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PROCESS RESTRICTED AST: AN ASSESSMENT OF GROUP SUPPORT SYSTEMS APPROPRIATION AND MEETING OUTCOMES USING PARTICIPANT PERCEPTIONS

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Abstract

In an advancement of Adaptive Structuration Theory (AST), Wheeler and Valacich (1996) offer Process Restricted Adaptive Structuration Theory (PRAST) as a means by which GSS appropriation may be assessed. Using an external assessment involving microcoding, they demonstrated in their study that so-called appropriation mediators may enhance the faithful appropriation of GSS structures. We offer further validation of their findings using individuals' perceptions to assess faithfulness of appropriation, consensus on appropriation, and the decision process and outcomes. We obtained, in general, the same findings as did Wheeler and Valacich, and propose perceptual measures as a more convenient means by which such phenomena may be assessed. We believe that our approach to measuring these phenomena may have merit, especially in situations where detailed microcoding may be impractical.

1. INTRODUCTION

The importance of groups to organizational performance as well as the variability of group outcomes has led numerous researchers to investigate the potential for applying information technology to support group work (cf. Dennis and Gallupe 1993). As a result, much research effort has gone into assessing the effectiveness of information technology in the form of Group Support Systems, or GSS (cf. DeSanctis and Gallupe 1987; Nunamaker et al. 1991) as a means to improve group meeting outcomes (Dennis and Gallupe 1993; Briggs, Nunamaker and Sprague 1999; Fjermestad and Hiltz 1999). GSS are integrated computer software and hardware systems designed to facilitate group decision-making performance by providing computer-based tools that are used to enhance group decision-making activities (DeSanctis and Gallupe 1987; Nunamaker et al. 1991).

A consistent theme in GSS research is that the tools should be employed in a certain manner in order to achieve the desired outcomes (DeSanctis and Poole 1994; Poole and DeSanctis 1990, 1992; Wheeler and Valacich 1996). However, the potential for variability of group use of GSS and resultant variable outcomes has led Poole and DeSanctis (1990, 1992; DeSanctis and Poole 1994) to introduce a view of GSS use based on structuration (Bordieu 1978; Giddens 1984) and appropriation (Ollman 1971), known as *Adaptive Structuration Theory* (AST). AST suggests that, in their adoption and use of GSS, groups draw upon the *structural potential* represented by the GSS and other relevant sources. This *appropriation* is the mode or fashion in which a group recreates a GSS structure for its use (Poole and DeSanctis 1990). What Poole and DeSanctis term a *coherent spirit* should channel the GSS appropriation in definite directions, which would in turn influence meeting outcomes in a particular direction (1990; cf. DeSanctis and Poole 1994; Silver 1990, Wheeler and Valacich 1996).

Further development of AST has been done by Wheeler and Valacich in their *Process Restricted Adaptive Structuration Theory* (PRAST). Wheeler and Valacich concur with Poole and DeSanctis that there is variability in group outcomes when using GSS. However, they emphasize the concept of the coherent spirit, suggesting that the presence of *appropriation mediators* will reduce the variability in GSS usage patterns, and hence reduce the variability in GSS outcomes. Examples of appropriation mediators

suggested by Wheeler and Valacich include the degree of process *restrictiveness* (either embedded in the GSS or imposed by a facilitator) and *training* in a decision-making procedure.

Chin, Gopal and Salisbury (1997) suggest a perspective that addresses GSS adoption and use as perceived by the users themselves. This perspective has merit for three reasons. First, the rigorous microcoding performed by Wheeler and Valacich and others (cf. Poole and DeSanctis 1992) in their studies may not be practical to apply in all circumstances. For example, in so-called "live" groups, the content of the discussion may be of a sensitive nature such that the participants do not wish their discussions to be recorded by videotape (Salisbury, Gopal and Chin 1996). Second, any assessment of faithfulness of usage of technology using external observers assumes the existence of an "objective" spirit that can be assessed independently of the group's interaction, (Chin, Gopal and Salisbury 1997). Chin, Gopal and Salisbury colleagues suggest that any assessment of the usage of a technology with respect to its spirit must take into account the internal interpretation of the spirit made by the end user as well. External observers cannot accomplish this. Since it is the internal interpretation of the spirit (and of subsequent faithfulness) that may drive a participant's actions in a GSS session, this may be critical to understanding how and why a particular group of individuals chose to adopt a GSS in a particular way in their session. Finally, the use of scales is also a more convenient way to capture AST constructs than microcoding (cf. Salisbury, Gopal and Chin 1996), because of the time and effort required to code participant behaviors.

