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STRUCTURAL ANTECEDENTS TO LEARNING: THE IMPACT OF INTERACTIVE GROUP PARTICIPATION ON EXAMINATION PERFORMANCE

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ABSTRACT

Research indicates that the structure of social interaction influences various outcomes for individuals. In previous studies, the pattern of social affiliations has proven quite useful, for instance, in explaining knowledge transfer. This paper reports on a quasi experimental design examining the role of social structure and interactive groups and their correlation with examination performance in a classroom setting. Results of this study suggest that network centrality, both local and global, plays a role in knowledge transfer in the classroom. Details of the study, findings, and implications are reported.

INTRODUCTION

Research exploring antecedents to various aspects of performance has long been of interest to behavioral studies. An array of research investigates individual and social antecedents to performance in a variety of mediums. This study investigates learning and its relationship with social capital. Using a quasi-experimental model, this study investigates whether the socialization patterns occurring within the classroom explain the academic performance of a student.

Among behavioral researchers, significant disagreement exists as to whether individual traits and motivation or group and social forces are more important in the development of the individual. Fundamentally, this academic question boils down to the issue of the nature of the individual or the specific nurturing of that individual's social network. Individual traits and motivations have a long and rich tradition with clear links to performance in a variety of settings. However, some researchers argue that the social forces which surround the individual play at least as important a role in performance.

Mayhew (1980) takes an extreme nurture position in the nature versus nurture debate. He has argued that the history of individual trait and motivation research produces statistically significant results explaining such a small percentage of variance as to be practically insignificant (Mayhew, 1980). He notes, though, that the individual (micro) perspective remains the overarching paradigm in behavioral studies. Brass (1995) somewhat concurs noting that social structures and roles seem to explain a very important and meaningful level of variance in human performance. However, Brass takes a far more moderate position than Mayhew and observes that the individual and structural perspectives are actually complements, not competitors (Brass, 1995). From the perspective of Brass and related researchers, both nature and nurture function simultaneously on the individual.

The research presented in this study follows the social network perspective. The nature of the research stems from the philosophy espoused by Brass (1995). We accept that individual traits and characteristics play a role in education, learning, and performance.

However, we posit that the social structure surrounding the individual plays an important a role in learning outcomes. In this study, we examine whether the social affiliations of a group of students influence the learning and academic performance outcomes of those same students.

The remainder of the paper consists of four sections. We begin with a literature review outlining the social capital theories informing the research questions addressed in this study. We follow with a detail of the methodology of the study and then an analysis using traditional statistic methods as well as network analysis. We conclude with a discussion of findings, implications, and suggestions for future directions.

LITERATURE REVIEW

We draw upon social capital theory to test and explain the results of this study. As suggested by Coleman (1978), social capital theorists argue that the various others an individual has access to comprise an important resource for that individuals performance (Contractor, Wasserman, & Faust, 2006; Parkhe, Wasserman, & Ralston, 2006). Social capital takes a variety of forms (Borgatti & Foster, 2003; Brass, Galaskiewicz, Greve, & Tsai, 2004), since various social groups provide different types of social capital (Wellman & Wortley, 1990).

Various types of social capital link to different aspects of performance and individual outcomes. Weak ties and acquaintances provide access to information leading to job opportunities (Granovetter, 1973) and salary negotiation benefits (Seidel, Polzer, & Stewart, 2000). Strong ties, those the individual is most closely affiliated with, have proven useful in explaining individual attitudes and beliefs.

Social capital studies linking to attitudes include attitudes towards other departments (Labianca, Brass, & Gray, 1998; Nelson, 1989), attitudes towards new technology (Rice & Aydin, 1991), and preferences for future job opportunities (Kilduff, 1990). Other aspects of social capital lead to career success (Seibert, Kraimer, & Liden, 2001), knowledge transfer (Hansen, 1999), organizational

