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Predicting Group Output: Assessing the Relative Impacts of Task-Related Input and GSS Use

Danial Clapper
Clarkson University

Anne Massey
North Carolina State University

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Danial L. Clapper
Department of Management Information Systems
Clarkson University

Anne P. Massey
Department of Business Management
North Carolina State University

Abstract

Although GSS researchers recognize the importance of communication within the group in determining the final group output, little attention has been given to the information that the individual group members possess prior to the group activity as a basis for this communication. The purpose of this study was twofold: (1) to characterize the pre-group, task-related information that individuals possessed, and to (2) to examine the impact of a GSS, as a transformer, on the sampling of these inputs during the process of generating group outputs. Our results provide strong evidence for the importance of pre-group information in determining the group output. For the idea generating task used in this study, the effect of using a GSS was overwhelmed by the impact of the task-related information that group members possessed prior to the group activity.

1. INTRODUCTION

While empirical evidence has been found to support the hypothesis that Group Support Systems (GSS) can have a positive impact on group outcomes (George et al. 1990; McLeod 1992), exploring the nature of this impact is complicated by the seemingly endless number of variables which can contribute to these group outcomes. GSS researchers typically use an Input-Process-Output framework to help partition these variables (McLeod 1992; Kraemer and Pinsonneault 1990). In this context, Kraemer and Pinsonneault propose that because studies typically lack control over contextual input variables, many alternative explanations may exist for observed group (in)effectiveness. Massey and Clapper (1994) suggest that how individuals perceive or understand the task, prior to any group interaction, is a contextual input variable whose impact warrants exploration.

These individual perspectives and understandings of the task prior to group interaction represent the fundamental input resource available to the group. Weick and Meader (1993) suggest that how individuals frame problems — based on their initial knowledge and understanding of the problem — strongly influences their subsequent interactions with the group. However, while GSS researchers recognize that communication — the sharing of information among members — is a core group process activity (DeSanctis and Gallupe 1987; Huber 1984), to date little research has been focused on examining "what" is being communicated in terms of the input brought to a group session by individual members. So it seems that a better understanding of the information that individuals bring to a group, as well as how these input resources are utilized by the group, may be crucial to more fully understanding the role that a GSS may play.

The view of group communication as information sharing is related to the perspective that group interaction is a "sampling process." That is, discussion content is obtained from a pool of information that members collectively bring to a group meeting (Stasser and Titus 1985; 1987). These "pools" reflect aspects of mental models — beliefs and facts, information and knowledge — that individuals have concerning the task facing them (Langfield-Smith 1992; Johnson-Laird 1983). In this study, we will first attempt to capture these initial pools of information available to the groups and then explore their relative importance — in relation to GSS technology — in determining the group output.

2. GROUP OUTPUT FROM AN INFORMATION SAMPLING PERSPECTIVE

Underlying all conceptualizations of group effectiveness is the view that what information individuals have, and what information they share with others, is key to the success of the group. Shiflett (1979) proposes a general model that examines group performance in terms of *resources*, *transformers*, and *outputs*. Resources include information and knowledge that an individual or set of individuals have relevant to a particular task, i.e., the potential input.

Transformers are factors that arbitrate the way resources are utilized to produce group outputs. From this perspective, a GSS can be viewed as a transformer that can impact the way groups utilize their resources to arrive at a group output. It is possible that using a GSS will significantly impact how groups use their resources to generate output. It is also possible that these initial resources are such a significant factor in predicting the group output that any effect due to using a GSS is overwhelmed by the effect of these resources. Attempting to assess the relative importance of these two factors is the fundamental objective of this study.

The information sampling model of Stasser and Titus (1985, 1987) posits that discussion content is obtained from the pool of information, or resources, that members collectively bring to a group. Resources may be characterized as whether they are shared resources versus unshared resources (information unique to particular individuals) (Stasser and Titus 1985, 1987; Carley 1991). Thus, for example, in the context of an idea generation task, the output of the group reflects the ideas sampled from this pre-group collective pool. Some of these ideas may be ones that were unshared by individuals, while other ideas may have been shared.[1]

Empirical research has indicated that, in terms of discussion content, there exists a bias in favor of shared information. An item of information that is shared by group members is more likely to enter the group discussion than an unshared item (Stasser and Titus 1985; Stasser, Taylor and Hanna 1989; Carley 1991). Stasser and Titus refer to this as *biased sampling* and suggest that unshared information will be omitted from the group discussion. However, as Stasser and Titus observe, unshared information should be considered by the group as it may be critical to the quality of the group output. In the context of sensemaking, unshared information may be ultimately crucial to understanding the problem.

One approach to characterizing groups is to examine their initial collective pools of information and how this information is distributed between shared and unshared resources (Carley 1991). Understanding the nature of the input pools allows a more detailed level of analysis to explain the origins of the observed outputs of each group. More precisely, this understanding will enable us to identify the pieces of information which were, in fact, sampled during the group session — from both the shared and unshared portions of the pool — and what information was not used by the group to generate the group output.

3. RESEARCH MODEL

The model guiding the research presented in this paper is shown in Figure 1. For the purpose of this study, *resources* are defined as the pre-group *collective pool of elements* that a set of individuals identify as relevant to understanding the task. As shown in Figure 1, some of these elements are *shared* by two or more individuals that will make up a specific group. Other elements are *unshared*; that is, only unique individuals identify that element. The collective pool for each group is the union of shared and unshared elements. The union of all the collective pools reflects the *universe of elements* for a given population of participants as shown in Figure 1.

This study will use an ill-structured sensemaking task in which participants are instructed to generate elements that they feel are relevant to the ultimate understanding of the problem in the given situation. One of the earliest activities of sensemaking involves this divergent activity (Abualsamh, Carlin and McDaniel 1990; Evans 1991). The elements suggested during this early stage often reflect only pieces of perspectives that individuals have with regard to a situation (Greeno 1973). (For an in-depth discussion of sensemaking see Massey and Clapper, in press). The focus of this study is on the divergent activity of generating elements that individuals and groups perceive as relevant to understanding the problem situation.

