AFFECTIVE PRIMACY IN INTRAORGANIZATIONAL TASK NETWORKS

Tiziana Casciaro, University of Toronto[1] Miguel Sousa Lobo, INSEAD[2]

August 25, 2014

[1]Rotman School of Management, Toronto, ON M5S 3E6, t.casciaro@utoronto.ca
[2]INSEAD, Abu Dhabi Campus, PO Box 48049, Abu Dhabi, UAE, miguel.lobo@insead.edu

AFFECTIVE PRIMACY IN INTRAORGANIZATIONAL TASK NETWORKS

Abstract

To better understand the role of affect in organizational task-related networks, we develop a theory of affective primacy that identifies cognitive and motivational mechanisms through which the affective value of a social relationship (a feeling of positive affect from interactions with a colleague) operates as an antecedent of perceived instrumental value (a subjective evaluation of a relationship's contribution to accomplishing assigned tasks). We test this theory with full network data collected over three years from employees in a small functional-form organization, which we analyze with a methodology drawing from the social relations model of interpersonal perception and Bayesian models for social network analysis. We find that, over time, the affective value of social relationships influences both perceptions of instrumental value and the formation of task-related ties through multiple paths not accounted for by either perceived instrumental value or formal-structural requirements. We also show that the emergence of task-related networks rests primarily on high-activation positive emotions, such as excitement (a subjective state of feeling energized) rather than positive emotions with lower levels of activation, such as pleasantness (a subjective state of feeling gratified). We discuss implications of these findings for organizational theory and managerial practice.

1 Introduction

Although organizations are formally designed to regulate behavior in the service of task goals, patterns of task interaction that only partly reflect formal structures unavoidably emerge between organizational participants (Barnard 1938; Roethlisberger and Dickson 1939; Mayo 1945; Dalton 1959; Homans 1950). Such emergent task networks influence a wide range of organizational processes and outcomes (Borgatti and Foster 2003; Brass, Glaskiewicz, Greve, and Tsai 2004). Understanding how task networks form is therefore critical to both organizational theory and practice.

We already know that task ties—dyadic patterns of task interaction between organization members—exhibit both instrumental motivations related to the accomplishment of task goals and affective motivations related to the emotional rewards of social relationships (Roethlisberger and Dickson 1939; Slater 1955; Brass 1984; Krackhardt 1999; Hinds, Carley, Krackhardt, and Wholey 2000). As a result, instrumental content and affective content are unavoidably intertwined in social interaction (Homans 1950; Lindenberg 1997).

What scholars know little about is how people attribute either instrumental value (a *subjective* evaluation of a relationship's contribution to accomplishing assigned tasks) or affective value (a feeling of positive affect from interacting with a colleague) to social relationships with coworkers, and how perceived instrumental value and affective value influence each other over time. This theoretical gap prevents researchers from establishing how affect influences task networks and which levers organizations could use to induce desirable task-oriented social behavior. For example, Casciaro and Lobo (2008) showed that positive and negative feelings about colleagues moderate the relevance of task competence as a criterion for choosing them as work partners, but could not rule out the possibility that these feelings might be a by-product of the perceived instrumental value of task interactions with them. We do not know, therefore, whether we have posiitve feelings for a colleague because we view her as helping us accomplish our task goals, or vice versa we view her as helful because we have positive feelings for her.

In this paper, we examine the link between perceived instrumental value (henceforth, instrumental value) and affective value that people in organizations experience from their relationships with colleagues. Existing theory proposes that instrumental value precedes affective value, such that the instrumental outcomes of social encounters generate affective responses which in turn can trigger subsequent social interaction (Lawler 2001). What scholars have not yet examined is the possibility that affect may also precede instrumental value, and trigger task-related ties independent of instrumental value. We advance this possibility with a theory of affective primacy in task-related networks that identifies cognitive and motivational mechanisms through which the affective value of social relationships operates as an antecedent of both instrumental value and task ties. The theory has two components. The first identifies cognitive processes that give affective value causal primacy over instrumental value and create self-reinforcing associations between affective value, task ties, and perceptions of instrumental value. The second specifies the motivational foundations of two distinct forms of affective value—excitement (positive affect with high activation) and pleasantness (positive affect with low-to-neutral activation)—to explain why the effect of positive affect in task-related networks is stronger as the level of emotional activation experienced in social relationships increases. To test this theory, we use longitudinal full-network survey data collected over three years in a small company formally designed with a functional structure. These data allow us to evaluate the joint, reciprocal, and self-reinforcing effects of instrumental and affective mechanisms of task-related ties within a single model.

2 A theory of affective primacy in organizational task networks

2.1 Instrumental and affective value of social relationships

Formal structural design and task requirements routinely press organizational participants into social interactions they might not willingly choose. Outside these requirements, however, task-related

networks emerge that reflect discretionary interactions people engage in based on the subjective value they see in relationships with different coworkers (Merton 1957). There are two distinct types of value. The first is instrumental value: a subjective evaluation of a relationship's contribution to accomplishing assigned tasks. An actor's assessment of instrumental value follows a deliberate expectation-based calculus of partner desirability (Borgatti and Cross 2003; Nebus 2006). Applied to task-oriented action in organizations, this logic predicts a direct effect of a relationship's instrumental value on the formation of task-related ties, causing people to seek out others they perceive as useful for completing assigned tasks.

The second basis for task-related ties is affective value: subjective positive affect experienced when interacting with a colleague. Scholars have long recognized that people in organizations tend to supplement, erode, and transform the formal structure's "logic of cost and efficiency" with a "logic of sentiments" (Roethlisberger and Dickson 1939), thus injecting affect into emergent patterns of task-related social action (Casciaro and Lobo 2008). Affect refers to consciously accessible feelings (Fredrickson 2001), defined along two dimensions: valence and activation (Russell 1980; Diener and Emmons 1984; Watson and Tellegen 1985). Valence (or hedonic tone) is a subjective feeling of pleasantness and unpleasantness. Activation is a subjective state of feeling energized or de-energized. A relationships affective value, therefore, can be characterized in terms of positive valence with varying degrees of activation. Positive valence with high activation represents an excited, enthusiastic mood, a subjective state of *feeling energized* based on the expectation of future rewards (Izard 1991; Lawler and Yoon 1996; Buck 1988). Positive valance with low-to-neutral activation represents instead a pleasant, contented mood, a subjective state of *feeling gratified* arising from the rewards received from the relationship (Izard 1991; Lawler and Yoon 1996; Buck 1988).

The distinction between affective and instrumental value in social relationships echoes, and yet also differs from, the distinction between warmth and competence as universal dimensions of

interpersonal judgments (Asch 1946; Osgood 1962; Fiske, Cuddy, and Glick 2006). The warmth dimension captures traits related to perceived intent for good or ill, including friendliness, helpfulness, and sociability. The competence dimension captures perceived ability to act on those intentions, including intelligence, skill and efficacy. Affective and instrumental value, as we define them, differ from warmth and competence judgments. Warmth and competence judgments are attitudes toward a person. Attitudes have three components: cognitive responses, which represent what one thinks of a person; affective responses, which represent what one feels about a person; and behavioral responses, which represent what one does or intends to do with regards to a person (Eagly and Chaiken 1998). Although warmth judgments can be saturated with affect (Wojciszke 2005), judging someone as warm does not necessarily imply experiencing emotions when interacting with that person. Warmth attitudes, like judgments of liking and disliking, can operate on a purely cognitive basis (Eagly and Chaiken 1998), making them incomplete representations of the affective value people derive from social relationships. Relatedly, constructs like closeness and friendship used in network research to represent affective ties confound behavioral components of attitudes with affective ones, and fail to identify precisely the emotions that actors feel in the relationship. By contrast, the construct of affective value captures directly the positive emotions one experiences when interacting with others. Affective value belongs therefore in the domain of emotions that result from social encounters with other people (Campos and Stenberg 1981; Parkinson 1996; Clark and Brissette 2001; Collins 2004; Leary 2000). Within this domain, our definition of affective value is distinct from *affective presence*, a construct concerned with the moods an individual tends to elicit in people she interacts with (Eisenkraft and Elfenbein 2010). Affective presence is an individual trait describing how alters tend to feel on average when they are with ego. Affective value, by contrast, is a dyadic construct describing the positive emotions a specific ego tends to feel during interactions with a specific alter.

Instrumental value, as we define it, is also distinct from competence judgments. Perceiving

someone as competent does not necessarily imply a belief that interactions with that person help the perceiver get her job done. The construct of instrumental value, by contrast, captures directly an actor's subjective evaluation of the degree to which interacting with someone contributes to accomplishing assigned tasks. Affective and instrumental value, therefore, concern not attitudes toward a colleague, but rather the emotional and task-related resources, respectively, that an actor perceives to derive from his relationship with that colleague.

2.2 Affective value as an antecedent of instrumental value

Although both affective and instrumental value exist in task-related ties, whether and how these two forms of relational value influence each other over time and contribute to the formation of task-related networks is still poorly understood.

Lawler's (2001) affect theory of social exchange provides the most systematic account to date of the relationship between the instrumental outcomes of a social exchange, the development of affective responses, and the subsequent strength and durability of a social relation. According to this perspective, the instrumental value of a social interaction generates affective responses: interactions perceived as facilitating task goal achievement spawn positive emotions; interactions perceived as hindering task goal achievement spawn negative emotions. People perceive social units—be they dyads, groups or networks—as the source of those general positive and negative emotions contingent on the degree of task interdependence in the exchange (Lawler 2001): the higher the task interdependence between actors in the exchange, the stronger the tendency to direct such feelings to the social unit, which becomes an object of attachment in its own right. This attachment manifests itself as relational commitment, such as staying in an existing relationship despite alternatives and expanding areas of collaboration among actors. In Lawler's affect theory of social exchange, therefore, instrumental value has causal precedence over affective value. Affect operates as a mediator in the relationship between instrumental outcomes of the exchange and

subsequent task interaction.

We argue that, rather than being solely a mediator between instrumental value and subsequent task-related ties, a relationship's affective value may also precede how instrumental value itself is perceived, as well as stimulate task ties independently of instrumental value. Two mechanisms are jointly responsible for this effect: affective primacy, and affect-congruent selective perception.

The theoretical foundation of affective primacy in social relationships builds on the idea, well documented in psychology and neuropsychology, that human reasoning operates along two parallel systems of processing: System 1 is automatic, rapid, effortless, affectively charged, associational, and non-volitional; System 2 is deliberative, slow, effortful, cognitively demanding, logical, and controlled (Kahneman 2011; Strack and Deutsch 2004; Sloman 1996). From a dual-process perspective, affective responses to social relationships are more likely to be regulated by impulsive, fast processing, rather than the reflective, slow processing that tends to regulate instrumental evaluations of a relationship. Affective responses can be evoked with minimal stimulus input and virtually no cognitive processing (Zajonc 1980; Murphy and Zajonc 1993); as such, affective responses to social interactions can develop very rapidly from mere glimpses of behavior (Ambady, Bernieri, and Richeson 2000), with consistency and discriminability along the valence and activation dimensions of affect (Vytal and Hamann 2010). By contrast, assessing whether a relationship aids or hinders task goals requires more information than mere exposure. In addition, feelings are intrinsically subjective and can never be "wrong," but assessments of contributions to task goals can be. For this reason, the affective response to a social relationship is less susceptible to persuasion and deliberation than evaluations of instrumental value. Feelings are also more personal than instrumental evaluations. While instrumental value has to do with the task as an external object, the emotions felt in a relationship implicate the self directly (Zajonc 1980). For these combined reasons, a relationship's affective value is likely to be established more quickly than its instrumental value.

