

# **Positive Affectivity and Accuracy in Social Network Perception<sup>1</sup>**

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## **ABSTRACT**

We investigated how positive affectivity influences people's perception of the patterns of social relationships around them. Positive affectivity was measured as trait positive affect. The outcome variable was accuracy in the perception of informal patterns of social interaction in a group, i.e., the group's network structure. Data on the perception of the relationships of friendship and work-related advice at an Italian university were collected from 24 members of the organization. Positive affectivity improved the accuracy of people's perception of the friendship network linking all respondents to each other (global accuracy), but hindered the accuracy of the perception of one's personal advice ties (local accuracy). These results suggest that, although happy people may feed unrealistic images of their personal social connections, their superior ability to develop an accurate picture of the broader dynamics of social interaction among people around them gives them an important advantage for social and professional accomplishment in a given social setting.

## 1 INTRODUCTION

The relationship between social structure (defined as the stable patterns of social interaction in a group), and attitudes and behaviors of social actors has been the theoretical and empirical object of a large amount of research in structural sociology and social network analysis (e.g., Leinhardt, 1977; Burt, 1987; Wellman & Berkowitz, 1988; Wasserman & Galaskiewicz, 1994). Recent work in social network analysis has advanced this line of research by underscoring the role of cognition, as opposed to mere structure, in social action. According to this cognitive-structural perspective, a social actor's *perception* of the patterns of interaction in a given context has consequences for social attitudes and action above and beyond the social structural *reality* in which social actors are embedded. For instance, in a study of the determinants of reputation in organizational labor markets, Kilduff and Krackhardt (1994) have shown that individual perceptions are more important than an objectively measured social structure in determining the performance reputation of organizational members.

One of the most interesting aspects of the development of the cognitive-structural perspective regards a social actor's *accuracy* in perceiving the informal patterns of interaction of their social groups, i.e., a group's network structure. Krackhardt (1990) has shown that the ability of organizational participants to accurately perceive the informal network of advice in their work organization is positively related to their individual power. Morris (1997) has supported the claim that a manager's accurate perception of a firm's communication network is positively related to their reputational effectiveness as leaders of the organization. Given the relevance of accuracy in social network perception for individual and organizational outcomes, a few studies have set out to identify the determinants of accuracy in social network perception (Bondonio, 1998; Casciaro,

1999). These studies, however, have ignored affective variables as potential determinants of accuracy in social network perception.

In fact, the concept that emotions, cognition, and social action are linked is not foreign to sociological thinking (Howard & Callero, 1991). From the early works of Cooley (1902), to the constructionist views of Hochschild (1983) and the positivist approach of Scheff (1990), sociologists have attempted to integrate human emotionality into theories of society and social order. Early exchange theories also included affective evaluations. Thibaut and Kelley (1959), Homans (1961) and Blau (1964) all devoted considerable effort to predicting actors' satisfaction with relations. Affect-control theory, in particular, has significantly contributed to sociological work on emotions with a quantitative approach to the study of affective and cognitive dynamics, and social action (Heise, 1979; 1985; 1987; Smith-Lovin, 1987). With few exceptions (e.g., Heise & MacKinnon, 1987), however, what characterizes affect-control theory is a tendency to view emotions as affective *reactions* to cognitive antecedents, as opposed to seeing emotions as antecedents of cognitive reactions. Such a tendency stems from the sociologist's ultimate interest in social action, which, as noted by Thoits (1995), leads to viewing emotions either as reactions to be controlled (e.g., Hochschild, 1983; Smith & Kleinman, 1989) or as means to produce or sustain normative behavior or social cohesion (Shott, 1979; Scheff, 1990).

When affect is conceptualized as a *precedent* of cognitive processes, the psychological literature more readily offers theoretical and empirical basis for understanding the relationship between people's emotions and their perception of their social environment. Attempts by psychologists to integrate cognition and emotions are concerned with both the influence of cognition on affect and the influence of affect on cognition (see Fiske & Taylor, 1991). In this

study, therefore, we built on this literature to develop hypotheses regarding the relationship between positive affectivity and the perception of the patterns of interaction in a social group. Hypotheses were tested based on social network data collected at a sub-unit of an Italian university. Both informal networks of friendship and work-related advice relationships were studied. The cognitive reaction of interest was individual accuracy in the perception of one's social networks. The affective antecedents of interest was trait positive affect.

## **2 CONSTRUCTS**

### **2.1 Accuracy in social network perception**

Accuracy in social network perception is broadly defined as the degree of similarity between an individual's perception of the structure of informal relationships in a given social context and the actual structure of those relationships. Because of its focus on stable patterns of social interaction among all actors inhabiting a given social context, the study of accuracy in social network perception presents peculiarities that are absent from traditional research on the accuracy of interpersonal perception.

