

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 2007 Proceedings

Americas Conference on Information Systems
(AMCIS)

December 2007

The Influence of Computer Mediated Communication on Social Capital: A Disaggregated Approach

Israr Qureshi
University of Western Ontario

Follow this and additional works at: <http://aisel.aisnet.org/amcis2007>

Recommended Citation

Qureshi, Israr, "The Influence of Computer Mediated Communication on Social Capital: A Disaggregated Approach" (2007). *AMCIS 2007 Proceedings*. 385.
<http://aisel.aisnet.org/amcis2007/385>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2007 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

THE INFLUENCE OF COMPUTER MEDIATED COMMUNICATION ON SOCIAL CAPITAL: A DISAGGREGATED APPROACH

Israr Qureshi

Richard Ivey School of Business
University of Western Ontario
iqureshi@ivey.uwo.ca

Abstract

In a work environment that is dominated by distributed work, virtual teams, and knowledge sharing, social capital enabled by computer mediated communication (CMC) has become a critically important, but increasingly more difficult resource for individuals to manage. Social capital is built on the foundation of social interactions; developing and maintaining it relies on communications that are increasingly supported by digital networks. Various studies have reported that computer-mediated communication (CMC) increases, decreases and has no effect on social capital (refer to Wellman et al., 2001 for a review). Interestingly, studies carried out by the same team of investigators using similar designs and measures also led to conflicting results (Kraut et al., 2002; Kraut et al., 1998). These conflicting effects of CMC on social capital necessitate a disaggregated approach to theoretical understanding and empirical analysis of effects of CMC on social capital. In this research program, I synthesize and extend research on computer mediated communications and social capital by theorizing about the influence of digital networks on structural, cognitive, and relational social capital and thus on the outcomes of the social capital such as information sharing, emotional support, satisfaction and stress. The preliminary analysis of data indicates that those who use CMC more for solo entertainment have less developed social networks irrespective of context. Those who use CMC for socializing activities have well develop social network in the context of leisure activities and close friendship but less so in the context of course related activities. Finally, those who use CMC more for course related activities are more central in course related networks but less central in leisure activities and close friendship networks. This work indicates the need for disaggregated conceptualization and empirical analysis of effects of CMC on social capital.

Introduction

The last several decades have witnessed dramatic changes in patterns of work, organization, and technology. The nature of what people do and how they do it has shifted concurrently with the advent of computerization. Work has become more informed (Zuboff, 1988), occupations have become more specialist (Barley, 1996), organizational forms have become more networked and horizontal, and vertical hierarchies have flattened (Barley, 1996). In such a work environment, workers must increasingly orchestrate a broad set of relations in order to accomplish complex, virtual, and team-based tasks (Barley, 1996). In a world of horizontally distributed work, who you know and how they can help you has perhaps become as important as what you know. Social capital is a commonly used term for the value or resources inherent in an individual's network of relations. Thus the value of social capital is associated both with whom you are connected and the resources those connections are able to provide to you. Social capital accumulation is accomplished via social interactions between people (Nahapiet and Ghoshal, 1998).

The advent of digital networks has significantly transformed social interactions. Individuals now use various types of communication and collaboration tools in conjunction with, or as a replacement for, face-to-face communication. It is not surprising then that the interaction of information technology and social capital has come under increasing scrutiny in various forums (Huysman and Wulf, 2004; Prusak and Cohen, 2001), given the substantial and growing importance of CMC in

today's business world. Such work has examined the generation and decline of social capital brought about by increasing use of CMC, primarily the internet, within various contexts (society, communities, corporations) and at various levels of analysis (individuals, groups, organizations). However, research on the effects of CMC use on the social interactions has produced mixed findings. Various studies have reported that computer-mediated communication (CMC) increases, decreases and has no effect on social capital (refer to Wellman et al., 2001 for a review). Interestingly, studies carried out by the same team of investigators using similar designs and measures also led to conflicting results (Kraut et al., 2002; Kraut et al., 1998). These conflicting outcomes of CMC resulted in a rich debate; however, many questions remained unanswered. How a media that was created to facilitate interaction is linked with increasing isolation? How usage of CMC that is claimed to disrupt the relationships and make individuals isolated can also function as channels for creating new and enduring social ties within and across the populations. This debate has resurfaced recently with a finding that average number of close ties has decreased from 3 to 2 in past twenty years (McPherson et al., 2006) as higher use of CMC reduces the time one spend with friends and family (Nie et al., 2005), thus, leading to shrinkage in social networks of close ties (McPherson et al., 2006). However, Boase et al (2006) provide evidence that CMC is actually helping people maintain their social networks and create networks across communities and geography (also refer to Plickert et al., 2007; Wellman et al., 2006).