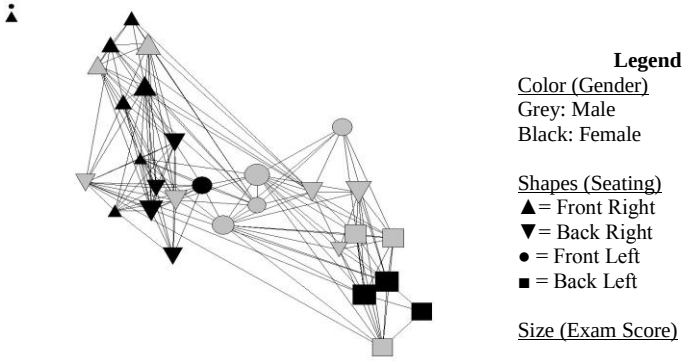
influence (Barley, 1990; Brass, 1984), organizational power (Burt, 1997; Krackhardt, 1990), and reducing drop-out rates in academia (Coleman, 1990). One of the primary tools used by social capital researchers is network analysis. While an extensive review of network analysis is beyond the scope of this study, the interested reader is recommended to examine Brass (1995) and Scott (2000) for an introduction into the primary concepts of network analysis. For purposes of this study, we will review the general principles of network diagramming, network distance, and centrality.

At its core, network analysis is interested in the affiliations and interactions between groups of actors (Brass, 1995; Scott, 2000). Within this study, the term actor is synonymous with individual. Use of sociograms enables visual depiction of individual affiliation patterns. A sociogram generated from this study appears in Figure one below.

The circles, triangles, and squares appearing in Figure one, represent nodes, one for each individual actor observed in this study. The lines which connect these actors represent a measure of affiliation, in this case participation in interactive groups during a class session. Further, by manipulating the size, shape, and color of the nodes, various attribute data can be depicted along with affiliation. In Figure one, the color of the node depicts gender, the shape of the node depicts the seating chart quadrant for the student, and the size of the node depicts the dependent variable, exam score. As one can see, interaction patterns as depicted can quickly become complex. As such, it is often useful to work with relatively small samples in a network diagram.

A number of attributes and measures can be inferred through the interaction patterns of a group of actors. We utilize the network concept of centrality using measures of in-degree and closeness (Borgatti et al, 2002). Centrality refers to the degree to which an actor occupies a central point within a group of actors (Borgatti, 2005; Borgatti, Carley, & Krackhardt, 2006; Borgatti & Everett, 2006).

Figure 1: Grouped at least one time



Centrality can take the local form an[illegible] group within the total network or it can take the form of overall network centrality Two common measures for centrality are in-degree centrality and distance. In-degree centrality measures the number of others an actor is directly connected to and primarily represents a measure of local centrality (Scott, 2000). Closeness, alternately, represents a calculation of the longest path distance between an actor and any other actors within the network. As such, closeness measures represent an approximation of overall network centrality (Borgatti et al, 2002).

The most common application of centrality in network studies involves examining centrality as either an antecedent or outcome of power or influence. Brass (1984) finds centrality correlates with influence. Additionally, both in-degree and distance independently explain power in organization (Brass & Burkhardt, 1993).

Studies which examine organizational learning find centrality plays a part in the adoption of new technologies. In his 1990 study, Barley find that technology adoption amongst medical personnel was influenced by, and in turn influenced, network structure. Actors adopting technology earlier, in units adopting technologies the fastest, became more central within their respective networks. The networks with central members adopting the technology tended to more readily embrace the technology change.

Rice and Aydin (1991) find that attitudes about new technology deployed in a workplace highly correlated to the respective position of that actor within their network. Specifically, individuals

in structurally equivalent positions adopted similar attitudes towards new technology. While at least part of the explanation for outcomes from both the Barley (1990) and the Rice and Aydin (1991) study involved changes in existing power structures communication patterns in the network influenced attitudes and adoption of technology.

Rice and Aydin (1991) conclude that information processing, via communication flows, directly influenced attitudes towards new technology. Their findings specifically suggest that the social capital available to an actor influences both the content and interpretation of new information. Social capital theory explains these findings by noting that the others connected to an individual assist in receiving new information (Granovetter, 1973), interpreting said information (Erickson, 1988), and achieving knowledge transfer (Hansen, 1999).

Specifically evaluating the role of weak and strong ties in information reception and processing, Hansen observed that weak ties were essential for acquiring new information. However, Hansen noted that the actor acquiring information also needed strong ties to transfer the new knowledge. Taken in the context of the classroom, social capital likely plays a similar role in the learning process.

Specifically we expect that access to other classmates plays a role in both knowledge search and transfer. From this, the more social capital available to a given student actor, the more likely that actor will have the right kernel of information available at the right time and further will be able to process and utilize that information correctly. Within the classroom, and interactive group context, this most likely will equate to measures of centrality, specifically in-degree and distance.

