

AFFECTIVE PRIMACY IN INTRAORGANIZATIONAL TASK NETWORKS

Tiziana Casciaro, University of Toronto¹ Miguel Sousa Lobo, INSEAD²

December 22, 2012

¹Rotman School of Management, Toronto, ON M5S 3E6, t.casciaro@utoronto.ca

²INSEAD, Abu Dhabi Campus, PO Box 48049, Abu Dhabi, UAE, miguel.lobos@insead.edu

AFFECTIVE PRIMACY IN INTRAORGANIZATIONAL TASK NETWORKS

Abstract

To better understand the causal role of affect in the formation of task-related networks in organizations, we develop a theory of affective primacy that identifies cognitive and motivational mechanisms through which the affective value of social interactions (a feeling of positive affect from interacting with a colleague) operates as a cause of instrumental value (a subjective evaluation of an interaction's contribution to accomplishing assigned tasks). We test this theory with longitudinal whole-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 the affective value of social interactions influences both perceptions of instrumental value and the formation of task-related ties through multiple causal paths not accounted for by either instrumental value or formal-structural requirements. The results also indicate that the causal role of affective value in 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 enjoyment (a subjective state of feeling gratified). We discuss implications of these findings for organizational theory and managerial practice.

1 Introduction

Several advances in organizational theory rest on the insight that although organizations are formally designed to regulate behavior in the service of task goals, patterns of task interaction among organizational participants that only partly reflect formal structures unavoidably emerge (Barnard 1938; Roethlisberger and Dickson 1939; Mayo 1945; Dalton 1959; Homans 1950). These emergent task networks influence a wide range of organizational processes and outcomes (Borgatti and Foster 2003; Brass, Glaskiewicz, Greve, and Tsai 2004). Because of their pervasive effects on organizational functioning, understanding how task networks form is critical to both theory and practice. To further this understanding, we consider evidence that task ties—dyadic patterns of recurrent task interaction between organization members—exhibit a coexistence of instrumental motivations related to the accomplishment of task goals and affective motivations related to the emotional rewards of social interaction (Roethlisberger and Dickson 1939; Homans 1950; Bales 1950; Slater 1955; McAllister 1995; Krackhardt 1999; Hinds, Carley, Krackhardt, and Wholey 2000; Brass 1984; Ibarra 1992).

Although task-related ties have both instrumental and affective content, scholars know little about how people attribute to interactions with coworkers either instrumental value (a subjective evaluation of an interaction’s contribution to accomplishing assigned tasks) or affective value (a feeling of positive affect from interacting with a colleague), and how instrumental and affective value influence each other over time. This theoretical gap prevents researchers from establishing the causal role of affect in the emergence of task networks, and thus identify levers through which organizations may induce desired task-oriented social behavior to pursue collective goals through joint action. For example, Casciaro and Lobo (2008) showed that the positive and negative feelings people harbor for colleagues moderate the relevance of task competence as a criterion for choosing work partners, but could not rule out the possibility that feelings for coworkers may be a by-product of the instrumental value of task interactions with them. It is unknown, therefore, whether we feel

positively about a colleague because she helps us accomplish our task goals, or rather we perceive a colleague as aiding our task goals because we feel positively about her.

In this paper, we examine the causal relationship between instrumental value and affective value in social interaction. Which comes first? Existing theory proposes that instrumental value precedes affective value (Lawler 2001). It does not contemplate the possibility that affect may precede instrumental value, and operate as a cause of task-related ties independent of instrumental value. We advance such a possibility with a theory of affective primacy in task-related networks that identifies cognitive and motivational mechanisms through which the affective value of social interactions operates as a cause of both instrumental value and task-related ties. The theory has two components. The first identifies cognitive processes that give affective value causal primacy over instrumental value and create self-reinforcing causal relationships between affective value, task interaction, 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 enjoyment (positive affect with neutral-to-moderate activation)—to explain why the causal effect of positive affect in task-related networks is stronger as the level of activation in the positive affect generated by social interactions increases.

To test our theory of affective primacy, we use longitudinal whole-network survey data collected over three years in a small functional-form business organization, which allow us to evaluate the joint, reciprocal, and self-reinforcing effects of instrumental and affective dimensions 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 interaction

Formal structural design and task requirements routinely press organizational participants into social interactions they might not willingly choose. Within these constraints, however, task-related networks emerge that reflect discretionary choices of organizational participants based on the subjective value they see in interacting with different coworkers (Merton 1957). Two forms of value can be distinguished. The first is instrumental value: a subjective evaluation of an interaction'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 causal effect of an interaction's instrumental value on the formation of task-related ties, such that people will seek out those they perceive as aiding them in carrying out assigned tasks.

