Facilitator Effects On The Process Of GSS Appropriation: Opening The "Black Box"

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ABSTRACT

Though technology support of group decision making has long been believed to increase the number of ideas generated and the overall quality of decisions, research on this topic has failed to provide consistent support of these outcomes. Facilitation of the group decision process by specially trained experts is believed to add even further to the benefits the technology brings. The effects of facilitation have been tested in many configurations, yet, here too, researchers have not been able to consistently identify the benefits. The literature shows that prior research in this area has been based on the outcomes of the group decision process focusing on the quantity of ideas generated and group member retrospective perceptions of the process. This suggests that researchers took a "black box" approach to studying the effects of facilitation in group support systems (GSS) adoption and use subsequently ignoring important aspects of group process and the effects of facilitation in that process. To that end, analysis has been done from the lens of adaptive structuration theory (AST) of 48 homogeneous decision groups in terms of setting, task, and prior relevant participant experience; an excellent environment in which to observe how group members act (make appropriation moves) to adopt and use GSS differently in differing facilitative contexts. This study found that process restrictiveness significantly affects the quantity and types of appropriation moves over the course of a decision task. An unprecedented finding was that different individual facilitators affect the quantity and types of appropriation moves even when holding the treatment restrictiveness constant. I also performed an original extension of the method suggested by AST by disaggregating appropriation moves into the source and target of interactions. This study successfully opens the "black box" of GSS facilitation and shows analysis of process *reveals nuanced differences in factors that affect appropriation that have not been apparent from prior, outcomes-based analyses.*

Keywords: adaptive structuration theory, appropriation, appropriation moves, facilitation, facilitator, group support systems.

INTRODUCTION

*I*t has long been believed that group decision making can increase the number of ideas generated and improve the overall quality of decisions (McGrath, 1984) and that group support systems (GSS) technology can increase the efficiency and effectiveness of the decision process (Keen and Scott Morton, 1978) thereby improving group decision outcomes even further. But, despite more than two decades of GSS development and research, results remain mixed regarding the ability of this technology to improve group process and outcomes (Poole and DeSanctis, 1992; Gopal and Prasad, 2000). Many studies of GSS have explored remedies for these inconsistent results (Fjermestad and Hiltz, 1998-1999; Dennis and Wixom, 2001-2002). Prominent among suggested remedies is to facilitate group meetings with an expert in group process (facilitator) to assist and guide the group. Though facilitation had been used as an intervention into group process well before the arrival of GSS (Hackman and Kaplan, 1974; Hirokawa and Gouran 1989), some scholars (Griffith, et al., 1998) suggested that the increased complexity from the introduction of GSS technology into group process amplifies the need for facilitation. Unfortunately, results of research on the effects of facilitation in GSS are mixed as well and, therefore, have so far offered no real solutions to the problem of disappointing GSS-supported group outcomes.

It may be that facilitation has uncontrolled or unpredicted effects on group process that should come under closer scrutiny. Limayem and colleagues (2006) criticized earlier researchers for having adopted a "black box" approach in GSS research, because they focused on the outcomes of GSS use without attending to the process. Arguably, a similar "black box" approach has been taken in GSS facilitation research. Researchers have viewed facilitation as a treatment applied to groups being studied, where analysis centered on outcomes, with little examination of facilitator behavior, interaction between facilitators and group members, and facilitation effects over the course of group meetings. The earliest studies simply compared facilitation to no facilitation (Anson, et al., 1992), with facilitation considered a unitary variable. Later studies manipulated various dimensions of facilitation, such as the levels of restrictiveness and types of assistance, to investigate their effects on group outcomes (Clawson et al., 1993; Dennis and Wixom, 2001-2002). Even so, these dimensions of facilitation were considered pre-specifiable and constant across individual facilitators; the facilitators were themselves not objects of study and only outcomes and group members' retrospective perceptions of the process were examined. Such research considered facilitators to be purveyors of the treatment (or to *be* the treatment) and not part of the process, almost as if they were a feature of the technology, devoid of human agency and fallibility. In contrast, the study reported in this article takes the stance that much can be learned by examining the effects of facilitation through a process perspective and that greater attention should to be paid to the potentially differential effects of individual facilitators.

Group Support Systems And Facilitation

GSS are among a class of advanced information technologies that enable the kinds of social interaction believed to improve group work. GSS help organize and schedule activities in the meeting process (DeSanctis and Gallupe, 1987), permit all participants to work simultaneously, provide an equal opportunity for participation, and discourage behaviors that threaten meeting productivity (Nunamaker, et al., 1991). Facilitation involves managing the group meeting process towards effective and efficient accomplishment of group meeting outcomes; one person carries out this management as the formal facilitator (Bostrom, et al., 1993). GSS facilitation varies along several dimensions, including the facilitator's position within the group, the sorts of assistance provided, and the level of restrictiveness the assistance has on group process. Regarding the first dimension, in most studies the facilitator is a confederate of the research team and not a study participant (Griffith, et al., 1998), but in certain studies (e.g., group leadership) a group participant has been trained in some facilitator functions and serves that role (see, for example, Sosik, et al., 1997; Parent and Gallupe, 2001). This study takes a hybrid approach: the facilitators were members of the research team, but I considered them as parts of group process for analysis. Second, researchers have identified two key types of assistance that GSS facilitation can provide: process facilitation and content facilitation (Clawson, et al., 1993; Dickson, et al., 1996; Griffith, et al., 1998; Miranda and Bostrom, 1999; Dennis and Wixom, 2001-2002; Khalifa, et al., 2002), though the terms vary among researchers. In *process facilitation*, the facilitator assists groups in the use of the GSS without intervening in the task, while *content facilitation* calls on the facilitator to be more participative in the group task, offering insights, interpretations, or opinions (Clawson, et al., 1993; Griffith, et al., 1998; Dennis and Wixom, 2001-2002). Only process facilitation is used in this study; henceforth "facilitation" refers to "process facilitation" (to avoid confusion with other uses of the word "process"). The third dimension of facilitation is the level of restrictiveness facilitation places on group process. In *restrictive facilitation* (high levels of assistance), the facilitator directs the group in which GSS tools to use and how and when to use them (Dickson, et al., 1993). In *non-restrictive facilitation* (low levels of assistance), the facilitator assists in the use of GSS tools only at the direction of the group and has far less direct influence on group process. Prior research tells us that different levels of restrictiveness affect group outcomes (Khalifa, et al., 2002); both high- and low-levels of facilitator restrictiveness are used (and compared) in this study.

Prior research in GSS facilitation has not observed facilitation itself. That research has utilized the externality of the facilitator from the group in order to manipulate some of the dimensions of facilitation (Clawson et al., 1993; Dennis and Wixom, 2001-2002). Group outcomes such as participant satisfaction with the meeting process, number of ideas generated, reduced decision time, and decision quality were then measured as proxies for the facilitation effects on group process (e.g., Wheeler and Valacich, 1996; Salisbury, et al., 2002). Despite two decades of development and research on the effects of GSS facilitation, results remain mixed. Though facilitation has tended to show higher participant satisfaction with group process, facilitation has not been reliably demonstrated to improve the quality of group outputs nor have positive results been found for other outcomes such as reduced

decision time and increased number of ideas generated (Dennis and Wixom, 2001-2002). It is apparent that there are aspects of the effects of facilitation in GSS that examination of outcomes alone has not been able to uncover.

