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How Personality Drives Network Benefits: Need for Cognition, Social Networks, and Information Amount

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ABSTRACT

This article provides some of the first evidence that network size and structural holes do lead to more information gathering, through a longitudinal study of managers' actual behaviors. It also shows that need for cognition (a personality trait) interacts with social network characteristics to predict the amount of information gathered.

INTRODUCTION

Access to a greater amount and diversity of information is considered a key benefit of social capital (e.g., Burt, 1992). Yet because of its difficulty, social network research rarely attempts to empirically measure information, and instead merely invokes it as an explanatory mechanism. Thus researchers have criticized the literature on social networks for not investigating the process by which social network effects occur (e.g., Emirbayer & Goodwin, 1994), and have complained that we really know little about how people in organizations actually gather information (e.g., Boyd & Fulk, 1996).

Another unanswered question is whether the benefits social networks provide are the same for all individuals. Existing social network research treats individuals as identical, and has not considered the role of individual differences (e.g., in personality) that might influence the realized benefits of social networks. While some research has begun to look at whether personality and social networks might interact (e.g., Mehra, Kilduff, & Brass, 2001), this research has only shown independent effects.

This article explicitly tests whether social network and personality characteristics lead to a greater amount and diversity of information, using a longitudinal research design involving a realistic management setting. It suggests that people with dissimilar personality characteristics differentially benefit from their social network characteristics. This demonstration helps pave the way for a richer understanding of social network benefits that incorporates actor personality.

The Determinants of the Amount of Information Individuals Gather

Several isolated literatures suggest three important classes of antecedents to information gathering: (1) social network structure, (2) individual personality characteristics, and (3) the broader environmental context. The basic model underlying much social network literature is that different network characteristics lead to different information (in terms of both amount and

diversity) and this leads to different outcomes. Both dyadic relationships (e.g., tie strength) and characteristics of the overall network (e.g., network size) have been identified as important determinants of information amount. In terms of tie strength, the key distinction is between weak and strong ties. It has been argued that weak ties are more important for information transfer (Granovetter, 1973), because people who are strongly tied are assumed to know the same information, and since weak ties are easier to maintain, people can have either a few strong ties or several weak ties. Network size has also been argued to affect information amount. Specifically, larger networks (in terms of both the number of contacts an individual has and the extent to which these contacts don't know one another) are thought to provide better access to information (e.g., Burt, 1992). This reasoning leads to the first two hypotheses (listed below).

A second set of determinants of information gathering is personality. Individuals differ in terms of key information processing characteristics. One of these characteristics is need for cognition (NFC; see Cacioppo et al., 1996). NFC measures the amount of thought individuals typically put forth in their everyday activities. While some people prefer to think deeply about even minor issues, others act as cognitive misers who exert little mental effort unless forced to do otherwise. Research on NFC has shown that high-NFC individuals tend to gather more information. This leads to the third hypothesis.

A final determinant of information gathering activities is the larger context, represented here by perceived strategic environmental uncertainty (PSEU; see Daft et al., 1988). Individuals who perceive a greater amount of uncertainty in their environment are expected to gather more information as a means of resolving that uncertainty, leading to the fourth hypothesis.

Finally, there may be interactions between the social network and personality characteristics. A large social network filled with weak ties is expected to be more important to information gathering if an individual is actually interested in gathering more information. Individuals whose personalities are such that they are less interested in thinking about issues and gathering information (e.g., low-NFC) are less likely to realize the benefits that their social networks might otherwise provide. This line of thinking leads to the final two hypotheses.

H1: Tie strength is negatively related to the amount of information an individual will gather.
H2: Network size is positively related to the amount of information an individual will gather.
H3: NFC is positively related to the amount of information an individual will gather.
H4: PSEU is positively related to the amount of information an individual will gather.
H5: Network size interacts with NFC to predict the amount of information an individual gathers, such that high-NFC individuals with large networks gather more information.
H6: Tie strength interacts with NFC to predict the amount of information an individual gathers, such that high-NFC individuals with weaker tie strengths gather the most information.

METHODS

Testing these hypotheses requires a setting in which individuals face a particular problem, gather information to help them address the problem, and record details of their information search. An almost ideal setting was found in two executive MBA classes at a large, Midwestern university. The basic research design involved (1) having the executive managers complete survey measures

of various social network, personality, and contextual factors, (2) presenting them with a relevant problem, and (3) having them record specific details about their search process while it occurred. The problem involved having managers write a six-page organizational assessment of how electronic commerce (e-commerce) was affecting (or would affect) their businesses (note: all data was collected in 2000 prior to the dot-com crash). Students had roughly two months to complete these reports. Students were also given information logs to complete while they gathered information relevant to completing their reports. Specifically, students were asked to record (for each information source they used): (1) the number of minutes spent with the source, (2) the amount of relevant information they received from that source, and (3) the extent to which the information they received from that source was different from information they already had. The assessment was a class requirement. The information log was also required, but students were told that they would not be graded. We explicitly stated that we didn't want them to change their search process, we merely wanted them to record details of whatever that search process was. A total of 70 (out of 77) students completed the initial surveys (measuring the independent and control variables), and 61 of these completed the e-commerce assessment and the information log (a response rate of 87% of those responding to the initial survey).

