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# **A PROCESS STUDY OF EFFECTS OF GSS AND TASK TYPE ON INFORMATIONAL AND NORMATIVE INFLUENCE IN SMALL GROUPS**

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## **ABSTRACT**

This research examines the effects of GSS and task type on informational and normative influence in small groups by analyzing group process. It extends Kaplan and Miller's research on task type and informational and normative influence in small groups in an unsupported setting to a GSS setting. The two tasks used are an intellectual task and a preference task, and the two support levels are unsupported baseline and GSS support. The findings show that (1) the mode of influence that predominates in group discussion depends on task type, but the degree of dominance is moderated by support level, and (2) GSS has the potential to encourage the use of informational influence in intellectual task groups and discourage the use of normative influence in preference task groups. These findings suggest that task type may have significant effects on influence behavior in small groups and a GSS may have some beneficial effects for certain task types but not for others. The paper concludes with some suggestions for further research.

## **1. INTRODUCTION**

Groups are the instrument through which much work gets done in modern organizations and societies (McGrath 1984). It is accepted that groups as decision makers are essential in organizations, but group work is often unproductive (Jessup and Valacich 1992). Group Support System (GSS) has been suggested as a solution to this problem and much research on GSS has been conducted in the last two decades.

In general, there is a high degree of agreement among GSS researchers that the effects of GSS on group outcomes are contingent on a myriad of group, task, context, and technology factors that differ from situation to situation (Mennecke, Hoffer and Wynne 1992; Nunamaker et al. 1991; Pinsonneault and Kraemer 1990), and that group outcomes are contingent on group interaction process (Nunamaker et al. 1991; Ziguers, Poole and DeSanctis 1988). During group interaction process, group members communicate, share information, organize and generate ideas, draft policies and procedures, share a vision, build consensus, generate decision outcomes, and collaborate in writing reports. Hence, it is important for GSS researchers to examine the

group process, which has been regarded as a black box in most previous empirical GSS research.

Researchers in social psychology attempted to open this black box from the social influences perspective in the 1950s. Deutsch and Gerard (1955) analyzed influence behavior in groups and identified two main components of influence: informational influence and normative influence. Informational influence is based on acceptance of information from others as evidence about reality and normative influence is based on the desire to conform to the expectations of other group members. It is likely that informational and normative influence operate on group members simultaneously, although to varying degrees. Informational and normative influence are among the main factors that affect group interaction and cause choice shifts during group process. Hence, the study of informational and normative influence has been an issue of long-standing interest in group research (Brown 1965; Burnstein and Santis 1981; Burnstein and Vinokur 1973; Clapper, McLean and Watson 1991; Kaplan and Miller 1987).

Kaplan and Miller (1987) conducted an empirical study of effect of task type on informational and normative influence

in unsupported groups. They used an intellectual task and a judgmental task and adopted two decision rules, unanimous decision and majority decision. They audio recorded the group sessions and later coded and analyzed the discussions for informational and normative influence. Their main findings are: (1) informational influence is predominant in intellectual task groups, (2) normative influence is predominant in preference task groups, and (3) the effect of task type was stronger under unanimous decision than under majority decision.

Introduction of a GSS into a group meeting alters the communication configuration available to members and causes a fundamental change in the information exchange process in a group. Therefore, much of what has been learned about group process and influence behavior in unsupported settings needs to be re-examined in a GSS setting. Clapper and McLean (1990) suggest that GSS intervention in group process can be studied in terms of communication networks, communication modalities, and communication strategies (Figure 1). They use this model to study the effects of three different communication modalities offered by GSS on normative influence in small groups.

This research extends the Kaplan and Miller research on the effect of task type on informational and normative influence in small groups to a GSS environment. By doing this, it also extends the study of Clapper, McLean and Watson (1991) to include the overall effects of communication networks, modalities, and strategies introduced by a GSS on both informational and normative influence in small groups. In short, this research studies the effects of GSS and task type on informational and normative influence in small groups by using interaction analysis of group process.

## **2. CONCEPTUAL FOUNDATIONS AND HYPOTHESES**

The conceptual foundations of this research for analyzing the effects of GSS on influence behavior are derived from the Clapper and McLean model (Figure 1). Moreover, it is based on the prior research by Kaplan and Miller (1987), McGrath (1984), Poole, Siebold and McPhee (1985), and Shaw (1964) to study the effects of task type on influence behavior in groups.