Since it is group *process* that is being facilitated, it follows that investigating the effects of GSS facilitation on group process should reveal previously hidden aspects. With this study, I "open the black box" and examine aspects of the *process* of GSS facilitation. Specifically, I investigate two levels of restrictiveness of facilitation assistance provided to multiple groups working on a decision task to see whether and how these types of facilitation impact technology adoption and use. Moving the lens from *outcomes* to *process* frees the researcher from the presumption that facilitative treatments are constant and predictable across groups—a presumption that outcome-focused studies are required to make. This process-view study of GSS facilitation enables examination of the facilitators—or more specifically, the individuals enacting the facilitative treatment within the groups—as a unit of analysis to see if this variable is influential.

Theory On Technology In Group Process

One reason that researchers have taken the outcomes-focused approach to GSS facilitation may be that the theoretical views of GSS advanced in the technology's infancy could not account for many of the dynamics of the group interaction process (Poole and DeSanctis, 1992; DeSanctis and Poole, 1994; Wheeler and Valacich, 1996; Chin, et al., 1997). One explanation for this is that the prevailing theories did not adequately attend to the process of technology use. They tended to consider technology a closed system and presumed one of two extremes: either technology had no effect on social interaction except as determined by users (highly individualistic) or it directly influenced social interaction (highly deterministic) (Miller, et al., 2000; Poole and DeSanctis, 2004). DeSanctis and Poole (1994) bridged these extremes by developing Adaptive Structuration Theory (AST) as a process-oriented, *social technology* perspective, in which technology contains structures that are resources for actors to use in social interaction. The structures of the technology are presumed to have the potential to influence social interaction but their actual effects on behavior are moderated by social practices. Since its inception, AST has become an important theoretical perspective for better understanding the process of technology use in social interaction.

A central concept of AST is *appropriation* (DeSanctis and Poole, 1994), the process of calling upon a technology in social interaction. The unit of analysis of appropriation is the *act of appropriation*, or *appropriation move*, which is the instance of an actor (or actors) calling upon a technology in social interaction. AST posits that users choose whether to appropriate the structures of a technology in their social interaction; further, they may choose whether to appropriate the technology as the designers intended or to adapt it in innovative ways to meet their particular needs. AST also proposes that users do not need to appropriate technology in its entirety, but can make incremental appropriations of the technology in a variety of possible patterns throughout the interaction process. Once the structures of a technology have been appropriated in social interaction, users then reinforce the appropriation through continued use of the structure in the interaction, or alter or abandon use of the structure through further appropriation. Therefore, technology such as GSS has the *potential* to affect social interaction, but it is *only in its use* that it impacts social process and only after observing actual appropriation of the technology that this impact can be determined (Orlikowski, 1992; DeSanctis and Poole, 1994; Orlikowski, 2000).

AST In GSS Research

Many studies in the last two decades—mostly experimental—have examined appropriation in the GSS context through the lens of AST. Early AST studies simply provided evidence that GSS affect social interaction and group outcomes (e.g., Zigurs, et al., 1989), while subsequent studies compared outcomes of technology-supported groups to those without the technology intervention (Watson, et al., 1988; Sambamurthy and Poole, 1992; Sambamurthy, et al., 1993). More recent studies compared various forms of technology support for group decision making (Gopal, et al., 1992-1993; Anson, et al., 1995; Contractor, et al., 1996; Wheeler and Valacich, 1996; Limayem and DeSanctis, 2000; Dennis and Garfield, 2001; Salisbury, et al., 2002). These experiments identified and manipulated aspects associated with the technology, task, and/or meeting environment as well as examined the technology as a system for actor-structure interaction (Limayem, et al., 2006). A primary means of manipulation in these studies and others (e.g. Dickson, et al., 1993; Wheeler and Valacich, 1993; Anson, et al., 1995) was to vary

process restrictiveness by prescribing the behavior of a facilitator (Dickson, et al., 1993). Even though AST calls attention to appropriation of technology in the process of social interaction, these early studies measured outcomes, evaluated primarily by decision quality and retrospective participant reports on such items as group consensus, cohesion, and satisfaction with the decision process; and used those results to theorize about what might have happened during the process. Only one of these studies (Dickson, et al., 1993) directly examined the effect of the facilitator on group performance, hypothesizing that the performance between groups would not differ based on the person facilitating the session. Though their hypothesis was statistically supported, Dickson and colleagues (1993) discovered anecdotally that behavior differences between facilitators did affect group outcomes. This unexpected finding raises the possibility that other studies have been limited by their "black box" approach to facilitation and their focus on outcomes. Similarly, in the study described in this article, I use AST to directly examine the process of group-technology appropriation.

Study Overview

This study investigated the effect of facilitation restrictiveness through prescribed facilitator actions. The restrictiveness level of the facilitation assistance was manipulated and its effect on group process was examined through the lens of AST to discover the quantity and types of interactions the group members had with the GSS— when and how the participants in the session included the GSS in their interaction, i.e., appropriated the GSS. My initial prediction was that the level of facilitation restrictiveness would have a substantial effect on group process, as reflected in the quantity and types of appropriation moves groups made. Such effects, if found, would complement prior, outcomes-based research on facilitation.

Some researchers (e.g., Dickson, et al., 1993; Griffith et al., 1998) have suggested that individual characteristics of a facilitator can affect group process. This point has not been empirically demonstrated, and the assumption of virtually all the GSS-facilitation research is that none of the variation found in group process is attributable to facilitator differences. However, prior research is limited in this respect, because it focused on outcomes and did not directly examine the effect of the facilitator on group process. Therefore, in addition to investigating the effects of prescribed facilitator restrictiveness on group process, I also investigated whether and how individual facilitators within the same restrictiveness level differently affected appropriation. What we learn from this more nuanced view of GSS facilitation has the potential to help us better understand the results of the prior studies. Findings from this process-based study will help us better understand the impact on group interaction of different facilitation types and facilitators. This information will help us better understand how to more effectively plan and facilitate technology-supported groups. It will also help us gauge individual facilitator effects and whether they can be safely ignored in future research.

METHOD

This study used videotapes collected in a prior laboratory study of facilitated groups using a GSS. I did not participate in either the design of the laboratory (experimental) setting and task or in the execution of the sessions. All artifacts of the decision environment—the task, GSS, group members, facilitator, and decision room—were observable in the videotapes. Below I describe how the videotapes were generated in that prior laboratory study and then my own data collection and analysis, which constitute the current study.

Videotape Content

Sessions

The sessions were held in two identical decision rooms, where 48 groups of four or five members worked on the same decision task scenario and were provided with the same GSS technology. Half of the groups (24) were placed in a restrictive facilitative environment, directed to use the GSS to accomplish the task, and guided in its use. The other 24 groups were placed in a non-restrictive facilitative environment, in which they were left to choose on their own whether and how to use any tool of the GSS, which then required the assistance of the facilitator to activate. Two facilitators each facilitated about half of the sessions in each treatment. The variation between

treatments along with the variation in facilitators within each treatment enabled a synchronic analysis with opportunity to observe how differences in facilitation restrictiveness and individual facilitators affect the quantity and types of appropriation moves.