Affective primacy in social relationships is the basis for cognitive biases that influence percep-

tions of instrumental value. Neurological evidence provides support for the influence of System 1 on System 2, such that affective reactions early in processing modulate subsequent perception (Phelps 2004; Blanchette and Richards 2004; Mishra, Mishra, and Nayakankuppam 2007). In social interaction, affect-congruent selective perception allows for affective responses to interfere with instrumental ones. Across a wide range of judgmental tasks, people show a pervasive tendency to selectively seek out, notice, and interpret data in ways that confirm and reinforce existing evaluations (Festinger 1957; Abelson, Aronson, McGuire, Newcomb, Rosenberg, and Tannenbaum 1968). Once a relationship becomes tinged with affect, therefore, discrepant information is subject to consistency pressures, leading people to pay greater attention to aspects of the instrumental content of the interaction that are consistent with the interaction's affective valence. The result is exaggerated emotional coherence (halo effect), in which early System 1 affective responses spill over to slower System 2 responses (Dion, Walster, and Berscheid 1972), including perceptions of instrumental value. Only in the face of strong evidence are people willing to exchange their intuitive System 1 responses for deliberative System 2 ones (Simmons and Nelson 2006). As a result of affective primacy and affect-congruent selective perception, we propose that, over time, those who derive positive affect from a relationship will be more likely to perceive it as aiding them in executing work tasks.

> **Hypothesis 1**: The affective value of a social relationship is positively associated with its subsequent instrumental value.

The joint effect of affective primacy and affect-congruent selective perception also implies that, over time, task-related interactions can amplify the effects of affective value on subsequent instrumental value. This is because greater exposure to the source of emotions provides an actor with more opportunities to encounter, and selectively perceive and encode, attitude-reinforcing information about coworkers (Festinger 1957; Abelson, Aronson, McGuire, Newcomb, Rosenberg, and Tannenbaum 1968). This self-reinforcing process predisposes actors toward affect-congruent instru-

mental evaluations over subsequent task interactions. As a result, the more positive the feelings elicited by a social relationship, the more repeated task interactions within that relationship will reinforce positive perceptions of instrumental value.

> **Hypothesis 2**: The magnitude of the positive association between the affective value of a social relationship and its subsequent instrumental value increases with a higher level of task interaction between the actors.

Affect-congruent self-reinforcement also applies to the perception of affective value. When a person derives positive affect from a relationship with a colleague, she will selectively perceive subsequent interactions to maintain emotional coherence (Thagard 2006), such that greater exposure to that colleague will provide greater opportunity to reinforce prior affective responses. As a result, the more positive the feelings elicited by a social relationship, the more task interactions within that relationship will reinforce positive perception of the relationship's affective value over time.

> **Hypothesis 3**: The magnitude of the positive association between prior affective value of a social relationship and subsequent affective value increases with a higher level of task interaction between the actors.

Although justified theoretically, these predicted self-reinforcing patterns are unlikely to progress ad infinitum empirically. First, strong evidence does have the potential to interrupt, or interfere with, affect-congruent selective perception (Simmons and Nelson 2006). Second, organizational changes—personnel selection and turnover, role assignments, shifts in cultural norms, and exogenous shocks—change the social environment in which interactions take place, thus modifying the context in which affective and instrumental value form in social relationships. These factors make the possibility of endlessly reinforcing cycles of affective and instrumental evaluations implausible. We explicitly consider such theoretical and empirical plausibility in the methods section.

2.3 The primacy of high-activation positive affect in task-related networks

Our theory thus far does not differentiate between distinct forms of affective value, because the proposed mechanisms for the influence of intuitive affective responses on deliberative instrumental responses apply across any form of affective value. With regard to the link between affective value and a subsequent task tie, however, we propose that different forms of positive affect have distinct effects on the formation of task-related ties. Specifically, high-activation positive affect (*i.e.*, excitement) and low-to-neutral activation positive affect (*i.e.*, pleasantness) operate differently as triggers of task-related social action due to their distinctive motivational foundations.

High-activation emotions motivate goal-oriented action more than low-activation emotions (Carver 2003). Positive emotions with low-to-neutral activation, such as pleasantness, signal that the goal has been reached and further effort is unnecessary. By contrast, positive high-activation emotions, such as excitement, imply eagerness to achieve (Buck 1988). In work contexts, job engagement is thus defined as a motivational state of high levels of energy (Rich, Lepine, and Crawford 2010), whereby goals are chosen and behavior is energized and directed in relation to envisaged positive outcomes (Warr and Inceoglu 2012). Consistent with these motivational foundations, Foo, Uy and Baron (2009) found high-activation positive affect (measured with markers such as enthusiastic, interested, and inspired) to predict individual orientation toward the future and effort toward tasks not immediately required. Applied to task ties, this suggests that relationships eliciting positive affect with higher levels of activation should motivate greater effort and higher levels of task-oriented action than relationships that elicit positive affect with lower levels of activation.

This notion is consistent with Collins' (2004) microsociology of social interaction. Collins argues that emotional energy—a positive high-activation state—is the main motivating force in social life. It provides the impetus for any human activity. An individual experiences an increase or a decrease in emotional energy based on how social encounters unfold during interaction rituals. An individual

who negotiates social interactions successfully acquires an increment of positive emotional energy. High levels of emotional energy consist of feelings of enthusiasm and confidence; low levels are manifested as apathy and depression (Collins 1993). People preferentially pursue social encounters that increase their emotional energy, and the confidence and enthusiasm an individual derives from social interactions stimulates action based on the expectation that a desirable future can be brought into the present (Barbalet 1998; Collins 1993). This argument implies that it is emotional energy, rather than any generic form of positive affect, that motivates people to seek colleagues out for task-oriented action.

Together, these insights suggest that pleasantness does not necessarily motivate task-oriented action, and may in fact dampen it (Carver 2003). By contrast, relationships that produce excitement should result in greater motivation to engage in task-oriented action.

> **Hypothesis 4**: The magnitude of the positive association between the affective value of a social relationship and the subsequent level of task interaction increases with a higher level of emotional activation experienced in the relationship.

In Figure 1, we summarize the predictions from affective primacy theory. Each arrow represents an hypothesized effect over time. The two curved arrows represent the moderation effect in hypothesis 3, according to which the positive association between prior affective value and subsequent affective value increases with a higher level of task interaction between two actors.

3 Methods

3.1 Site

To investigate the interplay of instrumental and affective value in intraorganizational task networks, we conducted a longitudinal network study of a business organization responsible for the distribution of high-end spirits in a European country. The company is structured as a pure functional-form

organization with four areas: finance, operations, marketing and sales. With the exception of the salespeople, who spend most of their time in the field, all other employees are co-located on the same floor of a single building. The floor plan is open, with minimal physical barriers. Because it operates as a country-level subsidiary of a large multinational corporation, the company employs personnel from both northern and southern European countries, as well as from Latin America, making for a culturally and linguistically diverse workplace. The company's general manager approached us hoping that a better understanding of informal social networks among employees might help the company lower what he perceived as communication and collaboration barriers across functional silos. To that end, the general manager agreed to conduct an end-of-year survey of the organization. The data collection occurred in three cycles over three consecutive years. The company had 40 employees in first year of the study, and 38 employees in both the second and third year. 24 employees were present for the entire length of the study.

Three features of this empirical setting made it particularly well-suited to test our theory. First, in this naturalistic organizational context, the content of task-related ties emerged over time within the constraints of purposefully designed formal structures. Second, the organization's small size allowed us to collect full-network self-report data over a substantial period of time, yielding a comprehensive data set that is virtually unattainable in large organizations. Third, its small size notwithstanding, the company represented a microcosm of common structural features and behavioral patterns of organizations: the vertical differentiation induced by hierarchical formal arrangements, the horizontal differentiation dictated by the division of labor into specialized units, the joint action stimulated by task interdependence among specialized units, and the consequent challenge of integration across functional silos.

3.2 Procedure and sample

The general manager invited all employees to complete an online questionnaire. In his invitation, the manager stated that the survey aimed to collect information on the network of work relationships among functional areas in the company, and thus provide the company with a better understanding of inter-departmental communication and help the organization to integrate functional areas more effectively. The manager also made clear that participation in the study was voluntary, that individual responses would be visible only to the researchers conducting the study, and that the researchers would share only data aggregated at the departmental level with the company.

The online survey included questions concerning the respondent's work-related ties with company employees, and his or her professional and personal opinions regarding each of these relationships. The survey clearly stated that such opinions would be treated as strictly confidential, while data on the organizational work network aggregated across respondents would be distributed to all survey participants. We collected responses with an online system using secure login credentials that we distributed directly to each participant.

In spite of the organization's small size, parsimony in survey design was essential to ensure adequate participation. Because we administered the survey three times and the company had 40 employees in the first year and 38 in years two and three, respondents faced the possibility of needing to answer each survey question up to 113 times over the course of the study. We took two steps to minimize the burden placed on respondents, and thus increase response rate and data quality. First, we included a minimal number of items in the survey. Second, the survey presented respondents with the complete company roster and asked them to answer the survey questions only about employees with whom they had interacted. In spite of the small size of the company, the absence of prior interaction with a colleague was not unusual, since respondents who had recently joined the organization had not yet familiarized themselves with every other employee, and salespeople operating in the field had limited opportunity to interact with colleagues at headquarters who

had no direct relevance to sales. Allowing respondents to select the appropriate set of company employees made it possible to collect whole-network data over time without placing an unnecessary burden on respondents.

As a result of these survey design choices, in each of the three years, all but one employee filled out the survey, yielding a 97% response rate. Participants rated 31 people on average in the first year (10th and 90th percentiles were 18 and 39), 30 in the second year (10th and 90th percentiles were 20 and 37), and 29 in the third year (10th and 90th percentiles were 18 and 36). The total number of dyadic ratings in each of the three years was 1212, 1098 and 1065. Because turnover at the company was 17.5% between the first and the second year and 24% between the second and the third year, 617 employee dyads had ratings in both year 1 and year 2, and 467 dyads had ratings in both year 2 and year 3, amounting to a total of 1084 usable observations.

