure as emerging from localized actions, relationships, and identities (e.g., Padgett & Ansell, 1993). New statistical approaches (e.g., Snijders, van de Bunt, & Steglich, 2010) allow for simultaneous modelling of network and attribute change; whereas the use of wearable tags allows for the real-time tracking of interaction data controlling for prior network positions and individual attributes (e.g., Ingram...
& Morris, 2007). These developments aside, the question remains whether a structuration perspective requires researchers who long have known that X causes Y to revisit this; or whether they can focus (as recommended by Borgatti et al., 2014) on the neglected, and therefore more interesting, question of whether Y causes X.

CONCLUSION

Organizational social network research is burgeoning in our journals and professional meetings, drawing upon advances in network theory, network methods, and empirical research (e.g., Kilduff & Brass, 2010). This social network program in organizational contexts faces challenges that are different from social network research in other contexts. There is strong interest in locating the nexus of action, and in identifying the ways in which outcomes are achieved (e.g., Tasselli et al., 2015). Thus, in terms of network research, the issue of agency is paramount in ways that have not been the case in traditional sociological network studies, nor in the network approaches championed by physicists (e.g., Dorogovtsev, Mendes, & Samukhin, 2003). As we have shown, the agency questions for network researchers are the following: Who or what is constructing the social networks within which actions are structured? How are the benefits of network structure derived, given that some people benefit more from occupation of network positions than others? How is purposive action different in open networks relative to closed networks? Does agency inhere in the actions that the social network enables? Or does it inhere in the formation of the network itself? Answers to these questions are generally implicit in current research and theory, if they are addressed at all. Our purpose in this paper is to bring issues of agency to the forefront of research attention for everyone interested in organizational network research. For too long, network research has operated as though social network structures are given, and benefits flow to those lucky enough to be in advantageous positions. Such a picture of passivity falls short of the expectation that social network research addresses questions of
how network change relates to the outcomes of networking. We look forward to new research initiatives that address these agency issues.

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Sayes, E. 2014. Actor–Network Theory and methodology: Just what does it mean to say that nonhumans have agency? *Social Studies of Science*, 44(1), 134-149.


Figure 1.
Contrasting Perspectives on Network Agency

Ontology of Agency

<table>
<thead>
<tr>
<th>Level of Agency</th>
<th>Dualism</th>
<th>Duality</th>
</tr>
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<tbody>
<tr>
<td>Individual</td>
<td>I. Individual Advantage</td>
<td>III. Micro-Foundations</td>
</tr>
<tr>
<td></td>
<td>(e.g., R.S. Burt, 1992)</td>
<td>(e.g., Tasselli, Kilduff, &amp; Menges, 2015)</td>
</tr>
<tr>
<td>Network</td>
<td>II. Embeddedness</td>
<td>IV. Structuration</td>
</tr>
<tr>
<td></td>
<td>(e.g., Granovetter, 1985)</td>
<td>(e.g., Barley, 1986)</td>
</tr>
</tbody>
</table>
Stefano Tasselli (tasselli@rsm.nl) is an Associate Professor at the Rotterdam School of Management, Erasmus University, and a member of the Exeter Centre for Social Networks of the University of Exeter. He received his PhD from the University of Cambridge. His research interests include the micro-foundations of organizational social networks, as well as organizational theory. Specifically, his research focuses on the interplay between characteristics of individual actors and network structure in explaining outcomes of importance for individuals and organizations.

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APPENDIX

Table 1.

Articles Selected for the Review, Categorization in the Conceptual Perspectives, and Implications for Network Agency