The *transformer variable*, which will be explored is the GSS, is either present or absent for the groups involved. The main task related *output* is the group generated list of elements. By capturing what constitutes the initial collective pool, the group output may be partitioned into *sampled elements* and *original elements*, as shown in Figure 1. Sampled elements may be traced back to the pre-group collective pool and are either sampled from the shared or unshared portions of the pool. Those elements that were not previously identified in the pre-group collective pool, i.e., they were *unused* but were generated during the group session, are termed *original*. These original elements are, however, elements of the identified universe. Some of these original elements may reflect creative thinking, as members generate elements they had never thought of before. Others of these elements may reflect recall or accessing of deeper held elements from individuals that were not readily available without some stimulus, such as interaction with others. In fact, identification of original elements may reflect more accessing than ingenuity, as sensemaking is thought to be more closely aligned with understanding that creativity (Abualsamh, Carlin and McDaniel 1990). Figure 2 summarizes the mapping of elements from "input resources" to "outputs." The collective pools represent shared and unshared elements and the group outputs represent sampled and original elements.

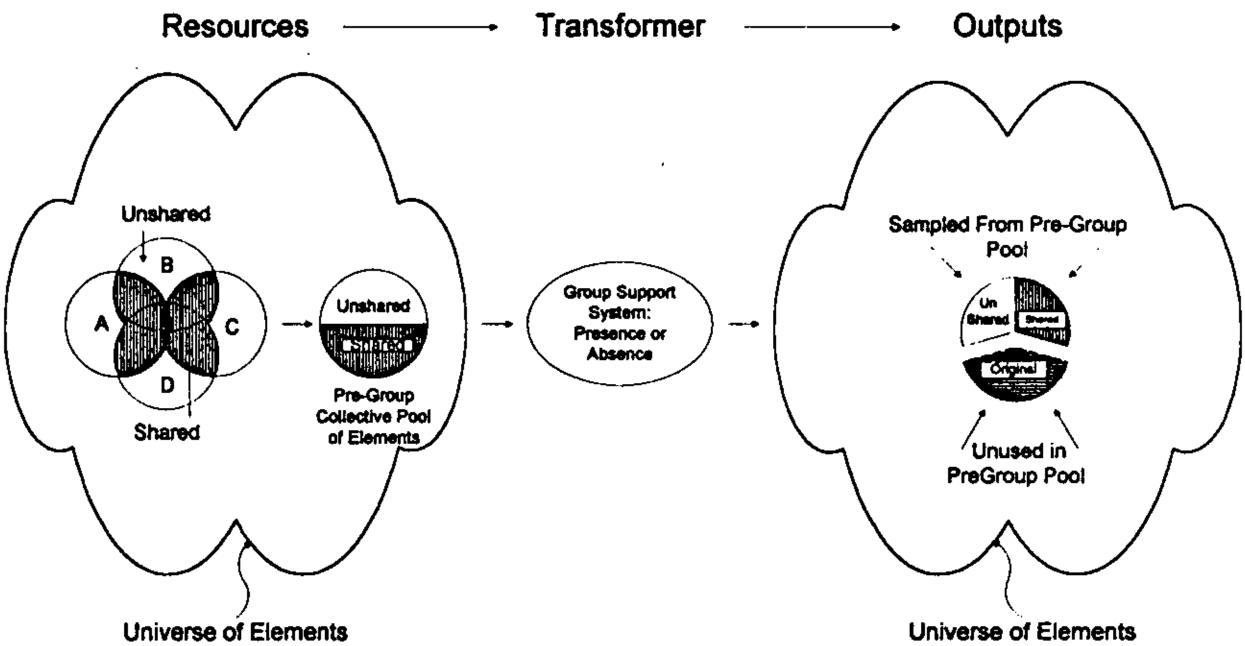

Figure 1. Research Model

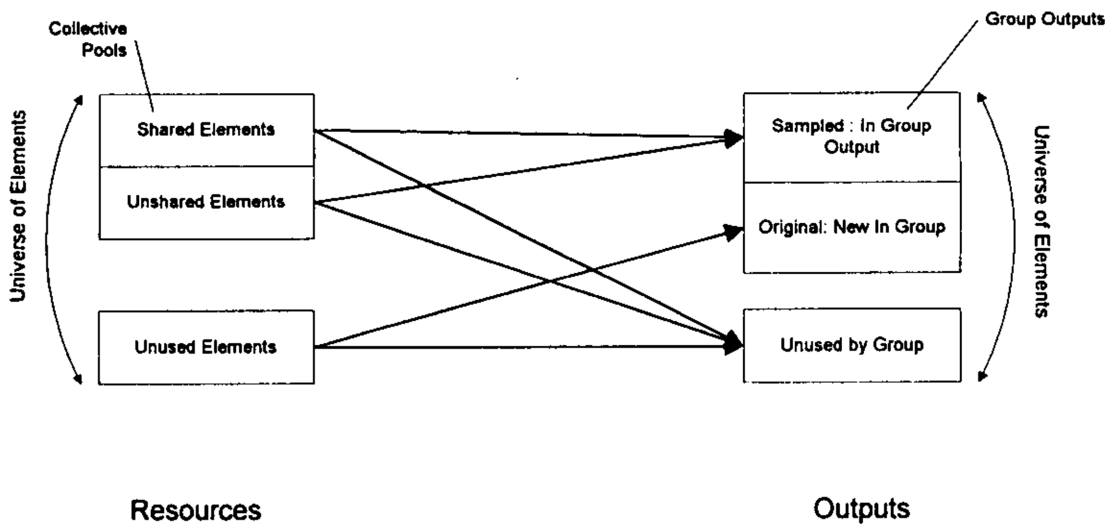

Figure 2. Element Characterization

4. HYPOTHESES

While it is a common practice to examine aggregated measures to determine the impact of GSS technology, in this paper we will take a finer look to illuminate the relative strengths of two key factors in the context of Shiflett's (1979) model of group process.