3.3 Measures

3.3.1 Dependent and independent variables

We measured task-related ties with the question: "I go to this person for work-related input." To measure the instrumental value of social relationships, we used the item "Interactions with this person are useful to my work." Finally, we measured the affective value of social relationships with two items: "Interactions with this person are pleasant" and "Interactions with this person are energizing." We designed these survey questions to measure positive affect with low-to-neutral activation (pleasantness) and high-activation positive affect (excitement), respectively. We measured all variables with 7-point scales. The anchors provided to respondents were "not at all" for "1" and "very much" for "7". We validated survey items in several ways. First, before administering the first survey, we piloted the survey items with the company's general manager and a mid-level employee, and revised the survey based on their feedback. Second, shortly after administrating the third survey, we visited the headquarters and interviewed 14 of the 38 employees. We stratified

the interviewee sample based on functional affiliation and hierarchical level. The semi-structured interviews lasted an hour on average, ranging from thirty minutes to two hours. The interviews gave us insight into the competitive, historical, and cultural context in which work interaction took place at the company. The interview data also provided evidence for the content validity of these survey questions, which respondents interpreted consistently and in accordance with the intended construct.

3.3.2 Control variables

We wished to account for the effects of formal structure on the emergence of informal task-related networks. To control for prescribed task interdependence in the design of formal roles (as distinct from emergent task ties between occupants of those roles), we asked the general manager, who had designed the company's formal structure, to answer the following question for each time period: "Task interdependence is the extent to which an employee in a certain position needs input from an employee in another position to be able to get the job done, and therefore is required to interact with somebody because of the nature of their job. Some positions are highly interdependent as they rely on each other's input a lot. Other positions can operate relatively independently from one another, so that the people occupying them do not need to interact very often. For each two positions in the organization, please indicate their degree of task interdependence (0 = no interdependence; 1 = low interdependence; 2 = medium interdependence; and 3 = high interdependence). As you assess task interdependence, think about the nature of the formal role, and not the specific two people that occupy those positions." To control for effects of hierarchical interdependence between occupants of super- and subordinate positions, we used the formal organizational chart to construct indicator variables for whether the respondent reported to (a variable we labeled *to superior*) or supervised (*to subordinate*) each person he or she rated in the survey.

To account for homophily as a driver of social relationships (Lott and Lott 1964; McPherson,

Smith-Lovin, and Cook 2001; Newcomb 1961; Segal 1974), we asked management to provide us with demographic data on all employees, which we then used to construct indicator variables for *same gender* and *same nationality*. To define shared nationality, we identified four groups emerging from the interviewees' subjective assessment of cultural affinity with colleagues. We initially also included a control variable for *age difference* between source and target, but this was not significant in any of our preliminary analyses and, in the interest of parsimony, was not included in the final analyses. To measure similarity of functional background, we used the organizational chart to construct an indicator variable for whether two employees worked in the same department (*same department*).

To control for the role of perceived competence in the emergence of task-related networks, we created a measure of task competence based on the survey item "I seek out this person because he/she is competent." Based on the post-survey interviews, we found that the wording of this control question was ambiguous to two of the interviewed employees, who thought that it could be interpreted either as a direct assessment of alter's competence or as a question regarding the relative importance of competence as a criterion for ego's choices in each relationship. While we chose to nevertheless include this measure as a control, we verified with supplemental analyses that its omission had no meaningful impact on results.

3.4 Modeling approach

To accurately model the survey responses in our studies, we draw from established methodology in interpersonal perception models (Kenny 1994), social network analysis (Wasserman and Faust 1994), and Bayesian data analysis (Gelman, Carlin, Stern, and Rubin 1995; Hoff 2005).

First, Kenny (1994) provides a method for interpersonal perception data analysis by distinguishing among four components of interpersonal judgments: source, target, item, and relationship effects (see the Appendix for definitions). Theoretically, we are interested in the relationship effect,

the component of the rating that is unique to two people beyond the biases associated with how participants tend to respond to each survey item, and beyond the way each person rates and is rated by others.

Second, in field data, where the social relationships that are the basis for the surveyed interpersonal ratings do not occur in a controlled setting, effects associated with network structure are present in addition to the interpersonal perception effects discussed by Kenny (1994). Structure that arises from measured demographic and organizational variables can be modeled directly as effects associated with the joint attributes of the source and target nodes (for example gender, or supervisor-subordinate relationships). In addition, we wished to model effects associated with unmeasured network structure. Such structure may arise from unmodeled demographic or organizational characteristics, including homophilous affiliations. It can also arise endogenously due to transitivity of relationships and the tendency for cliques to emerge as a consequence. Our treatment of network structure is similar to Hoff's (2005), and estimates group structure and associated effects from the data. This approach adds structural bilinear terms to the model, which can be understood as latent groups in which each survey participant has a differing degree of membership. For instance, when the frequency of interaction or the affective ratings within a group of people are observed to be disproportionately high, the model 'discounts' the responses between any two of those people as an artifact of their common membership to a latent group—*e.g.*, a work team or a collocated group of employees. Hoff provides theoretical justification for the appropriateness of a bilinear model for network structure, and finds it to account well for the data of the networks tested.

Third, we elaborate on Kenny's (1994) social relations analysis to account for the non-independence of ratings across respondents in a field setting. To that end, we modeled correlation between the different relationship effects in a dyad, including correlation in the reciprocal relationship effects between two actors to control for reciprocity (e.g., if ego rates alter as

especially pleasant, alter may be more likely to give ego a higher pleasantness rating then he would otherwise). Likewise, we modeled correlation across different source and target effects. We took further steps to ensure correct estimates of interaction terms. Such estimates can be biased due to nonlinearities inherent to the survey instrument as some items exhibit skewness, with a disproportionate number of responses at 6 and 7. If not adequately modeled, this nonlinearity in responses, combined with correlated source and target effects, will lead to false positives for the interaction terms.

We base the Bayesian estimates on the distribution of model coefficients that are probabilistically consistent with the observed survey responses. We obtain the posterior distribution by simulation using Gibbs sampling, with parameters iteratively drawn from their full conditional, and using either non-informative or weak priors. Further details, including the data generation model and sampling distributions, are in the Appendix, along with the rationale for our modeling choices. In addition to modeling flexibility, a Bayesian approach is advantageous in that it yields a posterior distribution for the model parameters that reflects the amount of observed data. Because we asked survey participants to rate only people with whom they had interacted, the number of responses provided by survey participants varied. Some rated everyone else in the organization, while others provided ratings for fewer people. This implies that the amount of information at our disposal to estimate source and target effects and response coefficients varied across respondents. Bayesian statistics is well suited to such a structure, in that it produces estimates of coefficients and confidence ranges (or *credible intervals*) that directly reflect the differing amounts of information available, and without the need for a 'disattenuation' step (Kenny 1994).

Nevertheless, we performed checks on our results by applying standard regression methods, without modeling the finite and discrete response scale and without bilinear controls (but retaining controls for source and target effects as well as the demographic and formal structure variables). For the first-order coefficients, we found a pattern of results consistent with the results presented

here. However, as already noted, estimating multiplicative interaction terms can be problematic. Some items have a skewed distribution with a disproportionate number of responses towards the upper end of the scale, which leads to a degree of heteroskedasticity that is dependent on the source and target effects. For instance, the responses regarding an employee with high target effect will have below-average variance. Since the source and target effects are correlated across items, in misspecified models that do not account for the nonlinearity introduced by the bounded response scale and for the correlation of different source and target effects, several false positives for multiplicative terms in the relationship terms were observed.

We also checked for the possibility of bias being introduced when an employee selects another as a target in the survey at year t but not in the survey at year $t+1$, as this event may be partly explained by the responses in year t. We performed alternative models predicting responses to the survey item "I go to this person for work-related input," where we set non-selection to be equivalent to a response of "1" to this question instead of missing. This only had a marginal impact in the results, suggesting that using the pre-selection step in the survey is not a significant source of bias.

4 Results

Tables 1 and 2 present descriptive statistics for the variables included in the regression models. To provide information on potential changes in correlation patterns across the three time periods, we constructed two correlation tables. Table 1 includes the variables used to predict the four primary constructs (*I go to for input*, *useful*, *pleasant*, and *exciting*) at time 2. Table 2 includes the variables used to predict the four primary constructs at time 3. Demographic variables were constant across periods. All other variables are listed followed by a number in brackets that indicates whether the variable reported in the table was measured at time 1, 2 or 3. The patterns of correlation among variables are comparable across time periods.

Given the parsimony in survey questions and the use of single-item measures, we are constrained

with regards to the statistical checks of construct validity we can perform. With regard to internal consistency, if we interpret responses in each of the three surveys as multiple measures of the same construct (e.g., the ratings of pleasantness that each ego gave to each alter in year 1, year 2, and year 3) considering only the directed respondent-target pairs present in all three years (340) and based on the raw 1-7 responses, we obtain values for Cronbach's alpha between .78 and .83. This positive indication of internal consistency still allows for sufficient variability of interpersonal ratings over time: namely, correlations for each survey item between two subsequent periods averaged .60 (for example, Table 2 shows that the correlation coefficient between ratings of excitement in year 2 and ratings of excitement in year 3 was .58). These pairwise correlations indicate significant dynamics in interpersonal judgments over time—which are the focus of this study—while the Cronbach's alpha values indicate consistency in how respondents interpreted and answered survey questions. We used a similar approach to check discriminant validity, with a proxy based on considering responses in different years as retests. While the results of these checks are consistent with valid measures, the statistical validity of single-item measures can never be positively confirmed. More confidence in the measures comes from their prior use in empirical work, the clear and concise phrasing of questions representing well-established constructs in organizational theory and social psychology, the replication of prior findings using these constructs, and from post-survey interviews showing that respondents interpreted items consistently and in accordance with the intended construct.

For further checks of the soundness of our data-collection and analysis procedures as they relate to the estimation of system dynamics, we drew on dynamic systems theory for a formal mathematical analysis (Söderström 2002; Strang 1988).[1] We assessed whether a shorter or longer interval between surveys might have been preferable. There is an optimal sampling interval from the point of view of statistical efficiency: if the samples are taken too close to each other, not enough change will have taken place to allow us to estimate the dynamics by which relationships

[1]The details of this analysis are available from the authors.

in the organization evolve; if the samples are taken too far apart, so much change will have taken place that the organization is no longer recognizable, again making it impossible to estimate the dynamics. For the empirical coefficient estimates we obtain, and given the constraint on the number of surveys we could conduct, our analysis indicates that a one-year sampling interval is near optimal.

Tables 3 to 6 report the results of the models testing the predictions from our theory of affective primacy. The tables report the posterior-mean estimates of the coefficients for each predictor. The p-value is the two-sided significance of the population mean of the coefficient (to be either positive or negative), based on the simulated posterior distribution. In each model, the dependent variable is measured at time $t+1$, and the predictors are measured at time t. Since the survey-based items (*I go to for input*, *useful*, *pleasant*, and *exciting*) have similar variances, the units of the coefficients are approximately equal to expected change in survey-scale points in the dependent variable for a one-point change in the independent variable. The tables also report an estimate of the explained variance including controls (Snijders and Bosker 1999).