### **2.1 Effects of GSS**

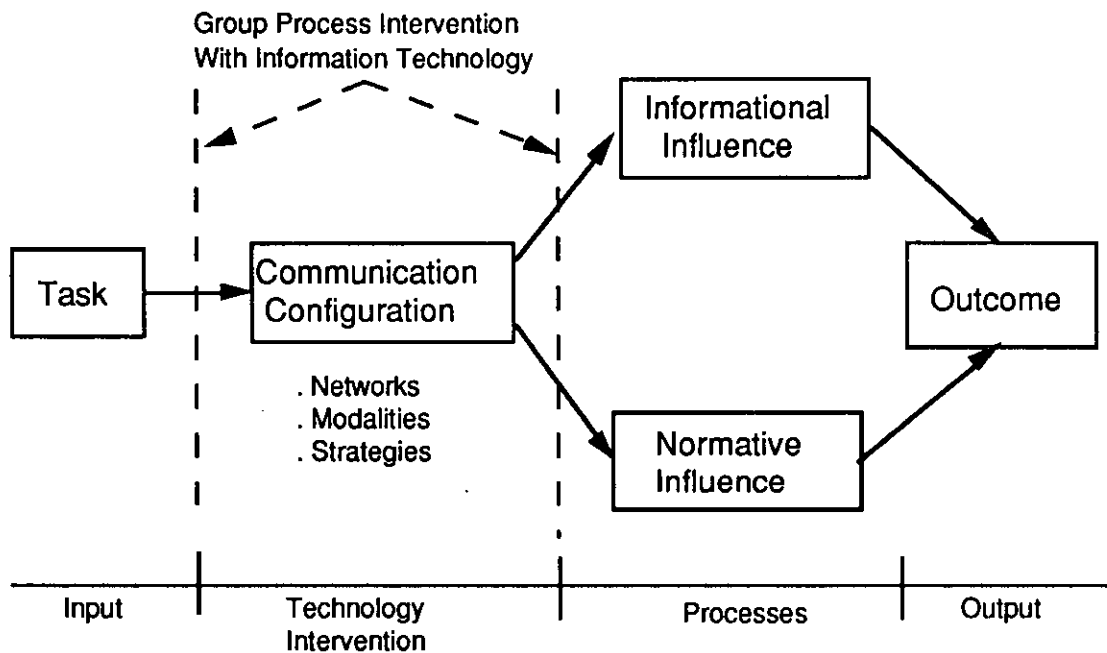
According to the Clapper and McLean model, the three dimensions of communication configuration (communication networks, communication modalities, and communica-

tion strategies) represent the mechanisms by which GSS can be used to intervene in the influence processes of a group.

Communication networks represent fixed, specific patterns of communication among group members. Leavitt (1951) identified four types of communication networks in groups: circle, wheel, chain, and Y. In a circle network, each group member is on an equal footing with every other member, in terms of communication access. In a wheel network, a central hub has access to all other positions whereas all other positions must go through the hub. An unsupported group environment (baseline groups) is close to a circle pattern. In a GSS environment (GSS groups), the public screen becomes the hub of information exchange and the communication pattern in GSS groups is closer to the wheel pattern. According to Leavitt, the circle pattern encourages social behavior whereas the wheel pattern supports rational behavior. Since informational influence corresponds to rational man and normative influence corresponds to social man (Clapper, McLean and Watson 1991), the communication network in GSS groups supports informational influence but not normative influence.

Communication modality is a broad term. Weeks and Chapanis (1976) define telecommunication mode as the amalgam of methods and devices that may be used to convey information in a particular communication situation. A rich communication medium such as unhindered face-to-face communication in baseline groups emphasizes the social content of messages. A leaner medium, such as the one mediated by a GSS electronic communication channel, has a tendency to remove social cues and lessen the power of personal persuasion (Williams 1977). This means that the changes in communication modality caused by a GSS also enhance the use of informational influence and reduce the use of normative influence.

Communication strategies are the rules and procedures followed in group meetings. In GSS groups, these include both the rules and procedures built into GSS which structure group deliberations and rules for the use of the system. Two widely used GSSs in research are GroupSystems and SAMM. The electronic brainstorming feature of GroupSystems uses anonymity to mask status differentials and lessen the fear of evaluation. These are nonrational influences which can constrain a member's participation (Dennis et al. 1988). SAMM uses a structured agenda to lead groups systematically through a rational sequence of decision phases (DeSanctis, Sambamurthy and Watson 1987). Therefore, communication strategies introduced by GSS tend to increase the use of informational influence and limit the use of normative influence.