The first of these factors is the view of a GSS as a transformer. As shown in Figure 1, a GSS can be viewed as a technological implementation or embodiment of a number of transformer variables including anonymity, parallel input, and a leaner communication modality. Thus, in the context of Shiflett's model, when it is hypothesized that a GSS will positively impact the group output, it is those variables which mediate the translation of input resources to outputs. We can reframe this more specifically for the task at hand. The task for each group will be to generate as many elements as possible — without analysis or judgement — that are perceived to be relevant to understanding the problem situation. Therefore, it is expected that a GSS will increase the likelihood that a given element will be included in the group output.

The second key factor of Shiflett's model is the input resources of each group, i.e., their respective pre-group collective pools of elements. From this perspective, it is expected that an element's existence in the pre-group pool will increase the likelihood that it will be included in the group output.

While exploring the significance of a GSS on group output is obviously a standard approach in GSS literature, exploring the significance of the pre-group collective pool of elements is considerably more novel. Exploring the impact of both of these factors allows us to judge the relative impact of each, while concurrently exploring the possibility of an interaction between them.

Identifying the universe of elements and the collective pools within this universe for each group provides a very unique opportunity for exploring these factors and their potential relationship. By moving to the finest level of disaggregation, we can test the relative importance of these factors in terms of a predictive model which attempts to predict the likelihood that an element will be included in the group output. Thus, we would propose, for example, that if a GSS is to be a significant transformer in an element generating task for sensemaking, it must raise the probability that an element will be generated by a group as part of its final group output.

4.1 Limited Sampling Information About the Elements

In attempting to predict the inclusion of an element in the group output, it seems likely that the amount of information available concerning the element could be very important in this prediction. The focus of this paper is not on the nature of the element itself, i.e., what it is, but rather the element in relation to the pre-group collective pool. Thus, simply whether an element of the universe was in the collective pool or not, i.e., Used or Unused, is perhaps the minimal amount of information which can be used to assess the importance of this resource factor. Therefore, the first set of hypotheses are developed based on the assumption of this level of element information.

H1: **The information that an element was *Used* or *Unused* in the pre-group collective pool of elements for a group will be a significant predictor of that element being included in the group's output.**

H2: **Given that the only information available concerning an element is whether it was *Used* or *Unused* in the pre-group collective pool of elements for a group, use of a GSS will be a significant predictor of that element being included in the group's output.**

4.2 More Sampling Information About the Elements

Whether or not an element is in the pre-group collective pool reflects a minimal amount of information about the resources available to a group. What would appear to be an important additional item of information concerning a *Used* element is whether it is shared or unshared by the individuals that ultimately comprise a given group. Thus, for each group, we will characterize elements of the universe as falling into one of three categories: Shared, Unshared, or Unused. This reformulation leads to the following hypotheses:

H3: **The information that an element was *Shared, Unshared,* or *Unused* in the pre-group collective pool for a group will be a significant predictor of that element being included in the group's output.**

H4: **Given that the only information available concerning an element is whether it was *Shared, Unshared,* or *Unused* in the pre-group collective pool for a group, use of a GSS will be an significant predictor of that element being included in the group's output.**

5. METHOD

5.1 Experimental Setting

This study represents a further exploration of an experiment described in Massey and Clapper (in press). Seventy undergraduate students from a *Personal Wellness* course participated in the experiment. This course was designed for Freshmen, and covered topics such as sexuality, alcohol and drugs, and stress management. This class was chosen due to the relevancy and nature of the problem situation, described below. The experiment using this population was conducted with sixteen groups of four and two groups of three participants. Students were randomly assigned to groups. All students received course credit for participation in the experiment.

The GSS used was *VisionQuest* (Collaborative Technologies Corporation 1991). The Brainwriting module of *VisionQuest* provided the GSS equivalent of traditional brainstorming. Using this module, participants were able to anonymously submit ideas via a keyboard and then view the contributions of all the group members on a public screen on their individual monitors.

Given the objectives of the experiment, we felt that an ill-structured problem situation would provide the best means to test the hypotheses. Of utmost importance was the interest of the student participants and the potential for multiple perspectives. The problem situation developed was based on the issue of AIDS on college campuses. It was felt that this problem situation would be relevant to the student participants, allow for varying perspectives, have the potential to cause some degree of discomfort in sharing ideas, and be a topic with which the students would be relatively familiar. The problem situation, as presented to the participants, is shown in Appendix A.

At the scheduled sessions, participants were presented with the problem situation by their group coordinator. Participants first worked *individually* to develop their own list of elements that they felt were relevant to understanding the problem. This twenty minute activity gave the participants an opportunity to think about the situation and prepare for their group session. Additionally, these individually generated element lists would be used by the researchers to determine the collective pre-group pool of elements for each group and which elements were shared or unshared by members. After a short break, the individuals convened in their assigned group where they were instructed to brainstorm about the problem situation and generate elements they felt were relevant to the understanding the problem situation.

During group element generation, the participants were instructed to refrain from judging or discussing any of the elements. In the nontechnical session, the coordinator recorded elements on a flipchart at the front of the room. When a sheet was full, it was removed from the flipchart and taped to the board. In the technical session, individuals typed elements directly at their own computers and these were submitted anonymously to the public screens on each monitor. In both settings, fifteen minutes were allotted for element generation. At the end of fifteen minutes, the list was perused for obvious redundancies and, with the approval of the group, any redundant elements were deleted.