The second basis for task-related ties is affective value: a subjective feeling of positive affect from interacting with a colleague. Scholars have long recognized that people in an organization tend to supplement, erode, and transform (Scott 1998) 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), and can be defined in terms of two dimensions: valence and activation (Russell 1979; Russell 1980; Diener and Emmons 1984; Watson and Tellegen 1985; Clark and Watson 1988). Valence (or hedonic tone) is a subjective feeling of pleasantness and unpleasantness. Activation is a subjective state of feeling energized or de-energized. The affective value an individual draws from interactions with another person, therefore, can be characterized in terms of varying degrees of activation. Positive valence with high activation represents an excited, enthusiastic mood. A positive mood with high activation corresponds to a discrete emotion of ex-

citement (Cropanzano, Weiss, Hale, and Reb 2003), which is a subjective state of *feeling energized* based on the expectation of future rewards (Izard 1991; Lawler and Yoon 1996; Buck 1988). Positive valence with neutral-to-moderate activation represents instead a pleasant, contented, happy mood. A positive mood with neutral-to-moderate activation corresponds to a discrete emotion of enjoyment (Cropanzano, Weiss, Hale, and Reb 2003), which is a subjective state of *feeling gratified* due to rewards received through the interaction (Izard 1991; Lawler and Yoon 1996; Buck 1988).

The distinction between affective and instrumental value in social interactions echoes, and yet also differs from, the distinction between warmth and competence as universal dimensions of interpersonal judgments, whereby “people everywhere differentiate each other by liking (warmth, trustworthiness) and respecting (competence, efficiency)” (Fiske, Cuddy, and Glick 2006). The warmth dimension captures traits related to perceived intent for good or ill, including friendliness, tolerance, helpfulness, and sociability. The competence dimension captures instead 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 to a person, 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 are likely to be saturated with affect (Wojciszke 2005), judging someone as warm does not necessarily imply experiencing emotions when interacting with that person. Warmth attitudes, as well as judgments of liking and disliking, can operate on a primarily cognitive basis, and thus are sub-optimal representations of the affective value people derive from social interaction. Indeed, Weiss and Cropanzano (1996) noted in their affective events theory that treating attitudes as affect has resulted in the misspecification of the affective experience at work. Likewise, constructs like closeness and friendship that are typically 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 notion of affective value captures directly the positive emotions an actor experiences when interacting with another. Our definition of affective value of social interaction is also distinct from the construct of *affective presence*, which concerns the moods that an individual tends to elicit across people she interacts with (Eisenkraft and Elfenbein 2010). Affective presence captures an individual difference in how alters, on average, tend to feel when they are with ego. Affective value, by contrast, is a dyadic construct that captures the positive emotions a specific ego tends to feel during interactions with a specific alter.

Instrumental value also differs from competence judgments. Perceiving someone as competent does not necessarily imply 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 derives from interactions with that colleague.

2.2 Affective value as a cause of instrumental value

Although both affective and instrumental value can be discerned 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, with interactions perceived as facilitating task goals generating positive emotions, and interactions

perceived as hindering task goals generating negative emotions. Social units—which can be dyads, groups or networks—are perceived 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 with relational commitment, which can take many forms, including staying in an existing relationship despite alternatives and expanding areas of collaboration among actors. In Lawler’s affect theory of social exchange, therefore, the instrumental value of the exchange has causal precedence over the 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 of the causal link between instrumental outcomes of the exchange and subsequent task-related ties, an interaction’s affective value may precede how instrumental value itself is perceived, as well as cause task-related ties independently of instrumental value. Two mechanisms are jointly responsible for this effect: affective primacy, and affect-congruent selective perception.

The bases of affective primacy in social interaction rest 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 with no sense of voluntary control; 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 interaction are likely to be regulated by impulsive, fast processing, rather than the reflective, slow processing that tends to regulate instrumental evaluations of an interaction. 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 glimpses of behavior (Ambady and Rosenthal 1993;

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 an interaction 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 an interaction is less susceptible to persuasion and deliberation than evaluations of instrumental value. Feelings are also more personal than instrumental evaluations. While the instrumental value of an interaction has to do with the task as an external object, the emotions felt in an interaction implicate the self directly (Zajonc 1980). For these combined reasons, the affective value of an interaction is likely to be established more quickly than its instrumental value.