**Figure 1. Group Process Intervention Using Information Technology**

In summary, introduction of GSS tends to amplify informational influence and attenuate normative influence in groups.

## 2.2 Effects of Task Type

Task type is another important factor that affects informational and normative influence in groups. Although different communication networks can cause major differences in influence behavior, the direction of these differences depends on the type of task assigned to the group (Shaw 1964). Research has shown that task type contributes up to 50% of variations in group process and outcome (Poole, Siebold and McPhee 1985).

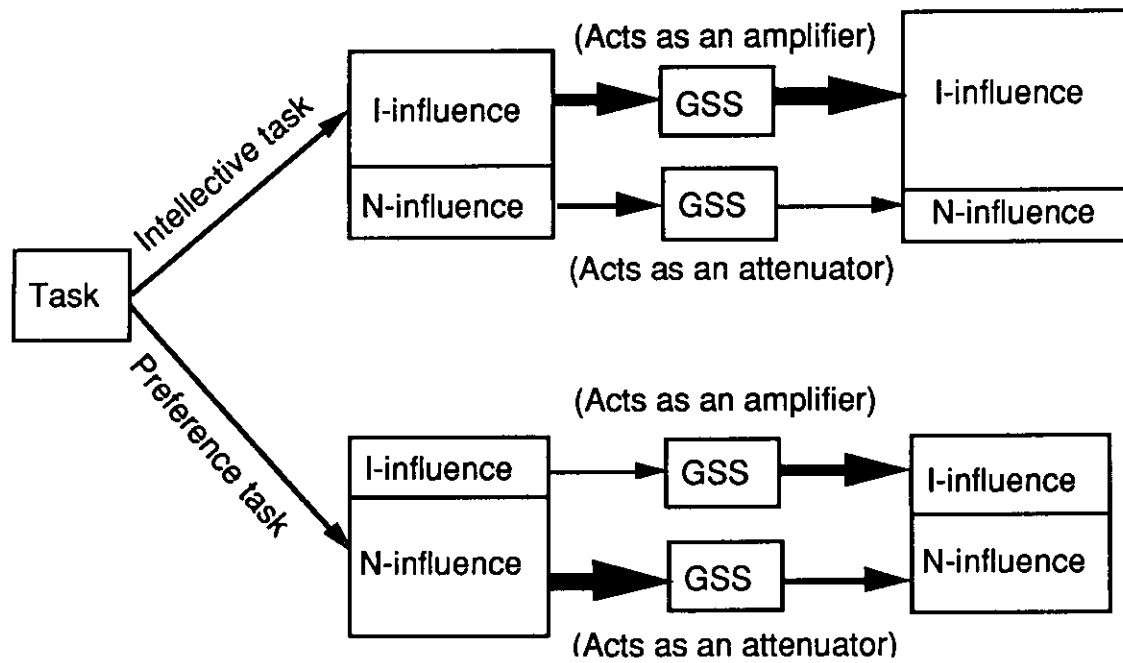
Two tasks, an intellective task and a preference task, are chosen for this research. In an unsupported environment (baseline groups), informational influence dominates in groups performing an intellective task and normative influence dominates in groups performing a preference task (Kaplan and Miller 1987). When a GSS is introduced (GSS groups) in intellective task groups, the amplifying effect of GSS is likely to enhance the dominance of informational influence. On the other hand, in GSS groups performing a preference task, the attenuating effect of GSS will reduce the degree of dominance of normative influence. However, there is no evidence to support that GSS

attenuates normative influence so sharply that informational influence becomes dominant in preference task groups. Therefore, we posit that normative influence still dominates in GSS groups performing a preference task, but the degree of dominance will be reduced by GSS.

The amplifying and attenuating effects of GSS are illustrated in Figure 2.

## 2.3 Hypotheses

The purpose of this research is to extend the Kaplan and Miller study to a GSS setting. An interaction effect between support level and task type will not be predicted, because there was not an interaction effect in the Kaplan and Miller study and there is also a lack of strong theoretical foundations to predict it. Instead, ANOVA test is used to detect the interaction effects. Further, the intervention of GSS generates the amplifying and attenuating effects as illustrated in Figure 2. Hence, the three issues need to be confirmed: (1) Kaplan and Miller's findings in an unsupported setting because replication of empirical studies is important for validating existing theories and findings (Gray 1987); (2) Kaplan and Miller's findings into a GSS setting; and (3) the amplifying and attenuating effects of GSS for the two task types. These three issues lead to the following hypotheses:



**Figure 2. GSS Intervention on I-influence and N-influence**  
(Legend: I-influence — Informational influence, N-influence — Normative influence)

#### For Intellective Task:

- H1a Informational influence will predominate the interaction process in both baseline and GSS groups performing an intellective task.
- H1b GSS will amplify informational influence in GSS groups performing an intellective task, relative to baseline groups.
- H1c GSS will attenuate normative influence in GSS groups performing an intellective task, relative to baseline groups.