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Individual advantage</th>
<th>Embeddedness</th>
<th>Microfoundations</th>
<th>Structuration</th>
<th>Journal</th>
<th>Implications for network agency</th>
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<td>2004</td>
<td>McFadyen &amp; Cannella</td>
<td>X</td>
<td></td>
<td></td>
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<td>AMJ</td>
<td>Effects of number and strength of ties on outcomes (knowledge creation)</td>
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<td>2004</td>
<td>Brass et al.</td>
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<td>X</td>
<td></td>
<td>X</td>
<td>AMJ</td>
<td>Study of network embeddedness at different levels of analysis</td>
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<td>2004</td>
<td>Soda, Usai, &amp; Zaheer</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>AMJ</td>
<td>Temporal effects of structural holes and closure on performance</td>
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<td>2004</td>
<td>Cross &amp; Cummings</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>AMJ</td>
<td>Properties of both networks and ties affect performance</td>
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<td>2004</td>
<td>Klein et al.</td>
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<td>AMJ</td>
<td>Effects of demography, values and personality on centrality</td>
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<td>2004</td>
<td>Reagans, Zuckerman, &amp; McEvily</td>
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<td>Social networks versus demography effects on team performance</td>
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<td>2004</td>
<td>Gibbons</td>
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<td>ASQ</td>
<td>Effects of advice versus friendship networks in influencing and changing professional values</td>
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<td>2004</td>
<td>Perlow, Gittell, &amp; Katz</td>
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<td>X</td>
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<td>Org. Sci</td>
<td>Nested theory of structuration through the ethnographic study of the interaction patterns among three groups</td>
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<td>2004</td>
<td>Rodan &amp; Galunic</td>
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<td>Role of network structure and access to heterogeneous knowledge on innovative performance</td>
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<td>2004</td>
<td>McLean &amp; Hassard</td>
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<td>JMS</td>
<td>Critical notes on issues related to the production of actor-network theory accounts</td>
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<td>2004</td>
<td>Totterdell et al.</td>
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<td>Analysis of the relationship between organizational networks and employees' affect</td>
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<td>Levin &amp; Cross</td>
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<td>2004</td>
<td>Chow &amp; Ng</td>
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<td>AJS</td>
<td>Analysis of the economic payoff of kinship networks in the context of China’s rural industrialization</td>
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<td>Burt, R.S.</td>
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<td>Effects of spanning structural holes on generation of new ideas</td>
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<td>2005</td>
<td>Milton &amp; Westphal</td>
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<td>Patterns of association between identity confirmation–based networks and cooperation and performance in groups</td>
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<td>2005</td>
<td>Barsness, Diekmann, &amp; Seidel</td>
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<td>Individual’s centrality in the network enhanced the positive association between impression management and performance</td>
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<td>Hanses, Mors, &amp; Løvås</td>
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<td>Multiple networks at the within-team and inter-unit level affect various phases of knowledge sharing</td>
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<td>2005</td>
<td>Obstfeld</td>
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<td>Sparrowe &amp; Liden</td>
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<td>Ibarra, Kilduff, &amp; Tsai</td>
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<td>Connecting individuals and collectivities at the frontiers of organizational network research</td>
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<td>Bono &amp; Anderson</td>
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<td>Janicic &amp; Larrick</td>
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<td>Balkundi &amp; Harrison</td>
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<td>Leader and team centrality contribute to performance</td>
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<td>Analysis of how the how the performance of organizational citizenship behavior may be associated with an individual’s occupation of social network positions</td>
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<td>Bowler &amp; Brass</td>
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<td>Analysis of the network correlates, such as tie strength and third party influence, of interpersonal citizenship behavior</td>
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<td>Ferrin, Dirks, &amp; Shah</td>
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<td>2007</td>
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<td>Xiao &amp; Tsui</td>
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<td>Effects of bridging structural holes in collectivistic environments</td>
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<td>Ingram &amp; Morris</td>
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<td>Li &amp; Zhang</td>
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<td>Network characteristics and behaviors behind creativity</td>
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<td>Pappas &amp; Wooldridge</td>
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<td>Analysis of the relationship between measures of network centrality and managers' divergent strategic activity</td>
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<td>Hanaki et al.</td>
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<td>Problems of cooperative behavior in contexts where individual behaviors and interaction structures coevolve</td>
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<td>Entwisle et al.</td>
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<td>Analysis of covariation of network structure and context</td>
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<td>Fernandez-Mateo</td>
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<td>Analysis of how a broker's ability to affect prices and extract superior value from its position has economic consequences for the actors tied to it</td>