As an exercise in triangulation among multiple methods (cf. Campbell and Fiske 1959), we used scales devised to capture *faithfulness of appropriation* (Chin, Gopal and Salisbury 1997) and *consensus on appropriation* (Salisbury, Gopal and Chin 1996) in an experimental setting similar to that of Wheeler and Valacich to perform an assessment of their findings using different types of measures. Perceptual measures of AST constructs (e.g., faithfulness of appropriation, consensus on appropriation) were employed and meeting outcomes (decision scheme satisfaction, outcome satisfaction, decision confidence) were assessed in an experimental treatment similar to that performed by Wheeler and Valacich.

2. EXPERIMENTAL PROCEDURE

We used data drawn from two studies for this research. Both studies drew subjects from an introductory Information Systems class at a western Canadian university who were organized into ad hoc groups that met one time for the purposes of their respective study. Study 1 used questionnaires administered to 236 undergraduate subjects (forming 50 four and five person groups) to capture the data after the groups used a GSS to perform a decision-making task. After eliminating cases due to missing responses on some items, the actual sample size was 231. Groups were balanced on gender (121 males and 110 females overall) such that no group included more than 60% of one gender, consistent with the implications found in Kanter (1977) regarding balanced versus skewed gender groups. Study 2 employed 309 students organized into 13 large groups (20 to 26 persons) and also balanced on gender. Missing responses reduced this sample to 305 (160 males and 145 females). Complete subject demographics for both studies are found in Table 1.

The experimental procedures were the same in both studies with one exception (described below). The treatment involved a manipulation of the degree of *restrictiveness* (Silver 1990; cf. DeSanctis and Poole 1994; Wheeler and Mennecke 1992). One half of the groups received the restrictive treatment, in which the facilitator led the groups through an on-screen agenda, limiting the range of options in using the system (in the large group study, there were 13 groups, hence seven groups received the restrictiveness treatment). The other groups received a non-restrictive treatment in which they were allowed to use (or not use) the GSS in any manner they wished. The GSS used was *VisionQuest™*, a product of Collaborative Technologies Corporation.[1] Group participants were seated in a horseshoe configuration, with a PC workstation available to each participant as they performed their tasks. Training about both the GSS tools and the decision-making methodology was provided to groups in both treatments prior to performing the task. This training lasted for approximately 40 minutes in total. The task used was the *School of Business Policy Task* (Wheeler and Mennecke 1992), adapted for Canadian use. This task is a hidden profile task (Stasser 1992), in which each group member is made aware of only a portion of the task information, requiring the group to work together to reach a solution. The spirit of the GSS intervention (derived from the *VisionQuest™* manual) was communicated to each group by the

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[1]Ventana Corporation has since acquired VisionQuest.

meeting facilitator. A post-session assessment of the data indicated no facilitator-based bias in the results. See Table 2 for a full elaboration of the experimental procedures.

Table 1. Demographics

Demographic	Study 1 (Small Groups)		Study 2 (Large Groups)	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	21.50	3.60	21.11	3.28
Work Experience (months)	19.07	30.43	15.52	26.95
Grade Point Average (4.0 scale)	2.81	0.49	2.93	0.40
Number of Previous GSS Uses	0.87	3.49	0.26	1.05

Table 2. Experimental Procedures

Phase	Time
Introduction, consent forms, pre-session questionnaire	15 minutes
Training in the decision-making method	20 minutes
Training with the GSS tools	20 minutes
Reading the case role and completing the pre-task questions	10-15 minutes
Break	5 minutes
Introduce roles, start task	5 minutes
Perform experimental task	70 minutes
Fill out solution memo	5 minutes
Fill out post-session questionnaires	25 minutes
Wrap-up	5 minutes
Total	up to 190 minutes

The difference between the experimental treatments between the small (Study 1) and large (Study 2) groups involved the task roles and how the information in the roles was divided. In the small groups, each individual in the group was randomly assigned an individual task role from the *School of Business* task (e.g., Chairperson, Commerce Faculty Association, or Associate Dean of the Commerce Faculty); in the large group sessions roughly equally-sized groups of students were randomly assigned similar roles (e.g. Commerce Faculty Association, Commerce Faculty Dean's Office Staff) from the *School of Business* task. Hence, in the small groups, one person represented a given set of interests, whereas in the large groups several people represented a given set of interests.