These conflicting results may be on account of three issues. *First*, the measurement issue associated with CMC usage. Most of the studies either measured CMC usage as users versus non-users (e.g., Nie et al., 2005) or total duration of use (e.g., Kraut et al., 2002; Kraut et al., 1998). It can be argued that someone who uses CMC for the purpose of solo entertainment will not have same effects on his/ her social ties as someone who use it for social activities. Some scholars have taken a step further and measured the use of different technologies such as email, World Wide Web and many-to-many communication programs (newsroom, bulletin boards etc) (e.g., Zhao, 2006). While this is a good first step and helps us understand individuals' usage of different technologies, this does not provide information on effect of uses of CMC for different purpose on social networks. It can be argued that use of World Wide Web, at one extreme, could be purely for solo entertainment such as downloading the music or watching a video clip where as, at another end, it could be for social interaction through websites like Facebook, LinkedIn and MySpace. Thus, classifying the CMC usage into various technologies does not serve the purpose.

Second, most of these studies ask for number of ties one interacts with. This is an aggregate measure of social interactions. These interactions can be for various purposes. One may interact with a contact for job related issues, with another contact for leisure activities, and with others for emotional needs. It can be argued that CMC usage will have differential effects on creation and maintenance of ties for these different purposes. In addition, such a measure of social networks captures only one aspect of social networks i.e. ego-network size while ignores other important structural aspects such as centrality and aggregate constraints (brokerage). *Third*, most of these studies do not control for the known antecedents of social networks such as personality traits, gender, and ethnicity. Thus, there is potential that the relationships that have been found in some of the past studies may be spurious.

In this research, I seek to address the conflicting results by employing disaggregated theoretical understanding of the relationship between CMC and social capital through conceptualizing effects of CMC on an individual's ability to marshal and manage their structural, cognitive, and relational social capital (Nahapiet and Ghoshal, 1998). What follows from this theoretical analysis is an exploration of the social capital benefits that are variously available to individuals who exploit CMC in particular ways. My theorizing suggests that the relationship between CMC and social capital (SC) is more complex and nuanced than simply "enabling efficient communications amongst geographically dispersed workers" (Nebus, 2006, pg 629). Growing usage of CMC to initiate and maintain social ties has neither inherently beneficial nor detrimental social capital effects. Instead, the consequence for the individual who deploys CMC to manage their social capital depends upon the benefits sought (i.e. emotional support, idea generation, tacit knowledge transfer, or information sharing), and the level of investment in different communication activities that an individual makes. This theoretical analysis reveals the complexity associated with increasing use of CMC enabled social interactions, the sometimes counter-acting influences this has on structural, cognitive, and relational dimensions of social capital, and the contexts in which various social capital benefits will accrue or be diminished by CMC usage.

Further, on the empirical front, I attempt to address the past disparate results by incorporating the usage patterns instead of traditional net use measure. I measure CMC usage for course related activities, leisure (socializing) activities and solo entertainment. Also, I identify social networks for various purposes such as course related interaction, close friendship networks and leisure activities networks. I then estimate the effect of various usage patterns on various attributes such as indegree, outdegree, betweenness centrality and aggregate constraints associated with networks established for various purposes. I control for self-monitoring behavior, extraversion, gender, and ethnicity.

My preliminary results indicate that those who use CMC more for solo entertainment have less developed networks irrespective of context. They are at the periphery of course related, leisure activities related and close friendship networks. Higher use of CMC for solo entertainment activities leads to lower number of contacts, low centrality and high aggregate constraints. In contrast, those whose use of CMC is higher for socializing activities have well develop networks in the context

of leisure activities and close friendship but less so in the context of course related activities. Finally, those who use CMC more for course related activities are more central in course related networks but less central in leisure activities and close friendship networks. These findings indicate that not only we need to disaggregate the CMC usage but also understand the context for which social networks are being used.

