

## Association for Information Systems AIS Electronic Library (AISeL)

---

ICIS 1995 Proceedings

International Conference on Information Systems  
(ICIS)

---

12-31-1995

# Meeting Impacts of Two Types of EMS Anonymity and Initial Difference in Opinions

Surinder Kahai

*State University of New York at Binghamton*

Bruce Avolio

*State University of New York at Binghamton*

John Sosik

*State University of New York at Binghamton*

Follow this and additional works at: <http://aisel.aisnet.org/icis1995>

---

### Recommended Citation

Kahai, Surinder; Avolio, Bruce; and Sosik, John, "Meeting Impacts of Two Types of EMS Anonymity and Initial Difference in Opinions" (1995). *ICIS 1995 Proceedings*. 8.

<http://aisel.aisnet.org/icis1995/8>

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 1995 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# MEETING IMPACTS OF TWO TYPES OF EMS ANONYMITY AND INITIAL DIFFERENCE IN OPINIONS

Surinder Singh Kahai

Bruce J. Avolio

John J. Sosik

Center for Leadership Studies

School of Management

State University of New York at Binghamton

## Abstract

A laboratory experiment was conducted to study the effects of two types of anonymity in an electronic meeting system (EMS) setting (source anonymity: participants know who their group members are but do not know the source of any comment, and participant anonymity: participants do not know who their group members are), initial difference in opinions, and their interaction on participation and satisfaction. Results suggest that the effects of participant anonymity should not be considered as similar in nature to but stronger than those of source anonymity. The extent to which source and participant anonymity make a group salient to its members is proposed as a crucial determinant of the effects of source and participant anonymity.

## 1. INTRODUCTION

The confusing results from studies comparing electronic meeting systems (EMS) to face-to-face meetings are motivating research examining (a) how EMS affect group processes and outcomes and (b) the moderation of EMS effects by factors such as task, proximity, restrictiveness, and participant characteristics (Benbasat and Lim 1993; Jessup and Tansik 1991; Nagasundaram and Dennis 1993; Rao and Jarvenpaa 1991; Sambamurthy, Poole, and Kelly 1993; Wheeler, Mennecke, and Scudder 1993). The direction being taken by EMS research is important for increasing the benefits from EMS use. Consistent with this direction, this study examines the impacts of two kinds of anonymity on participation and satisfaction in absence and presence of initial difference in opinions among group members.

Studies focusing on effects of anonymity on group interaction, performance, and satisfaction have found mixed support for the hypotheses that anonymity should increase group interaction (especially of critical nature), performance, and satisfaction (Connolly, Jessup, and Valacich 1990; Gallupe et al. 1992; Jessup, Connolly, and Galegher 1990; Jessup and Tansik 1991; Valacich, Dennis, and Nunamaker 1992). These studies generally concluded that further research on the nature of anonymity and the effects of various types of anonymity on group processes and outcomes is needed (Jessup, Connolly, and Galegher 1990; Valacich, Dennis, and Nunamaker 1992). Valacich, Dennis, and Nunamaker suggested that anonymity is a multicomponent variable and identified two types of anonymity: source anonymity,

where participants cannot identify the source of any comment (i.e., who said what) though they can identify the other members of their group, and participant anonymity, where participants do not know who are the other members of their group.<sup>1</sup> Participant anonymity can be considered as a more inclusive form of anonymity than source anonymity since participants cannot identify the source of any comment in addition to being unable to identify the other members of their group (Gallupe, et al. 1992).

This study focuses on the effects of source and participant anonymity in an EMS setting. With the exception of one study which employed participant anonymity (Connolly, Valacich and Jessup 1990), prior studies examined source anonymity (Gallupe, et al. 1992; Jessup, et al. 1990; Jessup and Tansik 1991; Valacich, Dennis, and Nunamaker 1992). To date, prior EMS research has not compared the effects of source and participant anonymity on group interaction. Although participant anonymity can be considered as a more inclusive form of anonymity than source anonymity (Gallupe et al. 1992), whether it leads to stronger effects than source anonymity remains to be empirically tested. If empirical research shows that participant anonymity has stronger effects than source anonymity, it provides managers with a tool to influence outcomes. Another motivation for comparing source and participant anonymity is their relationship with proximity; for the same level of source anonymity, dispersed groups may experience greater anonymity concerning who is actually participating (Nunamaker et al. 1991). Thus research on source and participant anonymity may help explain effects due to proximity.