H1: Local Centrality, measured by in-degree, will positively correlate with academic performance.

H2: Network Centrality, measured by closeness, will correlate with academic performance such that actors closest to all other actors will perform superiorly to less central actors.

DETAILS OF STUDY

Thirty-two students enrolled in an introductory management course at a southwestern University participated in this study. Two students withdrew from the course at differing points in the semester, with thirty completing the course. All students were aware that grading and roster of participation was being kept for various activities during the semester. As the affiliation choices had no overt impact on grading, students chose their affiliations without bias for the quasi-experiment.

This section met two hours a day, four days a week, for five weeks. Students enrolled in the course came from a variety of academic backgrounds. The course in question is an elective course for College of Business students and fulfills a minor course requirement for several non-business degrees. This course represents one of the first business courses taken by many of these students.

Over the course of the semester, students participated in a number of in-class interactive group activities each designed to facilitate knowledge transfer. With the exception of exam dates, nearly every class meeting had some form of interactive group activity. These activities typically involved small groups and took 20-30 minutes.

Materials

Three specific types of data were collected in the course of this study. At the beginning of the semester, all students took a standard network survey indicating whether they had prior class experience, pre-existing friendships, or pre-existing animosities with other class mates. The instrument used for measurement consisted of a survey instrument with a roster of all class member names along with scales for level of friendship and level of animosity. The results of this sample functioned as a partial control and verified the extent to which prior socialization patterns existed.

Two students did not attend any class meetings other than the scheduled examinations. In both situations, the students failed the course performing significantly below average on examination scores. While this supports our primary hypothesis, it presents a confound for standard network analysis as these two individuals had no in-group affiliation. For all analysis which follows, two types of analysis are

detailed. The first analysis includes all course participants using a score of 0.0 for in-degree and distance for the non attendees. Subsequent analysis details the 28 regularly participating students.

The second method of data collection involved maintaining an incidence matrix for each daily activity. These matrices for each event were compiled into a social affiliation matrix similar to those described in the Old South studies (for a review of affiliation matrices, see Scott, 2000). At the conclusion of the semester these matrices were summated so that the total number of times any two students jointly participated in a group was captured. Analysis of this summated matrix produce the independent variables used in this study. The dependent variable used in all analysis is the summated scores for each of four examinations.

Methods

For control purposes, six students had prior affiliation. In all but two cases, each had a prior friendship with one other student. One student had prior friendships with two other students. In all but one pairings, the friendship was associated with a prior class. One negative affiliation existed with each students reciprocating a strong dislike. As expected, this course represented initial contact for most dyads.

Students were allowed to self-select into groups. Each group then participated in an activity designed to reinforce material covered in the lecture. Each day the instructor altered the number of people permitted in each group (+/-1). This enabled subtle manipulation of grouping patterns. Students were forced to choose between group mates during sessions with reduced group size.

Eleven grouping activities are chronicled in this study. Four involved groups of two or three participants, six activities involved groups of four to six members, and one early activity involved eight member groups. Other than number of members, no other stipulations were placed upon grouping. Students were allowed to affiliate based on personal preferences; alteration of group size forced students to periodically choose a most preferable grouping pattern.

Students participated in four multiple choice examinations over the course of the semester. The final examination covered material covered in the last portion of the class, no material overlap is

covered in the point total. The final scores for each examination provide the measure of the learning performance for each student.

ANALYSIS

The independent variables in-degree and closeness were each calculated using UCInet (Borgatti, Everett, & Freeman, 2002) a commonly used software application for network analysis. In-degree measures captures the total number of actors a given actor is directly connected to along with the frequency of interaction between those actors. As such, a higher in-degree represents a larger number of stronger affiliations.

Closeness uses an inverse measure of the shortest geodesic distance to the most distant other in the network. Using the inverted measure for closeness means that a higher closeness level implies a higher level of overall network centrality. To support hypothesis 2, higher levels of closeness should positively correlate with academic performance.

Correlation

Bivariate correlation of the two independent variables and single dependent variable were conducted using SPSS version 13.0. The results of the analysis for all thirty students appear in Table one below. Both independent variables significantly correlate with the exam scores with closeness (r =.686) having a slightly higher correlation to exam scores than did in-degree (r =.661). Additionally, closeness and in-degree highly correlate with each other (r =.701). The correlation between independent variables is expected given the conceptually similar nature of each centrality measure.