3. DATA ANALYSES

Data were analyzed at the individual level. While the group is often the unit of analysis in GSS research, since the data were captured at the individual level, individual level analysis was considered appropriate (cf. Gallupe 1986). Indeed, collapsing the individual scores into a group score would eliminate much of the variance in the data. Analysis of individual-level data also has the advantage of increasing statistical power (Baroudi and Orlikowski 1989; cf. Cohen 1988). Further, Hoyle and Crawford (1994, p. 466) indicate that "…at the core of an analysis of either the structure of functioning of the group must be an analysis of what individual group members bring to the group." While appropriation itself is a group process, this process is influenced by the individual group members and their perceptions about what is occurring. It will be the individuals in the group that decide whether and how to participate in the group session, and it is the individuals in the group that will be asked to take what has been developed

by the group and carry it forth, either as an individual or as a participant in a subsequent group. Hence we believe that individual level analysis has something to offer rather than collapsing the individual scores into group scores.

3.1 Proposition 1: Appropriation Mediators Increase Faithful Appropriation

Wheeler and Valacich (1996) demonstrated that appropriation mediators such as process *restrictiveness* and *training* in a given decision-making methodology increased faithful appropriation of that methodology. Our study manipulated the degree of process restrictiveness provided to the groups. We anticipated that, as found by Wheeler and Valacich, increased restrictiveness would increase faithfulness of appropriation. Further, we expected that the presence of a more restrictive GSS agenda would also increase the degree of *consensus on appropriation* among the group with respect to the GSS decision methodology. The purpose of appropriation mediators is to reduce the range of options that groups face when calling the GSS intervention into use. Therefore, any intervention that caused the range of options (and potential interpretations) to be limited would likely enhance consensus on how to adopt what has been provided by GSS.

Two hypotheses were tested to assess Proposition 1:

> *Hypothesis 1a:* *Faithfulness of appropriation as perceived by participants will be higher in restrictive GSS groups than in non-restrictive GSS groups.*

> *Hypothesis 1b:* *Consensus on appropriation as perceived by participants will be higher in restrictive GSS groups than in non-restrictive GSS groups.*

For faithfulness of appropriation (H1a), the scores on the five-item faithfulness of appropriation scale[2] (Chin, Gopal and Salisbury 1997) were summed for each individual to create an aggregated perceived faithfulness of appropriation score for each participant. Because we identified unequal variances between treatments—the p-value for Levine's Test for Equality of Variances (cf. Norusis 1998) was 0.000—we used two-tailed t-tests with adjustments for unequal variances to test for differences, with restrictiveness (high or low) as the independent treatment. The results of this analysis are presented in Table 3. In the small groups (Study 1), the mean summed faithfulness of appropriation score in the non-restrictive treatment was greater than that of the restrictive treatment. This difference was significant, indicating support for Hypothesis 1a.

For consensus on appropriation (H1b), the scores on the five-item scale developed by Salisbury, Gopal and Chin were summed for each individual to create an aggregated perceived consensus on appropriation score for each participant. Although Levine's test revealed a non-significant difference between cell variances (p = 0.069), we decided to take the conservative route. Hence, independent sample t-tests adjusted for an assumption of non-equal variances were used, again with restrictiveness (high or low) as the independent treatment. The results of the analysis presented in Table 3 indicates that the mean summed consensus on appropriation score in restrictive groups was higher than for non-restrictive groups;, however this difference was not significant at $\alpha = 0.05$, indicating no support for hypothesis 1b in the small groups. This suggests that restrictiveness did not influence perceived consensus on appropriation as anticipated.

In the large groups (Study 2), the findings were basically the same as for the small groups. The means for faithfulness of appropriation were higher in restrictive groups than in non-restrictive groups. As with the small groups, the means for consensus on appropriation were higher in restrictive groups than in non-restrictive groups, but this difference was not significant. The findings for these analyses are summarized in Table 3, and we fully discuss the findings later in the paper, along with those about Proposition 2.

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[2]The items from all of the scales we employ here are reproduced in the appendix.