#### For Preference Task:

- H2a Normative influence will predominate the interaction process in both baseline and GSS groups performing a preference task.
- H2b GSS will attenuate normative influence in GSS groups performing a preference task, relative to baseline groups.
- H2c GSS will amplify informational influence in GSS groups performing a preference task, relative to baseline groups.

### 3. RESEARCH METHODOLOGY

#### 3.1 Research Design and Setting

The experiment is a two-by-two factorial design of support level and task type. The independent variables are support level (GSS supported groups and unsupported baseline groups) and task type (an intellective task and a preference task). The dependent variables are amount of informational influence behavior and amount of normative influence behavior. A group size of five was chosen because the average number of participants in an organizational meeting is five persons (*Datamation* 1986).

The baseline groups received no decision aid at all. They were allowed to interact freely during the meeting. The GSS groups received assistance in the form of an agenda built into the GSS used as well as electronic communication capabilities provided by the GSS. The GSS groups were required to follow the agenda and to display information on the public screen during the meeting. They could also communicate using the electronic communication capabilities.

The GSS used in this experiment is SAMM (Software Aided Meeting Management System, version 1.4), which was developed by University of Minnesota (DeSanctis,

Sambamurthy and Watson 1987). It was run on an AT&T 3B2-4000 minicomputer under Unix operating system. Five private terminals were connected with a separate public terminal that was attached to a Barco projector. The projector displayed all messages appearing on the public terminal onto a large public screen.

A total of 160 students at the National University of Singapore participated in the experiment. They were randomly assigned to thirty-two groups of five members each. The average age of the chosen students was 20 and they had worked in groups before. The students were course mates and were given course credit for participation in the experiment.

### 3.2 Task Type

The two tasks used in this study are an intellectual task and a preference task. The two tasks were chosen according to the task continuum proposed by Davis, Laughlin and Komorita (1976). The same continuum was used by Kaplan and Miller (1987). The intellectual task locates at one end of the continuum, for which there are, or are considered to be, demonstrably correct answers. The preference task locates at the other end of the continuum, which involves behavioral, ethical, or aesthetic judgements for which there are no demonstrably correct answers.

The intellectual task (an international studies program task) was adopted from Zigurs, Poole and DeSanctis (1988). This task asked group members to score a list of competing applicants based on six attributes of the applicants. The six attributes were gender, expectations for social success, self concept, expectations for independence, attitudes about premarital sex, and prior travel abroad. The preference task (a personal trust foundation task) was adopted from Watson (1987). This task asked group members to allocate funds to a list of competing projects based on their personal values. The projects were based on the personality components scheme described by Spranger (1928), who asserted that the six basic interests or motives in personality were theoretical, economic, aesthetic, social, political, and religious. The level of difficulty of both tasks was about the same because both solutions were based on six cues.

These two tasks have features similar to the two tasks of the law cases used by Kaplan and Miller but are different in the task contents. These two tasks were selected to further Kaplan and Miller's study using other tasks along the intellectual-judgmental continuum, which would be informative and necessary.

In both tasks, the students were instructed to make decisions acceptable to all members of the group. This means

that group decision rule is quite close to the unanimous decision rule in the Kaplan and Miller study.

### 3.3 Interaction Analysis Method for Group Process

Interaction analysis for capturing group process interaction has become increasingly important in GSS research (DeSanctis, Sambamurthy and Watson 1987; Zigurs 1987). In this study, Kaplan and Miller's coding scheme was used with some modifications. According to Kaplan and Miller, the first four categories of their scheme were used to measure informational and normative influence. The five categories of the modified coding scheme are testimonial facts ("We are supposed to choose the applicants who can represent our country with an idea of our diversity"), inferences from testimonial facts ("If PRE is high, SEL is also high"), values/norms ("It's wrong to allocate so much more money in purchasing an information system but less money in helping homeless families"), verdict preferences ("I think that IND should be more important than SOC"), and others ("Faster lah! Then, we can go to have lunch quickly"). Like Kaplan and Miller's research, there were very few statements fitting into the "others" category (less than 3% of the total statements in this research). Each verbal statement emitted by a single individual was coded by viewing the video-recorded tapes. No interpretation beyond the written word was allowed. It was coded on the actual verbal content of the text itself, without trying to read into the text. Two coders worked together on this scheme until they achieved reliability. They completed the remaining tapes separately. The overall average inter-rater reliability achieved was 90%.