#### ***2.1.1 Natural vs. artificial settings***

The stable, long-term nature of the patterns of social relationships that link people in a given context implies that accuracy in social network perception develops over time. Freeman, Romney and Freeman (1987) provided indirect support for a long-term conceptualization of social network perception. Although they did not investigate the perception of personal relationships in a given social context, they showed that people's perception of attendance at a specific social event was based on a long-term image of the social ties connecting the people in

the network, and did not reflect the short-term variations occurring in these connections. For this reason, the study of accuracy in social network perception will be most productive if undertaken in natural settings, where people have the opportunity to observe patterns of interaction that develop over time and cannot be artificially induced in a laboratory setting. Most psychological research on judgmental accuracy, however, has been carried out in artificial settings (e.g., Eckman & Friesen, 1975; Knudson, Sommers & Golding, 1980; Funder & Sneed, 1993; Funder, 1995; Marangoni *et al.*, 1995). Although the ecological argument that people are more accurate in natural settings (that is in judgments critical to the organism's survival) is open to various exceptions (Kruglanski, 1989), it is appropriate to investigate the impact of emotions on judgmental accuracy in settings over which people may exercise considerably greater control than in the laboratory (Swann, 1984). In this sense, the study of the perception of patterns of social interaction evolving over time in a natural setting represent an ideal complement to existing laboratory research on judgmental accuracy.

### ***2.1.2 Local vs. global accuracy***

Social network research on interpersonal perception accuracy has traditionally focused on accuracy in self-perception. In an important series of studies, Bernard, Killworth, and Sailer have investigated people's accuracy in reporting their own communications and social interactions (e.g., Killworth & Bernard, 1976; Bernard, Killworth, & Sailer, 1980; 1982). Other work has focused on accuracy in an individual's perception of specific social events (Freeman & Romney, 1987; Freeman, Romney, & Freeman, 1987). Only a few network studies have focused on people's accuracy in perceiving the stable patterns of informal social interaction among *others* in a group (Krackhardt, 1987; 1990; Freeman, Freeman & Michaelson, 1988).

In the present study, the social space being perceived by the respondents includes both patterns of interactions including the respondents personally, and patterns of interaction in which the respondents are merely observers, instead of participants. Since the degree of the perceiver's personal involvement in a given social relationship varies, Bondonio (1998) has suggested that accuracy in network perception may be better understood in terms of one's ability to perceive accurately different network subsets, than in terms of an individual's ability to perceive the entire, undifferentiated structure of the network. For this reason, in this paper a distinction was drawn between *local* and *global* accuracy. Local accuracy refers to the perception of a person's direct relationships to others in a social context; global accuracy refers to the perception of the complete set of social relationships linking all members of a social network.

## **2.2 Positive affectivity**

The psychological literature on affective influences on cognition has amply demonstrated the power of relatively minor mood manipulations to influence a variety of cognitive reactions such as memory (for reviews, see Blaney, 1986; Isen, 1987), judgment (e.g., Clark, Milberg & Erber, 1988; Isen, 1984; 1987; Mayer & Volanth, 1985; Mayer & Salovey, 1988), and decision-making style (for reviews, Fiedler, 1988; Isen, 1987). The affective variables that constitute the potential object of this literature cover a wide range of positive *and* negative preferences, evaluations, moods, and emotions. For the purposes of the present study, we aimed at first investigating the impact of positive affectivity on accuracy in social network perception.

The reason for focusing on the positive side of the affective spectrum is that positive emotions (conceptualized as both moods and traits) have been the object of richer strains of investigation in the literature on emotion and social cognition than negative affectivity (see, Fiske &

Taylor, 1991). The availability of such a reservoir of research was important for both theoretical and empirical reasons. Theoretically, the presence of numberless theories of considerably uneven status in the field of affect and cognition (Fiske & Taylor, 1991) calls for selecting theories that have been the object of thorough conceptual elaboration. Empirically, the striking absence of evidence specifically concerning the relationship between affect and accuracy in social network perception called for selecting affective variables which have been the object of extensive empirical testing in related domains of social psychological research.

### ***2.2.1 The positive affectivity spectrum***

The characterization of the rich variety of affective variables is a longstanding problem in psychology (e.g., Scherer & Ekman, 1984). A long line of research into the basic dimensions of affect, however, concurs that positive affectivity (PA) is a higher-order factor of human emotionality (for historical reviews, see Russel, 1980; Watson & Tellegen, 1985). Positive affectivity generally “reflects one’s level of pleasurable engagement with the environment” (Watson, 1988: 128). People with high positive affectivity are happy, enthusiastic, have a cheerful disposition, feel good about themselves, and lead an active, exciting life. People with low positive affectivity, on the contrary, are typically sad, depressed, and lethargic (e.g., Russell, 1980; Watson, 1988; Staw & Barsade, 1993). Recently, this characterization of low positive affectivity has actually been challenged by Watson *et al.* (1999), who have suggested that sadness and depression might more closely relate to the negative affectivity (NA) super-factor. Even according to this characterization, however, Watson *et al.* (1999) pointed out that the NA and PA super-factors are not entirely independent of one another, and empirically supported the prediction that intense levels of negative affectivity are associated with low levels of positive affectivity. In general, both NA and



PA have been shown to contribute to the diagnosis of depressive disorders, and be comparably related to depression (median  $r_s = .33$  and  $-.25$ , respectively). For the purposes of this study, therefore, high levels of depression were conceptualized as a manifestation of low levels of positive affectivity.

### ***2.2.2 Trait vs. state positive affectivity***

A fundamental issue in studying the impact of positive affectivity on accuracy in social network perception concerns the *stability* of affective states. The fact that social relationships are patterns of social interaction that develop over time suggests that, in studying accuracy in network perception, positive affectivity should be conceptualized and measured as a long-term *trait* instead of a short-term mood. Yet, most research on the relationship between positive affectivity and cognition has focused on short-term positive moods and state depression, rather than on trait positive affectivity.