EMS researchers suggest that anonymity is likely to have stronger impacts to the extent the task situation increases evaluation apprehension (Gallupe et al. 1992; Nunamaker et al. 1991; Valacich, Dennis, and Nunamaker 1992). Evaluation apprehension curbs participation among group members through self-censorship (Gallupe et al. 1992) and is likely to be higher when group members come from different organizational levels, when they are discussing a controversial issue, when their views differ at the outset of a discussion, or when they have limited background knowledge about the issue (Gallupe et al. 1992; Valacich, Dennis, and Nunamaker 1992). The current study examines the effects of source and participant anonymity under two conditions: absence and presence of initial difference in opinions among group members.

We focus on participation and satisfaction as dependent variables. Participation is important since it can impact outcomes such as output quality (Maier 1970; Zander 1982) and participant satisfaction (Pinsonneault and Kraemer 1989). We focused on satisfaction because it is an important predictor of repeat system use and group longevity (Connolly, Valacich and Jessup 1990; DeSanctis, Sambamurthy, and Watson 1988; Nunamaker et al. 1991).

The hypothesized model of the impact of source and participant anonymity, initial difference in opinion among group members, and their interaction on participation and satisfaction is presented next. This model is shown in Figure 1.

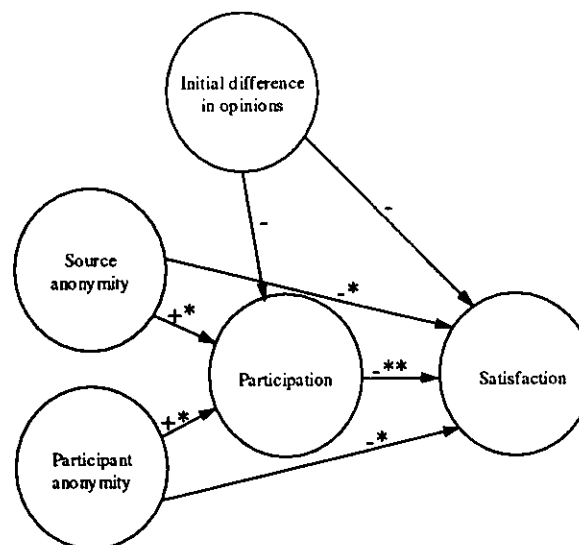
## 2. HYPOTHESIZED MODEL

### 2.1 Impact of Source and Participant Anonymity on Participation

Based on prior research, it is expected that both source and participant anonymity will reduce evaluation apprehension and increase participation (Gallupe et al. 1992; Jessup, Connolly, and Galegher 1990). Since participant anonymity incorporates an additional layer of anonymity relative to source anonymity, the intensity of anonymity experienced by participants is likely to be greater (Gallupe et al. 1992) and, hence, participant anonymity is likely to have a stronger impact on participation than source anonymity.

### 2.2 Impact of Source and Participant Anonymity and Participation on Satisfaction

EMS research proposes several mechanisms for both positive and negative effects of anonymity on satisfaction. Anonymity is proposed to increase satisfaction by reducing evaluation apprehension (Nunamaker et al. 1991) and by reducing the intensity of criticism felt by participants (Jessup, Connolly, and Galegher 1990; Valacich, Dennis, and Nunamaker 1992). Anonymity is proposed to reduce satisfaction by making it difficult for participants to earn recognition for their comments



#### Legend

+ refers to a positive impact, - refers to a negative impact

\* indicates that the impact becomes more positive (or less negative) when there is initial difference in opinions

\*\* indicates that the impact becomes more negative when there is initial difference in opinions

**Figure 1. Hypothesized Model of Impact of Source and Participant Anonymity and Initial Difference in Opinions**

(Nunamaker et al. 1991) and by making the exchange of ideas less personal (Valacich, Dennis, and Nunamaker 1992). Since evidence from prior research suggests a net negative effect (Connolly, Valacich and Jessup 1990; Valacich, Dennis, and Nunamaker 1992), we expect both source and participant anonymity to reduce satisfaction. Also, since participant anonymity is stronger than source anonymity, participant anonymity will cause greater reduction in satisfaction than source anonymity.

We examined the task assigned to the groups and the EMS tool they used in this study in order to hypothesize the effect of participation on satisfaction. Subjects used the Electronic Brainstorming (EBS) tool (Dennis et al. 1988) to present their arguments for or against an issue and make a group judgement. While EBS encourages participation by enabling anonymous and parallel communication, it does not provide any support for consolidating participants' input and converging to a group judgment. Therefore, any increase in participation will reduce satisfaction by making it difficult for the group to consolidate participants' input and converge to a group judgment.