Table 3 presents models testing Hypothesis 1, which predicted a positive association between the affective value on a social relationship and its subsequent instrumental value. Model 1 includes only the control variables predicting instrumental value. As expected, the results indicate positive and statistically significant effects of formal structural variables, indicating that people deemed interactions with colleagues in task-interdependent formal roles, and in superior and subordinate formal roles, as useful to the accomplishment of work tasks. Relationships with colleagues perceived as competent were also rated as instrumentally useful, consistent with cognitive-consequentialist models of the choice of task partners in organizations (Borgatti and Cross 2003; Nebus 2006). By contrast, no form of attribute similarity has a significant impact on the relationship's perceived usefulness for task-related purposes. Model 2 introduces task ties, instrumental value, and excitement as predictors of subsequent instrumental value. All three variables have positive and statistically significant effects. The coefficient for excitement, in particular, supports Hypothesis 1. Model 3

substitutes excitement with pleasantness, which does not have a statistically significant effect on instrumental value, contrary to our theory, which predicted that any form of affective value would have a positive association with subsequent instrumental value, irrespective of the level of emotional activation. Our results suggest instead that only high-activation positive affect is predictive of the instrumental value people perceive to receive from a social relationship. Merely enjoying a relationship does not alter its instrumental value.

Table 4 presents models testing Hypothesis 2, which predicted a moderating role of task interaction on the positive association between affective value and subsequent instrumental value. The positive and statistically significant effects of the two interaction terms for task interaction and, respectively, excitement and pleasantness support Hypothesis 2. Consistent with our arguments on affective primacy and affect-congruent selective perception, task interaction provides an opportunity to reinforce the effects of affective value on subsequent instrumental value.

Table 5 presents models testing Hypothesis 3, which predicted a moderating role of the level of task interaction on the positive association between prior affective value and subsequent affective value. Models 8 and 9 have excitement as the dependent variable, while the dependent variable in models 10 and 11 is pleasantness. Models 8 and 10 include only the control variables. Both formal task interdependence and task competence are predictive of affective value. In contrast to the irrelevance of attribute similarity for the instrumental value of the relationship (see Tables 3 and 4), both shared departmental affiliation and demographic characteristics predict affective value, although working in the same department only increases excitement, not pleasantness. Unexpectedly, gender similarity has a negative effect on the affective value of the interaction. Rather than reflect interpersonal attraction across the sexes in the organization we studied, this reversal of oft-documented gender homophily may be attributable primarily to a number of conflictual relationships within the all-male management committee. Also notable is the positive effect of task interdependence on the affective content of the relationship, which suggests the tendency for employees to develop positive

feelings for those with whom they are required to perform joint tasks. The causal effects of task interdependence are consistent across pleasantness and excitement, indicating that working with people in complementary and interdependent roles increases the affective value of the relationship. Model 9 includes instrumental value as a predictor of affective value. The results indicate that the relationship's instrumental value explains the experience of neither excitement nor pleasantness. What makes a relationship acquire positive affective valence is not the perception of instrumental gain, but rather the substantive task interdependence with colleagues and the joint action it stimulates, as well as the perceived task competence of colleagues.

Model 9 also introduces the interaction term for excitement and task ties. The positive and statistically significant coefficient supports the prediction that greater exposure to that colleague will provide greater opportunity to reinforce prior affective responses. This reinforcement pattern did not bear out in the data when we measured affect as pleasantness (Model 11). The tables do not report models testing for alternative moderation patterns, including the interaction of instrumental value and task ties. None of these alternative moderation effects was statistically significant.

A natural question regarding the long-run implications of these dynamics is whether our empirical findings imply a self-reinforcing process that, should it continue unchecked, would eventually lead to a pattern of polarized relationships with extreme positive and negative affect. Drawing again on dynamic systems theory for a formal analysis, this question can be answered by solving the Lyapunov equation associated with the estimated system dynamics (Söderström 2002; Strang 1988; Hammarling 1982). An organization is unlikely to ever reach a steady-state probability distribution for the characteristics of relationships on account of, say, reorganizations and the evolving culture of the organization. Even if it did, we find that the theoretical limit is a moderate rather than extreme correlation between the variables of interest, consistent with the reported cross-sectional descriptive statistics. Given the estimated coefficients and the magnitude of unexplained variance,

the system exhibits considerable reversion to the mean and is therefore stable.[2] Indeed, each of the two interactions predicted in Hypothesis 2 and 3 added just one percent of explained variance to the model. The small magnitude of these effects suggests that they are unlikely to produce unrealistically influential patterns of reinforcement that would trivialize the effects of other predictors in the system over time. While appropriately small in magnitude, these effects do support our theoretical arguments, because they indicate that the proposed mechanisms are at play as predicted. This is in contrast with alternative moderation patterns that the theory did not predict and the data did not bear out. In assessing the magnitude of these reinforcement effects, what is critical is that their impact cumulates across time and over people in a sample like ours, where most relationships had been in existence for months or years; hence a small change at any point in these relationships can have a sizable influence over the life of an organization (Fichman 1999; Abelson 1985).

Table 6 presents models testing Hypothesis 4, which predicted that the affective value of a social relationship is more strongly predictive of a subsequent task tie when positive affect has higher levels of activation. Model 12 includes only the controls. Both formal task interdependence and subordinate and superior hierarchical interdependence significantly affect the likelihood of a task tie. These findings are indicative of the data's external validity, because they provide support for patterns of association between formal structure and emergent task-related ties that established organizational theory would predict (Durkheim 1933; Barnard 1938; Roethlisberger and Dickson 1939; Merton 1957; Lincoln 1982; Tichy and Fombrun 1979; Shrader, Lincoln, and Hoffman 1989). Likewise, task competence is also predictive of task ties, consistent with existing theorizing and empirical evidence (Borgatti and Cross 2003; Nebus 2006; Casciaro and Lobo 2008).

Models 13-15 test the distinct effects of affective value with higher and lower levels of activation on a subsequent task tie. Only the excitement experienced in the relationship predicts a subsequent task tie, while pleasantness does not, supporting Hypothesis 4. In addition, the positive effect of the

[2]The details of this analysis are available from the authors.

usefulness of the relationship for task-related purposes was no longer statistically significant when the excitement of the relationship was included in the model.[3] These findings cast the relationship's instrumental value in a less consequential light as a cause of task ties than is typically assumed. Neither the cognitive assessment of the relationship's instrumental value nor the relationship's pleasantness trigger a level of task interaction beyond that required by formal hierarchy, task interdependence, and a colleague's perceived competence. Rather, the evidence suggests that it is the feeling of excitement due to the expectation of future rewards that elicits the motivational state of positive activation necessary for task-oriented social action.

We summarize our findings in Figure 2. The arrows represent all statistically significant associations between variables measured at time t and variables measured at time t+1. The label "excitement" indicates that a link was statistically significant for high-activation positive affect but not for positive affect with low-to-neutral levels of activation. All predictions from affective primacy theory were supported, with the exception of Hypotheses 1 and 3 being supported for excitement but not for pleasantness. The most notable patterns are the prominence of task interdependence, task competence, and affective value for the dynamics of this organizational system over time. More specifically, high-activation positive affect drives the effects of affective value. The excitement experienced in the relationship stimulates both a task tie and the instrumental value a person ascribed to it through multiple direct and indirect paths. In contrast to the diffuse explanatory power of high-activation positive affect, instrumental value has no explanatory power over the affective value of social relationships. Rather, instrumental value is an outcome of formal-structural design and the relationship's affective value. Three variables in our model contribute to explaining affective value: attribute similarity, task interdependence, and perceptions of competence. The effect of task competence on affective value sheds light on the lack of a significant association between instru-

[3]This pattern of results does not constitute evidence for excitement as a mediator of the relationship between instrumental value and task ties, because instrumental value does not predict affective value in our data (Table 5).

mental value and affective value. The perceived competence of a colleague—with its potential to yield positive instrumental outcomes—is positively associated with the relationship's subsequent excitement and pleasantness, as well as the level of task interaction, even though the instrumental value of interacting with competent others does not, in itself, stimulate a subsequent task tie.

5 Discussion

We began our study with the consideration that task-related ties in organizations contain both instrumental motivations associated with the accomplishment of task goals and affective motivations related to the emotional rewards of social relationships. However, the lack of a systematic theory concerning the interplay of affective and instrumental content of task-related ties has limited our understanding of the role of affect in the formation of task networks in organizations. To contribute to this understanding, we proposed a theory of affective primacy in organizational networks that yields novel predictions about affect preceding a relationship's instrumental value and stimulating task ties independent of instrumental value. We put these predictions to the test using full-network longitudinal data from a naturalistic setting representative of common structural features of organizations. We thus contributed to filling an empirical gap in research on intraorganizational networks, because the few studies that have also analyzed the informal structure of an entire organization over time (Barley 1990; Burkhardt and Brass 1990; Lazega, Lemercier, and Mounier 2006) have done so focusing only on task-related networks and without accounting systematically for the effects of formal organizational structure. Our study complements this literature by measuring jointly formal structure and both affective and instrumental networks.

5.1 Theoretical implications

This study yields two primary findings. First, we document the primacy of affect in the relationship between instrumental and affective value of social relationships in organizations. We find that

the instrumental value that people attribute to relationships with coworkers has no effect on those relationships' affective value. By contrast, a relationship's affective value influences the perception of its instrumental value not only directly, but also indirectly. Specifically, affective value produces reinforcing patterns by inducing affect-congruent selective perception of a relationship's subjective value: once a social relation is tinged with affect, further task interactions reinforce previously held attitudes about the relationship's instrumental and affective value. Although these reinforcing patterns are small in magnitude—which ensures that they do not exercise an unrealistically dominant role in the interpersonal dynamics of the organization over time—their bearing out in the data has meaningful theoretical implications. Namely, by providing arguments and evidence for why such self-reinforcing patterns are unique to the affective content of the relationship and do not generalize to instrumental value, we extend the affective primacy hypothesis (Zajonc 1980; Murphy and Zajonc 1993) to organizational contexts. Affective responses to social relationships are more visceral than instrumental evaluations, and more likely to be processed impulsively than deliberately. As such, affective evaluations may be particularly consequential for the formation of task networks, because they act as rapidly-established and persistent filters of relational attitudes. These findings are consistent with, but also deepen, the conclusions reached by Casciaro and Lobo (2008) by demonstrating that the affective value people draw from relationships with colleagues is not merely a by-product of the relationship's instrumental value, but rather it is an independent antecedent of both task ties and how people perceive a relationship's contribution to accomplishing task goals.

Second, we show that the affective value of a social relationship has substantially different effects on the formation of task networks depending on its level of emotional activation. What stimulates task-oriented action in organizations is a motivational state of energized activation, rather than a feeling of contentment. The approach orientation that underlies task action, therefore, requires feeling energized, rather than feeling satisfied. Positive emotions with low-to-neutral levels of activation, such as pleasantness, signal that a goal has been reached and, therefore, further effort

is unnecessary; by contrast, positive high-activation emotions signal that a desirable end-state is possible, triggering eagerness to achieve (Barbalet 1998; Carver 2003; Buck 1988). Theories of affect in organizational networks should therefore be sensitive to the motivational foundations of social relationships. A failure to do so may yield misleading conclusions about the relevance, or irrelevance, of affect for task-related action in organizations. Lower-activation positive affect does, however, have indirect effects on the formation of task networks. Pleasantness is a determinant of excitement, such that people are more likely to find relationships with a coworker energizing when those relationships are also pleasant. In addition, pleasantness reinforces the association between task ties and instrumental value: the more people enjoy a coworker, the more they will find a task tie with that coworker helpful in accomplishing their assigned tasks.