Table 3. Hypotheses and Findings for Proposition 1

Variable	Group Size	Mean (Restrictive)	Mean (Non-Restrictive)	t	d.f	p	Finding
FOA	Small	29.50	26.95	3.03	197.53	0.003	H1a supported
COA	Small	27.96	27.39	0.82	219.85	0.410	H1b not supported
FOA	Large	25.11	21.52	4.11	273.51	< 0.000	H1a supported
COA	Large	25.05	23.65	1.95	253.32	0.052	H1b not supported

3.2 Proposition 2: Faithful Appropriation Increases Favorable Meeting Outcomes

In addition to assessing the effect of restrictiveness on faithfulness of appropriation, Wheeler and Valacich also described how increased faithfulness of appropriation leads to more favorable meeting outcomes such as improved decision quality. We examined this in the present study by testing participant satisfaction with the decision process and outcome. The data were drawn from the same study as for our tests of Proposition 1; however, the relevant constructs for our tests Proposition 2 were faithfulness of appropriation (described above), decision confidence (Sambamurthy 1989), decision scheme satisfaction (Green and Taber 1980) and solution satisfaction (Green and Taber 1980). Again, since the data were collected at the individual level, they were tested at the individual level as well.

Three hypotheses were proposed relating the impact of faithfulness of appropriation on meeting outcomes:

> *Hypothesis 2a:* *Perceived faithfulness of appropriation will favorably influence decision confidence.*

> *Hypothesis 2b:* *Perceived faithfulness of appropriation will favorably influence decision scheme satisfaction.*

> *Hypothesis 2c:* *Perceived faithfulness of appropriation will favorably influence solution satisfaction.*

Each of these hypotheses was tested by performing a simple linear regression in which the influence of the summed faithfulness of appropriation score was assessed on each of the dependent variables in turn. For the relationship between faithfulness of appropriation and decision confidence, faithfulness of appropriation was measured as described previously, while decision confidence was captured using Sambamurthy's scale. The scores on the eight items in this scale were summed to make a decision confidence score that was used in the analysis. The procedure to arrive at a score for decision scheme satisfaction (Green and Taber 1980) and solution satisfaction (Green and Taber 1980) was similar (i.e., the items were summed to create a single score).

In our small groups (Study 1), the findings indicated that faithfulness of appropriation was significantly related (p < 0.000) on all three dependent measures. Faithfulness of appropriation explained 17% of the variance in decision confidence, 22% of the variance in decision scheme satisfaction, and 12% of the variance in solution satisfaction. In our large groups (Study 2), we also found significant (p < 0.000) relationships between faithfulness of appropriation and all of the dependent measures; however, the findings were not as strong in a substantive sense. Faithfulness of appropriation explained 5% of the variance in decision confidence, 20% of decision scheme satisfaction, and 6% of the variance in solution satisfaction. The regression findings are found in Table 4.

In addition to testing Proposition 2 by assessing faithfulness of appropriation and its influence on meeting outcomes, we devised three additional hypotheses to test the relationship between consensus on appropriation and meeting outcomes.

> *Hypothesis 2d:* *Perceived consensus on appropriation will favorably influence decision confidence.*

> *Hypothesis 2e:* *Perceived consensus on appropriation will favorably influence decision scheme satisfaction.*

> *Hypothesis 2f:* *Perceived consensus on appropriation will favorably influence solution satisfaction.*

As with the test of faithfulness of appropriation, these hypotheses were tested by running three simple linear regressions; in this case with consensus on appropriation as the independent variable, and decision confidence, decision scheme satisfaction, and solution satisfaction respectively as the dependent variables. In our small groups (Study 1), we found that consensus on appropriation was significantly related ($p < 0.000$) to all three dependent measures, explaining 10% of the variance in decision confidence, 21% of the variance in decision scheme satisfaction, and 7% of the variance in solution satisfaction.

Similar findings were obtained in our large groups (Study 2), where consensus on appropriation explained 11% of the variance in decision confidence, 14% of decision scheme satisfaction, and 8% of the variance in solution satisfaction. The regression findings are displayed in Table 4 with those from the small groups. For all three dependent variables the p-value (< 0.000) indicates support for our hypotheses.