Affective primacy in social interaction is the basis for cognitive biases that influence perceptions 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 the context of 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 substantial 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; Ambady and Rosenthal 1993), 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, over time, those who derive positive affect from the interaction will be more likely to perceive it as aiding them in the execution of work tasks.

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

The joint effect of affective primacy and affect-congruent selective perception also implies that task-related interaction 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 instrumental 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 interaction 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 interactions with a colleague, subsequent interactions will be perceived selectively 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 interaction's affective value.

Hypothesis 3: The magnitude of the positive association between prior affective value of a social interaction 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 interactions. These factors make the possibility of endlessly reinforcing cycles of affective and instrumental evaluations implausible. We consider explicitly such theoretical and empirical plausibility in the methods section.

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

So far, our theory of affective primacy has not differentiated between distinct forms of affective value, as 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 causal link between affective value and subsequent task interaction, 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 neutral-to-moderate activation positive affect (*i.e.*, enjoyment) operate differently as triggers of task-related social action due to their distinctive motivational foundations.

Forms of positive affect with higher and lower levels of activation map onto the two motivational orientations that underlie self-regulation: an avoidance (prevention) orientation that is concerned with vigilantly maintaining non-losses, and an approach (promotion) orientation that is concerned with eagerly pursuing gains (Higgins 1997; Carver, Sutton, and Scheier 2000). Approach concerns

aspirations and hopes, and movement toward a desired goal. It regulates the presence or absence of positive outcomes related to incentive-seeking behavior. Avoidance concerns safety and obligations, and movement away from an unwanted end state. It regulates the presence or absence of negative outcomes related to threat-avoidant behavior. Self-regulatory theory implies that social interactions that an individual perceives as moving away from potential losses generate positive affective responses with lower levels of activation (*e.g.*, calm and contentment) and social interactions that an individual perceives as moving closer to the pursuit of gains generate positive affective responses with high activation (*e.g.*, excitement and enthusiasm) (Higgins 1997; Carver, Sutton, and Scheier 2000). With regard to the effects of these emotional states on task interaction, high-activation emotions motivate goal-oriented action more than low-activation emotions (Carver 2003). Positive emotions with 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 the eagerness to achieve (Buck 1988). Applied to task ties, this suggests that social interactions eliciting positive affect with higher levels of activation should motivate greater effort and higher levels of task-oriented action than interactions 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 enjoyment does not necessarily motivate task-oriented action, and may in fact dampen it (Carver 2003). By contrast, the high-activation positive emotion of excitement has clearer theoretical links to task interaction. Social interactions that produce excitement should therefore result in greater motivation to engage in task-oriented action than enjoyable social interactions.

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

Figure 1 summarizes the predictions from affective primacy theory.

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, 2005-2007. The company had 40 employees in first year of the study, and 38 employees in both the second and third year.

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 whole-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 make available to the company only data aggregated at the departmental level.

The online survey included questions concerning the respondent's work-related interaction with

company employees, and his or her professional and personal opinions regarding each of these relations. 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. Responses were collected with an online system managed by the researchers, using secure login credentials distributed to each participant directly by the researchers. In spite of the organization's small size, parsimony in survey design was essential to ensure adequate participation. Because the survey was to be administered three times and the company counted 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, due primarily to respondents who had recently joined the organization and had not yet familiarized themselves with every other employee, and to salespeople operating in the field who had little opportunity to interact with those employees 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 on average 31 people 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 interactions, we used the item “Interactions with this person are useful to my work.” Finally, we measured the affective value of interactions with two items: “Interactions with this person are pleasant” and “Interactions with this person are energizing.” With these survey questions we aimed to capture, respectively, neutral-activation positive affect (enjoyment) and high-activation positive affect (excitement). We measured all variables with 7-point scales. The anchors provided to respondents were “not at all” for “1” and “very much” for “7”. To validate survey items, we proceeded as follows. Before administering the first survey, we piloted these survey items with the company’s general manager and a mid-level company employee, and revised the survey based on their feedback. Shortly after administering the third survey, we visited the company headquarters and interviewed 14 of the 38 employees. The sample of interviewees was stratified 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 had two goals. First, we wished to get insight into the competitive, historical, and cultural context in which work interactions took place at the company. Second, we wanted to ensure respondents had interpreted the survey questions in a manner consonant with the underlying constructs. The interviews provided evidence for the content validity of the questions in the survey, which were interpreted consistently across respondents 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 interaction 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 obtained from management the formal organizational chart, which allowed us 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.