The literature on affective state and trait interactions in cognition indicates, however, that affective states can be predicted from affective traits (Costa & McRae, 1982). Moreover, both affective traits and states correlate significantly with judgmental biases (Mayer & Salovey, 1988). Given the limited evidence on the relationship between affective traits and cognition, hypotheses on the impact of positive affectivity on accuracy in social network perception were developed based on a general assumption of isomorphism between affective states and traits in impacting cognition.

## **3 THEORY AND HYPOTHESES**

### **3.1 Positive affectivity and local accuracy**

People in neutral affective states display a positive bias in their social judgments (e.g.,

Parducci, 1968; Sears, 1983). When asked to make self-relevant judgments, this bias leads people to overestimate their popularity in a social context (e.g., Lewinshon *et al.*, 1980; Kumbasar, Romney & Batchelder, 1994). The existence of such a positive bias is at the basis of the phenomenon of depressive realism. Psychological research has indicated that depressives are often more accurate or realistic than nondepressives in making self-relevant judgments in a variety of situations (Lewinsohn *et al.*, 1980; and, for a review, Alloy and Abramson, 1988). The depressive realism hypothesis has obtained support with a number of cognitive processes, including attributional biases (Campbell & Fairey, 1985), estimating social consensus (Tabachnik, Crocker, & Alloy, 1983), or estimating the frequency of reinforcement (Nelson & Craighead, 1977).

Depressive realism is attributable to both lowered self-esteem and self-directed attention, which are two hallmarks among the cognitive symptoms of depression. Negative self-evaluation as a central factor in depression has been empirically documented. For instance, Lewinsohn *et al.* (1980) had psychiatric (depressed and nondepressed) patients interact with normal people in a group setting. When asked to assess their social performance, the nondepressed (psychiatric and normal) subjects rated themselves as more skillful than others rated them, while depressed subjects' self-ratings more closely corresponded to the ratings given them by others. Depression is also characterized by self-directed attention, and a withdrawal into the self where external involvement is reduced in each area of functioning (Musson and Alloy, 1988). Cognitively, there is a tendency for self-awareness and self-criticism, which has been shown to lead depressives to be more accurate than nondepressives in self-relevant judgments.

In the context of social network perception, the combined effect of lowered self-esteem and

self-directed attention suggests that depressives would be more accurate than nondepressives in representing the structure of those who are directly connected to them. Conversely, high levels of positive affectivity are likely to further enhance the positive bias normally displayed by people in self-relevant judgments, thus leading to inaccuracy in the perception of one's direct relationships in a social group.

**Hypothesis 1a: Positive affectivity is negatively associated with local accuracy in the perception of the work-related advice network.**

**Hypothesis 1b: Positive affectivity is negatively associated with local accuracy in the perception of the friendship network.**

### **3.2 Positive affectivity and global accuracy**

Several studies have challenged the “sadder, but wiser” hypothesis (Campbell & Fehr, 1990; Dunning & Story, 1991) suggesting that depressive realism is not a uniform phenomenon, but rather a tendency that occurs only under some circumstances, and relative to specific judgmental processes (Benassi & Mahler, 1985). We specifically propose that judgmental processes that are not directly self-relevant, will be hampered by low positive affectivity. The increased self-focus that may improve the accuracy of self-relevant judgments, may also lead depressed people to be less accurate than nondepressives when asked to make judgments about others. Martin, Abramson, and Alloy (1984) supported this prediction. The tendency to divert attention from others to the self is likely to decrease low-PA people's awareness of the behaviors and attitudes of those around them. In the context of social network perception, the effect of self-directed attention suggests that depressives may be less accurate than nondepressives in representing the overall structure of the larger social network in which they are embedded. People

with high levels of positive affectivity, on the contrary, may be best equipped to develop a clear perception of the broader web of social relationships in their environment.

Perceiving the informal structure of social relations in one's social network is a complex cognitive task. It entails the collection of large quantities of information about the many interpersonal ties, and the specific instances and modes of interaction, linking the people constituting the network. It also requires the organization of this information in meaningful categories that exclude non-relevant information (such as one-time "hallway" conversations that do not fit in an interactive pattern), and the mastery of such information in the face of changes in the patterns of interaction. Carrying out complex cognitive tasks such as this requires not just attentiveness to the social dynamics in one's environment, but also a degree of cognitive organization and flexibility which individuals with a positive affective disposition may be particularly capable of.

An increasingly large body of knowledge supports the proposition that happiness increases cognitive organization and flexibility. Alice Isen and her colleagues have shown that, compared to people in a neutral state, people in a positive mood have a broader range of associates, and more diverse associates, to neutral material (Isen *et al.*, 1985). They are also capable of perceiving more differences, when explicitly asked to focus on the way items differ from one another (Isen, 1987). Such an increase in cognitive flexibility in categorization tasks has also been documented by Murray *et al.* (1990). In general, mild inductions of positive moods could facilitate both complex decision making that requires simplification and the use of heuristics (Isen & Means, 1983), and problem solving that require the use of broader and more flexible categories for sorting information (Isen & Daubman, 1984; Isen, Niedenthal & Cantor,

1992). For instance, Isen *et al.* (1991) showed that medical students in whom positive affect had been induced reached a correct judgment about the likelihood of hypothetical patients with solitary pulmonary nodules having lung cancer faster than students in neutral affective states. In the judgmental process, independent observers rated students as displaying more complex and integrated thinking in a positive affect condition.