The Dependent Variable – Information Amount

Information amount is a difficult variable to operationalize (see Stabell, 1978: 120). This study uses three measures. Time Spent Searching is a sum of the total number of minutes managers spent gathering information (as recommended by Stabell, 1978). Effective Search weights the number of minutes spent with each source by how much information was received (as suggested by Sproull, 1984: 12). Diversity of Information Found weights the number of minutes spent gathering information by the extent to which the information found was diverse. Managers completed these ratings using five-point rating scales.

Independent Variables

Two measures of ego-network size were used: (1) Degree – the total number of people managers listed as being "important sources of information regarding important business or industry trends and issues" and (2) Effective Network Size, which discounts the Degree by the amount of redundancy among network actors ("the actual size minus the average degree of the alters," Borgatti, 1997: 37). Tie strength is a function of closeness, interaction, and duration (Krackhardt, 1992). For each tie managers reported, they answered three questions measuring these elements. The average tie strength across all network ties for each manager was then calculated. Need for cognition was measured using Cacioppo, Petty, and Kao's (1984) 18-item scale. Used in over 100 empirical studies, NFC has shown high convergent and discriminant validity and reliability (Cacioppo et al., 1996). The coefficient alpha for NFC in this study was 0.79. Perceived strategic environmental uncertainty (PSEU) was measured following Daft, Sormunen, & Parks (1988). Managers rated the importance, rate of change, and complexity of each of six environmental sectors (e.g., technological, customer, regulatory, etc.) on five-point scales. Following the Daft et al. (1988) formula, these were then combined into a single measure of overall PSEU. Two control variables were also included: E-commerce expertise (a two-item scale; reliability = 0.79) and a dummy variable for the executive MBA class the manager was in.

The data were analyzed with multiple regression analysis. There is a frequent tradeoff in research studies between rich, longitudinal data and sample size. The overall sample size of these analyses dropped to 53 due to missing observations on certain variables. While this sample size meets the minimum criteria of six to ten subjects per independent variable noted by Neter et al. (1996: 330), it does mean that the power of these tests is not as strong as would be ideally desirable. The power to detect large effects is 82%, medium effects is 40%, and small effects is only 8%. While this level of power is not unusual in the management literature, it does mean that the findings of this study are suggestive rather than conclusive, and that future work is needed to follow up on the results presented here.

RESULTS

Descriptive statistics revealed several interesting characteristics of the data. Managers spent an average of 423 minutes (just over seven hours) gathering information for the assessment, though there was a fair degree of variation in this amount (s.d. = 340 minutes). Correlations show that the three measures of information amount are distinct. While the time spent searching for information was significantly correlated with judged effectiveness of that search ($r=0.64$, $p<.01$), and search effectiveness was significantly correlated with the diversity of information found ($r=0.59$, $p<.01$), the amount of time spent searching was not significantly correlated with the diversity of information found ($r=0.14$, n.s.).

The means and standard deviations for the independent variables are: Network Size (u=8.03; s.d.=3.03), Effective Network Size (u=3.74; s.d.=2.35), NFC (u=4.01; s.d.=0.45), PSEU (u=27.45; s.d.=7.93). NFC was correlated with their network size ($r=0.24$, $p<.05$) – managers who prefer to think more deeply have larger networks. Network Size correlates highly with Effective Network Size ($r=.67$, $p<.01$). Average Tie Strength was not significantly correlated with any of the study variables. Effective Network Size is the only one of these variables that is significantly correlated with any of the information amount variables (with Effective Search, $r=.28$, $p<.05$). Finally, PSEU was significantly correlated with Effective Network Size ($r=.31$, $p<.05$), Time Spent Searching ($r=.42$, $p<.05$), and Search Effectiveness ($r=.28$, $p<.05$).

Given the three dependent variables (Time Spent Searching, Effective Search, and Diversity of Information Found) and the two operationalizations of network size (Degree and Effective Network Size), there are six regression models to report. Of the models using Degree as the measure of network size, the Time Spent Searching and Effective Search models were significant ($F=3.63$, $R^2=0.29$, $p<.01$; $F=3.60$, $R^2=0.29$, $p<.01$ respectively). The model of Diversity of Information Found was not significant ($F=1.80$, n.s.). Three variables were significant predictors of Time Spent Searching: PSEU (std. beta=0.28, $p<.10$), the interaction between degree and NFC (std. beta=0.33, $p<.05$), and the interaction between average tie strength and NFC (std. beta= -0.28, $p<.05$). Five variables were significant predictors of Effective Search: PSEU (std. beta=0.27, $p<.10$), degree (std. beta=0.30, $p<.05$), e-commerce expertise (std. beta= -0.32, $p<.05$), the interaction between degree and NFC (std. beta=0.33, $p<.05$), and the interaction between average tie strength and NFC (std. beta= -0.31, $p<.05$).