Statement of Problem

Social capital has been found to have a critical influence on information sharing, emotional support, individual performance, job satisfaction and job stress. Social networks form the foundations for social capital. Such networks evolve over time through repeated interpersonal communications – communications that are increasingly taking place via the use of technology. This research seeks to understand how CMC (for example email, instant messaging etc.) affects various aspects of social capital. The goal is to determine if individuals' patterns of CMC usage affect their social network attributes (centrality, diversity and network size). As digital networks expand and their use increases in organizations, the interaction of CCT and social networks will continue to be a topic of enduring interest to both researchers and practitioners in the fields of information systems, organizational behavior, sociology and strategic management.

Research questions

1. What effects do different patterns of CMC usage have on social capital in general and structural social capital (social network) characteristics such as network size, centrality, aggregate constraints and diversity in particular?
2. What effects do different patterns of CMC usage have on outcomes such as information sharing, performance, stress, satisfaction, and attachment with the organization?
3. To what degree do the patterns of CMC usage moderate the relationship between antecedents such as personality trait, proximity and homophily and structural social capital?
4. To what degree do the patterns of CMC usage moderate the relationship between structural social capital and the outcomes such as job stress, job satisfaction, organizational commitment and performance?

Layout of research plan

This dissertation work will be carried out in three paper format. The first study is a conceptual paper which is current under second round of review at a top tier IS journal. The second study is at data analysis stage and part of the results are now available (and provided in this abstract). The third study is at designing stage. These studies are briefly described here.

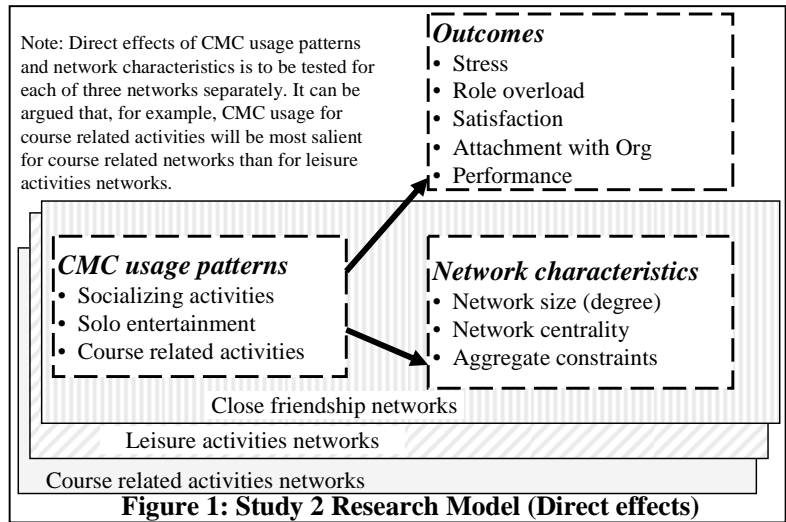
Study-1: Conceptual paper (The Consequences of Computer Mediated Communication on Social Capital)

The objective of this paper is to broaden and enrich theoretical understanding of the relationship between CMC and social capital. The focus of theorizing is individual level and setting is organizational. The most common computer mediated communication tools such as email, instant messaging, and other text-based tools are considered to formulate primary propositions regarding the influence of CMC on an individual's ability to marshal and manage their structural, cognitive, and relational social capital (Nahapiet and Ghoshal, 1998). Changes in various features of technology are then used to conceptualize the change in various propositions (Table 1). What follows from this theoretical analysis is an exploration of the social capital benefits that are variously available to individuals who exploit CMC in particular ways.