Research on *trait* positive affectivity also illustrates the beneficial effects of positive affect for a variety of cognitive tasks and behaviors (e.g., Scheier, Weintraub & Carver, 1986; Seligman & Schulman, 1986). Staw & Barsade (1993), in particular, showed that managers with high levels of positive affect performed better on the processes underlying good decision making. For instance, they requested more information whenever the data were insufficient to come to a sound decision, and they recognized the interdependence among multiple decisions. Moreover, in their interpersonal behavior, individuals with a positive disposition were seen by their group members as having greater mastery of the information needed to present their cases persuasively.

The commonly held belief that happiness results in a general difficulty processing information, whether for reduced ability or reduced motivation (for a review, see Clore, Schwartz & Conway, 1994) has also been challenged by a growing body of research (for reviews, see Aspinwall, 1998; Isen, 1993). Even when positive affect does lead to the use of general knowledge structures, this effect is not due to reduced cognitive ability (Bless *et al.*, 1996), and can be easily reversed when careful processing of the target information is given as the goal (Bodenhausen, Kramer & Susser, 1994). Most of the results suggesting a connection between positive affect and information processing deficits have been obtained in artificial settings with tasks that were likely to be of little importance or intrinsic interest to the participants. Whenever the target information

has greater personal relevance to the participants (e.g., their personality test scores; risks to their own health), however, individuals in positive moods have largely displayed effective information processing (see Aspinwall, 1998; Isen, 1993, for discussions). The evaluation of the map of social interactions in the participants' own social environment is likely to be highly self-relevant, since it involves the processing of information about the interactions among people that play an important part in the participant's social life.

The combined complexity and personal relevance of the target information suggests that high positive affectivity may improve global accuracy in social network perception.

**Hypothesis 2a: Positive affectivity is positively associated with global accuracy in the perception of the work-related advice network.**

**Hypothesis 2b: Positive affectivity is positively associated with global accuracy in the perception of the friendship network.**

### 3.3 Controls

#### *3.3.1 Perceiver's effects*

In measuring accuracy, one must account for the fact that people label equally intense relationships differently. Some people label only intimate relationships as friendships. For others, even superficial relationships qualify as friendships. Cronbach (1955) called attention to this problem in the social-psychological research on judgmental accuracy. In judging others, two people may use the rating scale in different ways, with one consistently using the scale's higher region, and the other consistently using the scale's lower region. Kenny (1994) calls these differences in the use of the scale *perceiver's effects*.

The manner in which one uses the rating scale has nothing to do with one's insight, and

should not be included in the measurement of accuracy. For this reason, in testing the relationship between affect and social network perception, we controlled for perceiver's effects with the total number of social ties (i.e., relationships) an individual perceived as existing among all members of the network.

### ***3.3.2 Social engagement***

One should also take into account the behavioral correlates of affect which may confound the relationship between affect and perceptual accuracy. Both psychologists and sociologists have shown that affect correlates not only with cognition, but also with behaviors such as risky decision making (e.g., Arkes, Herren & Isen, 1988), helping (e.g., Cunningham, 1979; Aderman, 1972; Isen & Levin, 1972; Cunningham *et al.*, 1990), and social interaction (e.g., Heise, 1979; 1987; Smith-Lovin, 1987).

Affective traits and states may also be associated with different levels of participation in social interaction (i.e., social engagement), since happy individuals are generally considered more attractive than depressed people (Coyne, 1976; Cardy & Dobbins, 1986). Because of their active social engagement, high-PA individuals may have better opportunities to observe the social structure around them, and thus improve their accuracy in perceiving the patterns of social relationship in their environment. For this reason, in this study we controlled for an individual's level of social engagement with the total number of his/her personal ties in the network.

### ***3.3.3 Formal social position***

Finally, people's formal position in a social group can also provide them with different opportunities to observe the social reality in which they are embedded. For instance, by virtue of their position, people at higher hierarchical levels in the formal structure of a work organization are

required to pay attention to how their subordinates work together, and are entitled to ask their subordinates for such information (Krackhardt, 1990). However, as pointed out by Casciaro (1999), because of the formal role associated with their position, higher-level participants tend to be isolated from the informal friendship network that develops at lower levels of the organization. Moreover, they may simply be uninterested in the dynamics of interaction involving people at lower levels (Kramer, 1996). An individual's formal position does not have any effect on his/her local accuracy, since people do not differ in their opportunities to observe the social relationship in which they are personally involved. Formal position, however, can be related to different opportunities to observe relationships in which others are involved. For this reason, in studying the relationship between affect and global accuracy, we controlled for an individual's formal position in the social structure of the setting of our interest.

## **4 METHODOLOGY**

### **4.1 The site**

The organization selected for the field study is constituted by three research centers belonging to an Italian university. Although formally distinct, and pursuing different research interests, the three centers constitute a single sub-unit of the university's research apparatus. First, all three centers are directed by the same person, a full professor at the university. Second, at times the centers conduct joint research. Third, the three centers occupy the same hallway of the same floor of the same building of the university. In this location, researchers share offices, regardless of their formal membership with one center or the other. Thus, to some extent all members of the organization interact with one another. The centers, which were founded between 1987 and 1989,



count 25 people as formal members in different hierarchical positions. They are funded by the profits from each center's research and teaching activities, as well as by university funds. Since their founding, all centers have been profitable.