### 3.4 Measurement of Dependent Variables

This study adopted the same measurement method used by Kaplan and Miller to measure the dependent variables. There are two components of influence behavior in groups: verbal and nonverbal. The verbal influence behavior was measured by using the coding scheme described above, but no attempt was made to conduct an indepth analysis of nonverbal influence behavior such as eye gaze, hand gestures, facial expressions, and so on. Hence, the nonverbal influence behavior such as eye gaze and hand gestures was not captured in either the baseline or GSS groups. The purpose of coding nonverbal influence behavior was really to capture influence behavior in GSS groups via the use of GSS, which could not be captured by the verbal coding system. Hence, the difference of nonverbal influence behavior between baseline and GSS groups can be attributed to the different electronic communication channel of GSS. This nonverbal influence behavior was measured by

coding the nonverbal influence from the computer log files for GSS groups. Again, Kaplan and Miller's coding scheme was used to measure the nonverbal influence behavior, in a manner similar to measuring verbal influence behavior. The sum of the statements of verbal influence behavior and nonverbal influence behavior which fit each category in a group was the total influence behavior comprising both informational and normative influence in the group.

### 3.5 Experimental Procedure

Because of the difference in task type, the experimental procedures for the intellective task and the preference task are slightly different. The experimental steps are briefly stated here: (1) for both tasks, group members were asked to do a warm-up task, (2) for intellective task groups, individual members were asked to learn the task criteria, (3) for both tasks, individual members were asked to perform the tasks before the meeting, (4) for both tasks, members in GSS groups were asked to learn the structured meeting agenda and the operations of the GSS system, (5) for both tasks, groups were asked to perform the tasks. The meeting sessions were recorded using video camera.

## 4. RESULTS

The mean scores and standard deviations of amount of informational and normative influence behavior for the four treatment conditions are tabulated in Table 1 and Table 2. These were further analyzed for significance by ANOVA test and t-tests. T-tests were used to test hypotheses H1a and H2a and ANOVA test was used to test the rest of the hypotheses.

### 4.1 Intellective Task

Hypothesis 1a asserts that informational influence will predominate the group process in baseline and GSS groups. This hypothesis was supported at the 5% significant level by simple t-tests. In baseline groups, informational influence predominates the group process significantly [ $t=14.3901$ ,  $p=0.0020$ ]. Informational influence predominates the group process in GSS groups also [ $t=21.5263$ ,  $p=0.0004$ ]. Therefore, Hypothesis 1a is fully supported.

The mean scores of amount of influence behavior for informational and normative influence in both groups are shown graphically in Figure 3. Hypothesis 1b asserts that informational influence will be amplified in GSS groups compared to baseline groups. GSS groups showed a significantly higher amount of informational behavior than baseline groups [ $F(1,15)=6.0431$ ,  $p=0.0276$ ] at 5% level. Therefore, Hypothesis 1b is supported.

Hypothesis 1c asserts that normative influence will be attenuated in GSS groups compared to baseline groups. Normative influence in GSS groups was not attenuated significantly compared to baseline groups at the 5% level [ $F(1,15)=0.0179$ ,  $p=0.8955$ ]. Therefore, Hypothesis 1c is not supported.