Table 1: Correlations

Construct	*Mean* S.D.	*1*		*2*		*3*
1. Exam Performance	322.37 46.54					
2. In-Degree Centrality	23.73 10.10	.66	**			
3. Closeness Centrality	19.89 5.48	.69	**	.70	**	
4. Gender	M = 14 F = 17	.41	*	.32		.29

Notes: * = .05, ** = .01

Regression Analysis

Separate regression runs were prepared with the dependent variable regressed separately on each independent variable. Results for these runs appear in Table Two below. Gender was entered as a control variable. Model 1 examines the local centrality measure, in-degree centrality, for all students also reached significance (β = .59) and explains roughly 48% of the variance (R^2=.48). In-degree achieves significance while gender does not. This suggests that exam performance variation is significantly explained by measures of centrality while not differing significantly for males or females.

Model 2 examines the impact of the overall centrality measure, closeness, achieves significance (β = .62) and explains roughly 52% of the variance (R^2=.519). Gender did not achieve significance in this model suggesting that exam performance did not differ significantly for male or female participants. Students more globally central exhibit stronger exam performance than those occupying peripheral positions.

Table 2: Regression Models

	Model 1		*Model 2*		*Model 3*		*Model 4*	
	Full Sample				Reduced Sample			
Variable	β		β		β		β	
In-Degree Centrality	.59	**			.36	†		
Closeness			.62	**			.04	
Gender	.22		.23		.27		.34	†
R^2	.48	**	.52	**	.24	*	.12	

Notes: † = .1, * = .05, ** = .01
Standardized Coefficients are reported

Results for the subset of students who fully participated appear in Models 3 and 4. In Model 3, examination scores regressed against the local centrality measure, in-degree, approaches significance (β = .36) while gender does not and explains 24% of the variance in performance (r^2=.241). This indicates that in-degree centrality marginally explains the variation in exam performance while point totals did not differ significantly between males and females. With in-degree centrality reaching significance in the full sample and approaching significance in the reduced sample, we find support for hypothesis one.

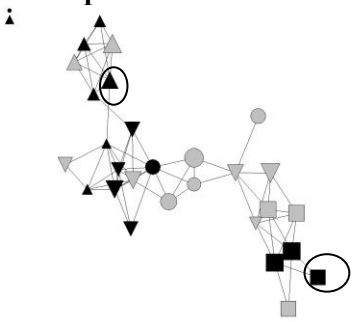
Model 4 examines the impact of closeness centrality in the reduced model. Here the model explains very little of the variance in exam performance (r^2=.12) and neither closeness nor gender achieve significance. With closeness centrality only achieving significance in the full model and dropping substantially in the reduced model we find no support for hypothesis two. The significant effects identified in Model 2 appear largely an artifact of our two non-participating students.

Network Analysis

A visual depiction of the emerging class network appears in Figure Two capturing students grouping two or more times. This

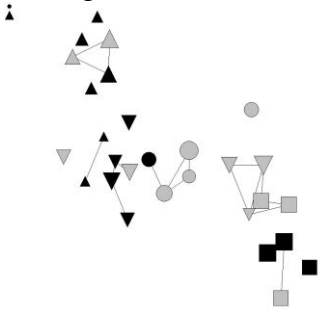
network model distinguishes by gender (grey = male, black = female) and quadrant of the room (by shape of node). There are several interesting observations visible in the sociogram.

Figure 2: Grouped at least two times



First, while gender and proximity appear to play a role in grouping patterns, this is not universal. Of the various cores visible within the diagram several are mixed gender. The four quadrants of the room, based on lecture seating chart, also do not completely explain grouping patterns. Two of the quadrants correspond closely to visible clusters while the other two clusters are comprised almost equally of members of the remaining two room quadrants. This becomes more apparent examining Figure three which depicts the network affiliation for actors with five or more common groupings. Interestingly, the diversified groups (by quadrant) represent opposing corners of the classroom. These students did not sit near each other in any way during the lectures. As such, it appears that something beyond gender and proximity played a part in the emerging network structure.