Though small, the organization has a rather vertical formal structure, constituted by five distinct hierarchical levels. At the top level, there is the director of the three centers, who makes all major decisions in the organization. At the next level, there are three vice-directors, who are responsible for the scientific development of research and teaching projects. The next level consists of two administrative coordinators, who have no involvement in the scientific aspects of the centers' activities, but are responsible for the organizational and logistics aspects of the life of the centers. Among their roles, the coordinators collect, screen, and summarize information flowing from the lower levels to the director. They constitute the operational link between the top and the lower levels, which, for most non-scientific matters, do not communicate directly. The following level consists of seventeen researchers, who constitute the largest group in the organization. Researchers occupy the lowest level of the academic hierarchy. At the lowest level of the group hierarchy there are two secretaries.

## **4.2 Accuracy in social network perception**

### ***4.2.1 Cognitive social structures***

We asked all members of the research centers about their perception of the social relationships between all possible pairs of individuals in the organization, including themselves. In this kind of social network data, it is not simply asked that respondents report their own social ties, but also that they report their perception of the complete map of social relations linking everybody

else in the network, i.e., the overall structure of the social system.

In network analysis, the structure of a social system is defined as a set of relational statements between all pairs of actors in the system. The cognitive social structure of this system is conceptualized as a three-dimensional array of linkages,  $R_{ijk}$ , among a set of  $N$  actors, where  $i$  is the sender of the relation,  $j$  is the receiver of the relation, and  $k$  is the perceiver of the relation between  $i$  and  $j$  (Krackhardt, 1987).

An individual's cognition of the network is his/her perception of the existence of a social relationship between any two individuals in the network, including him/herself. Formally defined, a person  $k$ 's network cognition is:

$$R_{ij}^k = \begin{cases} 1 & \text{if } R_{ijk}=1 \\ 0 & \text{if } R_{ijk}=0 \end{cases}$$

The individual cognition of two relations, friendship and work-related advice, was measured through a questionnaire in matrix format (see Appendix). In the friendship network, each person  $k$  in the organization was asked whether he or she thought that person  $i$  considered person  $j$  as a personal friend. In the case of a positive answer, person  $k$  would place a check in the cell of the friendship network matrix that corresponded to a relation going from  $i$  to  $j$ . The same procedure was used to assess the advice cognitive social structure. In this case, person  $k$  was asked whether he or she thought that person  $i$  would go to person  $j$  for work-related advice.

The resulting binary individual network cognitions were aggregated in order to obtain the actual structure of the network (as opposed to the individual cognition of the social network). The *actual* network is defined as a Locally Aggregated Structure (Krackhardt, 1987)<sup>2</sup>. Formally, the

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<sup>2</sup> The concept of locally aggregated structure (Krackhardt, 1987) is but one possible approach to the definition of the "actual" structure of a network emerging from the aggregation of individual network representations. Consensus

Locally Aggregated Structure  $R'_{ij}$  is:

$$R'_{ij} = \begin{cases} 1 & \text{if } R_{ji} \text{ and } R_{ij} = 1; \\ 0 & \text{otherwise.} \end{cases}$$

That is, in the actual network, a relationship between person  $i$  and person  $j$  exists if and only if both  $i$  and  $j$  perceive that it does. If only  $i$  indicates that he/she has a relationship with  $j$ , and  $j$  does not concur with  $i$ 's perception, the relationship is considered non-existent.

#### ***4.2.2 Local and global accuracy***

People's accuracy in perceiving their direct social relationships in a given context can be described in terms of generalized or dyadic meta-accuracy (Kenny, 1994). Generalized meta-accuracy describes people's ability to understand how they are generally seen by others. It is their sensitivity to how they are regarded by a group as a whole, apart from the ways in which they maybe viewed differently by different members of the group. Dyadic meta-accuracy describes people's ability to know how they are differentially regarded by other particular people. In the present study, local accuracy for person  $k$  was measured as  $k$ 's dyadic meta-accuracy, i.e., the correlation between  $k$ 's perception of every other network member's perception of their relationship with him/her, and their reported perception of their relationship with  $k$ . Formally, local accuracy was calculated as the correlation between the vectors (1) and (2):

$$(1) R^k_{ik} \forall i \neq k$$

$$(2) R^i_{ik} \forall i \neq k$$

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structures such as central graphs (Banks & Carley, 1994) and informant consensus analyses (Romney, Weller & Batchelder, 1986) also address the issue of aggregating individual network perceptions, and thus provide different views of the "true" network. The consensus question that these studies address is closely related to the accuracy question. However, as noted by Kenny (1994), consensus does not necessarily imply accuracy. Given our interest in accuracy, in this study we opted for the adoption of locally aggregated structures, aware of the fact that more

Global accuracy for individual  $k$  was measured as the correlation between  $k$ 's matrix representation of his or her network, and the actual matrix structure of that network. This measure of correspondence was chosen since it controls for different uses of the rating scale while at the same time having desirable metric and Euclidean properties (Gower & Legendre, 1986). Formally, for each individual  $k$ , global accuracy was calculated as the MRQAP correlation (Krackhardt, 1988) between matrices (3) and (4):

$$(3) R_{ij}^k$$

$$(4) R'_{ij}$$

### 4.3 Positive affectivity

Tellegen's Short Positive Emotionality scale was utilized to measure positive affect (Tellegen, 1982). This 11-item scale measures the Well-Being component of the Positive Affectivity super-factor. The questionnaire asks subjects to rate statements such as "I am just naturally cheerful" and "My future looks very bright to me" as true or false. The scale has been shown to be highly internally consistent ( $\alpha = .89$ ) and stable at appropriate levels (.90) over a one-month test-retest interval. The Cronbach alfa in the sample used in this study was .91.