### 4.2 Preference Task

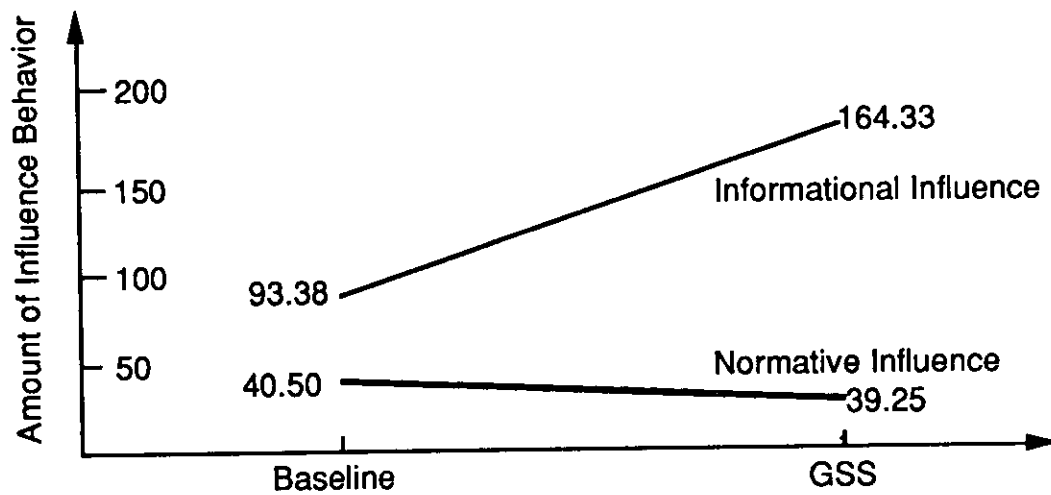
The mean scores of amount of influence behavior for informational and normative influence in GSS and baseline groups are illustrated graphically in Figure 4. Hypothesis 2a asserts that normative influence predominates group interaction process in baseline and GSS groups, which was supported at the 5% significant level by simple t-tests. In

**Table 1. Mean (Standard Deviation, Number of Groups) for Amount of Informational Influence Behavior**

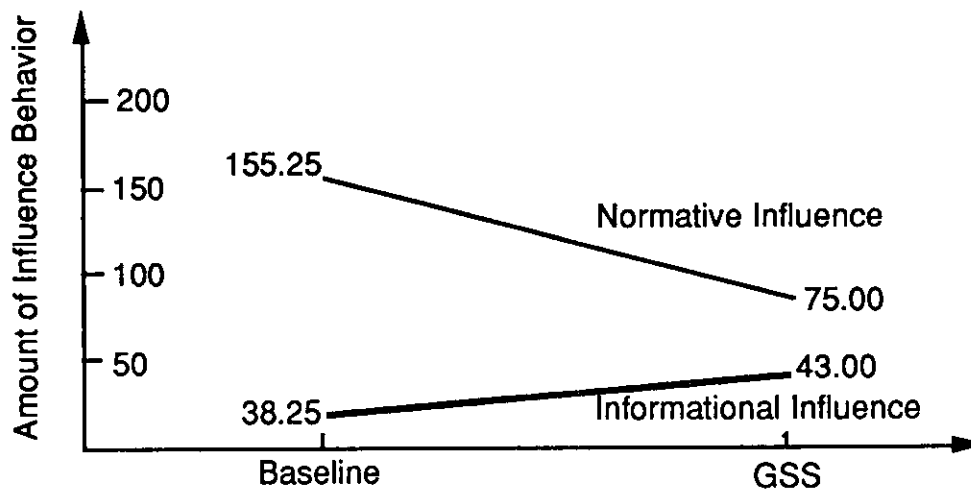
|           |              | Baseline Groups        | GSS Groups              | Total                   |
|-----------|--------------|------------------------|-------------------------|-------------------------|
| Task Type | Intellective | 93.375<br>(35.661, 8)  | 164.325<br>(73.469, 8)  | 128.875<br>(66.772, 16) |
|           | Preference   | 38.250<br>(23.020, 8)  | 43.000<br>(11.097, 8)   | 40.625<br>(17.629, 16)  |
| Total     |              | 65.813<br>(40.633, 16) | 103.688<br>(80.664, 16) | 84.750<br>(65.708, 32)  |

**Table 2. Mean (Standard Deviation, Number of Groups) for Amount of Normative Influence Behavior**

|                  |              | Baseline Groups        | GSS Groups             | Total                   |
|------------------|--------------|------------------------|------------------------|-------------------------|
| <b>Task Type</b> | Intellective | 40.500<br>(16.810, 8)  | 39.250<br>(20.415, 8)  | 39.875<br>(18.077, 16)  |
|                  | Preference   | 155.250<br>(93.158, 8) | 75.000<br>(23.422, 8)  | 115.125<br>(77.812, 16) |
| <b>Total</b>     |              | 97.872<br>(87.889, 16) | 57.125<br>(28.130, 16) | 77.500<br>(67.447, 32)  |



**Figure 3. Mean Scores of Amount of Influence Behavior (Intellective Task)**



**Figure 4. Mean Scores of Amount of Influence Behavior (Preference Task)**



baseline groups, normative influence predominates the group process significantly [ $t=11.8065$ ,  $p=0.0040$ ]. In GSS groups, informational influence also predominates the group process [ $t=12.1957$ ,  $p=0.0036$ ]. Therefore, Hypothesis 2a is fully supported.