Figure 3: Grouped five or more times



The hidden explanation lies in the negative affiliation discovered in the pre-study. The two actors exhibiting a negative attitude towards each other are circled on Figure Two. These two actors managed, in some way, to generate a significant amount of network distance from each other. Further, the two core groups which appear to be based on seating proximity also happen to be the quadrants (again diagonally opposed) where the two negatively affiliated actors sit. Essentially, it appears that these two actors, each reciprocating dislike towards the other, leveraged the class network in such a way as to provide the greatest insulation between themselves and the disliked other.

DISCUSSION

Results of the various analyses support the conclusion that centrality impacts classroom learning. Particularly in the full models, both centrality measures explain exam performance. These situations were, however, influenced by two individuals who did not participate in any class meetings. From this, it appears that access to social capital in the form of classmate's impacts course performance. However, given our results the benefits likely accrue at the local, not global level.

Removing those individuals from subsequent analysis lends marginal support for the centrality argument. In the reduced sets, in-degree centrality remained marginally significant in explaining variation in exam performance. Further, the amount of variance explained was fairly substantial (r^2=.24). In this case, direct access to numerous others in the classroom correlates with higher overall performance.

The first implication of this study is no surprise: attending class matters. In a course where with no penalties or bonuses tied to attendance, the individuals who did not attend class performed poorly. More importantly though, how students attend class matters. The students who maintained a fairly large and diverse interaction group outperformed students who tended to group with the same subset. Examination of social capital theory, particularly strong tie and weak tie literature, offers explanations for these results.

The students who had larger, more diversified networks had access to more contacts. This implies that they had a greater opportunity to hear information, or interpretation, in numerous different ways. The individuals who maintained a small, but dense, network only had the same individuals to regularly interact with. These individuals would be expected to largely have the same information and interpretation available as the other members of their core interaction groups. This means that those small groups likely understood, or misunderstood, the same material. For the individuals with larger networks, an opportunity existed to 'correct' misunderstandings and spread understandings. Having a larger interaction network translates to having more learning mirrors. By reflecting a given students understanding off the mirrors of others, it appears that a greater understanding of material developed.

These findings imply that development of social capital in the classroom aids learning. The prescription to instructors is to utilize grouping with forced rotation. By helping students develop larger, diverse networks, the potential for greater understanding increases. The implication for the student, is that development of social capital is critical in the learning process. This supports the initial findings of Hansen (1999) and extends his findings beyond innovation to academic learning.

Several extensions for future research are suggested. First, the study should be replicated using different sample sizes to investigate whether the size of the network plays has any bearing on the centrality to performance relationship. Second, different learning settings should be examined. Third, more depth to the network analysis is desirable. Specifically demographic and behavioral characteristics of network actors may influence how centrality and access impact learning. Finally, a fully experimental study using manipulation and control with a less sensitive subject matter would provide better basis for arguing causality in the centrality to learning performance relationship.

While the findings of this study are intriguing, they are not without limitation. The sample utilized for this class was small. While the effect sizes observed were notable, it remains unknown whether such results typically manifest or whether these results were influenced by some other aspect of the course. Further, while the

social capital theory which forms the foundation of the hypothesis in this study suggests a causal relation, we caution against causal inference at this time. Controls were taken to make certain pre-existing affiliations were catalogued and the measurements used for the independent and dependent variable were objective and separately obtained. Even so, the findings reported herein are correlational only. An alternate argument could be made that high performing students attract a larger number of individuals; their centrality might therefore be a consequence, rather than an antecedent, of their academic success. It is also possible that the relationship between centrality and academic performance is reciprocal. In this case, both explanations might be valid!

The primary reason we cannot infer causality in this study involves lack of experimental controls. To effectively argue a causal relation between access to social capital and academic performance would require a more complex experimental model. This would entail replication of study using groups which have access to interactive (and rotating groups), interactive groups with fixed membership, and courses with no interactive grouping. Given the nature of the subject matter, an actual course impacting the student's grades, such controls would not be ethically feasible. As such, in the context of this study, quasi-experimentation represented the optimal approach.

Future research should take these results and expand into a larger experimental study using a more complex experimental model. This could easily be accomplished in a setting where the outcomes for the participant are less salient and in which the participant experiences fewer long-term consequences for the performance outcomes (i.e. grades). This would reduce the ethical concerns of denying the 'optimal' manipulation to some subjects. Alternately, quasi-experimentation following the model detailed in this study could be replicated with larger samples, differing teaching styles, and different course work. While quasi-experimentation would not increase causal arguments, such replication would at least increase the generalizability of the correlational arguments arising from this study.