We also wished to account for homophily as a driver of social interaction (Lott and Lott 1964; McPherson, Smith-Lovin, and Cook 2001; Newcomb 1961; Segal 1974). To account for the effects of homophily in our data, we asked management to provide us with demographic data on all employees, based on which we constructed indicator variables for *same gender* and *same nationality*. To define shared nationality, we identified four groups emerging from a subjective assessment of cultural affinity expressed by the employees we interviewed. We initially also included a control variable for *age difference* between source and target, but this was not significant in any of our preliminary

analysis 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*).

In order 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, in 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 model accurately 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). Kenny (1994) provides a treatment for interpersonal perception survey data by distinguishing among four components of interpersonal judgments: source, target, item, and relationship effects. Theoretically, we are interested in the relationship effect, 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 we are concerned with dyadic choices of interaction partners.

In field data, where the social interactions that are the basis for the surveyed interpersonal ratings do not occur in a controlled setting, further effects associated with network structure are present. 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 wish 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 proceeds by estimating 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.

In addition to the already mentioned structural controls, we control for effects of demographic and organizational variables, and model correlation between the different relationship effects in a dyad, including correlation with the reciprocal relationship effects (control for reciprocity), as well as 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.

The Bayesian estimates are based on finding the distribution of model coefficients that are probabilistically consistent with the observed survey responses. The posterior distribution is obtained 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 provided 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 participant 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.

Another check we performed concerns 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 ran alternatives to the 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 the use of the pre-selection step in the survey is not a concern as a source of bias.

4 Results

Tables 1 and 2 present descriptive statistics for the variables included in the regression models, within the subset of usable dyads. 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, enjoyable, and energizing*) at time 2. Table 2 includes the variables used to predict the four primary constructs at time 3. Demographic variables were constant across all 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, we are constrained with regards to the statistical checks of construct validity we can perform. If we interpret responses in each of the three surveys as multiple measures of the same construct, 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. Note that this positive indication of internal consistency is obtained even though correlations for each item between subsequent periods average .60, failing a reliability diagnostic if interpreted as a test-retest procedure, but leaving room for the significant dynamics which we are concerned with studying. We used a similar approach to check discriminant validity, with a proxy assessment 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 credence to the measures is given by their prior use in other empirical work, by the use of questions with a clear and concise phrasing that address well-established constructs in organizational theory and social psychology, by replicating prior findings using these constructs, and from post-survey interviews showing that interpretation was consistent across respondents 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 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 a constraint on the number of surveys that can be conducted over the course of the study, 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 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

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

1999).

Table 3 presents models testing Hypothesis 1, which predicted a positive association between the affective value on a social interaction 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. Interactions 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 perceived usefulness of the relationship for task-related purposes. Model 2 introduces task interaction, 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 enjoyment, 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 see in a social interaction. Merely enjoying an interaction 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 enjoyment fully 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 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 enjoyment. 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 enjoyment. 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 enjoyment and excitement, indicating that working with people in complementary and interdependent roles increases the affective value of the interaction. Model 9 includes instrumental value as a predictor of affective value. The results indicate that the instrumental value of the social interaction explains neither the excitement nor the enjoyment experienced in the relationship. 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 task competence of colleagues.

Model 9 also introduces the interaction term for excitement and task interaction, The positive and statistically significant coefficients 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 affect was measured as enjoyment (Model 11). Not

reported in the tables are models testing for alternative moderation patterns, including the interaction of instrumental value and task interaction. 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). While the 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

Table 6 presents models testing Hypothesis 4, which predicted that the affective value of a social interaction is more strongly predictive of subsequent task interaction when the positive affect experienced in the interaction has high levels of activation. Model 12 includes only the controls. Both formal task interdependence and subordinate and superior hierarchical interdependence affect significantly the likelihood of task interaction. These findings validate our data by providing evidence for patterns of association between formal structure and emergent task-related ties that extant 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 interaction, consistent with existing theorizing

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

and empirical evidence (Borgatti and Cross 2003; Nebus 2006; Casciaro and Lobo 2008).

Models 13 and 15 test the distinct effects of affective value with higher and lower levels of activation on subsequent task interaction. Only the excitement experienced in the relationship predicts task interaction significantly, while enjoyment does not, supporting Hypothesis 4. In addition, the positive effect of the 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 instrumental value of the relationship in a less consequential light as a cause of task interaction than is typically assumed. Neither the cognitive assessment of instrumental value of the interaction nor feelings of gratification from the interaction trigger task interaction beyond that required by formal hierarchy, task interdependence, and a colleague's perceived competence. Rather, it is the feeling of excitement due to the expectation of future rewards that triggers the motivational state of positive activation necessary for task-oriented social action.