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<td>Analysis of how the costs associated with adding friends affect the publicly-displayed social network aids the establishment of trust, identity, and cooperation</td>
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<td>Analysis of demographic antecedents and performance consequences of structural holes in work teams</td>
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<td>2008</td>
<td>Chua, Ingram, &amp; Morris</td>
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<td>Effects of embeddedness in a network of positive and negative ties on trust</td>
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<td>McDonald, Khanna, &amp; Westphal</td>
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<td>Effects of CEO’s network advice behaviors on firm performance</td>
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<td>Jarvenpaa &amp; Majchrzak</td>
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<td>Role of transactive memories in ego-centered knowledge networks among professionals</td>
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<td>Cattani &amp; Ferriani</td>
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<td>Role of social networks, in terms of core-periphery structure, in shaping individuals’ ability to generate a creative outcome</td>
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<td>Zohar &amp; Tenne-Gazit</td>
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<td>Analysis of transformational leadership and social interaction as antecedents of climate strength</td>
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<td>Oh &amp; Kilduff</td>
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<td>Role of self-monitoring personality on direct and indirect brokerage in a sample of entrepreneurs</td>
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<td>Buskens &amp; van de Rijt</td>
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<td>Analysis of the returns associated with brokerage if everyone in the network spans across structural holes</td>
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<td>Burt, S.A.</td>
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<td>Analysis combining molecular genetics and social psychology experiments explaining genetic influences on popularity</td>
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<td>Analysis of perceived networks small world and clustering properties versus properties of actual friendship networks</td>
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<td>Gargiulo, Ertug, &amp; Galunic</td>
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<td>Effect of dense social ties, or network closure, on individual performance as dependent on the individual’s role</td>
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<td>McFayden, Semadeni, &amp; Cannella</td>
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<td>Role of average tie strength and ego network density on knowledge creation</td>
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<td>Goodwin, Bowler, &amp; Whittington</td>
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<td>Social network perspective, in terms of leader’s and followers’ centrality, on LMX relationships</td>
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<td>Scott &amp; Judge</td>
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<td>Analysis of personality in the form of core self-evaluations and situational position in the form of communication network centrality as antecedents of popularity</td>
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<td>Analysis of the influence of social networks and conformity value on employees’ creativity</td>
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<td>Analysis of the origins of homophily in a large university community</td>
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<td>Analysis of rule breaking as partially mediating the genetic effect on popularity</td>
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<td>Analysis of structure and spread of loneliness in a large social network</td>
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<td>Tortoriello &amp; Krackhardt</td>
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<td>The effects of people’s bridging ties are contingent upon the nature of the ties that people form to bridge across others</td>
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<td>Long Lingo &amp; O’Mahony</td>
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<td>Analysis of how brokers on creative projects integrate the ideas of others</td>
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<td>Self-monitoring personality effects on the opening of structural holes</td>
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<td>Rank, Robins, &amp; Pattison</td>
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<td>Effects of network structure and network content on innovation</td>
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<td>Analysis of the effects of the size and strength of actors' idea</td>
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<td>Venkataramani, Green, &amp; Schleicher</td>
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<td>Impact of leaders' social network ties (quality of the relationship and centrality) on LMX and members' work attitudes</td>
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<td>Bothner, Smith, &amp; White</td>
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<td>Network model that pictures occupants of robust positions as recipients of diversified support from durably located others</td>
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<td>Vedres &amp; Stark</td>
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<td>Eagle, Macy, &amp; Claxton</td>
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<td>Reinholdt, Pedersen, &amp; Foss</td>
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<td>Interplay between centrality, motivation and ability in explaining knowledge sharing</td>
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<td>Analysis of the broad theoretical domain of a multilevel network theory of organization</td>
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<td>Srivastava &amp; Banaji</td>
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<td>Analysis of the interplay of culture, cognition, and social networks in organizations</td>
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<td>Aral &amp; Van Alstyne</td>
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<td>Analysis of the novelty offered by bridging ties, suggesting that the strength of weak ties and structural holes depend on brokers’ information environments</td>
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<td>Presence of a possible trade-off between structural positions in local and global networks in facilitating individuals interpersonal citizenship behavior</td>
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<td>Relationship between power and perceptions of social networks</td>
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<td>Change agent's network role on the initiation and adoption of changes divergent from the institutional status quo</td>