5.1 Coding

Comparisons of the lists of elements developed by the individuals and their respective groups (during the process of element generating) required a "standardization" of the "language" used by the individuals and groups. Thus, a coding dictionary was developed and each of the seventy individually and eighteen group generated element lists were re-coded. The dictionary is presented in Appendix B. The coding dictionary represents six major categories in which generated elements would be categorized. Within each category, specific concept or elements are identified. For each element that was re-coded, it was assigned an identifier from this dictionary. For example, if an element was re-coded as "C9" this represented "Fear of being tested" as shown in the dictionary. This coding dictionary represents the totality of elements for the population of students involved in this experiment. Thus, we can think of the dictionary as representing the universe of elements for these participants. A description of the development of the coding dictionary and the re-coding process can be found in Massey and Clapper (in press).

5.2 Identifying Element Attributes

Software was used to compare these re-coded lists (development based on Carley 1986; Massey 1991). The software identifies similarities (intersections) and dissimilarities (complements) between "*k*" lists of elements. For this research, the outputs of the software were used to identify which elements were, in the pre-group collective pool of elements, *shared* by two or more individuals or *unshared*, i.e., only one individual had generated a particular element. Additionally, the software was used to compare the pre-group collective pool of elements (for each group) to the respective group generated list of elements. These comparisons indicated which elements were *sampled or not*, and which elements were newly identified by the group, i.e., "*original*."

For illustrative purposes, Figure 3 presents the comparison output for Group #10, one of the two groups that consisted of three individuals. This representation illustrates that Individual A had three elements (B4, C3, E6) **shared** with Individual B; zero elements **shared** with Individual C; one element **shared** with both Individuals B and C (B1); and four elements that were found **only** in Individual A's list (A2, B9, C6, E1), i.e., **unshared**. The UNION of all three individually generated lists yielded eighteen elements that were potentially available to be sampled from by the group, i.e., the "collective pool." Thus, for each pre-group collective pool, every element is identifiable as *shared* or *unshared*.

Using the software described above, for each respective group the pre-group collective pool was compared to the group generated list of elements. To illustrate, the results of Group #10 are also shown in Figure 3. In their session, Group #10 generated ten elements: seven sampled from the pre-group collective pool and three original elements (B2, B7, F0). Of those seven that were sampled, three (B1, C3, E6) are traced to shared elements and four (A1, B6, C1, E5) are traced to unshared elements in the pre-group collective pool.

6. RESULTS

Using Ordinary Least Squares techniques for data with a categorical dependent measure suffers from a number of problems (Neter, Wasserman and Kutner 1985). An alternative approach is Logit analysis. The term "Logit" is derived from "log odds ratio." The odds ratio represents the ratio of the probability of one output to the probability of another output. In our case, it is the ratio of the probability of an element showing up in the group output to the probability of the element not showing up in the group output. The log of this ratio is used in the Logit approach (rather than the ratio itself) to put the model in a linear form, which then lends itself to calculating Maximum Likelihood estimators. The *SAS* (SAS User's Guide 1985) CATMOD procedure was used to generate these parameter estimates.

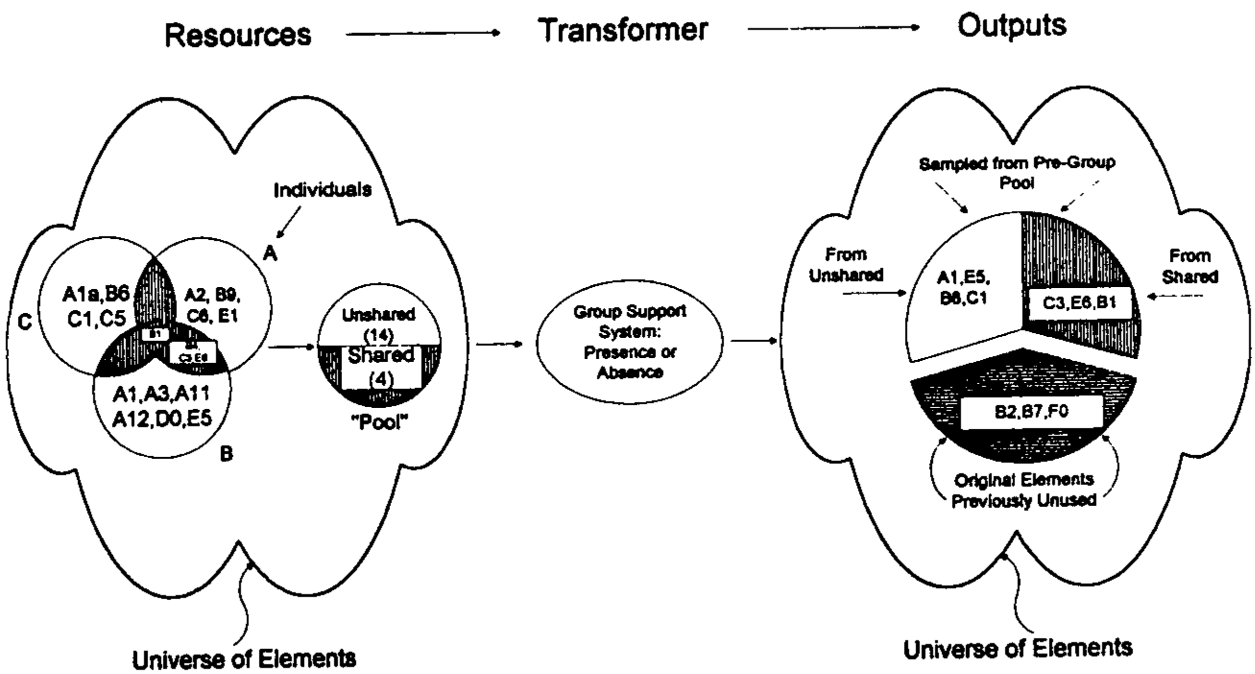

Figure 3. Group Illustration 10

6.1 Limited Sampling Information Hypotheses

Table 1 shows the observed frequencies based on the categorization of elements as *Used* or *Unused* in the pre-group collective pools. For example, the table indicates that for groups that used a GSS, 104 elements that were ***Used*** in the pre-group pools were sampled and included in the group outputs. Only 62 elements that had been ***Unused*** in the pre-group pools made it into the group outputs, where they were termed "original." Figure 4, based on the frequencies in Table 1, illustrates the mapping of "inputs" to "outputs" for both the GSS and Manual groups.