The sessions were single-meeting decision tasks in which all groups were presented with the same problem scenario to resolve. The problem scenario was a version of *The School of Business Policy Task* (Wheeler and Mennecke, 1992), a hidden-profile task (Stasser, 1992) in which each group member began with only a portion of the task information. This hidden profile required the group members to work together to integrate information. The task commenced just after the group members had been trained in group decision techniques as well as in the use of the GSS technology

Participants

There were five or six people in each session—four or five group members plus one facilitator. All group members were undergraduate business students with little or no experience in group decision making techniques or GSS technology. All of the students were solicited from an introductory course in information systems and earned extra credit in the class for participating in the study. One of the two facilitators had also designed and organized the experiment. I will use the alliterative name of Desmond (as in DESigner) for this facilitator. Desmond was the facilitator for 12 of the restrictive treatment groups and for 14 of the non-restrictive treatment groups. The other facilitator was a fulltime employee of the institution where the study was conducted and had been trained as a GSS facilitator. The alliterative name of Emmett (as in EMployee) is used for the fulltime employee. Emmett was the session facilitator for twelve of the restrictive treatment groups and for ten sessions of the non-restrictive treatment groups.

Group Meeting Environment

All of the group meetings took place under tightly controlled laboratory conditions. All groups were identically trained in group decision techniques and use of the GSS tools by the facilitator just prior to the commencement of the decision task. Each group member was provided with a packet of documents that included a description of his or her individual role and detailed information pertaining to the role, instructions on how to access and use the tools of the GSS, and a sample decision-process agenda that named the GSS tools that supported each step in the decision process. The facilitator had general instructions for conducting each session and scripts to follow that were particular to each treatment. The design of the original study presumed an agenda that followed a four-stage approach to a decision task, with each stage incorporating many of the properties of the *nominal group technique* (Delbecq, et al., 1975), and roughly approximating the *reflective thinking model* (Cragan and Wright, 1986) with the features (tools) of the GSS arranged to correspond with the agenda.

There are five main tools in the GSS used for this study: anonymous brainstorming, voting, ranking, rating and scoring. The anonymous brainstorming tool is believed to encourage idea generation, because it allows individuals to enter ideas without having to reveal authorship, eliminating much of the fear or social concerns that can arise when authorship is known. Egalitarian decision making is presumably reinforced through the voting tools, which impose a single "Yes" or "No" vote per item. Finally, the group members work in parallel when ranking, weighting, and scoring the various lists of ideas that their group has generated. Use of these tools is believed to give the group opportunity to build consensus towards the final solution. The design of the GSS still provided occasion for the group members to directly interact. For the discussion period at the conclusion of each brainstorming activity, the GSS listed the items that all of the members had generated and allowed the group members to ask for clarification of a specific item. The group could also remove redundant items with the facilitator's assistance. Also, though the GSS tools provided substantive results of each activity, it did not provide the final product; it remained to the group members to reach consensus on the task outputs for each stage of the decision process. Table 1 shows how these tools and their expected outputs align with the agenda.

Table 1: GSS Tools and Outputs by Agenda Item

Agenda Item	GSS Tool or Output
Stage 1 – Identify the Real Problem	
Generate problem statements	Anonymous brainstorming
Discuss & clarify problem statements	Output list from brainstorming
Reduce the list of problem statements	Voting – 60% Yes vote required for item to remain on list
Choose the best problem statement	Ranking – scale of 1 to 10 with 10 being highest
State the problem	Displays ranked list
Stage 2 – Identify & Weight the Criteria and Constraints	
Generate criteria and constraints	Anonymous brainstorming
Discuss and clarify criteria & constraints	Output list from brainstorming
Reduce the list of criteria & constraints	Voting – 50% Yes vote required for item to remain on list
Assign weights – the relative importance criteria & constraints	Rating – display of results
Stage 3 – Identify Potential Solutions	
Generate potential solutions	Anonymous brainstorming
Discuss and clarify potential solutions	Output list from brainstorming
Reduce the list of potential solutions	Voting – Yes vote required for item to remain on list
Short list of potential solutions to receive further consideration	Display results of voting
Stage 4 – Select the Best Solution	
Consider how well each proposed solution meets each criteria & constraint	Scoring of potential solutions against weighted criteria & constraints
Discuss and clarify evaluation of various proposed solutions	Display results of scoring
Group agrees on final recommendation	Display results of scoring

The treatments—restrictive versus non-restrictive—were the only design difference in the decision task environments. The treatments were manifested in the scripts that each facilitator followed. At the onset of the decision task for the restrictive treatment groups, the facilitator's scripted statement to the group was, "At this time, we will commence your meeting using the Group Support Technology." The facilitator then led the group through the task, instructing group members to use each GSS tool in a sequence and manner consistent with the printed agenda. If the group began using, or suggested using, the GSS in a manner inconsistent with the design of the technology, the facilitator took action to return or keep the group to the use of the technology in a manner consistent with its design. For the non-restrictive treatment groups, the scripted statement from the facilitator to the members was, "At this time, you may begin to work on your case. Any facility in this room is at your disposal. You may choose to use or not use the computer-aided meeting system with my assistance, the pads of paper, or the white board. Your only constraint in completing your task is that you do so in 1:10." The facilitator then set up specific tools of the GSS if and when they were requested and in the manner requested by the group members, regardless of whether or how that request conformed to the agenda. While the restrictive treatment called for the facilitator to provide corrective action when individuals or groups strayed from the design of the GSS, the non-restrictive treatment called for the facilitator to allow individuals or the group to use, attempt to use, or not use the GSS as they wished.

Data Collection And Analysis

I considered appropriation moves to be found in what are termed here *significant interaction events*. The participants are not constantly "in play" throughout the meeting session (Goffman, 1959). Rather, there is a succession of engagements in interaction events that make up the interaction process (Giddens, 1984). In my analysis, any instance of social interaction in which a subject mentioned or made a physical motion to use a feature of the GSS I considered a significant interaction event and therefore an appropriation move. I did not examine discrete utterances or motions (cf. Poole and DeSanctis, 1992). For my observations, the level of social interaction for analysis was interaction fragments—clusters of conversational and gestural exchanges—that contained or represented significant interaction events including elements of their social context. There is one important point to

clarify: When the groups in the restrictive treatment submitted unquestioningly to the use of the agenda or tools embedded in the GSS as explicitly directed by the facilitator, I did not count this as an appropriation move. For example, when the members of a restrictive treatment group simply began working at their keyboards when the facilitator directed them to use the brainstorming tool, I considered this an act of reinforcing the use of the prevailing structure, not appropriating the structure. When, on the other hand, a group member then asked the facilitator, "So, we're supposed to enter as many things as we can think of related to identifying the problem, right?" I considered this to be a query about the structure of the GSS in which the member was attempting to gain greater understanding of the meaning of the brainstorming tool and I counted it as an appropriation move.