This conceptual work makes three contributions. First, a disaggregated approach to CMC is adopted that helps in conceptualizing the effects of specific features such as audibility, visibility, instantaneity, etc on social capital. Second, effects of CMC on various attributes of all the three dimensions of social capital are theorized which provides a richer and nuanced understanding. Third, incorporating 3 by 3 matrix of how contacts were initiated and how they are being maintained, this study provides nine scenarios. Theoretical understanding obtained in this conceptual work suggests that the attributes of social capital are quite different in each of these cells. Thus, highlighting the importance of capturing, in empirical studies, not only how contacts are maintained but also how they were initiated. Fourth, the effects of CMC on social capital have been theorized in the context of idea generation, emotional support, information sharing, and tacit knowledge transfer. This theoretical analysis reveals the complexity associated with increasing use of CMC enabled social interactions. Similarly, various social capital benefits which accrue or diminished by CMC usage depend on the context of benefits being sought.

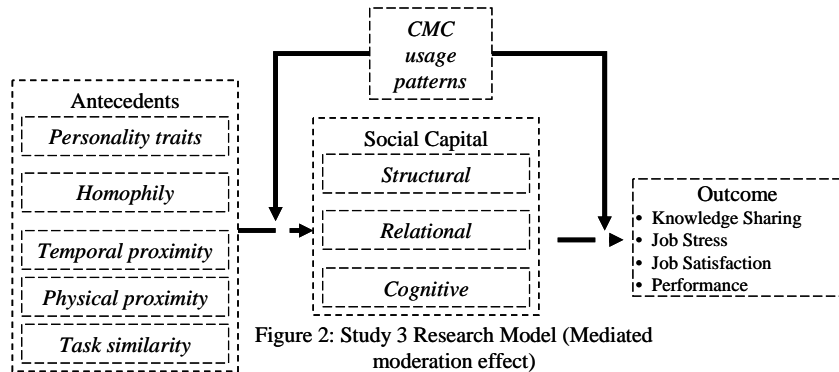
Study 2: Empirical study (Disaggregated Effects of Computer Mediated Communication Usage Patterns on Social Networks)

The objective of this empirical study is to test effect of CMC usage patterns on the social network characteristics and outcomes such as stress, satisfaction, attachment with organization and performance. In this study, I attempt to address the past disparate results by incorporating the usage patterns instead of traditional net use measure. I measure CMC usage for course related activities, leisure (socializing) activities and solo entertainment. Also, I identify social networks for various purposes such as course related interaction, close friendship networks and leisure activities networks. I then estimate the effect of various usage patterns on various social networks attributes such as indegree, outdegree, betweenness centrality and aggregate constraints associated with networks established for various purposes. I control for self-monitoring behavior, extraversion, gender, and ethnicity. The research model is presented in Figure 1, and hypothesis and initial findings are presented in Table 2.



Study 3: Empirical study (The Consequences of Computer Mediated Communication on Social Capital in the Context of Knowledge Sharing)

Study 3 is at very early stage of formulation. This study will test some of the propositions conceptualized in the study 1 in an organizational setting. Literature review for the Study 1 forms the basis for hypotheses to be tested in this study. The research model is presented in Figure 2.



Research Plan

A potential research site has been identified. The firm is in cutting edge innovatio field and has offices spread over 7 countries and three continents. Number of knowledge workers (200) is ideal for network analysis as well as SEM analysis. My research plan includes: Phase-I: A few preliminary interviews to get details about the nature of work, degree of interdependence in tasks, type of collaboration tools used, and main perceived obstacles to knowledge sharing. The goal of this phase is to get information to design a targeted questionnaire (July-August 2007); Phase-II: Administration of questionnaires to all the employees (or a subset, depending on the information gathered in Phase-I) preliminary data analysis. (October 2007-January, 2008); Phase-III: Detailed interviews spread at least on two locations (February 2008-March 2008) and data analysis and report preparation (April-May 2008).