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<td>Galunic, Ertug, &amp; Gargiulo</td>
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<td>Second-order social capital from connection to senior brokers</td>
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<td>Origins of brokerage as dependent on links with former coworkers and with friends of friends and role of “organizational misfits” on brokerage opportunities</td>
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<td>McEvily, Jaffee, &amp; Tortoriello</td>
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<td>Analysis of the conditions under which bridging ties from the past affect current organizational outcome</td>
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<td>Schulte, Cohen, &amp; Klein</td>
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<td>Co-evolution of social network ties and team members' climate perceptions over time</td>
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<td>Study of the instrumental and interpersonal mechanisms driving nascent entrepreneurs’ value attributions</td>
<td>2012</td>
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<td>Analysis of brokering of situated knowledge within an organizational context characterized by formalized hierarchy</td>
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<td>Shipilov</td>
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<td>Multiplex analysis of how multiple kinds of relationships could simultaneously affect network dynamics and network outcomes</td>
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<td>2012</td>
<td>Dunbar</td>
<td>OTJ</td>
<td>Women can maintain relationships through electronic communication; men, instead, are more likely to require time-heavy social activities that involve co-presence</td>
<td>2012</td>
<td>Apicella et al.</td>
<td>OTJ</td>
<td>Social networks may have contributed to the emergence of cooperation in human history</td>
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<td>2012</td>
<td>Grund</td>
<td>OTJ</td>
<td>Centralization around one or a few players negatively affects performance, in terms of goals scored by the team</td>
<td>2013</td>
<td>van Wijk et al.</td>
<td>AMJ</td>
<td>Interplay of Agency, Culture, and Networks in Field Evolution</td>
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<td>2013</td>
<td>Batjargal et al.</td>
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<td>Effects of structural holes and institutional network polycentrism on entrepreneurs’ venture growth</td>
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<td>Dahlander &amp; McFarland</td>
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<td>Effects of intra-organizational tie formation and persistence on collaboration</td>
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<td>2013</td>
<td>Bridwell-Mitchell &amp; Lant</td>
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<td>Analysis of the role of agency and choice in how individuals use social networks</td>
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<td>2013</td>
<td>Lomi et al.</td>
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<td>Analysis of advice relationship formation based on the strength of organizational members’ identification with social foci</td>
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<td>2013</td>
<td>Brands &amp; Kilduff</td>
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<td>Effects of gender-biased perceptions of friendship network brokerage on attributions and performance</td>
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<td>2013</td>
<td>Chung &amp; Jackson</td>
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<td>Study of the relationships between qualities of team internal and external networks and team performance and moderating impact of task routineness</td>
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<td>Bizzi</td>
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<td>Analysis of the negative effects of structural holes on group functioning and group climate</td>
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<td>2013</td>
<td>Venkataramani, Labianca, &amp; Grosser</td>
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<td>Effect of centrality in positive and negative networks on employees’ organizational attachment</td>
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<td>2013</td>
<td>Zou &amp; Ingram</td>
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<td>Analysis of the impact of the number (high or low) of structural holes across organizational boundary on creativity, decision-making, task execution and teamwork</td>
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<td>2013</td>
<td>Miritello et al.</td>
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<td>People use electronic media mainly to communicate with a small number of strong ties</td>
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<td>2014</td>
<td>Shipilov et al.</td>
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<td>The importance of relational pluralism within and between organizations</td>
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<td>2014</td>
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<td>Role of multiplex ties in exchange partner retention</td>
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<td>2014</td>
<td>Casciaro, Gino, &amp; Kouchaki</td>
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<td>Consequences of instrumental social networking for an individual’s morality, in terms of how individuals feel</td>
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<td>2014</td>
<td>Bensaou, Galunic, &amp; Jonczyk-Sédès</td>
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<td>Analysis of the individual strategies and underlying agency behind social networking</td>
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<td>2014</td>
<td>Perry-Smith &amp; Shalley</td>
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<td>Analysis of member informal social network ties outside of the team as a way to achieve cognitive variation within the team and thus affect creativity</td>
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<td>Rogan &amp; Mors</td>
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<td>Network effects on individual level ambidexterity in organizations</td>
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<td>Casciaro &amp; Lobo</td>
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<td>Effect of cognitive and motivational affective primacy on tie perceived instrumental value</td>
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<td>2014</td>
<td>Ren, Gray, &amp; Harrison</td>
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<td>Analysis of informal networks as triggers and dampeners of faultline effects on performance</td>
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<td>2014</td>
<td>Tortoriello, McEvily, &amp; Krackhardt</td>
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<td>Closed network enables individuals to act as innovation catalysts</td>
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<td>Individuals with an initial advantage in social ties form more extensive networks post entry</td>