I observed and documented every appropriation move that occurred in the decision-making task phase of each group session. I viewed all 48 sessions twice. In the first viewing, I wrote detailed descriptions of each interaction event in which participants appropriated structures of the GSS, including when and how the event occurred. I stopped the videotapes and replayed segments as necessary to ensure precise descriptions of events. I made detailed descriptions of both verbal exchanges and non-verbal actions representing appropriation moves. I transcribed some of the significant verbal exchanges that were appropriation moves for closer analysis of the event.

In the second viewing, I compared observations of appropriation moves to the notes I had made of the observations from the first viewing. The second viewing added greater precision to the overall observation of appropriation moves. During the second viewing, I also classified and coded each appropriation move according to the 31-item DeSanctis and Poole (1994) appropriation moves typology (Table 2) to help organize the data and provide framework through which the data could be analyzed. In the end, the notes from the two viewings yielded approximately 350 pages of word processed single-spaced notes. Preliminary analysis of the findings (described below) impelled me to return to the data for further classification and coding, where I added a designation to each appropriation move denoting whether the source and target of each interaction were the facilitator, an individual group member, or the group as a whole.

FINDINGS

Observations are reported first according to differences in the quantity and types of appropriation moves found between the treatment groups, regardless of who facilitated the sessions. Observations are then reported according to differences found between facilitators within the same treatment. Note that statistical analysis in these findings must be interpreted with some caution since the counts of appropriation moves were made by a single rater.

Appropriation Move Differences Between Treatments

Table 3 shows the counts of appropriation moves observed within each major type. The counts are separated by treatment (restrictive and non-restrictive) and totaled with a mean of counts per session as well as the standard deviation. The table also lists the differences between the means and p-values of t-tests for each of the types of appropriation moves observed.

There were almost three times (2.90) as many appropriation moves observed for the non-restrictive treatment groups as for the restrictive treatment groups. Appropriation moves of all types within the restrictive treatment averaged 11.7 per session, with a low of five appropriation moves in a single session—four groups had this quantity—and a single group with the high count of 28 appropriation moves in its session. The non-restrictive treatment averaged 34.0 appropriation moves per session, with one group having the low of 17 appropriation moves and one group with the high count of 58 appropriation moves. The significance ($p < 0.01$) of the difference between the means of the total of the appropriation moves between treatments supports the conclusion that how the groups are facilitated (restrictive versus non-restrictive) had a substantial effect on group process, manifested in the quantity and type of appropriation moves that occurred between treatments.

Table 2: Appropriation Move Typologies and Subtypes*

Appropriation Moves	Types	Subtypes
Direct Use	1. Direct appropriation	a. explicit b. implicit c. bid
Relate to Other Structures	2. Substitution	a. part b. related c. unrelated
	3. Combination	a. composition b. paradox c. corrective
	4. Enlargement	a. positive b. negative
	5. Contrast	a. contrary b. favored c. none favored d. criticism
Constrain the Structure	6. Constraint	a. definition b. command c. diagnosis d. ordering e. queries f. closure g. status report h. status request
Express Judgments About the Structure	7. Affirmation (structure is accepted)	a. agreement b. bid agreement c. agree to reject d. compliment
	8. Negation (structure is rejected or ignored)	a. reject b. indirect c. bid to reject
	9. Neutrality	

* From DeSanctis and Poole (1994, Table 5, p. 135). See DeSanctis and Poole (1994) for detailed definitions of each of these appropriation move typologies.

The results of the *t*-tests indicate that there are also between-treatment differences in the means for each of the major types of appropriation moves observed. There were more occurrences on average (p-values less than 0.05) of every appropriation move type observed in the non-restrictive treatment compared to the restrictive treatment groups. Appropriation move types that represent direct appropriation of structures as well as types that represent substitution and combination of structures (Types 1, 2 and 3) refer to overt acts of appropriation, in which the subjects explicitly use or discuss use of structures. Activity in each of these three types was different between the treatments. The higher frequency of these types in the non-restrictive treatment groups makes sense, because the members had to appropriate structures to proceed with the task—something the restrictive treatment groups did not have to do. Strongly related to Types 1, 2 and 3, Types 7, 8 and 9 appropriation moves are ones in which participants express judgments about appropriating a structure: accept appropriation (Type 7), reject or ignore appropriation (Type 8), or express uncertainty or neutrality toward appropriation (Type 9). It makes sense that, as groups appropriate structures, judgments regarding that appropriation would also be made. Therefore, because there were more Types 1, 2, and 3 appropriation moves observed in the non-restrictive treatment we would also expect to see more Types 7, 8 and 9 in those groups, because more appropriation activity should compel more opinions being expressed about that appropriation. These expectations are partially borne out: more Type 7 and 8 moves were observed for the non-restrictive treatment groups than for the restrictive. Though appropriation moves rejecting or ignoring use of a structure (Type 8) occurred many times in the non-restrictive treatment groups, all groups eventually chose to use the GSS and at least attempted to complete the decision task using the structures of the GSS.

Once a group had chosen to use the GSS, the design of the GSS meant that no group member could reject use of the GSS outright and still reasonably participate in the decision task activity. So each group had to reach consensus on appropriating the GSS if the technology was to be used. Therefore, despite some moves to reject use of the GSS, all group members eventually agreed to appropriate the structures of the technology.

Table 3: Types of Appropriation Moves by Treatment

Type[1]	Non-restrictive			Restrictive			Difference	
	Count	Mean[2]	S.D.	Count	Mean[2]	S.D.	Means[3]	p-value
1. Direct Appropriation	214	8.92	3.36	7	0.29	0.55	8.63	0.00
2. Substitution	85	3.54	2.13	5	0.21	0.41	3.33	0.00
3. Combination	57	2.38	2.02	23	0.96	1.27	1.42	0.01
5. Contrast	8	0.33	0.56	1	0.04	0.20	0.29	0.03
6. Constraint	382	15.92	7.23	238	9.92	5.76	6.00	0.00
7. Affirmation	23	0.96	1.43	6	0.25	0.85	0.71	0.03
8. Negation	42	1.75	1.82	1	0.04	0.20	1.71	0.00
9. Neutrality	4	0.17	0.38	0	0.00	0.00	0.17	0.04
Total Appropriation Moves	815	34.0	10.53	281	11.7	6.64	22.25	0.00

[1]There were no Type 4 (Enlargement) appropriation moves observed in either treatment.
[2]Mean for counts of Type per session.
[3]Non-restrictive treatment mean minus restrictive treatment mean.

The expectation that more Type 9 appropriation moves would be observed in the non-restrictive treatment groups was not really borne out (four moves compared to zero). This type along with Type 5 (nine total moves) were hardly observed in this study, and Type 4 was not observed at all.

The number of Type 7 moves seems low when compared with the quantity of other moves observed, particularly Type 1, 2 and 3 appropriation moves. Surely, one should think, if participants were moving to appropriate a structure, group members would voice (or gesture) agreement with the appropriation. This would seem especially relevant in the non-restrictive treatment groups, where group members had to decide on their own whether or how to appropriate structures. However, the low frequency of Type 7 moves can be explained methodologically. My method was to observe complete interaction events (i.e., all of the interactions that concluded the act of calling upon the technology in social interaction) the agreement to appropriate the structure would have been subsumed in the interaction event of the move to appropriate the structure if the agreement move occurred in the same interaction event.