5.2 Implications of affective primacy for managerial practice

Our findings indicate that two distinct logics can serve as stimuli for task ties. One is an instrumental logic, whereby organizational participants assess the value of interactions with coworkers with a transactional calculus devoid of affective content. The other is an affective logic, whereby organizational participants value interactions with coworkers because of the motivational state of energized activation they stimulate. Our results suggest that the levers available to managers to induce task-related social action differ across the instrumental logic and the affective logic (see Figure 2). The formal design of hierarchical interdependence between subordinate and superordinate roles is more likely to trigger instrumental forms of task interaction. By contrast, the formal design of task interdependencies and the induction of perceptions of similarity through recategorization processes (Gaertner, Mann, Murrell, and Dovidio 1989) are more likely to trigger affective forms of task interaction. With regards to task interdependence, we corroborate the classic social-psychological insight that the need to work closely together to achieve superordinate goals powerfully shapes the emotional content of social relationships (Sherif, Harvey, White, Hood, and

Sherif 1961; Sherif 1966). Managers, therefore, can trigger desired patterns of task interaction by linking formal roles through the design of meaningful joint tasks. Our findings are also consistent with the established notion that attribute similarity (McPherson, Smith-Lovin, and Cook 2001; Lott and Lott 1964) and related categorization and social identity mechanisms (Hogg and Terry 2000), are primary causes of interpersonal affective responses. Managers can induce perceptions of attribute similarity through recategorization processes that give organization members superordinate identities (Gaertner, Mann, Murrell, and Dovidio 1989). Unlike mere social contact, which can generate either positive and negative sentiment, especially when people feel forced to interact with one another (Miller and Brewer 1984), recategorization processes induce desired affective responses by shaping social identities directly (Mackie, Devos, and Smith 2000). For instance, simple manipulations of superordinate identity through symbols of group membership (*i.e.*, shared group name, proximity in the physical space, shared rewards for joint performance) can induce recategorization processes that stimulate desired task-related interactions, such as knowledge transfer (Kane 2010).

Task competence also emerges from our analysis as a critical lever through which managers can stimulate desired patterns of task interaction along both instrumental and affective logics of action. Perceived coworkers' competence stimulates task interactions directly and indirectly, by influencing both affective value and instrumental value. Competence matters, therefore, not because the instrumental value that stems from it has any effect on affective value (it does not), but because perceptions of competence lead people to seek coworkers out for task ties and to experience positive affect in interactions with them. These effects of competence do not change any of our results concerning affective primacy, but they enrich our findings with evidence of the relevance of colleagues' perceived task resources for task-related action.

The affective primacy we document should encourage managers to consider affective stimuli for task-oriented action as explicitly as oft-used instrumental incentives, because self-reinforcing motivation toward task goals is more likely to have affective bases than instrumental ones. Much

managerial practice, however, is still bound to a rational model of leadership that deals uncomfortably with the role of emotions in how people associate with others to perform their job. Therefore, managers tend to design formal structures and processes to encourage desired task interactions through instrumental incentives. Our results provide a new empirical and theoretical justification for directing a manager's attention to the emotional undertow of relational life in organizations, while also confirming the importance of formal-structural mechanisms.

5.3 Limitations and directions for future research

Despite its strengths, our research also has some limitations that point to avenues for future research. We could not fully capture the multiplicity of social identities people develop in organizational contexts, and therefore our data leave much unexplained about the determinants of affective value. Indeed, the variable with the largest predictive power on affective value was affect itself, in the form of either excitement or pleasantness. Future research should thus produce a fuller account of the structural and psychological forces that shape the emergence of affect in organizations.

Our investigation might be extended in other directions. We made a definite epistemological choice in our empirical strategy. A longitudinal field study documenting the development of task-related networks and affect in a naturalistic setting allowed us to investigate complex structural effects emerging over long periods of time, but has two clear limitations as a test of causality. First, ongoing relationships that precede the administration of a network survey foreclose the ability to capture the development of relationships from their onset. Second, during the three years of our study, the organization we analyzed did not experience events that affected comparable subunits in systematically different ways. This deprived us of the analytical power of testing our theory with proxies for treatment and control groups. While we traded off control for realism and contextual richness, future research can fruitfully complement our work with either laboratory or field experiments. An experimental design would also provide the opportunity for a direct

comparison between our theory of affective primacy and Lawler's (2001) affect theory of social exchange. Such a comparison was not the objective of the present study, and our empirical setting did not allow it. Yet, the two theories complement each other, and jointly testing predictions from both would provide additional insight into how social networks evolve as a result of the interplay of instrumental and affective responses to social encounters.

As for measurement strategy, the operationalization of both affective responses and instrumental tasks can be more nuanced than in this research. For instance, distinguishing between coordination tasks and conflict tasks might be germane (Thibaut and Kelley 1959). In conflict tasks, people achieve their goals by exploiting power differentials. Affective motivations may therefore play a different role in conflict tasks than in coordination tasks. Similarly, one can draw meaningful distinctions between specific interpersonal emotional responses. Lawler (2001) offered an elegant account of the discrete emotional responses social actors direct at the self and the other in social exchange. The positive affective responses on which we focused do not fully capture the complexity of the affective experience, as they account neither for negative emotions, such as anger and fear, nor for discrete positive emotions, such as pride and gratitude, that may be highly consequential in organizations. We also note the ambiguity with which a few respondents interpreted the survey item measuring competence, which may have biased estimates for the effects of both affective and instrumental value. In general, our study is limited by the use of single-item measures, which typically constrain network studies of organizations. Our model addressed several of the validity concerns associated with single-item measures, but it is advisable to replicate this research using alternative measurement strategies.

Future work could also investigate whether the primacy of affect we documented is contextually bound. We do not expect it to be, however, for several reasons. First, prior research has shown that interpersonal affective evaluations moderate the reliance on competence as a criterion for the choice of task partners independent of either organizational or task characteristics (Casciaro

and Lobo 2008), suggesting that these basic interpersonal responses may not vary significantly by context. Second, the organization we analyzed employed people of numerous nationalities, representing varying cultural norms concerning social interaction and work style. These cultural differences predicted the affective content of interactions, consistent with the principle of homophily, but they did not alter any of the other causal patterns, which may therefore generalize beyond the organization we studied. Third, we replicated well-established empirical results concerning the interplay of formal and informal structure in organizations (Durkheim 1933; Barnard 1938; Roethlisberger and Dickson 1939; Merton 1957; Lincoln 1982; Tichy and Fombrun 1979; Shrader, Lincoln, and Hoffman 1989), providing further reassurance about the generalizability of our findings. We acknowledge, however, cross-cultural network research suggesting that contextual factors may affect the interpersonal dynamics of network formation (Chua, Morris, and Ingram 2009). In addition, the organization we investigated is small, which not only limited our sample size but prevented us from assessing the generalizability of our theory to large organizations with more complex structural arrangements. Most importantly, evaluations of individual performance were largely subjective in our sample, which may have provided a particularly fertile ground for affective primacy. With more objective instrumental assessments, affective value may have a more limited role in the emergence of task-related networks.

These avenues for future inquiry notwithstanding, the evidence we provided for the role of affect in task-related networks is a building block for a relational theory of organizations that treats the emotional sphere of human interaction not just as a by-product of organizational life with little relevance for the instrumental sphere, but as a primary determinant of an organization's ability to pursue collective goals.

Acknowledgement

Thanks to Batia Weisenfeld and the anonymous reviewers, and to Katy DeCellles, Sarah Kaplan, Ned Welch and seminar participants at Stanford University, UC Berkeley, UCLA, Columbia University, and the Darden and McIntire schools of the University of Virginia for their comments on earlier drafts. The financial support of the Rotman School of Management and the Harvard Business Schools Division of Research is gratefully acknowledged.

Table 1: Standard deviation and correlation coefficients for variables in year 1 to year 2 regression.

		S.D.	1	2	3	4	5	6	7	8	9	10	11
1	I go to for input (1)	1.74											
2	Useful (1)	1.61	.70										
3	Exciting (1)	1.40	.33	.59									
4	Pleasant (1)	1.33	.27	.51	.67								
5	Competence (1)	1.24	.29	.54	.65	.68							
6	Task interdependence (1)	.87	.41	.38	.23	.13	.18						
7	To subordinate (1)	.19	.16	.04	.00	-.04	-.07	.19					
8	To boss (1)	.20	.17	.19	.12	.07	.10	.19	-.04				
9	Same department (1)	.47	.16	.12	.17	.03	.05	.18	.19	.18			
10	Same nationality (1)	.50	-.01	.06	.08	.14	.17	-.05	-.10	-.11	-.02		
11	Same gender (1)	.49	-.03	.00	.05	.00	.06	.03	.06	.07	.04	-.05	
	I go to for input (2)	1.83	.62	.52	.24	.17	.23	.38	.18	.20	.12	.00	-.02
	Useful (2)	1.60	.46	.54	.41	.32	.41	.41	.10	.15	.04	.05	.02
	Exciting (2)	1.48	.28	.41	.52	.41	.44	.19	-.01	.04	.06	.08	-.03
	pleasant (2)	1.36	.20	.34	.45	.51	.47	.16	-.03	-.04	-.03	.15	-.06

Table 2: Standard deviation and correlation coefficients for variables in year 2 to year 3 regression.

		S.D.	1	2	3	4	5	6	7	8	9	10	11
1	I go to for input (2)	1.79											
2	Useful (2)	1.52	.66										
3	Exciting (2)	1.32	.28	.53									
4	Pleasant (2)	1.16	.26	.55	.66								
5	Competence (2)	1.21	.33	.59	.62	.64							
6	Task interdependence (2)	.79	.36	.41	.15	.17	.18						
7	To subordinate (2)	.19	.14	.07	-.01	-.04	.03	.14					
8	To boss (2)	.19	.18	.17	.05	-.01	.05	.14	-.04				
9	Same department (2)	.48	.21	.16	.16	.11	.14	.29	.19	.22			
10	Same nationality (2)	.50	.09	.18	.17	.28	.29	.06	-.05	-.05	.04		
11	Same gender (2)	.50	-.07	-.06	-.04	-.06	-.01	-.01	.06	.06	-.09	-.04	
	I go to for input (3)	1.78	.72	.57	.31	.23	.29	.29	.22	.19	.28	.00	.02
	Useful (3)	1.62	.65	.67	.37	.35	.39	.33	.13	.20	.22	.05	.04
	Exciting (3)	1.45	.10	.39	.58	.50	.46	.14	-.01	.07	.15	.01	.04
	Pleasant (3)	1.22	.14	.36	.45	.60	.43	.18	.01	.07	.09	.12	.01

Table 3: Models testing Hypothesis 1.