Table 4. Findings for Proposition 2

Relationship	Group Size	Beta	t	p	Adjusted R^2	Finding
FOA-DECON	Small	0.42	6.94	< 0.000	0.17	H2a Supported
FOA-DSS	Small	0.47	8.12	< 0.000	0.22	H2b Supported
FOA-SS	Small	0.35	5.70	< 0.000	0.12	H2c Supported
FOA- DECON	Large	0.23	4.11	< 0.000	0.05	H2a Supported
FOA-DSS	Large	0.46	8.89	< 0.000	0.20	H2b Supported
FOA-SS	Large	0.24	4.33	< 0.000	0.06	H2c Supported
COA- DECON	Small	0.32	5.03	< 0.000	0.10	H2d Supported
COA-DSS	Small	0.47	7.96	< 0.000	0.21	H2e Supported
COA-SS	Small	0.27	4.25	< 0.000	0.07	H2f Supported
COA- DECON	Large	0.34	6.29	< 0.000	0.11	H2d Supported
COA-DSS	Large	0.38	7.05	< 0.000	0.14	H2e Supported
COA-SS	Large	0.29	5.27	< 0.000	0.08	H2f Supported

4. DISCUSSION

Our findings were anticipated in light of theory and previous GSS research. We found that restrictiveness in agenda choices was positively related to faithfulness of appropriation, which supports Proposition 1. We did not find the same relationship between restrictiveness and consensus on appropriation, which does not support Proposition 1. However, we did find support for the hypothesis that faithfulness of appropriation and consensus on appropriation favorably influence perceived meeting outcomes, offering fairly strong support for Proposition 2.

Turning first to Proposition 1, the finding for faithfulness of appropriation was as anticipated, and confirms the findings from Wheeler and Valacich's (1996) study, however, using *perceptual* measures. It does indeed appear that when group members understand the intent of a GSS-based process intervention, they are able to assess whether or not they have adopted it faithfully.

On the other hand, we did not anticipate the non-significant influence of restrictiveness on consensus on appropriation in either large or small groups. This finding may not be that surprising, however. In the non-restrictive treatment, it is possible that the group members, in the absence of restrictiveness, negotiated their own arrangement to complete their tasks in a timely fashion. Hence, these groups would have achieved much the same consensus on appropriation scores as did their counterparts in the restrictive treatment. We believe that this is because, unlike faithfulness of appropriation, consensus on appropriation is not only internally assessed but internally defined. Some suggest that participants in GSS sessions are not passive users of the technology, but are active producers of meaning (cf. Beger and Luckmann 1967; Huang et al. 1996; Lee 1994; Ngwenyama and Lee 1997). As users learn about and employ the GSS, each individual member will develop perceptions and opinions about this intervention (Fulk, Schmitz and Steinfield 1990). We suggest the possibility that in the restrictive groups, understanding about how to use the

GSS was provided by the restrictive agenda. On the other hand, in the non-restrictive groups, the group members, being active producers of meaning, were able to reach a consensus on how they should proceed with the system, thus reaching quite nearly the same degree of consensus on appropriation as the restrictive groups. As to why a greater degree of faithfulness assessed by participants in the restrictive groups, we would anticipate that the groups were making their assessment of faithfulness was with respect to the external standard of appropriate use (i.e., the "spirit" that was communicated). It is also possible that the similar training in the decision-making methodology provided to groups in both treatments led to some compression of the between-treatment differences with respect to consensus on appropriation. However, had this been the case, such a compression of the differences between treatments should have also reduced faithfulness of appropriation, which did not occur.

Consistent with Wheeler and Valacich's findings, it also appears that the AST appropriation variables can indeed be used to predict meeting outcomes (Proposition 2). In all cases tested, higher levels of faithfulness of appropriation and consensus on appropriation were related to more favorable perceived meeting outcomes, although this finding did not appear to be as strong in the large groups.