The types of appropriation moves discussed thus far have provided easy comparison among treatment types; restrictive treatment group quantities were so small that the comparison was really one of appropriation activity to no appropriation activity within each type. Clearly, the different treatment types influence appropriation. This holds true for Type 6 appropriation moves, which occur significantly more frequently in the non-restrictive treatment groups. But, there is a substantial quantity of Type 6 moves, where there are hardly any occurrences other types of appropriation moves in the restrictive treatment. Type 6 appropriation moves represent interaction that is different from the interaction occurring in the other types of moves. Whereas other moves represent actions that use the structure or express judgments about that use, actions related to adopting a structure for use; Type 6 moves represent interaction aimed primarily at the group interpreting (or reinterpreting) a structure, actions related to a structure already in use. This characteristic of Type 6 appropriation moves and that such a high quantity were seen in the restrictive treatment, allows us to ask a more sophisticated question: are there cross-treatment differences in the nature of appropriation moves within a type? Thus I analyzed the subtypes of the Type 6 appropriation moves.

Immediately we see that there is a difference in the nature of the Type 6 moves across treatments. Looking at Table 4, three of the eight subtypes of Type 6 appropriation moves (6c, 6d, and 6h) we see activity in the non-restrictive treatment groups but almost none in the restrictive. Subtype 6c appropriation moves are diagnoses of how the structure is working, subtype 6d moves are efforts to specify the order in which structures are to be used,

and subtype 6h moves are questions or requests for information about what has been done or is being done with the structure. Even in Subtypes 6e (queries—questions about the meaning of the structure or how to use it) and 6f (closure—showing how the use of a structure has been completed) where there is more substantial activity in both treatments, there are still significantly ($p < 0.05$) more in the non-restrictive treatment. But, there are three subtypes, explanations of the meaning of a structure (Subtype 6a), directing a group or member to use a structure (Subtype 6b) and reports of what was being done with a structure (Subtype 6g) that did not have significantly different numbers of occurrences between treatments ($p > 0.10$). Interestingly, there were more occurrences of Subtype 6b in the restrictive treatment; the only type of which there was more in the restrictive treatment. Does this mean that the nature appropriation activity is similar in these subtypes across treatments? To test this I went to a further level of analysis.

Table 4: Type 6 Appropriation Moves by Treatment

Subtype	Non-restrictive			Restrictive			Difference	
	Count	Mean[1]	S.D.	Count	Mean[1]	S.D.	Means[2]	p-value
6a. Definition	90	3.75	2.64	82	3.42	2.80	0.33	0.67
6b. Command	23	0.96	0.91	33	1.38	1.93	–0.42	0.37
6c. Diagnosis	17	0.71	0.91	5	0.21	0.51	0.50	0.02
6d. Ordering	52	2.17	2.46	8	0.33	0.64	1.83	0.00
6e. Queries	79	3.29	2.26	53	2.21	1.47	1.08	0.03
6f. Closure	72	3.00	1.87	36	1.50	1.32	1.50	0.00
6g. Status Report	26	1.08	1.25	17	0.71	1.04	0.38	0.25
6h. Status Request	23	0.96	1.12	4	0.17	0.38	0.79	0.00
Type 6 Appropriation Moves	382	15.92	7.23	238	9.92	5.76	6.00	0.00

[1]Mean for counts of Type per session.

[2]Non-restrictive treatment counts minus restrictive treatment counts.

Noting that DeSanctis and Poole (1994) had included the source of an appropriation move in their illustration of analysis coding (see their Table 6, pp. 136-137), I added coding for not only the source, but the target of the interaction as well. I determined that the source of an appropriation move could be either the facilitator (coded as 'F') or a group member (coded as 'M'). I further determined that the target of the source could be the facilitator, a group member (other than the source) or the group as a whole (coded as 'G'). This created five possible combinations of interactions: the facilitator to the group or to a member of the group; and a member to the facilitator, another group member or the group as a whole. Counts and summary statistics of this coding of the observations are reported in Table 5. The data show that facilitator-initiated (F2G and F2M – Fac. Init.) interactions represent a majority of the appropriation moves for each of the subtypes (6a, 6b, and 6g) reported in the restrictive treatment. Conversely, group member-initiated interactions that excluded the facilitator (M2G and M2M – No Fac.) comprised the majority in the non-restrictive treatment for Subtypes 6a and 6b, and comprised nearly half (42.3%) of the Subtype 6g interactions. The contrast here reflects the different levels of guidance the facilitator provided between the treatments. The facilitator in the restrictive treatment defined the structures for the group members, directed them to use the structures, and reported what was being done with the structures. However, the facilitator in the non-restrictive treatment was not permitted (by the design of the study) to provide such guidance. Therefore, the group members had to rely on each other to arrive at shared meanings of the structures.

In summary, far more appropriation moves occurred in the non-restrictive treatment than in the restrictive treatment. This difference is much larger than what could be explained by the fact that each group in the non-restrictive treatment had to make at least one appropriation move to progress on the task where groups in the restrictive treatment could complete the task without having to make a single appropriation move. Only the command constraint (Subtype 6b) appropriation move occurred more often in the restrictive treatment; all other subtypes of appropriation moves occurred more often in the non-restrictive treatment. Counts of subtypes of appropriation moves that constrain the structure (Type 6), though often still significantly different between the treatments, were more even between the treatments than other types of appropriation moves. But, looking at the source and target of the Type 6 appropriation moves whose overall frequencies were not significantly different

between the treatments reveals that interactions in the non-restrictive treatment were much less likely to include the facilitator as either source or target, compared to the restrictive treatment, where the facilitator was usually involved.

Table 5: ource and Target in Select Types of Appropriation Moves

Source/Target	Restrictive Treatment				Non-restrictive Treatment			
	6a	**6b**	**6g**	**Total**	**6a**	**6b**	**6g**	**Total**
F2G	48	20	8	76	9	3	11	23
F2M	28	3	1	32	6	1		7
M2F			2	2	4	2	4	10
M2G		7	6	13	56	10	7	73
M2M	6	3		9	15	7	4	26
Fac. Init.	76	23	9	108	15	4	11	30
FacInit%	92.7%	69.7%	52.9%	81.8%	16.7%	17.4%	42.3%	21.6%
No Fac.	6	10	6	22	71	17	11	99
NoFac%	7.3%	30.3%	35.3%	16.7%	78.9%	73.9%	42.3%	71.2%

Appropriation Move Differences Between Facilitators

Because facilitators followed a script, we would not expect to see differences in the nature of appropriation within a treatment type across facilitators. Tables 6 and 7 report the counts for each type of appropriation move separated by the two individuals facilitating the sessions. Table 6 reports the counts within the restrictive treatment groups and Table 7 reports the counts for the non-restrictive treatment groups. Though not as stark as the differences between treatments, there are areas of substantial difference in occurrences of appropriation moves between same-treatment sessions facilitated by Desmond versus Emmett.