### 4.4 Controls

Perceiver effects in local accuracy were controlled for with the total number of ties an individual perceived as existing in the network, measured as the *density* of  $R_{ij}^k$ . The density of a network is defined as the ratio between the number of existing ties over the number of all possible ties. As for global accuracy, the matrix correlation used to measure accuracy already takes into account row and column effects, thus making it superfluous to control for network density. An

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theoretical and empirical work is needed to define the domain in which these approaches are more appropriate.

individual's level of social engagement in the organization was measured as an individual's *indegree* network centrality. An actor's indegree centrality is defined as the number of ties converging on that actor. For instance, in the advice network, a person's indegree score is the number of people who go to that person for advice. Finally, an individual's formal position in the social structure of the organization was measured as his/her *hierarchical level*. Hierarchical level was scored in the following way: a score of 5 was given to the director; the three vice-directors were scored 4; the coordinators were given a score of 3; a score of 2 was given to the researchers; secretaries were given a score of 1.

#### **4.5 Procedure**

A questionnaire containing the positive affect scale and the matrices for the collection of data on the friendship and advice networks (see Appendix) was distributed to all 25 members of the research centers. Respondents were asked to fill out the questionnaire at their leisure during work hours and return the questionnaire to the researcher within the following week. Participants were guaranteed confidentiality of their answers. Of the 25 people asked to participate in the study, 24 completed the questionnaire.

### **5 RESULTS**

Descriptive statistics for the dependent variables and the predictors are presented in Table 1. Table 2 shows the correlation structure for all dependent and independent variables. Table 3 and 4 contain regression models for local accuracy in the advice and friendship network, respectively. Table 5 and 6 present regression models for global accuracy in the advice and friendship network, respectively.

Controlling for the density of individual perceptions of the network, and centrality in the network, positive affect was negatively related to local accuracy in the perception of the advice network (Standardized  $\beta = -.540$ ;  $p < .01$ , one-tailed) but not in the friendship network, supporting Hypothesis 1b. This result indicates that joyful, enthusiastic individuals with a cheerful predisposition tend to have an inaccurate perception of their personal work-related advice relationships in the organization.

Controlling for hierarchical level and centrality in the network, positive affect was positively related to global accuracy in the friendship network (Standardized  $\beta = .407$ ;  $p < .01$ , one-tailed), and not in the advice network, supporting Hypothesis 2a. According to this result, when asked about their perception of the map of social connections linking *all* members of the organization to each other (and not just their personal connections) people with high positive affectivity are more accurate than people with low positive affectivity.

## 6 DISCUSSION

In this study, we utilized cognitive social structure data to investigate how positive affectivity relates to accuracy in social network perception. The small size of the organization utilized for the data collection limits the statistical power of this study, thus making nonsignificant results inconclusive. However, our statistically significant results do provide us with clear indications as to the relationship between positive affectivity and accuracy in the perception of relationships in people's social environment.

Overall, the results confirm the main proposition underlying this study, that positive affectivity enhances people's perception of the broader patterns of social relationships in their environment, while it hampers the accuracy of judgments concerning their own direct social

connections. In other words, happy, enthusiastic people with a positive outlook on life have a clear, accurate picture of the dynamics of social interaction among people around them, even though they may feed unrealistic images of their personal social interactions.

The impact of positive affectivity on accuracy, however, is not homogeneous across the friendship and the advice networks. While PA was relevant to local accuracy only in the advice network, in the case of global accuracy PA emerged as a significant variable only in the friendship network. In the context of our dataset, such a result may well be the artifact of the limited statistical power of this study, which may not have allowed us to uncover all underlying relationships between positive affectivity and social network perception. However, a tentative alternative interpretation suggesting the existence of a motivational foundation behind the differential impact of PA in the advice and friendship networks can be suggested.

The fact that positive affect improves accuracy in perceiving friendship relationships (arguably, the pleasurable side to people's social life), and hinders accuracy perceiving work-related advice relationships (arguably, the instrumental side to people's social life) is consistent with both *mood-maintenance* and *mood-congruent processing*, two stable result in cognitive psychology. According to these phenomena, people in a positive mood will be motivated to process material that has the potential to be uplifting, and avoid material that has the potential to be depressing (e.g., Wegener & Petty, 1994), and will find it easier to encode and retrieve material with a positive valence (e.g., Bower, 1981; and for reviews, Blaney, 1986; Isen, 1987). To the extent that friendly associations have a more positive valence and more potential to the uplifting than work-related associations, it is not surprising than the beneficial effects of positive affectivity emerged in connection with the perception of the friendship network, and the detrimental effects in connection