Figure 2 summarizes our findings. Each arrow represent an observed causal link between variables measured at time t and variables measured at time $t+1$. Solid lines indicate hypothesized causal links. Dotted lines indicate other causal relationships. The label "excitement" indicates that a causal link was statistically significant for high-activation positive affect but not for positive affect with neutral levels of activation. All predictions from the theory of affective primacy were supported, with the exception of Hypotheses 1 and 3 being supported for excitement but not for enjoyment. The most notable patterns in the figure are the prominence of task interdependence, task competence, and affective value as causal engines in this organizational system. More specifically, the causal effects of affective value are mainly driven by high-activation positive affect. The excitement experienced in the relationship stimulates both task interaction and the instrumental value ascribed to it through multiple direct and indirect causal paths. In contrast to the diffuse

³This pattern of results does not constitute evidence for excitement as a mediator of the relationship between instrumental value and task interaction, because instrumental value does not predict affective value in our data (see Table 4).

explanatory power of high-activation positive affect, instrumental value has no explanatory power over the affective value of social relationships. Its causal standing in the model is that of an outcome of formal-structural design and the interaction'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 instrumental value and affective value. The perceived competence of a colleague—with its potential to yield positive instrumental outcomes—does increase both the excitement and the enjoyment of the relationship, as well as subsequent task interaction, even though the instrumental value of interacting with competent others does not, in itself, stimulate subsequent task interaction.

5 Discussion

Our study began with the consideration that task-related ties in organizations are characterized by the coexistence of instrumental motivations associated with the accomplishment of task goals and affective motivations related to the emotional rewards of social interaction, but the lack of a systematic theory of the interplay of affective and instrumental content of task-related ties has limited our understanding of the causal 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 as preceding an interaction's instrumental value and causing task interaction independent of instrumental value. We put these predictions to the test using whole-network longitudinal data from a naturalistic setting representative of common structural features of organizations. In so doing, we contributed to filling an empirical gap in research on intraorganizational networks. The few studies that, like ours, have produced analyses over time of the informal structure of an organization in its entirety (Barley 1990; Burkhardt and Brass 1990; Lazega, Lemerrier, and Mounier 2006) have done so focusing exclusively 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

Two primary findings emerge from this study. First, we document the primacy of affect in the causal relationship between instrumental and affective value of social interactions in organizations. We find that the instrumental value organizational actors attribute to interactions with coworkers has no effect on those interactions' affective value. By contrast, within the constraints imposed by the formal structure, the affective value of interactions influences the perception of instrumental value not only directly, but also indirectly. Specifically, the affective value of the relationship produces reinforcing causal patterns by inducing affect-congruent selective perception of an interaction's subjective value. Once a social relation is tinged with affect, further task interaction reinforces previously held attitudes about the relationship's instrumental and affective value. By providing theoretical arguments and empirical evidence for why such self-reinforcing causal patterns are unique to the affective content of the interaction and do not generalize to instrumental value, we extend the affective primacy hypothesis (Zajonc 1980; Murphy and Zajonc 1993) to organizational contexts, suggesting that affective responses to social interaction 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 self-reinforcing 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 interactions with colleagues is not merely a by-product of the interaction's instrumental value, but rather it is an independent cause of both task interaction and how people perceive its 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 pleasantness and contentment. The approach orientation that underlies task action, therefore, requires feeling energized, rather than feeling satisfied. Positive emotions with moderate or neutral levels of activation, such as enjoyment, 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 the causal role affect in organizational networks should therefore be sensitive to the motivational foundations of social interaction between organization members. 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 in organizations. Enjoyment is a determinant of excitement, such that actors in organizations are more likely to find interaction with a coworker energizing when those interactions are also enjoyable. In addition, enjoyment reinforces the causal link between task interaction and instrumental value: the more people enjoy a coworker, the more they will find task interactions with that coworker helpful in accomplishing their assigned tasks.

5.2 Implications of affective primacy for managerial practice

Two distinct logics emerge from our study as stimuli for task interaction. 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. 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 member 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 establish social relationships with one another (Miller and Brewer 1984), recategorization processes inducing desired affective responses to others by shaping social identities directly (Mackie, Devos, and Smith 2000). Organizational research in this domain shows that affect induced through recategorization can stimulate desired forms of task interaction, such as knowledge transfer (Kane 2010).