As can be seen in Table 6, there was a large difference in the total quantity of appropriation moves between the facilitators' restrictive treatment sessions (163 for Desmond compared to 117 for Emmett), with approximately 39 percent more moves having occurred in sessions facilitated by Desmond than by Emmett, though the difference is not statistically significant (p = 0.16). Differences in the means for types of appropriation moves in which the p-values are 0.10 or less are limited to just five subtypes. Appropriation moves that explained the meaning of a structure or how to use it (Subtype 6a), diagnosed the structure by commenting on how it was working (Subtype 6c), or showed how use of a structure had been completed (Subtype 6f) had significantly more occurrences in sessions facilitated by Desmond than Emmett. Conversely, there were significantly more occurrences of appropriation moves combining structures, both in ways consistent with the structure design (Subtype 3a) and contrary to the structure design (Subtype 3b) in sessions facilitated by Emmett than by Desmond.

Table 7 shows that, for sessions of the non-restrictive treatment, only Subtype 2a had significant difference in the means of counts of appropriation moves between Desmond's and Emmett's sessions. However, there are many other subtypes of appropriation moves where the p-values are less than 0.20 suggesting that the means between facilitators' sessions are different here, too. In sessions facilitated by Desmond, there were more occurrences of substitutions of structures at hand with unrelated opposing structures (Subtype 2c), combining of contrary structures (Subtype 3b), and indirectly rejecting the appropriation of a structure (Subtype 8b), and fewer occurrences of explanations of the meaning of a structure, or how the structure should be used (Subtype 6a), than there were for sessions facilitated by Emmett.

Table 6: Restrictive Treatment Counts of Appropriation Moves by Facilitator

Subtype[1]	Desmond			Emmett			Difference	
	Count	Mean	S.D.	Count	Mean	S.D.	Means	p-value
1a. explicit	4	0.33	0.65	2	0.17	0.39	0.17	0.44
1c. bid	1	0.08	0.29	0	0.00	0.00	0.08	0.34
2b. related	2	0.17	0.39	0	0.00	0.00	0.17	0.17
2c. unrelated	2	0.17	0.39	1	0.08	0.29	0.08	0.59
3a. composition	1	0.08	0.29	6	0.50	0.67	−0.42	0.10
3b. paradox	2	0.17	0.39	10	0.83	1.47	−0.67	0.10
3c. corrective	3	0.25	0.87	1	0.08	0.29	0.17	0.34
6a. definition	56	4.67	3.26	26	2.17	1.53	2.50	0.01
6b. command	20	1.67	1.97	13	1.08	1.93	0.58	0.50
6c. diagnosis	5	0.42	0.67	0	0.00	0.00	0.42	0.05
6d. ordering	4	0.33	0.65	4	0.33	0.65	0.00	1.00
6e. queries	24	2.00	1.76	29	2.42	1.16	−0.42	0.52
6f. closure	24	2.00	1.21	12	1.00	1.28	1.00	0.05
6g. status report	9	0.75	1.06	8	0.67	1.07	0.08	0.87
6h. status request	2	0.17	0.39	2	0.17	0.39	0.00	1.00
7a. agreement	2	0.17	0.58	0	0.00	0.00	0.17	0.34
7b. bid agreement	2	0.17	0.58	2	0.17	0.39	0.00	1.00
8a. reject	0	0.00	0.00	1	0.08	0.29	−0.08	0.34
Total	163	13.58	6.67	117	9.75	6.17	3.83	0.16

[1]Subtypes for types included in the analysis.

My analysis then focused on the degree to which each facilitator was involved in the appropriation moves as either the source or target. First, I considered how often appropriation moves included each facilitator in the interaction event that constituted each appropriation move. Table 8 shows that in the restrictive treatment for the appropriation moves that explained the meaning of a structure or how to use it (Subtype 6a) and showed how use of a structure had been completed (Subtype 6f), nearly all of the interactions involved the facilitator, whether the facilitator was Desmond or Emmett. Within these two subtypes, while the distribution of interactions initiated by the facilitator and directed at an individual group member was about the same between the facilitators, there were nearly three times (2.8) as many interactions initiated by Desmond directed at the entire group than there were interactions initiated by Emmett to the group. That is, Desmond offered the whole group more explanations of a structure or descriptions of how use of the structure had been completed than did Emmett. For two of the types of appropriation moves for which there were significantly more occurrences per session when facilitated by Emmett than Desmond—appropriation moves that combined two structures in a way consistent with the structure design (Subtype 3a) and combined contrary structures (Subtype 3b)—the interactions were fairly evenly distributed between those that involved the facilitator and those that did not for Emmett while none of the interactions involved the facilitator when Desmond facilitated the session.

In the non-restrictive treatment (Table 9), appropriation moves of substitutions of structures at hand with unrelated opposing structures (Subtype 2c), combining of contrary structures (Subtype 3b), and indirectly rejecting the appropriation of a structure (Subtype 8b), had more than two and a half times as many interactions involving the facilitator as either the source or target when Desmond facilitated the session than when Emmett was the facilitator. By contrast, more than five times as many explanations of the meaning of a structure, or how it should be used (Subtype 6a) involved the facilitator when the session was facilitated by Emmett than when Desmond was the facilitator. To summarize, for appropriation moves that substituted, combined or negated the appropriation of structures, Desmond was involved in the interaction more often than was Emmett. And, groups involved Emmett in the interaction more often in appropriation moves that defined the structure than groups involved Desmond in such interactions.

Table 7: Non-restrictive Treatment Counts of Appropriation Moves by Facilitator

Subtype[1]	Desmond 14 Sessions			Emmett 10 Sessions			Difference	
	Count[2]	Mean	S.D.	Count	Mean	S.D.	Means	p-value
1a. explicit	34	3.36	2.44	35	3.50	1.84	−0.14	0.87
1b. implicit	17	1.71	1.91	16	1.60	1.07	0.11	0.85
1c. bid	41	4.07	2.30	35	3.50	1.51	0.57	0.47
2a. part	3	0.29	0.47	0	0.00	0.00	0.29	0.04
2b. related	4	0.36	0.63	8	0.80	1.03	−0.44	0.25
2c. unrelated	33	3.29	1.98	22	2.20	1.69	1.09	0.16
3a. composition	6	0.57	0.94	6	0.60	0.97	−0.03	0.94
3b. paradox	18	1.79	1.89	7	0.70	1.34	1.09	0.11
3c. corrective	6	0.57	0.65	3	0.30	0.48	0.27	0.25
6a. definition	31	3.14	2.71	46	4.60	2.41	−1.46	0.18
6b. command	8	0.79	0.89	12	1.20	0.92	−0.41	0.28
6c. diagnosis	6	0.64	0.93	8	0.80	0.92	−0.16	0.69
6d. ordering	21	2.14	2.57	22	2.20	2.44	−0.06	0.96
6e. queries	35	3.50	2.71	30	3.00	1.49	0.50	0.57
6f. closure	29	2.86	1.99	32	3.20	1.75	−0.34	0.66
6g. status report	9	0.93	1.33	13	1.30	1.16	−0.37	0.47
6h. status request	7	0.71	1.07	13	1.30	1.16	−0.59	0.22
7a. agreement	1	0.07	0.27	2	0.20	0.63	−0.13	0.56
7b. bid agreement	9	0.86	1.66	8	0.80	1.14	0.06	0.92
8a. reject	3	0.29	0.47	2	0.20	0.42	0.09	0.64
8b. indirect	14	1.36	1.78	5	0.50	0.97	0.86	0.15
8c. bid reject	5	0.50	0.52	5	0.50	1.27	0.00	1.00
Total	338	33.79	11.54	330	33.00	8.63	0.79	0.85

[1]Subtypes for types included in the analysis.