Model	1	2	3
Dependent (t+1)	Useful	Useful	Useful
I go to		0.17 (0.04) •••	0.17 (0.04) •••
Useful		0.20 (0.05) •••	0.26 (0.05) •••
Exciting		0.14 (0.04) ••	
Pleasant			0.01 (0.05)
Competence	0.11 (0.02) •••	0.14 (0.04) •••	0.17 (0.04) •••
Task interdependence	0.86 (0.11) •••	0.43 (0.07) •••	0.42 (0.07) •••
To subordinate	1.02 (0.20) •••	0.55 (0.21) ••	0.57 (0.21) ••
To superior	1.26 (0.21) •••	0.63 (0.22) ••	0.61 (0.22) ••
Same department	-0.01 (0.08)	0.04 (0.09)	0.00 (0.09)
Same nationality	0.03 (0.08)	-0.17 (0.09)	-0.16 (0.10)
Same gender	-0.05 (0.06)	0.10 (0.08)	0.09 (0.08)
Explained variance	0.43	0.63	0.63

Time-dependent predictors are at time t; the dependent variable is at time $t + 1$.
• $p < .05$; •• $p < .01$; ••• $p < .001$.

Table 4: Models testing Hypothesis 2.

Model	4	5	6	7
Dependent (t+1)	Useful	Useful	Useful	Useful
I go to	0.17 (0.05) •••	0.18 (0.05) •••	0.17 (0.05) •••	0.18 (0.05) ••
Useful	0.21 (0.05) •••	0.27 (0.05) •••	0.20 (0.05) •••	0.27 (0.05) •••
Exciting	0.13 (0.04) ••		0.12 (0.04) •	
Pleasant		0.01 (0.05)		0.01 (0.05)
Competence	0.13 (0.04) •••	0.17 (0.04) •••	0.14 (0.04) •••	0.16 (0.04) •••
Task interdependence	0.43 (0.07) •••	0.40 (0.07) •••	0.44 (0.06) •••	0.41 (0.07) •••
To subordinate	0.47 (0.20) •	0.52 (0.20) ••	0.46 (0.19) •	0.50 (0.19) ••
To superior	0.54 (0.21) ••	0.48 (0.20) •	0.52 (0.21) •	0.48 (0.20) •
Same department	-0.04 (0.09)	0.00 (0.09)		
Same nationality	-0.16 (0.09)	-0.15 (0.09)		
Same gender	0.10 (0.08)	0.10 (0.08)		
(I go to)*(Exciting)	0.06 (0.03) •		0.07 (0.03) •	
(I go to)*(pleasant)		0.10 (0.04) ••		0.09 (0.04) •
Explained variance	0.64	0.64	0.64	0.64

Time-dependent predictors are at time t; the dependent variable is at time $t + 1$.
• $p < .05$; •• $p < .01$; ••• $p < .001$.

Table 5: Models testing Hypothesis 3.

Model	8	9	10	11
Dependent (t+1)	Exciting	Exciting	Pleasant	Pleasant
I go to		-0.06 (0.04)		-0.03 (0.04)
Useful		0.05 (0.05)		-0.03 (0.05)
Exciting		0.38 (0.05) •••		0.11 (0.05) •
Pleasant		0.13 (0.05) •		0.38 (0.05) •••
Competence	0.12 (0.02) •••	0.14 (0.04) •••	0.11 (0.02) •••	0.16 (0.04) •••
Task interdependence	0.31 (0.08) •••	0.14 (0.06) •	0.17 (0.05) •••	0.15 (0.06) •
To subordinate	0.04 (0.19)	-0.11 (0.19)	0.02 (0.17)	0.09 (0.18)
To superior	0.19 (0.19)	-0.10 (0.20)	0.20 (0.17)	0.09 (0.18)
Same department	0.32 (0.08) •••	0.07 (0.09)	0.14 (0.08)	-0.04 (0.08)
Same nationality	0.27 (0.07) •••	-0.17 (0.09)	0.22 (0.07) •••	-0.07 (0.09)
Same gender	-0.16 (0.06) ••	0.00 (0.08)	-0.15 (0.05) ••	-0.04 (0.07)
(I go to)*(Exciting)		0.10 (0.03) •••		
(I go to)*(Pleasant)				0.02 (0.03)
Explained variance	0.40	0.59	0.41	0.51

Time-dependent predictors are at time t; the dependent variable is at time $t + 1$.
• $p < .05$; •• $p < .01$; ••• $p < .001$.

Table 6: Models testing Hypothesis 4.

Model	12	13	14	15
Dependent (t+1)	I go to	I go to	I go to	I go to
I go to		0.33 (0.05) •••	0.35 (0.05) •••	0.32 (0.05) •••
Useful		0.08 (0.06)	0.18 (0.06) ••	0.09 (0.06)
Exciting		0.14 (0.05) ••		0.17 (0.06) ••
Pleasant			-0.02 (0.05)	-0.08 (0.06)
Competence	0.08 (0.02) •••	0.07 (0.05)	0.10 (0.05) •	0.10 (0.05) •
Task interdependence	0.73 (0.09) •••	0.38 (0.07) •••	0.33 (0.08) •••	0.37 (0.07) •••
To subordinate	1.22 (0.21) •••	0.91 (0.23) •••	0.92 (0.23) •••	0.90 (0.23) •••
To superior	1.92 (0.22) •••	1.03 (0.24) •••	1.02 (0.24) •••	1.06 (0.24) •••
Same department	0.15 (0.08)	0.09 (0.10)	0.09 (0.10)	0.08 (0.09)
Same nationality	0.20 (0.08) •	-0.09 (0.10)	-0.07 (0.10)	-0.08 (0.10)
Same gender	-0.05 (0.06)	0.06 (0.09)	0.03 (0.09)	0.06 (0.08)
Explained variance	0.49	0.65	0.64	0.65

Time-dependent predictors are at time t; the dependent variable is at time $t + 1$.
• $p < .05$; •• $p < .01$; ••• $p < .001$.

Figure 1. Predictions of affective primacy theory

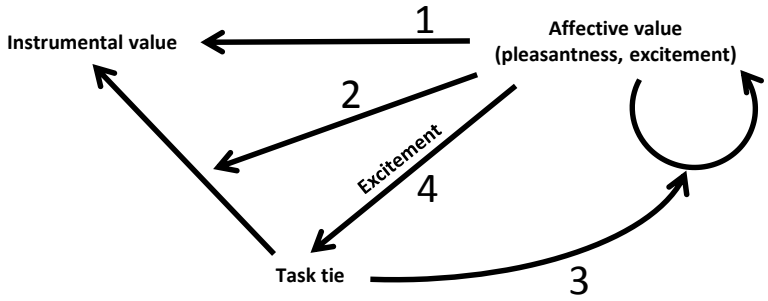
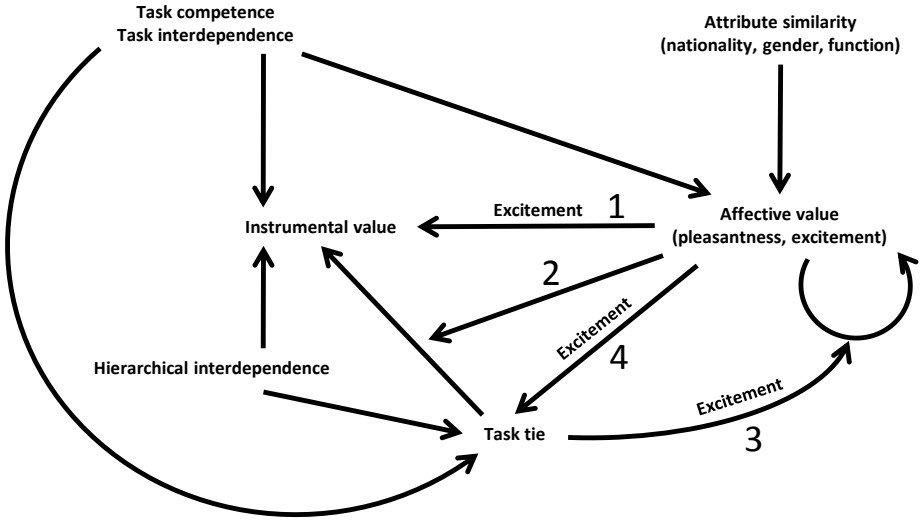


Figure 2. Observed relationships over time



Legend: Each arrow represents a statistically significant link observed between a variable measured at time t and a variable measured at time t+1 (with nationality and gender invariant). The two curved arrows jointly represent the moderation effect according to which the positive association between prior affective value and subsequent affective value increases with a higher level of task interaction. The label ``excitement'' indicates that a link was significant for high-activation positive affect but not for neutral-activation positive affect.

Appendix: Modeling Approach

There is now a significant and developing literature on Bayesian methods in social network analysis. See, for instance, Snijders (2002), Gill and Swartz (2004), Koskinen and Snijders (2007). This literature has largely focused on binary data. Given the nature and size of our dataset, dichotomizing the survey responses makes it infeasible to make inferences regarding their changes over time. Hoff (2005) developed a modeling approach that does not have this restriction. This model proceeds by estimating group structure and associated effects from the data by adding structural bilinear terms to the model, which can be understood as latent groups in which each survey participant has a differing degree of membership.

This approach addresses concerns with the structure of interpersonal judgments and with the non-independence of network data as two sources of type I errors. The first is that correlations may exist between survey items at the level of an unmodeled effect (the simplest being that the source effects are correlated across items because each person uses the survey scale differently). The other concern is that autocorrelation due to network structure reduces the effective sample size, yielding misleading estimates of statistical significance and increasing the likelihood of spurious correlations. The approach we follow allows us to account for structural confounds and associated autocorrelation as they emerge in a data-driven approach (in contrast, statistical procedures such as QAP make assumptions about the correlation structure that may not be reflected in the actual interaction behavior of participants) (Lobo and Casciaro 2008).

The data-generation model and parameter estimation procedures mostly follow either Hoff (2005) or Casciaro and Lobo (2008). In the following, we index by i the person being rated (or target, alter), and by j the person responding to the survey (or perceiver, source, ego). The index k refers to the variables, either survey items or other control variables, with K_x the number of independent variables (survey items) and K_z the number of control variables (measures of demographic characteristics and formal structure) in the model. We denote the dependent variable

by the index $k = 0$. Note that this variable is measured at time $t + 1$ (responses in years 2 and 3), while all other variables are measured at time t (responses in years 1 and 2).