For the Logit approach used in this study, the transformed dependent measure is the log of the ratio of the probability that an element *does show up* in the group output to the probability that an element *does NOT show* up in the group output. This log ratio is computed for each combination of levels of the independent variables and allows us to examine their relative significance in predicting an element's inclusion in the group output.

The first step in examining the significance of the independent variables is to build a "Saturated" Logit model (Demaris 1992). The saturated model is simply one that includes all the independent variables and all possible interactions among those variables. In this model, there are only two independent variables: *Use of a GSS* and *Existence in Pre-Group Collective Pool.* Hence, there exists only one interaction term representing the interaction between these two variables. The results from this saturated model are shown in Table 2.

After estimating the saturated model the next step is to drop the effects that are not significant and re-estimate a "parsimonious model." Based on Table 2, it is clear that the interaction term is not significant and can be dropped from the model. It is less clear what should be done with the *GSS* variable. Although it is not significant at the .05 level, it is close ($p = 0.07$) and perhaps re-estimated in the parsimonious model it might turn out to be significant. To explore this possibility, it was included in the parsimonious model. The results of re-estimating the parsimonious model are shown in Table 3.

As in the saturated model, the effect of an element's membership in the pre-group collective pool is highly significant ($p < 0.0001$). The next question is whether the direction of the effect is as expected, which would be that the existence in the pre-group pool would make it **more** likely that an element would show up in the group output (not less likely). The predicted odds of showing up in the group output (as opposed to not showing up there) can be calculated from the estimated logit model parameters. These calculations yield the following odds: 0.20 for Unused elements in GSS groups; 0.15 for Unused elements in Manual groups; 1.37 for Used elements in GSS groups; 1.02 for Used elements in Manual groups. These odds are shown graphically in Figure 5.

As can be seen, the predicted odds for showing up in the group output are higher for both GSS and Manual groups if the element was Used in the pre-group pool. Based on the predicted odds, it is 6.7 times more likely that an element will show up in the group output if it existed in the pre-group pool than if it did not exist in the pre-group pool. Thus, the direction of the effect is the same as hypothesized and therefore **Hypothesis H1 is supported.**

Table 1. Observed Frequencies Based on Limited Information About Elements

		In Group Output		Not in Group Output	
		GSS	Manual	GSS	Manual
Pre-Group Status of Element	Used	104	72	79	67
	Unused	62	37	295	256

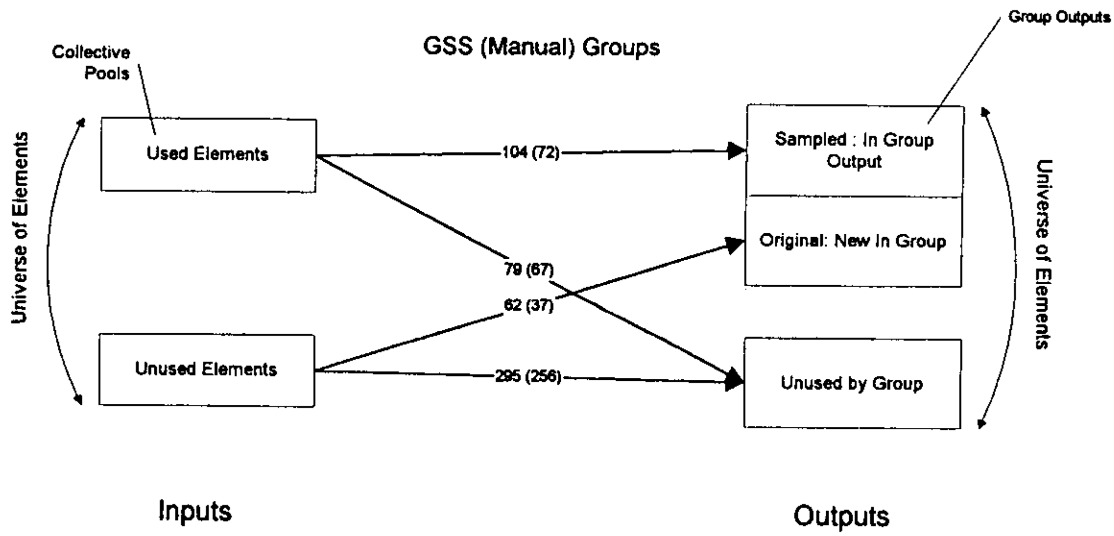

Figure 4. Mapping of Inputs to Outputs: Limited Information

Table 2. Saturated Logit Model Based on Limited Information About Elements

Source	df	Chi-Square	p-value
Existence in Pre-Group Pool	1	145.30	P < 0.001
Use of GSS	1	3.28	0.0700
Existence in Pre-Group Pool * Use of GSS	1	0.29	0.5905

Table 3. Parsimonious Model with Parameter Estimates

Effect	Parameter	Estimate	Chi-Square	p-value
Existence in Pre-Group Pool			147.83	$p < 0.0001$
	Used	0.9530		
	Unused	-0.9530		
Use of GSS			3.32	0.0682
	GSS	0.1448		
	Manual	-0.1448		