Another interesting finding was the relatively low correlation between faithfulness of appropriation, consensus on appropriation and the outcome measures relevant to decision quality (as opposed to quality of the decision-making process). This would appear reasonable because the group members knew all the relevant information about their decision process (captured by decision scheme satisfaction) to make their assessment. By comparison, the group participants would not know the objective quality of their decisions (captured by decision confidence and solution satisfaction). This might also explain why, in general, faithfulness of appropriation appeared to have a greater effect on the outcome measures than did consensus on appropriation in our study. This may be in part due to a belief promoted by the facilitation and training during the experimental session (and any GSS session, for that matter) that this *leading edge*, *efficient*, and *rational* intervention (cf. Jepperson 1991) into the group interaction would improve group performance, if used appropriately. As a result, to the extent that group participants believed that they used the GSS properly, it would likely favorably influence their satisfaction with the meeting process and outcomes (cf. Clapper and Prasad 1993). In particular, the belief that they had used the system in a "proper" manner would give them more evidence to suggest that they had, in fact, reached an appropriate outcome, because faithfulness of appropriation would be consistent with the belief they used the tools appropriately.

5. CONCLUSION

This research offers evidence to support Wheeler and Valacich's (1996) findings about Adaptive Structuration Theory in a similar context using individual perceptions. Using the perceptual measures, we obtained findings similar to those of Wheeler and Valacich. This congruence between findings where appropriation was externally assessed and where it was assessed using scales completed by experimental participants suggests that the scales have face validity (and have been demonstrated in other contexts to have favorable psychometric properties—see Chin, Gopal and Salisbury [1997] and Salisbury, Gopal and Chin [1996] for the validation of these scales). Further work should address the applicability of the measures in this study to other advanced information technologies besides GSS.

One key arena in which our approach may be more useful is that of assessing appropriation of collaborative technology by dispersed groups, or groups that are communicating in an asynchronous fashion. In this environment,, it would be extremely difficult to capture appropriation by any type of microcoding. In this type of environment it would appear that scales would be quite important.

One important future appraisal of the perceptual measures will be to assess their consistency with more "objective" measures of meeting outcomes.[3] For example, decision quality can be assessed by external observers and these two measures can be compared. Further, the AST scales should be validated by comparing them with external observers' assessments of appropriation. Recent research (cf. Pinsonneault et al. 1999) has further indicated the need for this type of validation.

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[3]We thank the associate editor for this suggestion.

In sum, the scales for the AST constructs faithfulness of appropriation and consensus on appropriation provide a convenient manner in which to capture these critical AST constructs in a variety of settings. Through this effort at assessing Wheeler and Valacich's findings using the perceptual measures, we offer an alternative manner in which to assess GSS appropriation. Given the potential importance of individual perceptions about the adoption and use of advanced information technologies such as collaborative technologies, and in an environment where greater and greater emphasis is being placed on distributed collaboration, the usefulness of relatively portable and convenient measures to capture key constructs is fairly clear.

6. REFERENCES

Baroudi, J. J., and Orlikowski, W. J. "The Problem of Statistical Power in MIS Research," *MIS Quarterly* (13:1), 1989, pp. 87-106.

Berger, P. L., and Luckmann, T. *The Social Construction of Reality,* New York: Doubleday, 1967.

Bordieu, P. *Outline for a Theory of Practice,* Cambridge, England: Cambridge University Press, 1978.

Briggs, R. O.; Nunamaker, J. F.; and Sprague, R. "GSS Insights: A Look Back at the Lab, A Look Forward from the Field," *Journal of Management Information Systems* 15(3), 1999, pp. 3-6.

Campbell, D. T., and Fiske, D. W. "Convergent and Discriminant Validation by the Multitrait-multimethod Matrix," *Psychological Bulletin* (56), 1959, *pp.* 81-105.

Chin, W. W.; Gopal, A.; and Salisbury, W. D. "Advancing the Theory of Adaptive Structuration: The Development of an Instrument to Measure Faithfulness of Appropriation of an Electronic Meeting System," *Information Systems Research* (8:4), 1997, pp. 342-367.

Clapper, D. L., and Prasad, P. "The Rationalization of the Organizational Meeting: Implications of Group Support Systems for Power, Symbolism and Face-work," in *Proceedings of the Fourteenth Annual International Conference on Information Systems*, J. I. DeGross, R. P. Bostrom and D. Robey (eds.), Orlando, Florida, 1993, pp. 321-329.

Cohen, J. *Statistical Power Analysis for the Behavioral Sciences* 2nd ed., Hillsdale, NJ: Lawrence Earlbaum Associates, 1988.

Dennis, A. R., and Gallupe, R. B. "A History of Group Support Systems Empirical Research: Lessons Learned and Future Directions," in *Group Support Systems: New Perspectives,* L. M. Jessup and J. S. Valacich, (eds.), New York: Macmillan, 1993, pp. 59-77.