Consistent with social relation models (Kenny 1994) for interpersonal perception survey data, we included in our model the following four components of interpersonal judgments from survey measures: (1) c_k, an *item effect*, whereby some survey questions elicit different responses than others (for instance, across all respondents in a given organizational context, evaluations of pleasantness may be generally higher than evaluations of instrumental usefulness); (2) b_{jk}, a *source effect*, whereby people use the survey scale differently, in that some respondents tend to enter systematically higher ratings than others; (3) a_{ik}, a *target effect*, whereby some people are rated in systematically different ways by the group (with certain individuals generally considered more pleasant than others, for instance); and (4) e_{ijk}, a *relationship effect*, which is the component of the rating that is unique to two specific people, beyond the biases associated with the survey item and beyond the way each person rates and is rated by others. As in social relations models, the effects are modeled as additive, that is $c_k + b_{jk} + a_{ik} + e_{ijk}$. Since our theory is concerned with dyadic choices of interaction partners, we are interested in the statistical association of relationship terms across items.

Source and target effects are row and column effects in the sociomatrix. Item effects are the matrix effects for each survey item. Further network effects are modeled to avoid false positives due to autocorrelation structure they may introduce. Structure that arises from measured demographic and organizational variables is modeled directly.

However, unlike experimental tests using the social relations model where, by design, no further structure should be present, field data requires additional controls for network structure. We follow Hoff (2005) in our treatment of unmeasured network structure, which may follow from unmeasured variables or arise endogenously due to transitivity of relationships. The bilinear structural effects include, for each term $l = 1, \ldots, L$, weights u_{il} and v_{jl} associated with each target and source. A

weight λ_{kl} is associated with variable k and bilinear term l. This allows the structure to be present to different degrees in each survey item. Overall, the model is then

$$x_{ijk} = c_k + b_{jk} + a_{ik} + \sum_{l=1}^{L} \lambda_{kl} u_{il} v_{jl} + e_{ijk}.$$

The vector of source and target effects for each person over all survey items (including dependent variable) is

$$[a_{i0}\ a_{i1}\ \cdots\ a_{iK_x}\ b_{i0}\ b_{i1}\ \cdots\ b_{iK_x}]' \sim \mathcal{N}\left(0, \Sigma_{ab}\right).$$

The $2+2K_x \times 2+2K_x$ covariance matrix Σ_{ab} estimates the variance of the source and target effects, as well as the covariance between different node-specific effects (*e.g.*: do people who, on average, are rated higher on 'useful' by others tend to be, also on average, rated higher or lower on 'energizing' by others; or, do people who, on average, give higher 'I go to' ratings to others tend to receive, also on average, higher or lower 'pleasant' ratings). We gave Σ_{ab} a weak inverse-Wishart prior to ensure a proper posterior. Unsurprisingly, its posterior distribution was wide in all models: it is not possible to make meaningful inferences regarding node-level effects with the relatively small number of people in the study.

The vector of relationship effects associated with each dyad ij (including reciprocals, but excluding the dependent variable) is

$$[e_{ij1}\ e_{ij2}\ \ldots\ e_{ijK_x}\ e_{ji1}\ e_{ji2}\ \ldots\ e_{jiK_x}]' \sim \mathcal{N}\left(0, \Sigma_e\right).$$

The $2K_x \times 2K_x$ covariance matrix Σ_{ab} estimates the variance of the relationship terms, as well as the covariance between different relationship terms in a dyad. For example, the covariance between ij for 'useful' and ji for 'pleasant' pertains to whether, in dyads where one person rates the other high on 'useful', the reciprocal 'pleasant' rating tends to be higher or lower. Since the e_{ijk} have, by construction, the same distribution as their reciprocals e_{jik}, Σ_e is subject to additional constraints: we constrained the diagonal blocks to be identical, and the off-diagonal blocks to be symmetric. To obtain a correct sample, a covariance matrix $\Sigma^+ \in \mathbf{R}^{K_x \times K_x}$ is drawn inverse-Wishart based on the

current samples of $(e_{ij} + e_{ji})/2$, and a covariance matrix $\Sigma^- \in \mathbf{R}^{K_x \times K_x}$ is drawn inverse-Wishart based on the current samples of $(e_{ij} - e_{ji})/2$. A sample of the covariance of the relationship effects (including reciprocals) in a dyad is then constructed as

$$\Sigma_e = \begin{bmatrix} \Sigma^+ + \Sigma^- & \Sigma^+ - \Sigma^- \\ \Sigma^+ - \Sigma^- & \Sigma^+ + \Sigma^- \end{bmatrix}.$$

The vector of latent memberships as source and receiver for each person is

$$[u_{il}, v_{il}]' \sim \mathcal{N}(0, \Sigma_{uvl}).$$

We estimated the correlation between 'strength of membership' as a source and as a target in each bilinear term is estimated via the 2×2 covariance matrices $\Sigma_{uv1}, \ldots, \Sigma_{uvL}$. To avoid having to impose strong priors on both Σ_{uv} and λ_{kl} (which can thus receive an improper uniform prior), we constrained the vectors $[\lambda_{0l}, \lambda_{1l}, \ldots, \lambda_{K_x l}]$ to add to $K_x + 1$. Note that the distribution of the u_{il} and v_{jl} is zero-mean, as otherwise this would allow for additional item, row, and column effects.

For a simpler interpretation of results, we included additional terms for the effects of the independent variables in the dependent variable and the e_{ij0} for the independent variable are normal and independent of the other relationship terms. The coefficients β_k for survey items apply to the relationship terms. The coefficients γ_k associated with control variables Z_k (such as indicator demographic variables) apply to the variables as measured. A coefficient α for the interaction between two relationship effects is included when appropriate. All coefficients are given improper uniform priors. In summary,

$$x_{ij0} = c_0 + b_{j0} + a_{i0} + \sum_{l=1}^{L} \lambda_{0l} u_{il} v_{jl} + \sum_{k=1}^{K_x} \beta_k e_{ijk} + \alpha\, e_{ij1} e_{ij2} + \sum_{k=1}^{K_z} \gamma_k Z_{ijk} + e_{ij0}.$$

We chose the link from the continuous x_{ijk} to the discrete survey responses X_{ijk} for simplicity and model fit. Each survey response X_{ijk} on the Likert-like scale is assumed to be the observation of the continuous x_{ijk} rounded to the nearest integer from 1 to 7. If $X_{ijk} = 6$, for instance, the

likelihood of x_{ijk} is zero outside of $[5.5, 6.5]$, and if $X_{ijk} = 7$ it is zero below 6.5. The full conditional is drawn from a truncated normal distribution.

We obtained the posterior distribution by simulation using Gibbs sampling, with all parameters drawn in blocks from their joint conditional distributions with either non-informative or weak priors. The sampler iterates the following steps in the stated order.

1. Each c_k is drawn normal conditional on all other parameters.

2. The b_{jk} are drawn jointly normal conditional on all other parameters.

3. The a_{ik} are drawn jointly normal conditional on all other parameters.

4. Σ_{ab} is drawn inverse-Wishart conditional on the a_{ik} and b_{jk}.

5. The u_{il} are drawn jointly normal, conditional on the v_{jl} and all other parameters.

6. The v_{jl} are drawn jointly normal, conditional on the u_{il} and all other parameters.

7. The λ_{kl} are drawn jointly normal, conditional on all other parameters (and on adding to $K_x + 1$).

8. Each Σ_{uvl} is drawn inverse-Wishart conditional on the u_{il} and v_{jl}.

9. The β_k, α, and γ_k are drawn from a joint normal distribution conditional on all other parameters.

10. Σ_e is drawn conditional on all other parameters (and therefore on the e_{ijk}): Σ^+ is drawn inverse-Wishart conditional on the $(e_{ijk} + e_{jik})/2$, and Σ^- likewise from the $(e_{ijk} - e_{jik})/2$; Σ_e is then updated. The covariance for the relationship effects in the independent variable is likewise drawn.

11. The x_{ijk} are drawn from a truncated normals, conditional on all other parameters.

The c_k are initialized with the item means, the b_{jk} and a_{ik} with the column and row means (after subtracting the item mean). The u_{il} and v_{jl} are initialized based on the singular value decomposition of an average of the sociomatrices (after subtracting the initial item, row, and column effects), and the λ_{kl} to one. The coefficients β_k, α, and γ_k are initialized based on a simple regression, after further subtracting the initial bilinear terms. All covariances are initialized to the corresponding point estimates. The x_{ijk} are initialized to X_{ijk}.

We coded the sampler in MATLAB[4]. We ran the simulations for up to 40,000 trials, and estimated the posterior from the second half of the chain. After subsampling every 20 iterations, the chain was sufficiently decorrelated. To determine the number of terms to include in the model, we considered model fit based on an information criterion (Hoff 2005). On different models the optimal number of terms varied from zero to two and, because a single term was judged to be acceptably close to optimal in all cases, for comparability we ran all models with a single structural term (which leads to about 200 real-valued model parameters for this structural control).

[4]Note, however, that the Gibbs sampling package JAGS has recently implemented extensions to the BUGS language that permit the implementation of this model, which should greatly facilitate future work and wider adoption of similar models.

References

Abelson, R. 1985. "A variance explanation paradox: When a little explains a lot." *Psychological Bulletin* 97:129–133.

Abelson, R.P., E. Aronson, W.J. McGuire, T.M. Newcomb, M.J. Rosenberg, and P.H. Tannenbaum. 1968. *Theories of Cognitive Consistency: A Sourcebook*. Chicago: Rand McNally.

Ambady, N., F.J. Bernieri, and J.A. Richeson. 2000. "Toward a histology of social behavior: Judgmental accuracy from thin slices of the behavioral stream." *Advances in Experimental Social Psychology* 32:201–263.

Asch, S.E. 1946. "Forming impressions of personality." *Journal of Abnormal Social Psychology* 42:258–290.

Barbalet, J.M. 1998. *Emotion, Social Theory, and Social Structure*. Cambridge, UK: Cambridge University Press.

Barley, S.R. 1990. "The alignment of technology and structure through roles and networks." *Administrative Science Quarterly* 35:61–103.

Barnard, C.I. 1938. *The Functions of the Executive*. Cambridge: Harvard University Press.

Blanchette, I. and A. Richards. 2004. "Reasoning about emotional and neutral materias: Is logic affected by emtion?" *Psychological Science* 15:745–752.

Borgatti, S.P. and R. Cross. 2003. "A relational view of information seeking and learning in social networks." *Management Science* 49:432–445.

Borgatti, S.P. and P.C. Foster. 2003. "The network paradigm in organizational research: A review and typology." *Journal of Management* 29:991–1013.

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

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

Buck, R. 1988. *Human motivation and emotion*. John Wiley & Sons.

Burkhardt, M.E. and D.J. Brass. 1990. "Changing patterns or patterns of change: The effects of a change in technology on social network structure and power." *Administrative Science Quarterly* 35:104–127.

Campos, J.J. and C. Stenberg. 1981. "Perception, appraisal, and emotion: The onset of social referencing." In *Infant Social Cognition: Empirical and Theoretical Considerations*, edited by M.E. Lamb and L.R. Sherrod. Hillsdale, NJ: Erlbaum.

Carver, C.S. 2003. "Pleasure as a sign you can attend to something else: Placing positive feelings within a general model of affect." *Cognition and Emotion* 17:241–61.