Hypothesis 2b asserts that normative influence will be attenuated in GSS groups compared to baseline groups. Normative influence in GSS groups was attenuated significantly compared to baseline groups at the 5% level [ $F(1,15)=5.5430$ ,  $p=0.0337$ ]. Therefore, Hypothesis 2b is supported.

Hypothesis 2c asserts that informational influence will be amplified in GSS groups compared to baseline groups. GSS groups did not show a significantly higher amount of informational behavior than baseline groups at the 5% level [ $F(1,15)=0.2764$ ,  $p=0.6073$ ]. Therefore, Hypothesis 2c is not supported.

## 5. DISCUSSION AND IMPLICATIONS

In summary, the findings of this research show that:

- (1) The relative proportion of informational influence or normative influence use in groups is dependent upon task type. Intellectual task appears to lead to heavier use of informational influence during group discussion, whereas preference task appears to lead to heavier use of normative influence, regardless of whether group members are supported with or without a GSS. By using two different tasks, our findings confirm the findings of Kaplan and Miller that the type of task determines the nature of predominant influence mode utilized by small groups. Further, this study confirms Kaplan and Miller' findings in an unsupported setting to a GSS setting.
- (2) The effects of task type on predominant influence are amplified/attenuated by GSS. This means that the degree of dominance of informational influence will be increased in GSS intellectual task groups and that of normative influence will be decreased in GSS preference task groups.
- (3) A GSS has the potential to affect the group interaction process, much like the amplifier and attenuator effects described in section 2.1. The amplifier and attenuator effects exist for the two tasks but are not always significant. An indepth discussion and implication of these findings follows.

One practical implication of these findings is that a GSS such as SAMM used in this research appears to be more

suitable to an intellectual task than to a preference task. In an intellectual task, there is a correct answer based on shared criteria. Group members tend to focus their attention on factual information and accuracy, leading to the greater use of informational influence (H1a was supported significantly). Since the use of a GSS has the potential to encourage the use of informational influence (H1b was supported significantly), members in a group are likely to have more opportunities to give more factual opinions, suggestions, and information to lead the group to the correct decision. This would enhance group performance.

In a preference task, the "correct answer" is based on personal values and a measure of success is a solution agreeable to every member (McGrath 1984). Since group members have different personal values, they are likely to possess different views. During the group meeting, they are more likely to use normative influence and attempt to convince others with their personal views (H2a was supported significantly). In GSS groups, the use of normative influence is likely to be attenuated by GSS (H2b was supported significantly). This has led to the reduction of number of attempts by group members to convince others with their personal views. As a result, members are more likely to stick to their own opinions without compromise since there is no correct answer and it is more difficult to arrive at a solution agreeable to every member. Therefore, the group performance would be decreased.

Tan, Wei and Raman (1991) reported similar and consistent results by using the same experiment settings and procedures as this study to study the effects of GSS and task type on group decision outcome instead of focusing on the process study and informational and normative influence in this research. They found that intellectual task groups reported better group performance than preference task groups in terms of post-meeting consensus and influence equality. These findings again suggest that task type is a very important factor in determining the effectiveness of GSS use and GSS may have some beneficial effects for certain task types but not for others.

It is interesting to note, from hypothesis 1c and 2c, that the amplifier and attenuator effects of GSS are not always significant for the two tasks; namely, (1) for the intellectual task, normative influence in GSS groups was not attenuated significantly compared to baseline groups (corresponding to the attenuator effect); and (2) for the preference task, informational influence in GSS groups was not amplified significantly compared to baseline groups (corresponding to the amplifier effect). One possible explanation is that in groups there may exist a certain minimum threshold level of informational and normative influence, regardless of the type of task performed. This minimum threshold level of informational and normative influence would be necessary