DeSanctis, G., and Gallupe, R. B. "A Foundation for the Study of Group Decision Support Systems," *Management Science* (33:5), 1987, pp. 589-609.

DeSanctis, G., and Poole, M. S. "Capturing the Complexity of Advanced Technology Use: Adaptive Structuration Theory," *Organization Science* (5:2), 1994, pp. 121-147.

Fjermestad, J., and Hiltz, S. R. "An Assessment of Group Support Systems Experimental Research: Methodology and Results," *Journal of Management Information Systems* (15:3), 1999, pp. 7-15.

Fulk, J.; Schmitz, J.; and Steinfield, C. W. "A Social Influence Model of Technology Use," in *Organizations and Communication Technology*, J. Fulk and C. Steinfield (eds.), Newbury Park, CA: Sage, 1990, pp. 117-140.

Gallupe, R. B. "Experimental Research into Group Decision Support Systems: Practical Issues and Problems," in *Proceedings of the Nineteenth Annual Hawaii International Conference on System Sciences, Volume 3*, Los Alamedos, CA: IEEE Computer Society Press, 1986, pp. 13-22.

Giddens, A. *The Constitutuion of Society*, Los Angeles: University of California Press, 1984.

Green, S. G., and Taber, T. D. "The Effects of Three Social Decision Schemes on Decision Group Process," *Organizational Behavior and Human Performance* (25)*,* 1980, pp. 97-106

Hoyle, R. H., and Crawford, A. M. "Use of Individual Level Data to Study Group Phenomena: Issues and Strategies," *Small Group Research* (25), 1994, pp. 464-485.

Huang, W.; Wei, K. K.; Watson, R. T.; Lim, L. H.; and Bostrom, R. "Transforming a Lean CMC Medium into a Rich One: An Empirical Investigation in Small Groups," *Proceedings of the Seventeenth International Conference on Information Systems*, K. Kumar and J. I. DeGross (eds.), Atlanta, Georgia, 1996, pp. 265-277.

Jepperson, R. L. "Institutions, Institutional Effects, and Institutionalism," in *The New Institutionalism in Organizational Analysis,* W. W. Powell and P. J. DiMaggio (eds.), Chicago: University of Chicago Press, 1991, pp. 143-163.

Kanter, R. M. "Some Effects of Proportions on Group Life: Skewed Sex Ratios and Responses to Token Women," *American Journal of Sociology* (82:5), 1977, pp. 965-990.

Lee, A. S. "Electronic Mail as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation," *MIS Quarterly* (18:2), 1994, pp. 143-157.

Ngwenyama, O. K., and Lee, A. S. "Communication Richness as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation," *MIS Quarterly* (23:1), 1997, pp. 145-167.

Norusis, M. J. *SPSS 8.0 Guide to Data Analysis*, Englewood Cliffs, NJ: Prentice-Hall, 1998.

Nunamaker, J. F.; Dennis, A. R.; Valacich, J. S.; Vogel, D. R.; and George, J. F. "Electronic Meeting Systems to Support Systems Support Group Work," *Communications of the ACM* (34:7), 1991, pp. 40-61.

Ollman, B. *Alienation: Marx's Conception of Man in Capitalist Society,* Cambridge, England: Cambridge University Press, 1971.

Pinsonneault, A.; Barki, H.; Gallupe, R. B.; and Hoppen, N. "Electronic Brainstroming: The Illusion of Productivity," *Information Systems Research* (10:2), 1999, pp. 110-133.

Poole, M. S., and DeSanctis, G. "Understanding the Use of Group Decision Support Systems: The Theory of Adaptive Structuration," in *Organizations and Communication Technology,* J. Fulk and C. Steinfield (eds.), Newbury Park, CA: Sage, 1990, pp. 173-193.

Poole, M. S., and DeSanctis, G. "Microlevel Structuration in Computer-supported Group Decision Making," *Human Communication Research* (19:1), 1992, pp. 5-49.

Salisbury, W. D.; Gopal, A.; and Chin, W. W. "Are We All Working from the Same Script? Developing an Instrument to Measure Consensus on the Appropriation of an Electronic Meeting System," in *Proceedings of the Twenty-ninth Annual Hawaii International Conference on System Sciences, Volume 3,* J. F. Nunamaker, Jr., and R. H. Sprague, Jr., (eds.), Los Alamitos, CA: IEEE Computer Society Press, 1996, pp. 13-23.