[2]Counts for Desmond are normalized (deflated and rounded to the nearest whole number) to compensate for the difference in the number of sessions facilitated in the non-restrictive treatment.

Continuing with the non-restrictive treatment, there were also differences in interactions that did not include the facilitator. The three subtypes of appropriation moves mentioned in the previous paragraph (2c, 3b, and 8b) in sessions facilitated by Desmond had nearly twice as many occurrences not involving the facilitator than did sessions facilitated by Emmett. Regarding the number of occurrences of appropriation moves that were explanations of the meaning of a structure, or how it should be used (Subtype 6a) not involving the facilitator, there were slightly more in sessions facilitated by Emmett than those facilitated by Desmond.

To summarize observations of same-treatment sessions across facilitators, there were differences in the quantity and type of appropriation moves as well as the proportion of moves that involved the facilitator. Within the non-restrictive treatment, the types of appropriation moves that occurred significantly more frequently in sessions facilitated by Desmond concerned the group members manipulating the structures, and Desmond was involved in these interactions much more than Emmett was in the sessions he facilitated. Conversely, the types of appropriation moves in the non-restrictive treatment that occurred significantly more often in sessions facilitated by Emmett concerned explanations and improving understanding of how a structure should be used, and Emmett was involved in these interactions at a much higher rate than Desmond was in the sessions he facilitated. The case is reversed within the restrictive treatment. Desmond was far more likely to be involved in explanations of a structure or describing how it should be used, and show that use of a structure had been completed, than was Emmett.   On the other hand in the restrictive treatment, though there were more occurrences of appropriation moves involving constraining the structure, Emmett was less likely to be involved in the interaction.

Table 8: Source and Target in Restrictive Treatment for Select Types of Appropriation Moves by Facilitator

Source/Target	Desmond				Emmett			
	3a	3b	6a	6f	3a	3b	6a	6f
F2G			38	18	2	2	10	2
F2M			14		1		14	1
M2F				3				2
M2G	1	1		3	3	3		7
M2M		1	4			5	2	
Total	1	2	56	24	6	10	26	12
Fac. Inv.	0	0	52	21	3	2	24	5
FacInv%	0.0%	0.0%	92.9%	87.5%	50.0%	20.0%	92.3%	41.7%
No Fac.	1	2	4	3	3	8	2	7
NoFac%	100.0%	100.0%	7.1%	12.5%	50.0%	80.0%	7.7%	58.3%

Table 9: Source and Target in Non-restrictive Treatment for Select Types of Appropriation Moves by Facilitator

Source/Target	Desmond				Emmett			
	2c	3b	6a	8a	2c	3b	6a	8a
F2G	3		4		1		5	
F2M			2				4	
M2F	15	5			2	3	4	
M2G	26	17	28	2	18	4	29	1
M2M	3	4	10	2	1		4	1
Total	47	25	44	4	22	7	46	2
Fac. Inv.	18	5	6	0	3	3	13	0
FacInv%	38.3%	20.0%	13.6%	0.0%	13.6%	42.9%	28.3%	0.0%
No Fac.	29	21	38	4	19	4	33	2
NoFac%	61.7%	84.0%	86.4%	100.0%	86.4%	57.1%	71.7%	100.0%

DISCUSSION

The many sessions captured in the videotapes, all with homogeneous groups in terms of setting, task, and prior relevant participant experience, provided a strategic environment in which to observe how groups appropriate GSS differently in differing facilitative contexts. This study investigated the effect of facilitation restrictiveness through prescribed facilitator actions. The restrictiveness level of the facilitative assistance was manipulated and its effect on group process was examined through the lens of AST. The original typologies of appropriation moves developed by DeSanctis and Poole (1994) were a valuable research aid, providing an effective scheme for identifying and classifying appropriation moves. Yet, greater insight into the groups' process was attained when I moved beyond this categorization scheme to disaggregate appropriation moves by the source and target of each interaction event.

In this study, highly contrasting levels of facilitative control affected the quantities and types of appropriation moves that occurred over the span of a group decision task meeting. This process-based result supports and complements the prior outcomes-based research on facilitation. This study also provided empirical evidence of the quantity and types of appropriation moves differing between individual facilitators within the same treatment. This finding suggests that characteristics and behaviors of individual facilitators can affect technology appropriation and thus group process. This is the first empirical evidence supporting Dickson and colleagues' (1993) anecdotal evidence of this effect. Clearly, individual effects should be considered in future facilitation research. Further, I have shown that a process-based analysis reveals effects on appropriation that are not observable in outcome-based analysis. Collectively, this study has opened the facilitation "black box" by providing evidence of the effects on group process from differing levels of facilitative control and individual facilitators, and of the importance of including the facilitator as a unit of analysis.

Treatment Effects

It was easy to predict that the extreme differences in facilitative control would have substantial effect on the quantity of various types of appropriation moves and who participated in them. Nevertheless, important findings emerged from the analysis. First, though restrictive treatment groups could have simply submitted to the directives of the facilitator and completed the task without making any appropriation moves, all such groups made at least 5 moves (with as many as 28 moves made by one group), averaging nearly 12 moves per group over the course of the decision meeting. The vast majority (85%) of their appropriation moves were for defining or otherwise constraining the use of a structure. Unlike the groups of the restrictive treatment, non-restrictive treatment groups were required to make at least one appropriation move to progress at all. This was essentially dictated by the restrictive group facilitation and evident in the comparatively high quantity of appropriation moves indicating direct use or relating the structures to other structures. Yet, importantly as in the restrictive treatment, a high quantity (382) of the appropriation moves in the non-restrictive treatment were queries, definitions, and other moves constraining the use of a structure. This means that participants attempted to interpret and question the structures provided to them in spite of the environment placing no obligation on them to do so. This pattern of appropriation could also reflect the workings of deeper structures of social interaction (DeSanctis and Poole, 1994). While the group members were discussing and defining the use of the GSS, they may have been metaphorically working out the social order of their group, at least in the context of the decision task at hand.

The appropriation activity in the face of the highly constrained restrictive treatment environment may also be considered evidence that group members retain agency—they are able to exert at least some power in the group that may influence group interaction—reflecting the "dialectic-of-control" premise of social interaction (Giddens, 1984). Future research focused on how appropriation of a structure changes group process—particularly in a restrictive group meeting environment—should help substantiate this premise.

There are real world applications of the findings of the differences in appropriation between the two treatments. A relatively restrictive group meeting environment may be more effective for meetings with a task-oriented goal. Since the appropriation moves that occurred in restrictive treatment groups were primarily those that defined and constrained the structure in use, rather than appropriating other structures, they should remain more on-task than groups of a non-restrictive facilitation environment. If the meeting goals skew towards team-building, however, a less-restrictive facilitative environment may be more appropriate. The qualities of this environment seem to encourage the group members to interact more and force them to reach consensus on appropriation of the structures of the technology if they are to use it effectively, thus providing opportunity to build team cohesion. Of course, the effects of facilitation restrictiveness could have unproductive consequences for group process. For instance, while remaining on task, restrictive facilitation groups could miss out on opportunities to innovate. Non-restrictive facilitation groups could fail to reach a decision while they grapple with team-building. Further research should more closely explore the effects of treatment environment specifically on task performance and team-building.