Task competence also emerges from our analysis as a critical lever through which managers can stimulate task interaction along both instrumental and affective logics of action. The competence of coworkers causes task interaction both 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 causal effect on affective value (it does not), but because perceptions of competence lead people to seek coworkers out for task interaction and to experience positive affect

in interactions with them. These causal effects of competence do not change any of our results concerning affective primacy, but they do enrich our findings with evidence of the relevance of colleagues' task resources for task interaction.

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 the way people associate with others to perform their job. For this reason, managers tend to design formal structures and processes to encourage desired task interaction patterns among members of the organization through instrumental incentives. While confirming the importance of formal-structural mechanisms, our results provide a new empirical and theoretical justification for directing a manager's attention to the emotional undertow of relational life in organizations.

5.3 Limitations and directions for future research

Several limitations should be considered when assessing this study and its implications for future work. Partly because we could not fully capture the multiplicity of social identities people develop in organizational contexts, 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 enjoyment. Personality traits that we did not contemplate in our theory are likely determinants of both affective and instrumental value of social interaction, and of the extent to which affective and instrumental value drive task interaction. Interpersonal theory (Pincus and Ansell 2003), in particular, can productively extend our model with a relational theory of personality in social interaction. Future research should thus produce a fuller account of the structural and psychological forces that shape the emergence of affect in organizations.

Our investigation can be extended in other directions, as well. The empirical strategy we adopted implies a definite epistemological choice. A longitudinal field study that documents the development of task-related networks and affect in a naturalistic setting allows for the investigation of complex structural effects emerging over substantially long periods of time. The primary limitation of this empirical approach as a test of causality is that organizational settings such as ours are characterized by on-going work relationships that pre-exist the administration of a network survey. This forecloses the ability to capture the development of relationships from their onset, a limitation when testing causality. While we traded off full control for realism and contextual richness, future research can fruitfully complement our work with either laboratory or, more appropriately, field experiments to investigate the emergence of task-related ties from their inception.

As for measurement strategy, both affective responses to the interaction and instrumental tasks can be operationalized with more nuance than we provided in this research. For instance, in early exchange-theoretic work, Thibaut and Kelley (1959) drew a distinction between pure coordination tasks, and mixed coordination and conflict tasks. In the latter case, the desired outcome is achieved by leveraging power differentials. It is possible, therefore, that affective motivations may play a different role in conflict tasks than in pure coordination tasks. Similarly, meaningful distinctions can be drawn 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 cannot capture the great complexity of the affective experience, as they account neither for negative emotions, such as anger, envy, or fear, nor for discrete positive emotions, such as pride and gratitude, that may be highly consequential in organizations. Our study is also limited by the use of single-item measures, which typically constrain network studies of organizations. Our modeling strategy 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, for three 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 context (entrepreneurial vs. corporate vs. academic) or task characteristics (routine task advice vs. creative problem-solving) (Casciaro and Lobo 2008), suggesting that these basic interpersonal responses may not vary significantly by organizational context. Second, the organization we analyzed comprised employees of numerous nationalities, representing varying cultural norms and values 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, the evidence from our site 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 network formation (Chua, Morris, and Ingram 2009). In addition, the organization we investigated is small, which not only limited our sample size but also prevented us from assessing the generalizability of our theory to large organizations with more complex structural arrangements.

These avenues for future inquiry notwithstanding, the evidence we provided for the causal role of affect in the formation of task-related networks constitutes 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 through joint action.

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	Enjoyable (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
	Enjoyable (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	Enjoyable (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
	Energizing (3)	1.45	.10	.39	.58	.50	.46	.14	-.01	.07	.15	.01	.04
	Enjoyable (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) **	
Enjoyable			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	0.64	0.64

Time-dependent predictors are at time t ; the dependent variable is at time $t + 1$.

• $p < .05$; ** $p < .01$; *** $p < .001$.

Table 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) •	
Enjoyable		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)*(Energizing)	0.06 (0.03) •		0.07 (0.03) •	
(I go to)*(Enjoyable)		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	Enjoyable	Enjoyable
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) •
Enjoyable		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)*(Energizing)		0.10 (0.03) ***		
(I go to)*(Enjoyable)				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) **
Enjoyable			-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 $t + 1$.

• $p < .05$; ** $p < .01$; *** $p < .001$.