Sambamurthy, V. *The Effects of Variations in GDSS Capabilities on Decision-making Processes in Groups*, Unpublished Doctoral Dissertation, University of Minnesota, 1989.

Silver, M. S. "Decision Support Systems: Directed and Nondirected Change," *Information Systems Research* (1:1), 1990, pp. 47-70.

Stasser, G. "Pooling of Unshared Information During Group Discussions," in *Group Process and Productivity*, S. Worchel, W. Wood and J. A. Simpson (eds.), Newbury Park, CA: Sage, 1992, pp. 48-67.

Wheeler, B. C., and Mennecke, B. M. "The School of Business Policy Task Manual," Indiana University Working Paper #92-524, 1992.

Wheeler, B. C., and Valacich, J. S. "Facilitation, GSS, and Training as Sources of Process Restrictiveness and Guidance for Structured Group Decision Making: An Empirical Assessment," *Information Systems Research* (7:4), 1996, pp. 429-450.

Appendix

Faithfulness of Appropriation (Chin, Gopal and Salisbury 1997), $\alpha = 0.93$[4]

1. The developers of the GSS would disagree with how our group used the system.
2. Our group probably used the GSS improperly.
3. The original developers of the GSS would view our group's use of the system as inappropriate.
4. Our group failed to use the GSS as it should have been used.
5. We did not use the GSS in the most appropriate fashion.

Responses given on a seven-point Likert scale, with the following anchors: *Extremely Likely, Quite, Slightly, Neither, Slightly, Quite, Extremely Unlikely.*

Consensus on Appropriation (Salisbury, Gopal and Chin 1996), $\alpha = 0.84$

1. Our group members were able to reach consensus on how to apply the GSS to our task.
2. Overall, members of our group agreed on how we should use the GSS for our work.
3. There was no conflict in our group regarding how we should incorporate the GSS into our work.
4. Our group reached mutual understanding on how we should use the GSS to perform our task.
5. Our group was able to reach consensus on how we should use the GSS to perform our task.

Responses given on a seven-point Likert scale, with the following anchors: *Strongly Disagree, Quite, Slightly, Neither, Slightly, Quite, Strongly Agree.*

Decision Scheme Satisfaction (Green and Taber 1980), $\alpha = 0.82$

How would you describe your group's problem solving process?
1. *Efficient-inefficient*
2. *Coordinated-uncoordinated*
3. *Fair-unfair*
4. *Confusing-understandable*
5. *Satisfying-dissatisfying*

Responses given on a five-point Likert scale with the anchors shown above.

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[4]Cronbach alphas are assessed using the combined data from our two samples.

Solution Satisfaction (Green and Taber 1980), $\alpha = 0.91$

1. To what extent does the final solution reflect your inputs?
    Five-point Likert—Not at all, To a little extent, To some extent, To a great extent, To a very great extent.

2. To what extent to you feel committed to the group solution?
    Five-point Likert—Not at all, To a little extent, To some extent, To a great extent, To a very great extent.

3. To what extent are you confident that the group solution is correct?
    Five-point Likert—Not at all, To a little extent, To some extent, To a great extent, To a very great extent.

4. To what extent do you feel personally responsible for the correctness of the group solution?
    Five-point Likert—Not at all, To a little extent, To some extent, To a great extent, To a very great extent.

5. How satisfied or dissatisfied are you with the process by which your group made the decision?
    Five-point Likert—Very dissatisfied, Somewhat dissatisfied, Neither, Somewhat satisfied, Very Satisfied

Decision Confidence (Sambamurthy 1988), $\alpha = 0.93$

1. I am confident that our group's recommendations are good ones.

2. I feel certain that people who are affected by our recommendations will be satisfied with them.

3. I am not sure our recommendations are appropriate.

4. I am positive that we could justify our recommendations.

5. I am not confident about our recommendations.

6. I am convinced of my group's recommendations and assumptions.

7. I am satisfied with my group's recommendations and assumptions.

8. I am completely certain of my group's final recommendation.

Responses given on a seven-point Likert scale, with the following anchors: *Strongly Disagree, Greatly Disagree, Disagree, Neutral, Agree, Greatly Agree, Strongly Agree.*