Of the models using Effective Network Size as the measure of network size, the Time Spent Searching and Effective Search models were significant ($F=3.05$, $R^2=0.24$, $p<.01$; $F=3.79$,

R^2=0.30, p<.01 respectively). The model of Diversity of Information Found was not significant (F=1.54, n.s.). Two variables were marginally significant predictors of Time Spent Searching: average tie strength (std. beta=0.24, p<.10) and the interaction between effective network size and NFC (std. beta=0.26, p<.10). Three variables were significant predictors of Effective Search: Effective Network Size (std. beta=0.32, p<.05), e-commerce expertise (std. beta= -0.34, p<.05), and the interaction between effective network size and NFC (std. beta=0.35, p<.05).

DISCUSSION

These results support the overall model that social network characteristics, personality characteristics, and contextual factors all affect the amount of information individuals gather to address complex and uncertain emerging issues. However, the results differ for the different measures of information amount. While managers who perceive a higher level of environmental uncertainty spend more time gathering information, PSEU did not affect search effectiveness. Instead, network size (using either measure) was significantly related to search effectiveness. Perhaps most interesting are the interactions between the personality and social network variables. Specifically, NFC and network size strongly affected the time spent searching for information and the effectiveness of that search. Median split analyses confirmed that high-NFC managers with larger networks gather the most information. There was also a negative relationship between the NFC * average tie strength interaction term, suggesting that weak ties are more useful for gathering information for high-NFC managers.

These findings are important because they provide crucial empirical support for the assumption that network characteristics affect the amount of information that managers get. The finding that degree and effective network size do in fact lead to individuals getting more relevant information shows that this assumption is warranted, and addresses concerns that social network research needs to more specifically address the process behind social network effects.

Given the increasing interest among researchers in how personality and social network characteristics relate to each other, the findings presented here are especially interesting. This is the first known empirical evidence that social network characteristics differentially benefit actors with dissimilar personality characteristics, and this has enormous implications for future research on social networks. If social networks are more beneficial for certain types of people (e.g., those with a high-NFC), then future research should explicitly consider whether proposed social network benefits might more strongly accrue to individuals with particular personality profiles, and perhaps include personality variables as moderators.

A final implication of this research is that researchers need to be more specific in discussing information amount. While many treatments of information amount assume that a greater amount of time spent searching for information will result in more relevant and diverse information being found, this study suggests that such an assumption may be unfounded. In particular, this research found that none of the study variables was a significant predictor of the diversity of information found. Future research is needed to more precisely distinguish between these three information variables, and delineate what factors predict each and when.

REFERENCES

Borgatti, S.P. 1997. Structural holes: Unpacking Burt's redundancy measures. **Connections**, 20(1): 35-38.

Boyd, B.K. & Fulk, J. 1996. Executive scanning and perceived uncertainty: A multidimensional model. **Journal of Management**, 22(1): 1-21.

Burt, R.S. 1992. **Structural holes: The social structure of competition**. Cambridge, Mass: Harvard University Press.

Cacioppo, J.T., Petty, R.E., Feinstein, J.A., & Jarvis, W.B.G. 1996. Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. **Psychological Bulletin**, 119(2): 197-253.

Cacioppo, J.T., Petty, R.E., & Kao, C.F. 1984. The efficient assessment of need for cognition. **Journal of Personality Assessment**, 48: 306-307.

Daft, R.L., Sormunen, J., & Parks, D. 1988. Chief executive scanning, environmental characteristics, and company performance: An empirical study. **Strategic Management Journal**, 9: 123-139.

Emirbayer, M. & Goodwin, J. 1994. Network analysis, culture, and the problem of agency. **American Journal of Sociology**, 99(6): 1411-1454.

Granovetter, M.S. 1973. The strength of weak ties. **American Journal of Sociology**, 78(6): 1360-1380.

Krackhardt, D. 1992. The strength of strong ties: The importance of philos in organizations. In N. Nohria & R.G. Eccles (Eds.), **Networks and organizations** (pp. 216-239). Boston: Harvard University Press.

Mehra, A., Kilduff, M., Brass, D.J. 2001. The social networks of high and low self-monitors: Implications for workplace performance. **Administrative Science Quarterly**, 46(1): 121-146.

Neter, J., Kutner, M.H., Nachtsheim, C.J., & Wasserman, W. 1996. **Applied linear statistical models**. Chicago: Irwin.

Sproull, L.S. 1984. The nature of managerial attention. In L.S. Sproull & P.D. Larkey (Eds.), **Advances in Information Processing in Organizations** (Volume 1, pp. 9-27). Greenwich, CT: JAI Press.

Stabell, C.B. 1978. Integrative complexity of information environment perception and information use: An empirical investigation. **Organizational Behavior and Human Performance**, 22: 116-142.