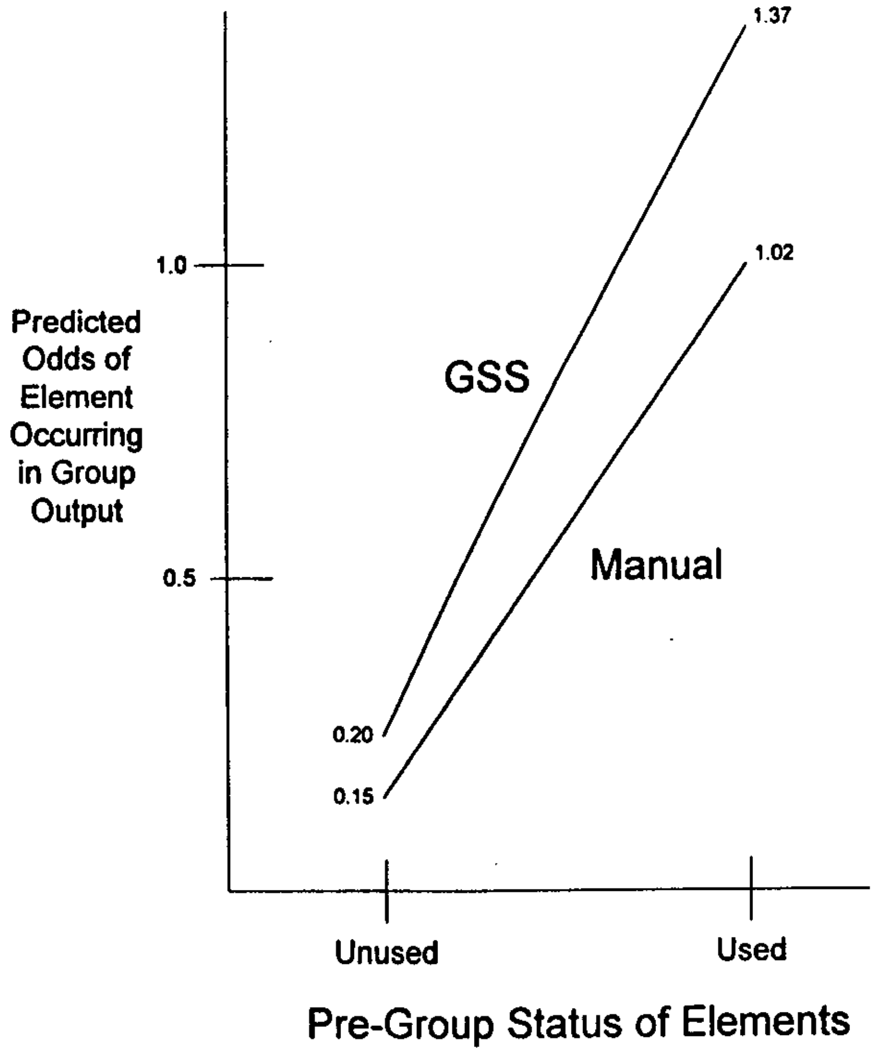

Figure 5. Predicted Odds Based on Limited Sampling Information

Table 4. Observed Frequencies Based on More Information About Elements

		In Group Output		Not in Group Output	
		GSS	Manual	GSS	Manual
Pre-Group Pool Status	Shared	31	26	14	12
	Unshared	73	46	65	55
	Unused	62	37	395	256

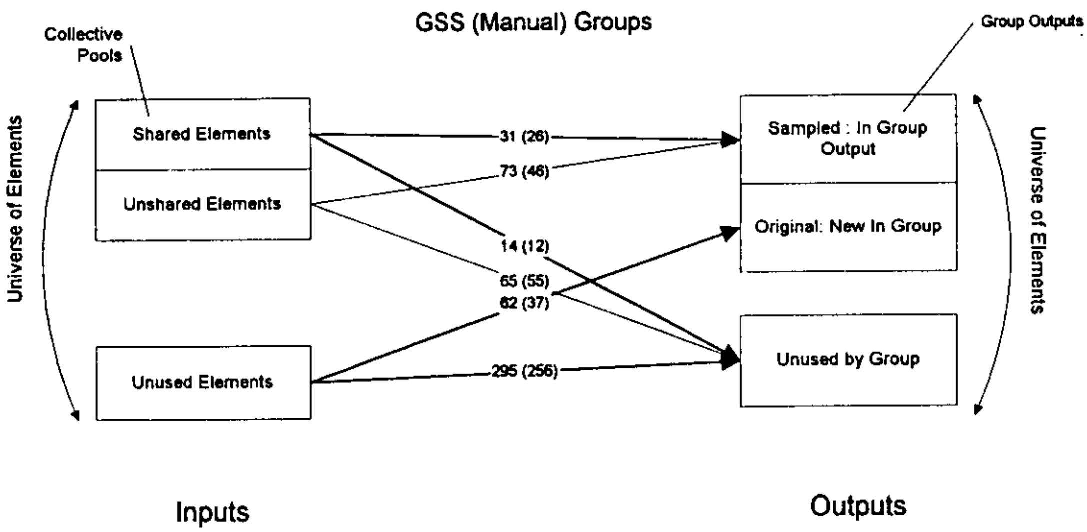

Figure 6. Mapping of Inputs to Outputs: More Information

As in the saturated model, the GSS effect remains non-significant at the .05 level. Therefore, **Hypothesis H2 is not supported** at the .05 level of significance. Although the GSS effect was not significant at the .05 level, it is interesting to note that the direction of influence was in the direction hypothesized. The predicted odds are 1.3 times greater for an element showing up in the group output if a GSS was used than if it was not.

6.2 More Sampling Information Hypotheses

Table 4 shows the observed frequencies of the data reorganized based on more information about the nature of the elements in the pre-group collective pools. For this set of hypotheses, we are using more information about the pre-group pools than simply whether an element was in a pre-group pool or not. Here, we include information as to whether an element was shared or unshared by individuals prior to the group session. This information is shown in the three rows of Table 4: Shared, Unshared and Unused. As described previously, an unused element is one that was not identified in the pre-group collective pool for a given group. Figure 6, based on the frequencies in Table 4, illustrates the mapping of "inputs" to "outputs" for the GSS and Manual groups.