with the perception of the work-related advice network

This interpretation is consistent with the finding that such motivational properties of affect can be reversed in the presence of appropriate processing goals (Aspinwall, 1998). In the absence of an explicit motivational impetus to devote cognitive capacity to the perception of the work-related advice network, happy people will allow their mood-congruence and mood-maintenance goals to drive their processing strategy. A larger and larger body of knowledge, however, suggests that high-PA people are characterized by the ability to purposefully *re-direct* their (superior) potential for cognitive organization and flexibility towards important goals, whether the goal's level of importance is intrinsically set by the perceiver or extrinsically imposed (Isen, 1993; Bodenhausen, Kramer & Susser, 1994; Aspinwall, 1998). This implies that, when made aware of the importance of an accurate perception of the work-related advice network for their individual power and performance in the organization (Krackhardt, 1990; Morris, 1997), high-PA individuals may well devote their cognitive capacity to produce a more accurate perception of the advice network, as well as the friendship network. Further testing of these ideas in different contexts is needed to provide direct empirical support for this argument.

What emerges clearly from this study is the potential role of positive affectivity not only for individual cognition, but also for individual outcomes in a social group. Given the link *between* people's ability to perceive accurately the social world surrounding them and their power and performance in a group (Krackhardt, 1990; Morris, 1997), positive affectivity can be seen as an important vehicle for personal accomplishment in a given social setting. Moreover, to the extent that happy people are particularly responsive to environmental demands to perceive their social world accurately, they may have a higher potential for improving their accuracy (and, therefore,



their power and performance) than individuals with less cheerful dispositions.

Overall, this study contributes to both psychological and sociological research on affect and social cognition. It advances psychological research by bringing the study of affect and cognition in a field setting. The study also shows that positive affectivity does not only have an impact on short-term cognitive processes, but it also exercises a detectable effect on the long-term perceptions of patterns of social relationships evolving over time. Moreover, this study provides a contribution to the structural tradition in sociology by bringing in psychological theory and empirical research to shed light on the otherwise under-investigated connection between emotions and perception of the social structure.

## **7 CONCLUSION AND FUTURE RESEARCH**

A related question that deserves the attention of future studies regards the consequences of emotions on people's position in social structure. The behavioral consequences of affective states and dispositions have been investigated in the psychological literature we described earlier, as well as in a number of studies of organizational behavior (e.g., Isen & Baron, 1991; George & Brief, 1992; Staw & Barsade, 1993), but not with regards to people's social-structural position in the organization. In the sociological tradition, affect control theory also proposes that affect is not only cognitively active, but behaviorally active too. People seek associations with some persons and avoid associations with others in order to experience events confirming fundamental sentiments (Heise, 1979; 1987; Smith-Lovin, 1987). In this perspective, negative affectivity should have an impact on people's social position. Empirical tests of affect control theory, however, have not directly investigated the role of emotions in determining one's social position. An experimental study by Robinson and Smith-Lovin (1992) addressed the relationship between affect and choice of

interaction partners. The results suggest that people select interaction partners who provide identity-consistent feedback. In people with low self-esteem, this choice results in negative interactions, even when these interactions cause negative emotions. The study, however, leaves the question of how negative affectivity relates to one's position in their social networks unanswered.

In the social network literature, a few recent studies have started to address the question of whether individual differences predict people's position in their social network (Burt, Jannotta, & Mahoney, 1998; Conn, 1997), but this work typically conceptualizes individual differences as personality traits, not as affective states. Research in social support networks has provided evidence of how ego-networks change in the face of distressing events (Behrens, 1997).

Overall these studies hint to the existence of a relationship between affect and level of social engagement. The link between social structure and cognition is explicitly drawn in Carley's constructivist theory (Carley 1990; 1991). Carley theorizes that social interaction and knowledge dynamically co-evolve: social interaction drives knowledge acquisition, which drives social interaction; shared social position leads to shared knowledge, which leads to shared social position; and level of social interaction among individuals in a social entity determines the extent of their shared knowledge, and vice-versa. Empirical work has given support to Carley's model. For instance, in a study of the bases for both self and other's perception of an individual's behavior, and the affective and behavioral consequences of those perceptions, Carley and Krackhardt (1995) use a model of cognitive mediation to illustrate how differences in knowledge in organizations lead to differences in perception, performance, and affect. In their model, individual knowledge mediates the relationship between organizational position, attitudes, and behaviors.

Smith-Lovin (1987) pointed to the relevance of such cognitive-structural analyses for the study of the relationship between affect, social order, and social action. She argues that an explicit statement of how knowledge and affect are related would allow us to link affect, knowledge, and social structure in a model where affective meaning and social structure co-evolve, as shared meaning is developed through social interaction. The present study follows up on Smith-Lovin's call for action by providing some provisional evidence on the link between affect and knowledge. A useful extension of this research would examine the relationship between affect and social position. More generally, this study represents a preliminary step towards the development of a theory of how affect and cognition work as interfaces between self and social structure, which can arguably be considered a primary goal of contemporary sociological social psychology (Howard & Callero, 1991).

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## APPENDIX

### Friendship matrix

- E. By putting an "X" in the cells of the following matrix, please indicate whether you think the people listed in each row (from 1 to 25) considers the people listed in each column (from A to Z) as personal friends. For example, if you think that Ms. Jacket (row 9) considers Mr. Norris (column N) as a friend, place an "X" in the corresponding cell "9N".