This study sought to examine whether social capital plays a role in academic performance. Past research documents that social capital aids in knowledge discovery and transfer, however those results focused particularly on R&D in a business setting. Social

capital as been used previously in educational studies; however the social capital relationship was only evaluated in the context of educational continuance. This study extends that of Rice and Aydin (199X) and Coleman (1990) and suggests that social capital plays a direct role in the learning process. Further study is warranted, but the initial results appear promising.

REFERENCES

Barley, S. (1990). The alignment of technology and strcture through roles and networks. *Administrative Science Quarterly, 35*, 61-103.

Borgatti, S. P. (2005). Centrality and network flow. *Social Networks, 27*(1), 55-71.

Borgatti, S. P., Carley, K., & Krackhardt, D. (2006). Robustness of centrality measures under conditions of imperfect data. *Social Networks, 28*(1), 124-136.

Borgatti, S. P., & Everett, M. G. (2006). A graph-theoretic perspective on centrality. *Social Networks, 28*(4), 466-484.

Borgatti, S. P., Everett, M. G., & Freeman, L. (2002). *Ucinet for windows. Software for social network analysis*.Harvard, MA: Analytic Technologies.

Borgatti, S. P., & Foster, P. C. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management, 29*(6), 991.

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. (1995). A social network perspective on human resources management. In G. R. Ferris (Ed.), *Research in personnel and human resources management* (Vol. 13, pp. 39-79). Greenwich: JAI Press.

Brass, D. J., & Burkhardt, M. E. (1993). Potential power and power use: An investigation of structure and behavior. *Academy of Management Journal, 36*, 441-470.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal, 47*(6), 795-817.

Burt, R. S. (1997). The contingent value of social capital. *Administrative Science Quarterly, 42*(2), 339.
Coleman, J. S. (1990). Social capital in the creation of human capital. *American Journal of Sociology, 94*, S95-S120.
Contractor, N., Wasserman, S., & Faust, K. (2006). Testing multitheoretical, multilevel hypothesis about organizational networks: An analytic framework and empirical example. *Academy of Management Review, 31*(3), 681-703.
Erickson, B. (1988). The relational basis of attitudes. In B. Wellman & S. D. Berkowitz (Eds.), *Social structures: A network approach* (pp. 99-121). Cambridge: Cambridge University Press.
Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology, 78*, 1360-1380.
Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organizational subunits. *Administrative Science Quarterly, 44*, 82-111.
Kilduff, M. (1990). The interpersonal structure of decision making: A social comparison approach to organizational choice. *Organizational Behavior and Human Decision Processes, 47*, 270-288.
Krackhardt, D. (1990). Assessing the political landscape: Structure, cognition, and power in organizations. *Administrative Science Quarterly, 35*, 342-369.
Labianca, G., Brass, D. J., & Gray, B. (1998). Social networks and perceptions of intergroup conflict: The role of negative relationships and third parties. *Academy of Management Journal, 41*, 55-67.
Mayhew, B. (1980). Structuralism versus individualism: Part 1, shadowboxing in the dark. *Social Forces, 59*, 335-375.
Nelson, R. E. (1989). The strength of strong ties: Social networks and intergroup conflict in organizations. *Academy of Management Journal, 32*, 377-401.
Parkhe, A., Wasserman, S., & Ralston, D. A. (2006). New frontiers in network theory development. *Academy of Management. The Academy of Management Review, 31*(3), 560.
Rice, R. E., & Aydin, C. (1991). Attitudes toward new organizational technology: Network proximity as a mechanism for social information processing. *Administrative Science Quarterly, 36*, 219-244.
Scott, J. (2000). *Social network analysis: A handbook* (2nd ed.). London: Sage Publications.

Seibert, S. E., Kraimer, M. L., & Liden, R. C. (2001). A social capital theory of career sucess. *Academy of Management Journal, 44*, 219-237.
Seidel, M.-D. L., Polzer, J. T., & Stewart, K. J. (2000). Friends in high places: The effects of social networks on discrimination in salary negotiation. *Administrative Science Quarterly, 45*, 1-24.
Wellman, B., & Wortley, S. (1990). Diffferent strokes from different folks: Community ties and social support. *The American Journal of Sociology, 96*(3), 558.

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