With this new set of hypotheses it is again necessary to begin with estimating a saturated logit model for the new categorization of the data based on the additional information about the pre-group pools. The results of the saturated model are shown in Table 5. The impact of the technology, which was close to being significant with the first set of hypotheses, is not close in this model (p = 0.2394). Therefore, **Hypothesis H4 is not supported**. The interaction effect between technology and existence in the pre-group pool is also not significant, so it will not be included in the parsimonious model. As was the case with the first set of hypotheses, the *Existence in the Pre-group Collective Pool* is highly significant and therefore it will be the only variable in the parsimonious model.

Table 5. Saturated Logit Model Based on More Information About Elements

Source	df	Chi-Square	p-value
Existence in Pre-Group Pool	2	149.84	$p < 0.001$
Use of GSS	1	1.38	0.2394
Existence in Pre-Group Pool * Use of GSS	2	0.45	0.7974

Table 6. Parsimonious Model with Parameter Estimates

Effect	Parameter	Estimate	Chi-Square	p-value
Existence in Pre-Group Pool			152.81	$p < 0.0001$
	Shared	1.0983		
	Unshared	0.3050		
	Unused	-1.4033		
	GSS	0.1448		
	Manual	-0.1448		

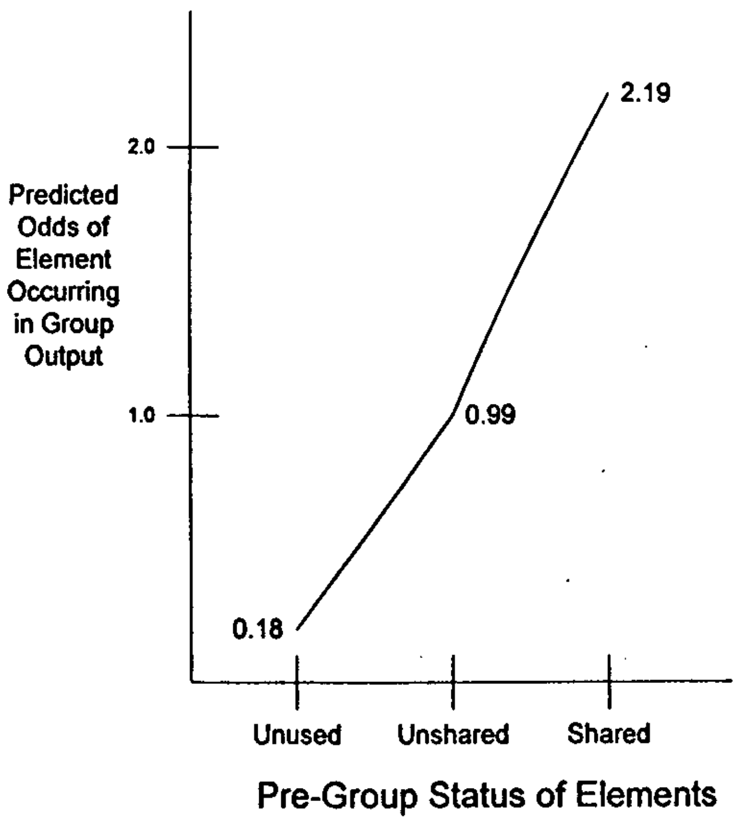

Figure 7. Predicted Odds Based on More Sampling Information

Table 7. Summary of Hypothesis Testing Results

Hypothesis	Result
H1: The Information that an element was used or unused in the pre-group collective pool of elements will be a significant predictor of that element being included in the final group output.	SUPPORTED
H2: Given that the only information available concerning an element is whether it was used or unused in the pre-group collective pool of elements use of a GSS will be a significant predictor of that element being included in the final group output.	NOT SUPPORTED
H3: The information that an element was shared, unshared or unused in the pre-group collective pool will be a significant predictor of that element being included in the final group output.	SUPPORTED
H4: Given that the only information available concerning an element is whether it was shared, unshared, or unused in the pre-group collective pool, use of a GSS will be a significant predictor of that element being included in the final output.	NOT SUPPORTED

The parameter estimates for the parsimonious model are shown in Table 6. The next step in testing hypothesis H3 is to examine the direction of the influence. This yields the following predicted odds of showing up in the group output: 2.19 for Shared, 0.99 for Unshared and 0.18 for Unused. The odds are shown graphically in Figure 7. Computing the ratios of these odds yields that it is 12.2 times more likely for an element to appear in the group output if it was a Shared element than if it was an Unused element, and 5.5 times more likely that an element would appear in the group output if it was Unshared element than if it was an Unused element. Also, it is 2.2 times more likely for a Shared element verses an Unshared element. These are the directions expected for this effect, therefore **Hypothesis H3 is supported.**

The results of the hypothesis testing are summarized in Table 7.

7. DISCUSSION

While examining the impact of a GSS on group output is a well documented approach in the literature, examining the importance and nature of the input resources is not. Notable exceptions include recent work by Weisband (1995) and Dennis (1993). However, a key difference between the work presented in this paper and that of Weisband and of Dennis is that we did not pre-define the information available to the participants (the universe of elements), nor manipulate the distribution of shared and unshared information between participants. Rather, we have taken a representative brainstorming experiment and conducted a detailed analysis of the inputs and outputs.

To facilitate this analysis we used a somewhat novel statistical methodology: Logit analysis. This approach allowed us to build models that generated predicted odds for an element occurring in the group output given different combinations of resources and transformers. Logit was particularly well suited for our exploration for a number of reasons: (1) the dependent variable was dichotomous (either it occurred in the group output or it did not); (2) the independent variables were categorical; (3) it allowed the simultaneous significance testing of all of the independent variables; (4) it allowed the effect of any independent variable to be interpreted in terms of the likelihood that it would lead to an element occurring in the group output; and (5) it allowed the direction of the effect to be examined (i.e., did the effect make it **more** likely or **less** likely that an element would occur in the group output).