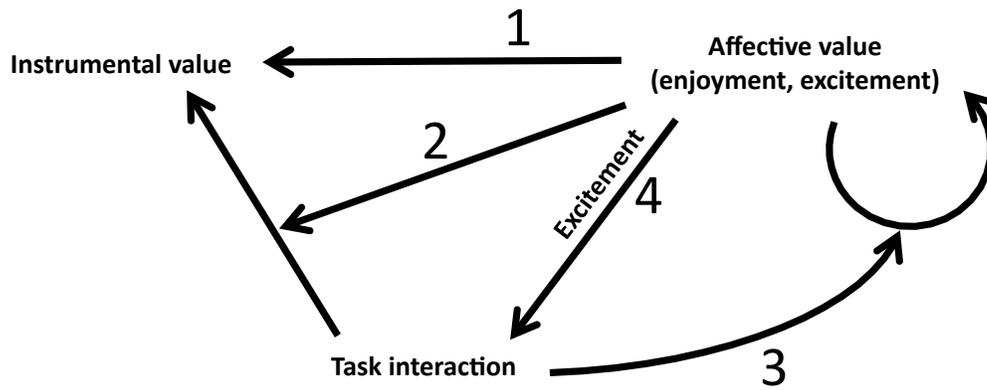


Figure 1: Predictions of affective primacy theory.

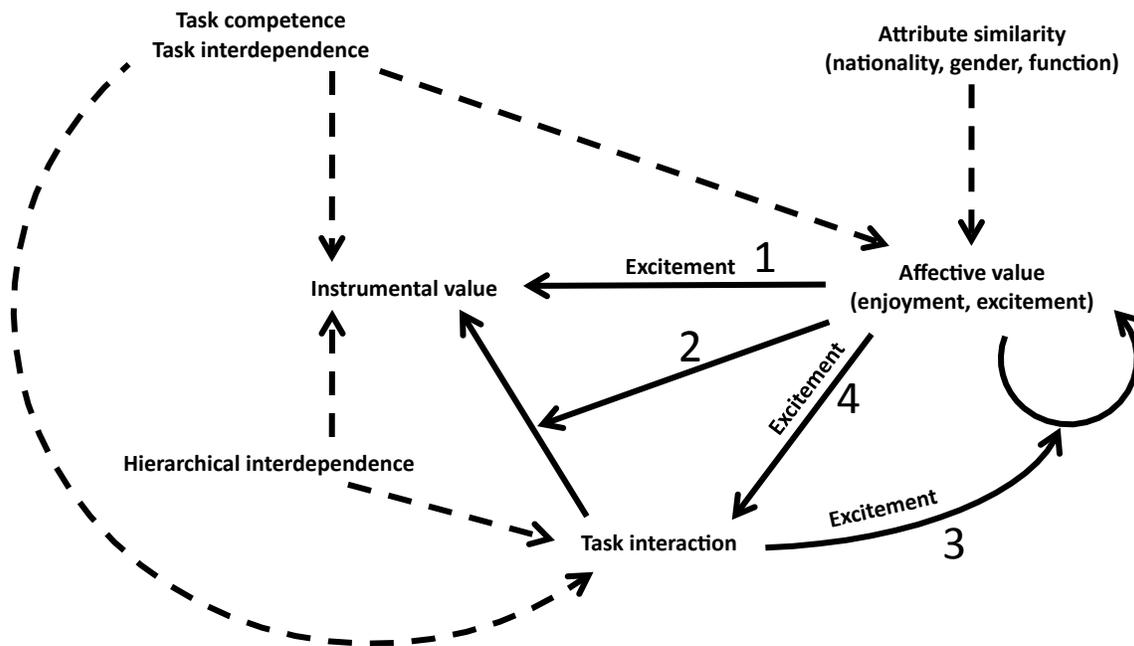


Figure 2: Observed causal relationships.