	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
	A da m s	A n d e r s o n	Be nn e t t	Fr i c k	Gr a n t	Gr e e n	G u i d e l l i	G u n d e	Ja c k e t	La n g	M a r c u s	N e w m a n	N o r r i s	O l i v e r	O l s o n	Pe r l m a n	Pe r r y	Po o l e	Pr i c e	R u m m e l	Sa n d e r s	Ta y l o r	Tu c k e r	Wi s o n	W o l f	
1 Adams	X																									
2 Anderson		X																								
3 Bennett			X																							
4 Frick				X																						
5 Grant					X																					
6 Green						X																				
7 Guidelli							X																			
8 Gunde								X																		
9 Jacket									X																	
10 Lang										X																
11 Marcus											X															
12 Newman												X														
13 Norris													X													
14 Oliver														X												
15 Olson															X											
16 Perlman																X										
17 Perry																	X									
18 Poole																		X								
19 Price																			X							
20 Rummel																					X					
21 Sanders																						X				
22 Taylor																							X			
23 Tucker																								X		
24 Wison																									X	
25 Wolf																										X

**Table 1**  
**Means, and Standard Deviations of Variables**

<i>Variables</i>	<b>Mean</b>	<b>Standard Deviation</b>
Positive affect	6.958	2.773
Hierarchical level	2.292	.908
Advice InDegree Centrality	9.964	15.032
Friendship InDegree Centrality	15.942	11.151
Advice Network Density	46.708	28.313
Friendship Network Density	83.042	54.312
Advice Local Accuracy	.439	.289
Friendship Local Accuracy	.408	.187
Advice Global Accuracy	.450	.120
Friendship Global Accuracy	.420	.118

Table 2  
Correlations Among Variables

Variables	2	3	4	5	6	7	8	9	10
1 Positive Affect	.30	.25	-.09	.02	-.19	**-.48	.02	-.20	.21
2 Hierarchical Level		** .54	-.20	-.09	.25	-.17	-.29	*-.42	**-.49
3 Advice InDegree			.29	.02	.03	.11	-.34	.08	-.03
4 Friendship InDegree				-.11	.09	.19	.12	*.45	** .56
5 Advice Network Density					.31	-.18	-.10	.12	.27
6 Friendship Network Density						.23	-.08	.02	-.22
7 Advice Local Accuracy							*.42	.31	-.07
8 Friendship Local Accuracy								-.02	.19
9 Advice Global Accuracy									** .60
10 Friendship Global Accuracy									1.00

^p<.1; \*p<.05; \*\*p<.01



Table 3  
**Regression Models: Local Accuracy in the Advice Network (N=22)**

Independent Variables	$\beta$	Standardized $\beta$
Intercept	.885	.
	<i>.170</i>	
Advice Network Density	-.002	-.195
	<i>.002</i>	
Advice InDegree	.005	.272
	<i>.004</i>	
<b>Positive Affect</b>	<b>**-.053</b>	<b>**-.540</b>
	<i>.020</i>	
R-Squared	$\wedge$ .325	
Adjusted R-Squared	.213	
F-Statistic	2.89	
d.f.	3,18	

$\wedge p < .1$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

One-tailed tests

Standard errors in italics

Table 4  
**Regression Models: Local Accuracy in the Friendship Network (N=23)**

Independent Variables	$\beta$	Standardized $\beta$
Intercept	.389	.
	<i>.166</i>	
Friendship network density	-.001	-.087
	<i>.001</i>	
Friendship indegree	.002	.132
	<i>.004</i>	
<b>Positive affect</b>	<b>-.002</b>	<b>-.016</b>
	<i>.166</i>	
R-Squared	.024	
Adjusted R-Squared	.199	
F-Statistic	.15	
d.f.	3,19	

$\wedge p < .1$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

One-tailed tests

Standard errors in italics

Table 5  
**Regressions Models: Global Accuracy in the Advice Network**

Independent Variables	$\beta$	Standardized $\beta$
Intercept	.639 <i>.077</i>	.
Hierarchical level	** <i>-.082</i> <i>.029</i>	** <i>-.616</i>
Advice InDegree	.003 <i>.002</i>	.438
<b>Positive affect</b>	<b><i>-.005</i></b> <i>.008</i>	<b>**<i>-.121</i></b>
R-Squared	$\wedge$ .312	
Adjusted R-Squared	.107	
F-Statistic	3.03	
d.f.	3,19	

$\wedge p < .1$ ; \* $p < .05$ , \*\* $p < .01$ ; \*\*\* $p < .001$

One-tailed tests

Standard errors in italics

Table 6  
**Regressions Models: Global Accuracy in the Friendship Network**

Independent Variables	$\beta$	Standardized $\beta$
Intercept	.367 <i>.019</i>	.
Hierarchical Level	***-.066 <i>.019</i>	***-.507
Friendship InDegree	***.005 <i>.002</i>	***.498
<b>Positive affect</b>	<b>**<i>.017</i></b> <i>.006</i>	<b>**<i>.407</i></b>
R-Squared	***.312	
Adjusted R-Squared	.107	
F-Statistic	3.03	
d.f.	3,20	

$\wedge p < .1$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

One-tailed tests

Standard errors in italics