This study consisted primarily of an analysis of observations of interaction events of appropriation moves that considered contextual factors within the group decision meeting process, and it has shown the effect of the facilitation restrictiveness on appropriation moves. This analysis did not consider the temporal aspect of group process. Structuration theory (Giddens, 1984), upon which AST is based, holds that social structure is ordered across space and time. Because this study did not analyze group process over time, the development of dominant patterns of appropriation in the groups cannot be ascertained. Research that analyzes the temporal emergence of appropriation moves should prove to be a fruitful avenue for future research in revealing patterns of appropriation.

Effects Of Facilitators

The scripts the facilitators followed greatly controlled their actions; thus there was no reason to expect differences in the quantity, types, and nature of appropriation moves across facilitators in each treatment environment. Certainly, the facilitation research literature has presumed negligible cross-facilitator impact. My findings show otherwise. There were many areas of difference in the quantity of certain types of appropriation

moves depending on who facilitated the session. This was most apparent in the restrictive treatment, where there was a large difference in the total quantity of appropriation moves; substantially more occurred in Desmond's sessions than in Emmett's. The observation methods of this study could not conclusively show what facilitator characteristics caused the differences in appropriation. However, my observations suggested possible—perhaps likely—facilitator traits that affected group member behavior. For example, there was a stark difference in the appearances of the two facilitators. Emmett was a large man, taller and fuller-bodied than any of the participants in the study. He had a beard, wore button-down collared shirts with slacks and often a necktie (group sessions were held over several days and the facilitators' clothing, though not style of dress, varied over the sessions). By contrast, Desmond was clean-shaven, was notably shorter and slimmer than Emmett, and wore a rugby shirt, shorts and running shoes. Observations showed that both facilitators adhered closely to the scripts, so unsanctioned deviations from the script cannot explain the differences in group member behavior. My sense from repeated viewing of the tapes is that Desmond seemed more aware and engaged in each group's activity, while Emmett appeared more detached or aloof. Emmett always performed his duties as per the script, but he was called upon far less frequently by group members than Desmond. Group members exhibited a readiness to interact with Desmond that was absent from meetings facilitated by Emmett. Further research on GSS facilitation should examine links between group behavior and the personal traits and mannerisms of individuals facilitating decision meetings.

Effects Revealed By Source-Target Disaggregation

The comparably close quantities between the treatment environments of appropriation moves that constrained the structure (Type 6) and the disparity in the quantity of those appropriation moves between facilitators in restrictive treatment groups impelled me to delve further into the nature of the appropriation moves. Looking at the source and target of each appropriation move illuminated an aspect of that move that could not be seen from appropriation move counts. In particular, the nature of interactions in Type 6 moves, in terms of who interacted with whom, was quite different between the treatment environments, despite their similar move counts. Identifying the source and target reveled that, in the restrictive treatment groups, most Type 6 moves involved the facilitator directing use of a structure, whereas in the non-restrictive treatment groups, Type 6 moves typically involved group members interacting to define a structure's use. Identifying the source and target reveled that, in the restrictive treatment groups, most Type 6 moves involved the facilitator directing use of a structure, whereas in the non-restrictive treatment groups, Type 6 moves typically involved group members interacting to define a structure's use.

The examination of the source and target also proved valuable when considering the differences between facilitators. I denoted when each facilitator was involved in an interaction and whether he was the target or source of the interaction. Examining this aspect across particular types of appropriation moves revealed that, for the same type of appropriation move, groups behaved differently with each facilitator and that the facilitator's involvement in the interaction varied across treatments. None of this was apparent from examination of the appropriation move counts alone. Clearly, further appropriation research that includes the source and target of interactions in analysis is warranted. A categorization scheme could be developed to identify the source and target of interactions in combination with the DeSanctis and Poole (1994) types of appropriation moves. Such an elaborate scheme could provide deeper understanding of group process than can a log of appropriation moves.

Use Of The Appropriation Moves Typology

The scheme for categorizing appropriation moves presented in the original development of AST (DeSanctis and Poole, 1994) is a useful aid in organizing the process of studying appropriation. The scheme served as a set of sensitizing concepts (Bowen, 2006) that drew attention to aspects of social interaction important to recognizing appropriation moves. On my first viewing of the videotapes, the scheme served as a valuable interpretive device and a starting point for my observations of appropriation. On my second viewing of the videotapes, the scheme served as an effective tool for categorizing the observations from the first viewing and organizing them for further analysis.

Though the scheme was applied without modification, it was not done unproblematically. A difficulty in applying this or any other categorization scheme is that each researcher must interpret the definitions provided by

the creators of the scheme (Blumer, 1969). I occasionally had difficulty neatly fitting the observed behavior into a subtype and had to make some determinations that I was not completely comfortable with. Also, I could not tell whether I did not find any Type 4, enlargement, appropriation moves simply because none of this type occurred in the sessions or because I did not understand the meaning of this type of move well enough to recognize when one occurred. It is also important to note that my level of analysis was somewhat different from the one employed by DeSanctis and Poole (1994). Where I examined interaction events of appropriation moves in context, the original scheme was developed through keyword content analysis that looked only at the verbal dialogue of the participants. This difference in levels of observation appears to have made the scheme less conducive to the categorization of contextual factors of the interaction. For example, many of the events in which an appropriation took place often included multiple utterances that could each represent an appropriation move in the discrete-utterance-based DeSanctis and Poole (1994) method. I suggest future research revisit the categorization scheme with an eye towards developing an action-based scheme that allows for some level of contextual interpretation by the researcher.

Limitations

As does any laboratory study, this study had certain limitations. The participants were students with no prior experience in group decision techniques or GSS technology and had no stake in the group decision. While these features provided the homogeneous sample necessary for between-group comparisons, they also limit the applicability of the findings to real-world circumstances. Another limitation comes from the levels of restrictiveness of the treatments. The levels represented the extremes of the facilitative control spectrum and would be unrealistic in any real-world circumstances. It is also possible that the extreme differences in restrictiveness levels masked differences between the facilitators. It would be valuable to see the effects of less extreme restrictiveness, preferably at levels more reflective of what one might expect to encounter in real-world situations.

CONCLUSION

Despite of the limitations of this study, it has successfully opened the facilitation black box and augmented research by Limayem (2006), Dickson (1996) and Griffith (1998), and their colleagues. Limayem and colleagues had revealed that "black boxing" GSS by focusing on outcome variables ignores process as an important factor that ultimately impacts outcomes. I have shown that analysis of process reveals nuanced differences in factors that affect appropriation that would not have been apparent from an outcomes-based analysis. My study also complements the findings of Dickson et al. (1993) and Griffith et al. (1998) providing the evidence showing that individual facilitators can affect group process, even in a tightly-controlled facilitation environment.

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