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 been largely focused on binary data and, given the nature and size of our dataset, dichotomizing the survey responses makes it infeasible to make inferences regarding their changes over time. A modeling approach that does not have this restriction is that of Hoff (2005), which 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 (1994) for interpersonal perception survey data the following four components of interpersonal judgments are included for survey-based variables: (1) c_k , an *item effect*, whereby some survey questions elicit different responses than others (for instance, affective evaluations may be generally higher than instrumental evaluations in a given organizational context); (2) b_{jk} , a *source effect*, whereby people use the survey scale differently, in that some 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 enjoyable 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. Further 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 $l = 1, \dots, L$, 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 , allowing 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

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

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 ‘enjoyable’ ratings). Σ_{ab} is given a weak inverse-Wishart prior to ensure a proper posterior. Unsurprisingly, its posterior distribution was wide in all models: it’s 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

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

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 ‘enjoyable’ pertains to whether, in dyads where one person rates the other high on ‘useful’, the reciprocal ‘enjoyable’ rating tends to be higher or lower. Since the e_{ijk} have, by construction, the same distribution as their reciprocals e_{ji} , Σ_e is subject to additional constraints: the diagonal blocks are constrained to be identical, and the off-diagonal blocks are constrained 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

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

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 $\Sigma_{uv1}, \dots, \Sigma_{uvL}$. To avoid having to impose strong priors on both Σ_{uv} and λ_{kl} (which can thus receive an improper uniform prior), the vectors $[\lambda_{0l}, \lambda_{1l}, \dots, \lambda_{K_x l}]$ are constrained to add to $K_x + 1$. Note that the distribution of the u_{il} and v_{jl} is zero-mean, as otherwise this would be equivalent to row and column effects.

For a simpler interpretation of results, additional terms for the effects of the independent variables in the dependent variable are included 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. The bilinear terms are as above. In summary,

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

The link from the continuous x_{ijk} to the discrete survey responses X_{ijk} was chosen 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.

The posterior distribution is obtained 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} .

The sampler was coded in MATLAB⁴. The simulations were run for up to 40,000 trials, and the posterior estimated 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).

⁴Note, 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.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.
- Ambady, N. and R. Rosenthal. 1993. "Half a minute: Predicting teacher evaluations from thin slices of nonverbal behavior and physical attractiveness." *Journal of Personality and Social Psychology* 64:431–441.
- Bales, R.F. 1950. "A set of categories for the analysis of small group interaction." *American Sociological Review* 15:257–263.
- 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.
- 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.
- Carver, C.S., S.K. Sutton, and M.F. Scheier. 2000. "Action, emotion, and personality: Emerging conceptual integration." *Personality and Social Psychology Bulletin* 26:741–751.
- 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, L.A. and D. Watson. 1988. "Mood and the mundane—Relations between daily life events and self-reported mood." *Journal of Personality and Social Psychology* 54:296–308.
- 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.
- Cropanzano, R., H.M. Weiss, J.M.S. Hale, and J. Reb. 2003. "The structure of affect: Reconsidering the relationship between negative and positive affectivity." *Journal of Management* 29:831–857.
- 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.
- 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.
- 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.
- Higgins, E.T. 1997. "Beyond pleasure and pain." *American Psychologist* 52:1280–1300.
- 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.
- Ibarra, H. 1992. "Homophily and differential returns: Sex differences in network structure and access in an advertising firm." *Administrative Science Quarterly* 37:422–447.
- Izard, C.E. 1991. *The Psychology of Emotions*. New York: Plenum Press.
- Kahneman, D. 2011. *Thinking fast and slow*. Farrar, 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. Lemerrier, 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.
- 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.
- 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 cohesiveness 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.
- McAllister, D.J. 1995. "Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations." *Academy of Management Journal* 38:24–59.
- 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.
- Phelps, E.A. 2004. "The human amygdala and awareness: Interactions between emotion and cognition." In *The cognitive neuroscience*, edited by M.S. Gazzaniga. Cambridge, MA: MIT Press.
- Pincus, A.L. and E.B. Ansell. 2003. "Interpersonal theory of personality." In *Handbook of Psychology*, edited by T. Millon and M.J. Lerner. Hillsdale, NJ: John Wiley & Sons.
- Roethlisberger, F.J. and W.J. Dickson. 1939. *Management and the Worker*. Cambridge, MA: Harvard University Press.
- Russell, J.A. 1979. "Affective space is bipolar." *Journal of Personality and Social Psychology* 37:345–356.
- 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 contingencies and distributional form." *Human Relations* 42:43–66.
- Simmons, J.P. and L.D. Nelson. 2006. "Intuitive confidence: Choosing between intuitive and nonintuitive alternatives." *Journal of Experimental Psychology* 135:409–428.
- Slater, P.E. 1955. "Role differentiation in small groups." *American Sociological Review* 20:300–310.

- Slooman, 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.
- 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.
- Weiss, H.M. and R. Cropanzano. 1996. "Affective events theory: A theoretical discussion of the structure, causes and consequences of affective experiences at work." *Research in Organizational Behavior* 18:1–74.
- 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.