for the successful solution of any task, which might be due to fundamental elements of informational and normative influence. In any task, some fundamental elements of informational influence may always exist, such as the information that concerns the arrangement of the in-group system activities, developing a list or rank order of alternatives, addressing how the group should implement a decision or a course of action, and discussing how to carry out decisions made by a group. In this study, by reviewing the video-tapes, the statements of informational influence that were fit into the above categories were found in both intellective and preference task groups ("Let's first define the criteria, and then allocate the funds to these six projects according to the criteria," "Let's rank them individually now," "I gave this one the score of 25. What did you give him?", etc.). Similarly, some fundamental elements of normative influence may always exist, either, such as the information related with the overall purposes or responsibilities or jurisdiction of a group, individual persuasiveness, individual dominance, or majority influence. In this study, the statements of normative influence that were fit into the above categories were also found in both intellective and preference task groups ("We are supposed to pick three applicants to enter an international studies program," "We are supposed to allocate the funds to the six competitive projects," "We have to come up with a solution agreeable to at least most of us," etc.). Since these fundamental elements of informational and normative influence may be essential for the solution of any task, they are most likely to be independent of task type and support level. Therefore, the amplifier and attenuator effects of GSS did not take effect below this threshold level for both intellective and preference task groups.

It is seen from Table 1 and Table 2 that the standard deviations under four treatment conditions are large. This can be attributed to the uneven distribution of influence behavior among groups. Even though a group was formed by randomly assigning members to it, each group still possessed different characteristics because of the different characteristics of members. Groups can be different in verbal skills, verbalization amounts, nonverbal skills, procedural skills, quality of arguments, facility with the electronic channel (for GSS groups), and so on. Hence, some groups can be much better in the above mentioned aspects than other groups. This caused distribution of influence behavior among groups to be uneven. Zigurs (1987) also reported the much different characteristics of groups in her study. She indicated that a group could be classified into a category that was composed of "gold mean" group, "dominance-being-challenged" group, "the agreeers" group, "the tentative" group, and other kind of group. Different kinds of groups generated much different amounts of influence behavior in her study, which also supports the explanation above for the large standard

deviations of amount of informational and normative influence behavior in Table 1 and Table 2.

One concern with regard to this study is the Kaplan and Miller coding scheme that was used to capture informational and normative influence. Kaplan and Miller designed their coding scheme for the two tasks of law cases in their study. This study used intellective and preference tasks rather than law cases. However, there is no coding scheme specially designed to distinguish and capture informational and normative influence among the ten or more coding schemes available for group interaction analysis. Because this research is an initial effort to study informational and normative influence in group process and validate Kaplan and Miller's findings, it was considered appropriate to use Kaplan and Miller's coding scheme with some modifications.

## 6. FURTHER RESEARCH

This study can be viewed as an extension and combination of the studies of Kaplan and Miller, and Clapper, McLean and Watson. The findings, like the findings of other studies which extended the work on unsupported groups into a GSS setting, also confirm the conclusion that information technology has the ability to profoundly affect the nature of group work and it is dangerous to generalize the outcomes or conclusions from research with unsupported groups to a GSS environment (Nunamaker et al. 1991).

The findings of this research also lead to some interesting problems for further research.

- (1) In this study, the amplifier effect of GSS failed to significantly enhance informational influence in a preference task and the attenuator effect of GSS failed to significantly reduce normative influence in an intellective task. This has been explained in this paper by introducing the concept of fundamental elements of informational and normative influence. Some important aspects related to this concept need to be further studied. What are the structures and features of these fundamental elements of influence? How do we define the boundary for these fundamental elements of influence? How do the informational and normative influence interact with GSS, task, and context, and gain the position of dominance based on these fundamental elements of influence?
- (2) The two tasks, both in this study and the Kaplan and Miller study, were chosen from the extremely opposite ends of the task continuum. Therefore, it will be necessary and important to choose other tasks, also apparently varying along the task continuum but

located closer, in order to investigate to what extent the amplifier and attenuator effect are limited by this particular operationalization.

- (3) Choice shift is a very important phenomenon in group interaction process. Many studies relevant to choice shift have been conducted in social psychology without GSS intervention. Choice shift is mainly generated by individual judgement. There is less influence on individual judgement in an anonymous mode compared to a face-to-face situation in an unsupported setting (Deutsch and Gerard 1955). Further, both normative influence and informational influence could cause choice shift. Informational influence may be more important to affect choice shift than normative influence for some types of tasks, and vice versa. Therefore, it would be interesting to study how informational and normative influence jointly affect choice shift in groups with the intervention of GSS.
- (4) Process gains and losses are two very important variables in group process, and meeting outcomes are contingent on the balance of these process gains and losses (Nunamaker et al. 1991). Hence, it would be important to study why and how informational and normative influence impact the dynamic balance of process gains and process losses in groups.

## 7. ACKNOWLEDGEMENTS

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