Data Analysis

I will analyze the data using combination of social network analysis and structural equation modeling. The attributes for structueral dimension of social capital will be obtained using social network analysis. This will then be used for testing research model in SEM framework

Table 1: Propositions Conceptualized in Study-1 (partial list)	
	Structural dimension
Network size	<i>P1a: Network size will increase as the proportion of ties that are supported by CMC increases. P1a1: Within the CMC environment network size will decrease as cotemporality and instantaneity increase and deployability decreases</i>
Demographic diversity	<i>P1b: Demographic diversity will increase as the proportion of ties that are supported by CMC increases. P1b1: Within the CMC environment demographic diversity will decrease as the support for social presence, visibility and audibility by technology increase.</i>
Aggregate constraints	<i>P1c: Aggregate constraints will decrease as the proportion of ties that are supported by CMC increases. P1c1: Within the CMC environment aggregate constraints will increase as the support for simultaneity and 'awareness' increase.</i>
Proportion of strong ties	<i>P1d: Proportion of strong ties will decrease as the proportion of ties that are supported by CMC increases. P1d1: Within the CMC environment proportion of strong ties (based on multiplicity) will increase as the support for social presence, cotemporality, instantaneity, visibility, and audibility increases. P1d2: Within the CMC environment proportion of strong ties (based on frequency) will decrease as the support for cotemporality increase and deployability, recordability, and searchability decrease.</i>
	Relational dimension
Trust	<i>P2a: Trust will decrease as the proportion of ties that are supported by CMC increases. P2a1: Components of trust will show different effects (empathy-decrease, integrity-unaffectd and competence-increase) as the proportion of ties that are supported by CMC increases P2a2: Within the CMC environment empathy based trust will increase as the support for social presence, cotemporality, instantaneity, visibility and audibility increases. P2a3: Within the CMC environment competence-based trust will increase as the support for recordable and searchable messages increases.</i>
Social Norms	<i>P2b: Social norms will decrease as proportion of ties that are supported by CMC increases. P2b1: Within the CMC environment, social norms will be stronger as the support for simultaneity, awareness, visibility, audibility, and social presence increases.</i>
Identity and identification	<i>P2c: Identification and identity formation process will be weaker as proportion of ties that are supported by CMC increases P2c1: Within the CMC environment identification and identity formation process will increase as the support for social presence, visibility, and audibility by technology increases.</i>
Obligation and expectation	<i>P2d: Sense of obligation and expectation will be weaker as the proportion of ties that are supported by CMC increases. P2d1: Within the CMC environment identification and identity formation process will increase as the support for social presence, visibility, and audibility by technology increases.</i>
	Cognitive Dimension
shared interpretation	<i>P3a: Shared cognition and interpretation in the network will be lower as the proportion of ties that are supported by CMC increases P3a1: Within the CMC environment shared cognition and interpretation will increase as the support for simultaneity increases.</i>
Principle of reflected exclusivity	<i>P3b: Principle of reflected exclusivity will be less salient as the proportion of ties that are supported by CMC increases. P3b1: Within the CMC environment the principle of reflected exclusivity will be relatively more salient as the support for simultaneity and 'awareness' increase.</i>
Consistency in cognitive structures	<i>P3c: Consistency in cognitive social structures of the members of a network will decrease as the proportion of ties that are supported by CMC increases. P3c1: Within the CMC environment consistency in the cognitive social structure of the members will increase as the support for simultaneity and 'awareness' increase. P3d: Consistency in cognitive knowledge structures of the members of network will increase as the proportion of ties that are supported by CMC increases P3d1: Within the CMC environment consistency in cognitive knowledge structures of the members will increase as the support for recordable and searchable features increase.</i>