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<td>2014</td>
<td>Kleinbaum &amp; Stuart</td>
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<td>Focus on structure as a means to achieve coordination and on selection process in which individuals with broad networks match to coordination-focused jobs.</td>
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<td>2014</td>
<td>Wong &amp; Boh</td>
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<td>Analysis of centrality and actions needed to actualize potential resources embedded in social networks</td>
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<td>Ho &amp; Pollack</td>
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<td>Van den Brink &amp; Benschop</td>
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<td>Effect of gender networking practices and gatekeeping on inequality in organizations</td>
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<td>Effect of knowledge content and tie strength on creativity</td>
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<td>Lönnqvist et al.</td>
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<td>Analysis of the five-factor model of personality and degree and transitivity</td>
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<td>2014</td>
<td>Mund &amp; Neyer</td>
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<td>Analysis of personality-relationship transaction with focus on effects of relationship experiences on personality development</td>
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<td>Neyer et al.</td>
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<td>Contingent analysis of mutual personality-relationship transactions</td>
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<td>Lomi &amp; Stadtfeld</td>
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<td>Co-evolutionary analysis of social networks and social settings</td>
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<td>Gulati &amp; Srivastava</td>
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<td>Conceptualization of agency as the interplay between constraint and action</td>
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<td>Effects of corruption on communication behavior and interaction patterns among managers</td>
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<td>2015</td>
<td>Sosa, Gargiulo, &amp; Rowles</td>
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<td>Effects of the structure of the informal communication network and task interdependence on inter-team communication</td>
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<td>2015</td>
<td>Vardaman et al.</td>
<td>Org. Sci</td>
<td>Psychological factors and individuals’ network centrality jointly impact employee turnover</td>
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<td>DeRue, Nahrgang, &amp; Ashford</td>
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<td>Analysis of interpersonal perceptions as an explanation for why emergent, informal leadership structures vary across teams</td>
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<td>2015</td>
<td>Brands, Menges, &amp; Kilduff</td>
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<td>Analysis of how attributions of charismatic leadership depend on the match between the gender of the leader and the perceived structure of the network</td>
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<td>2015</td>
<td>Fang et al.</td>
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<td>Meta-analysis on the links between personality, social networks and work outcomes</td>
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<td>Analysis of intra-organizational networks’ transitory shifts when organizational change produces high levels of ambiguity for employees</td>
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<td>2015</td>
<td>Walter, Levin, &amp; Murnighan</td>
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<td>Analysis of critical biases and consequences of executives’ reconnection preferences of dormant ties</td>
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<td>2015</td>
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<td>Effects of external knowledge on individuals’ innovativeness contingent upon individuals' spanning of structural holes in the internal social structure.</td>
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<td>Porter &amp; Woo</td>
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<td>A dynamic psychological perspective on how and why people network</td>
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<td>2015</td>
<td>Caimo &amp; Lomi</td>
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<td>Analysis of the role of reciprocity and formal structure on knowledge sharing</td>
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<td>Analysis of the processes through which entrepreneurs first build social networks and then use the network resources for enhancing venture performance</td>
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<td>Hirst et al.</td>
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<td>Effects of reach efficiency of indirect network on individual creativity</td>
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<td>Porath, Gerbasi, &amp; Schorch</td>
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<td>Actor-based analysis for the coevolution of communication network ties and actor attributes, in terms of perceived stress</td>
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<td>Effect of social capital on gender inequality in a project-based labor market</td>
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<td>Burt, R.S.</td>
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<td>Analysis of the benefits of dyadic versus reinforced structural holes</td>
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<td>Dynamic study of partnership ties shape friendship networks</td>
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<td>Kilduff et al.</td>
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<td>Acolyte effect (subordinates with work connections to high-reputation industry leaders) on careers</td>
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<td>Quintane &amp; Carnabuci</td>
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<td>Analysis of information-brokerage strategies of brokers relative to those of actors embedded in denser network positions</td>
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<td>2016</td>
<td>Cannella &amp; McFayden</td>
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<td>Analysis of knowledge worker ego networks and change over time</td>
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<td>2016</td>
<td>Parker, Halgin, &amp; Borgatti</td>
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<td>Foulk, Woolum, &amp; Erez</td>
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<td>Analysis of the cognitive and semantic mechanisms behind rudeness contagion</td>
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<td>Jones &amp; Shah</td>
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<td>Ballinger, Cross, &amp; Holtom</td>
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<td>Perry-Smith &amp; Mannucci</td>