Casciaro, T. and M.S. Lobo. 2008. "When competence is irrelevant: The role of interpersonal affect in task-related ties." *Administrative Science Quarterly* 53:655–684.

Chua, R.Y.J., M.W. Morris, and P. Ingram. 2009. "Guanxi vs networking: Distinctive configurations of affect- and cognition-based trust in the networks of Chinese vs American managers." *Journal of International Business Studies* 40:490–508.

Clark, M.S. and I. Brissette. 2001. "Relationship beliefs and emotion: Reciprocal effects." In *Emotions and Belief: How Feelings Influence Thoughts*, edited by N. Frijda, A. Manstead, and G. Simin. New York: Cambridge University Press.

Collins, R. 1993. "Emotional energy as the common denominator of rational action." *Rationality and Society* 5:203–230.

Collins, R. 2004. *Interaction ritual chains*. Princeton University Press.

Dalton, M. 1959. *Men Who Manage*. New York: Wiley.

Diener, E. and R.A. Emmons. 1984. "The independence of positive and negative affect." *Journal of Personality and Social Psychology* 47:1105–1117.

Dion, K., E. Walster, and E. Berscheid. 1972. "What is beautiful is good." *Journal of Personality and Social Psychology* 24:285–290.

Durkheim, E. 1933. *The Division of Labor in Society*. New York: Macmillan.

Eagly, A.H. and S. Chaiken. 1998. "Attitude structure and function." In *The Handbook of Social Psychology*, edited by D.T. Gilbert, S.T. Fiske, and G. Lindzey. McGraw-Hill.

Eisenkraft, N. and H.A. Elfenbein. 2010. "The way you make me feel: Evidence for individual differences in affective presence." *Psychological Science* 21:60–70.

Festinger, L. 1957. *A Theory of Cognitive Dissonance*. Palo Alto, CA: Stanford University Press.

Fichman, M. 1999. "Variance explained: Why size does not (always) matter." *Research in Organizational Behavior* 21:295–331.

Fiske, S.T., A.J.C. Cuddy, and P. Glick. 2006. "Universal dimensions of social cognition: Warmth and competence." *Trends in Cognitive Science* 11:77–83.

Foo, M.D., M.A. Uy, and R.A. Baron. 2009. "How Do Feelings Influence Effort? An Empirical Study of Entrepreneurs' Affect and Venture Effort." *Journal of Applied Psychology* 94:1086–1094.

Fredrickson, B.L. 2001. "The role of positive emotions in positive psychology - The broaden-and-build theory of positive emotions." *American Psychologist* 56:218–226.

Gaertner, S.L., J. Mann, A. Murrell, and J.F. Dovidio. 1989. "Reducing intergroup bias: The benefits of recategorization." *Journal of Personality and Social Psychology* 57:239–249.

Gelman, A., J.B. Carlin, H.S. Stern, and D.B. Rubin. 1995. *Bayesian Data Analysis*. Chapman & Hall/CRC.

Gill, P.S. and T.B. Swartz. 2004. "Bayesian analysis of directed graphs data with applications to social networks." *Journal of the Royal Statistical Society: Series C (Applied Statistics)* 53:249–260.

Hammarling, S. J. 1982. "Numerical Solution of the Stable, Non-negative Definite Lyapunov Equation Lyapunov Equation." *IMA Journal of Numerical Analysis* 3:303–323.

Hinds, P.J., K.M. Carley, D. Krackhardt, and D. Wholey. 2000. "Choosing work group members: Balancing similarity, competence, and familiarity." *Organizational Behavior and Human Decision Processes* 81:226–251.

Hoff, P. 2005. "Bilinear mixed-effects models for dyadic data." *Journal of the American Statistical Association* 100:286–295.

Hogg, M.A. and D.J. Terry. 2000. "Social identity and self-categorization processes in organizational contexts." *Academy of Management Review* 25:121–140.

Homans, G.C. 1950. *The Human Group*. New York: Harcourt, Brace and World.

Izard, C.E. 1991. *The Psychology of Emotions*. New York: Plenum Press.

Kahneman, D. 2011. *Thinking fast and slow*. Farra, Straus and Giroux.

Kane, A.A. 2010. "Unlocking knowledge transfer potential: knowledge demonstrability and superordinate social identity." *Organization Science* 21:643–660.

Kenny, D.A. 1994. *Interpersonal Perception: A Social Relations Analysis*. The Guilford Press.

Koskinen, J.H. and T.A.B. Snijders. 2007. "Bayesian inference for dynamic social network data." *Journal of statistical planning and inference* 137:3930–3938.

Krackhardt, D. 1999. "The Ties that Torture: Simmelian Tie Analysis in Organizations." *Research in the Sociology of Organizations* 16:183–210.

Lawler, E.J. 2001. "An affect theory of social exchange." *American Journal of Sociology* 107:321–352.

Lawler, E.J. and J. Yoon. 1996. "Commitment in exchange relations: Test of a theory of relational cohesion." *American Sociological Review* 61:89–108.

Lazega, E., C. Lemercier, and L. Mounier. 2006. "A spinning top model of formal organization and informal behavior: dynamics of advice networks among judges in a commercial court." *European Management Review* 3:113–122.

Leary, M.R. 2000. "Affect, cognition, and the social emotions." In *Feeling and Thinking*, edited by J.P. Forgas. Cambridge: Cambridge University Press.

Lincoln, J.R. 1982. "Intra- (and inter-) organizational networks." In *Research in the sociology of organizations*, edited by S.B. Bacharach. Greenwich, Conn.: JAI Press.

Lindenberg, S. 1997. "Grounding groups in theory: Functional, cognitive, and structural interdependencies." *Advances in Group Processes* 14:281–331.

Lobo, M.S. and T. Casciaro. 2008. *The Quadratic Assignment Procedure (QAP) and Bayesian estimates of social networks with autocorrelation structure*. Duke University: Working paper.

Lott, A.J. and B.E. Lott. 1964. "Group cohesiness as interpersonal attraction: A review of relationships with antecedent and consequent variables." *Psychological Bulletin* 64:259–309.

Mackie, D.M., T. Devos, and E.R. Smith. 2000. "Intergroup emotions: Explaining offensive action tendencies in an intergroup context." *Journal of Personality and Social Psychology* 79:602–616.

Mayo, E. 1945. *The Social Problems of an Industrial Civilization*. Boston: Graduate School of Business Administration, Harvard University.

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

Merton, R.K. 1957. "The role-set: problems in sociological theory." *British Journal of Sociology* 8:106–120.

Miller, N. and M. Brewer. 1984. *Groups in contact: the psychology of desegregation*. Academic Press.

Mishra, H., A. Mishra, and D. Nayakankuppam. 2007. "Seeing through the heart's eye: The interference of System 1 in System 2." *Management Science* 26:666–678.

Murphy, S.T. and R.B. Zajonc. 1993. "Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures." *Journal of Personality and Social Psychology* 64:723–739.

Nebus, J. 2006. "Building collegial information networks: A theory of advice network generation." *Academy of Management Review* 31:615–637.

Newcomb, T.M. 1961. *The Acquaintance Process*. New York: Holt, Rinehart and Winston.

Osgood, C.E. 1962. "Studies on the generality of affective meaning systems." *American Psychologist* 17:10–28.

Parkinson, B. 1996. "Emotions are social." *British Journal of Psychology* 87:663–683.

Phelps, E.A. 2004. "The human amygdala and awareness: Interactions between emotion and cognition." In *The cognitive neuroscience*, edited by M.S. Gazzaniga. Ca,bridge, MA: MIT Press.

Rich, B.L., J.A. Lepine, and E.R. Crawford. 2010. "Job engagement: Antecedents and effects on job performance." *Academy of Management Journal* 53:617–635.

Roethlisberger, F.J. and W.J. Dickson. 1939. *Management and the Worker*. Cambridge, MA: Harvard University Press.

Russell, J.A. 1980. "A circumplex model of affect." *Journal of Personality and Social Psychology* 39:1161–1178.

Scott, W.R. 1998. *Organizations: Rational, natural, and open systems*. New Jersey: Prentice Hall.

Segal, M.W. 1974. "Alphabet and attraction: An unobtrusive measure of the effect of propinquity in a field setting." *Journal of Personality and Social Psychology* 30:654–657.

Sherif, M. 1966. *In common predicament: Social psychology of intergroup conflict and cooperation*. Boston: Houghton Mifflin.

Sherif, M., O.J. Harvey, J. White, W. Hood, and C. Sherif. 1961. *Intergroup Conflict and Cooperation: The Robber's Cave Experiment*. Institute of Intergroup Relations: Norman: University of Oklahoma.

Shrader, C.B., J.R. Lincoln, and A.N. Hoffman. 1989. "The networks structures of organizations - Effects of task contingnecies and distributional form." *Human Relations* 42:43–66.

Simmons, J.P. and L.D. Nelson. 2006. "Intuitive confidence: Choosing between intuitive and nonintuitive alternatives." *Journa of Experimental Psychology* 135:409–428.

Slater, P.E. 1955. "Role differentiation in small groups." *American Sociological Review* 20:300–310.

Sloman, S.A. 1996. "The empirical case for two systems of reasoning." *Psychological Bulletin* 119:3–22.

Snijders, T.A.B. 2002. "Markov chain Monte Carlo estimation of exponential random graph models." *Journal of Social Structure* 3:1–40.

Snijders, Tom and Roel Bosker. 1999. *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*. London: Sage Publications.

Söderström, T. 2002. *Discrete-time stochastic systems*. Springer, 2 edition.

Strack, F. and R. Deutsch. 2004. "Reflective and impulsive determinants of social behavior." *Personality and Social Psychology Review* 8:220–47.

Strang, G. 1988. *Linear Algebra and Its Applications*. Thomson Learning, 3 edition.

Thagard, P. 2006. *Hot thought: mechanisms and applications of emotional cognition*. MIT Press.

Thibaut, J.W. and H.H. Kelley. 1959. *The Social Psychology of Groups*. New York: Wiley.

Tichy, N. and C. Fombrun. 1979. "Network analysis in organizational settings." *Human Relations* 32:923–965.

Vytal, K. and S. Hamann. 2010. "Neuroimaging support for discrete neural correlates of basic emotions: a Voxel-based meta-analysis." *Journal of Cognitive Neuroscience* 22:2864–2885.

Warr, P. and I. Inceoglu. 2012. "Job Engagement, Job Satisfaction, and Contrasting Associations With Person-Job Fit." *Journal of Occupational Health Psychology* 17:129–138.

Wasserman, S. and K. Faust. 1994. *Social Network Analysis: Methods and Applications*. Cambridge University Press.

Watson, D. and A. Tellegen. 1985. "Toward a consensual structure of mood." *Psychological Bulletin* 98:219–235.

Wojciszke, B. 2005. "Affective concomitants of information on morality and competence." *European Psychologist* 10:60–70.

Zajonc, R.B. 1980. "Feeling and thinking: Preferences need no inferences." *American Psychologist* 35:151–175.