Using the Logit approach we constructed models to examine the effect of two different levels of information about the pre-group pool of information. In the least information scenario, the effect of the input was highly significant ($p < 0.0001$) and the effect of the GSS was marginally significant, although not at the 0.05 level ($p = 0.068$). The directions of both of the effects were in the direction expected: its existence in the pre-group pool and the use of GSS both increased the likelihood that an element would occur in the group output. In the more information scenario, the effect of the input was still highly significant ($p < 0.0001$) while the effect of the GSS was no longer even marginally significant ($p = 0.2394$). This model generated predicted odds that an element was 12.2 times more likely to occur in the group output if it was shared by more than one person in the pre-group pool than if it was not in the pre-group pool.

These results provide strong evidence for the importance of understanding the nature of the task-related information that individuals bring to the group as opposed to knowing solely if a GSS was used or not. As demonstrated in this study, gaining some understanding of the information that is potentially available to the group provides the means for a richer assessment of whether a GSS is contributing to information sharing. However, it is important not to over-generalize these results. The task was a narrowly focused, idea generation exercise in the early stages of the problem solving process. Whether these effects would also hold for later stages of the process can not be determined based on this experiment. At the very least, these results demonstrate that — for at least at one stage of the problem solving process — any effect due to a GSS can be overwhelmed by the impact of the task-related information that group members possess prior to working together as a group.

7. REFERENCES

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8. ENDNOTES

1. For the exploration conducted in this study, we define shared information as being known by two or more individuals.

APPENDIX A

PROBLEM SITUATION

College administrators across the country have become increasingly concerned with the rising number of college age students infected with the AIDS virus. It is estimated that one in 500 college students is HIV positive.

The administration at the University has requested that a task force be formed to address this issue and formulate a comprehensive program. However, a variety of attempts here and at other universities have met with limited success, partially due to the lack of student input. I am going to read a portion of a letter sent to a campus newspaper by a student at a major university. This letter was shared, by that university's president, at a national meeting of higher education administrators.

The letter read as follows:

> The doctor said he wasn't trying to scare me. It seemed like a lifetime had passed by since he had said, "You've tested positive for HIV, the AIDS virus." How could I...how could I not be scared? My mind keeps saying, "The test has to be wrong." Four tests now; it isn't wrong. I have become a victim. I am only 19. It is hard to face people and know they are thinking, "I'm glad I'm not you." I use to think that too, when I watched the news stories and heard about people like Magic Johnson and Kimberly Begalis. I've told my friends; I've told them to be careful, but I know they're not. I wish I had been.

This letter has prompted discussions among students, parents, faculty-staff, administrators, and community action groups at many colleges and universities across the country. It was the driving force for the creation of this task force. The question that is being addressed is why is there such a difference between "what students know" and "what students do." At many institutions, most programs have focused on AIDS awareness seminars, advertisements in student newspapers, the installation of condom machines in dormitories, and free HIV testing. Many campuses openly discuss with students "risky behavior." However, apparently none of these programs have effected large scale changes in behavior among our college students.

APPENDIX B

Dictionary		
Category	**Elements**	
A. AIDS Education	A1.	Awareness/knowledge about AIDS
	A1a.	Ignorance; lack of knowledge/awareness
	A1b.	SexEd in school; teacher/student involvement
	A2.	People with AIDS as speakers; famous people
	A3.	Seminars/classes on AIDS/HIV
	A4.	Counselors/hotlines
	A6.	Printed information; pamphlets; articles
	A7.	Advertisements: radio, television, posters
	A8.	Parental/family involvement
	A9.	Religious values
	A11.	Need for new programs
	A12.	Shock value/advertising scare tactics
B. Human Sexuality & Behavioral Issues	B0.	Change behavior of people
	B1.	Drugs, alcohol impair judgment; bars, parties
	B2.	Casual Sex; risky/unprotected sex; impulsive
	B4.	Sexual needs, desires, awakening
	B6.	Discussing sexual history/AIDS with partner
	B7.	Morality/immorality; beliefs, values
	B8.	Freedom from parents and authority
	B9.	Monogamy/longterm partner
C. Personal Issues	C1.	Immortality: "IT won't happen to me"
	C2.	Don't know anyone with AIDS
	C3.	Probability of contraction
	C4.	Peer pressure/stress/bad role models
	C5.	Apathy
	C6.	Accepting responsibility for actions
	C7.	Ignore warnings/information
	C8.	Boredom
	C9.	Fear of being tested
	C10.	Fear of contraction
	C11.	Don't know HIV status
	C12.	Fear of infecting someone else
C. Modes of Contraction	D1.	Homosexual sex
	D2.	Heterosexual sex
	D3.	Needle sharing by drug users
	D4.	Blood transfusion
	D5.	Rape
E. AIDS Prevention	E1.	Safe sex
	E2.	Abstinence
	E3.	Condom availability: location, price
	E3a.	Embarrassed to buy condoms
	E4.	Condoms use: not spontaneous sex
	E5.	Pill/pregnancy prevention not a protection
	E6.	Availability of testing

Dictionary		
F. HIV/AIDS Issues	F0.	Living with AIDS
	F1.	Inaccurate information; always changing
	F2.	Confidentiality of testing
	F3.	Society's reaction to AIDS/HIV
	F4.	Discrimination/assumptions about PWA
	F5.	Blame "high-risk" groups
	F5a.	AIDS doesn't discriminate
	F6.	Rights of PWA versus rights of society
	F7.	Symptoms
	F8.	Latency of HIV and AIDS
	F9.	Medical treatment/research/cure