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<td>Analysis of the social network drivers of the phases of the creative idea journey and focus on network activation</td>
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<td>2017</td>
<td>Paruchuri &amp; Awate</td>
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<td>Effects of the reach of inventors in the intra-firm network and their span of structural holes on search behavior</td>
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<td>Jiang et al.</td>
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<td>Role of network-based indicators on executive decisions</td>
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<td>Effects of having strong ties and a dense network of professional colleagues on research citations</td>
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<td>Rogan &amp; Mors</td>
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<td>Effects of relationships built using predominately individual rather than firm resources on exploration for new business</td>
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<td>2017</td>
<td>Annosi et al.</td>
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<td>Effects of stakeholder network density in shaping the identities of self-managed teams</td>
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<td>Grosser, Venkatramani, &amp; Labianca</td>
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<td>Effects of alters’ creative self-efficacy in an employee’s problem solving network on that employee’s innovation behavior</td>
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<td>Clement &amp; Puranam</td>
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<td>Inverted U-shaped relation effect between quantity and quality i.e. between the size of an ego's social network and engagement in helping behavior</td>
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<td>Tasselli &amp; Kilduff</td>
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<td>Effects of advice giving brokerage on team creativity</td>
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<td>Clement, Shipilov, &amp; Galunic</td>
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<td>Carnabuci, Emery, &amp; Brinberg</td>
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<td>Cognitively informed network model of leadership emergence in social groups</td>
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<td>Grosser et al.</td>
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<td>Ertug et al.</td>
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<td>Analysis of the relationship between choice homophily in instrumental relationships and individual performance</td>
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<td>Kuwabara, Hildebrand, &amp; Zou</td>
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<td>Effects of how laypeople construe different components of networks</td>
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<td>Kauppila, Bizzi, &amp; Obstfeld</td>
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<td>Analysis of strategic network decision characteristics shape the creative process at the organizational micro-level</td>
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<td>Indirect cost of communication centrality, moderated by individual differences in political skills, on workplace thriving through role overload and role ambiguity</td>
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<td>Landis et al.</td>
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<td>Effect of the experience of power on the under-perception of brokerage opportunities for which sense of agency is suited</td>
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<td>Analysis of narrative networks in time as the assembly of memories through history</td>
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<td>Analysis of the coevolution between the creation (dissolution) of both friendship ties and advice ties and thoughts of quitting</td>
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<td>Brands &amp; Mehra</td>
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<td>Analysis of the performance of men and women friendship network brokers</td>
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<td>Soda, Stea, &amp; Pedersen</td>
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<td>The level of collaboration in a network moderates the effects of closed and brokering network positions on the acquisition of knowledge that supports creativity</td>
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<td>Analysis of the role of cosmopolitans in bridging structural and cultural holes</td>
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<td>Relationships between perceived overqualification, perceptions of fit, and advice network centrality</td>
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<td>Analysis of novices’ knowledge creation benefits from both closed and open structures in developmental networks</td>
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<td>Effects of brokerage and closure in corporate control</td>
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<td>2019</td>
<td>Sage, Vitry, &amp; Dainty</td>
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<td>Affective encounters between human and non-human bodies from the perspective of actor-network theory</td>
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<td>2019</td>
<td>Porter et al.</td>
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<td>Meta-analysis of how instrumental and expressive network positions relate to turnover</td>
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<td>McCarthy &amp; Levin</td>
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<td>Effects of social network ties that can be activated in people’s minds on employees’ organizational commitment</td>
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<td>Tasselli &amp; Caimo</td>
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<td>Effects of triadic transitive and cyclic closure on knowledge sharing as contingent on formal organizational structure</td>
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<td>Tasselli, Zappa, &amp; Lomi</td>
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<td>Analysis of the patterns between social networks and organizational vocabularies as contingent on the formal structure of organizational subunits</td>
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<td>In</td>
<td>Gómez-Solórzano, Tortoriello, &amp; Soda</td>
<td>X</td>
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<td>Analysis of how a specific structural arrangement (i.e., belonging to a clique) affects inventors’ innovative productivity depending on the kind of ties (instrumental or affective)</td>
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In Basov X OTJ Socio-semantic network analysis to examine how cultural homophily works when field logic meets practice

Appendix.

Complete references of the articles selected for the review and included in Table 1.


Sayes, E. 2014. Actor–Network Theory and methodology: Just what does it mean to say that nonhumans have agency? *Social Studies of Science*, 44(1), 134-149.