Table 2: Hypothesis (and preliminary results) for study 2 (partial list)	<i>Results</i>
<i>Direct effects of CMC usage pattern on network characteristics</i>	
<i>A: Close friendship networks</i>	
H1: Higher use of CMC for socializing purpose will be associated with higher a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in close friendship networks.	a***, b**, c*, d***
H2: Higher use of CMC for course related activities will be associated with lower a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in close friendship networks.	a+, b***, c**, d ns
H3: Higher use of CMC for isolated entertainment activities will be associated with lower a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in close friendship networks.	a***, b***, c***, d***
<i>B: Socializing activities networks</i>	
H4: Higher use of CMC for socializing purpose will be associated with higher a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in socializing activities networks.	a***, b***, c***, d***
H5: Higher use of CMC for course related activities will be associated with lower a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in socializing activities networks.	a***, b***, c***, d***
H6: Higher use of CMC for isolated entertainment activities will be associated with lower a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in socializing activities networks.	a***, b***, c***, d***
<i>C: Course related activities networks</i>	
H7: Higher use of CMC for socializing purpose will be associated with lower a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in course related activities networks.	a ns, b***, c ns, d ns
H8: Higher use of CMC for course related activities will be associated with higher a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in course related activities networks.	a+, b*, c ns, d ns
H9: Higher use of CMC for isolated entertainment activities will be associated with lower a) in-degree centrality, b) out-degree centrality, c) betweenness centrality, and d) incidence of structural holes in course related activities networks.	a***, b***, c***, d***
<i>Direct effects of CMC usage pattern on outcome variables</i>	
H10: Higher use of CMC for socializing purpose will be associated with higher a) role overload, b) stress, c) satisfaction, d) attachment with the program, and with lower e) performance.	a***, b**, c***, d***, e ns,
H11: Higher use of CMC for course related activities will be associated with higher a) performance, b) satisfaction, c) attachment with the program, and lower d) stress, and e) role overload.	a+, <u>b</u> , c ns, d+, e*
H12: Higher use of CMC for isolated entertainment activities will be associated with higher a) stress, b) role overload, and lower c) attachment with the program, d) performance, and e) satisfaction.	a ns, <u>b</u> ***, c***, d ns, e***
ns - not significant, + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. The underlined results (e.g. <u>b***</u>) indicates significant results in which relationship found was opposite to hypothesized directions.	

References

- Barley, S.R. "Technicians in the workplace: Ethnographic evidence for bringing work into organization studies," *Administrative Science Quarterly* (41:3) 1996, pp 404-441.
- Boase, J., Horrigan, J., Wellman, B., and Rainie, L. "The Strength of Internet Ties." Pew Internet & American Life Project, Washington, DC.
- Huysman, M., and Wulf, V. (eds.) *Social Capital and Information Technology*, 2004.
- Kraut, R., Kiesler, S., Boneva, B., and Cummings, J. "Internet paradox revisited," *The Journal of Social Issues* (58:1) 2002, p 49.
- Kraut, R., Patterson, M., Lundmark, V., and Kiesler, S. "Internet paradox: A social technology that reduces social involvement and psychological well-being?," *The American Psychologist* (53:9) 1998, p 1017.
- McPherson, M., Smith-Lovin, L., and Brashears, M.E. "Social Isolation in America: Changes in Core Discussion Networks over Two decades," *American Sociological Review* (71) 2006, pp 353-375.
- Nahapiet, J., and Ghoshal, S. "Social capital, intellectual capital, and the organizational advantage," *The Academy of Management Review* (23:2) 1998, pp 242-266.
- Nie, N., Stepanikova, I., Heili Pals, L.Z., and He, X. "Ten years after the birth of the Internet: How do Americans use the Internet in their daily lives?."
- Nooy, W.D., Mrvar, A., and Batagelj, V. *Exploratory social network analysis with Pajek* Cambridge University Press, New York, 2005.
- Plickert, G., Côté, R.R., and Wellman, B. "It's Not Who You Know, It's How You Know Them: Who Exchanges What with Whom," *Social Networks* (Forthcoming) 2007.
- Prusak, L., and Cohen, D. "How to invest in social capital," *Harvard Business Review* (79:6), Jun 2001 2001, pp 86-93.
- Scott, J. *Social Network Analysis* Sage, London, 1992.
- Wellman, B., Hogan, B., Berg, K., Boase, J., Carrasco, J.-A., Rochelle Cote, Kayahara, J., Kennedy, T.L.M., and Tran, P. "Connected Lives: The Project," in: *Networked Neighborhoods*, P. Purcell (ed.), Springer, London, 2006.
- Wellman, B., Quan-Haase, A., Witte, J., and Hampton, K. "Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment.," *American Behavioral Scientist* (45:3) 2001, pp 436-455.
- Zhao, S. "Do Internet Users Have More Social Ties? A Call for Differentiated Analyses of Internet Use," *Journal of Computer Mediated Communication* (11:3) 2006, pp 844-862.
- Zuboff, S. *In the Age of the Smart Machine: The Future of Work and Power* Basic Books, New York, 1988.