Prior literature reports that EMS designed to lower communication barriers generally reduce participant satisfaction. Using meta-analysis, Benbasat and Lim found that Level 1 EMS reduced participants' satisfaction with outcome. Based on a literature review, Pinsonneault and Kraemer concluded that Group Communication Support Systems (GCSS), which include Level 1 EMS, reduce satisfaction with process. Level 1 EMS and GCSS are designed primarily to lower communication barriers and do not provide any support for integrating participants' input and converging to a group judgement (DeSanctis and Gallupe 1987, Pinsonneault and Kraemer 1989; Sambamurthy and Poole 1992). The EBS tool employed in this study is a Level 1 EMS tool. Since Level 1 EMS and GCSS have been typically observed to increase participation (Nunamaker et al. 1991; Pinsonneault and Kraemer 1989), the observation that they reduce satisfaction supports the current study's hypothesis that participation will reduce satisfaction.

### **2.3 Impact of Initial Difference in Opinions on Participation**

Initial difference in opinions is likely to cause divergent input which, in turn, is likely to cause evaluation apprehension among participants about how others will evaluate their input (Gallupe et al. 1992). Consequently, participants are likely to withhold their input. Thus, initial difference in opinions is likely to reduce participation.

### **2.4 Impact of Initial Difference in Opinions on Satisfaction**

Initial difference in opinions is likely to be associated with lower levels of satisfaction for at least two reasons. First, initial difference in opinions is likely to produce conflict management pressures thereby increasing participant tension levels and reducing satisfaction. Second, in presence of initial difference in opinions among group members, any participant's input is likely to be criticized by another participant. Such a climate is likely to reduce satisfaction (Connolly, Valacich and Jessup 1990).

### **2.5 Moderating Effects of Difference in Opinions**

Source and participant anonymity are hypothesized to increase participation by lowering participants' evaluation apprehension. Since, as stated earlier, evaluation apprehension is likely to be greater when there is initial difference in opinions, the reduction in evaluation apprehension due to source and participant anonymity is also likely to be greater when there is initial difference in opinions (Gallupe et al. 1992). Consequently, the effect of increase in participation due to source and participant anonymity is likely to be stronger when there is initial difference in opinions.

Initial difference in opinions is likely to influence the positive component of the effect of anonymity on satisfaction (i.e., increase in satisfaction via reduction in evaluation apprehension and via reduction in the intensity of criticism experienced by participants). Since evaluation apprehension and criticism are likely to increase with initial difference in opinions, the positive effect of anonymity (source or participant) on satisfaction is also likely to be stronger when there is initial difference in opinions. Initial difference in opinions is not expected to moderate the negative effect of anonymity on satisfaction since there is no reason to expect that it will influence the ability to recognize valuable contributions of others or whether the communication is more or less personal. Recall that a net negative effect of anonymity on satisfaction is hypothesized. Since the positive effect of anonymity on satisfaction becomes stronger while the negative effect does not change when there is initial difference in opinions, the effect of source and participant anonymity on satisfaction will become less negative when there is initial difference in opinions.

Participation is hypothesized to reduce satisfaction in the current study by making it more difficult for participants to synthesize their contributions and converge to a group judgement. Because of dissimilarity of views among participants when there is initial difference in opinions, the ideas presented by participants are likely to be more diverse. Consequently, it will also be more

difficult for participants to synthesize their contributions and converge to a group judgement. Accordingly, the effect of participation on satisfaction will become more negative when there is initial difference in opinions.

### 3. METHOD

A laboratory experiment was conducted to test the model described above; each link in Figure 1 and the proposed effect on the links due to initial difference in opinions is a hypothesis to be tested.

#### 3.1 Subjects

A total of 231 students (149 undergraduate and 82 graduate) enrolled over three semesters in an introductory MIS course at a Northeastern public university participated in the current study for course credit. While controlling for gender composition and whether the subjects were undergraduate or graduate students, subjects were randomly assigned to 58 four-member groups consisting of either undergraduate or graduate students.<sup>2</sup> The groups had no history of interaction prior to the experiment.

#### 3.2 Overview of Experimental Task

Each group was assigned a 40 minute task during which group members, first, *privately* indicated whether they agreed or disagreed with an issue presented to them and typed the reasons justifying their position, second, *publicly* discussed the issue with other group members, and, third, *privately* indicated whether they agreed or disagreed with the issue and typed the reasons justifying their position. In this study, we focused on the effects of anonymity and initial difference in opinions on participation and satisfaction during the group discussion.

#### 3.3 The EMS: GROUPEXTREMS V

Subjects used Ventana Corporation's GROUPEXTREMS V in a Decision Room setting (Dennis et al. 1988). This system provides a computer terminal to each user and consists of twenty user terminals connected by a local area network to a facilitator's terminal. The terminals are arranged in a traditional classroom format such that each user seated at a terminal faces the facilitator's terminal in the front. The public screen connected to the EMS was not used in this study. The Idea Organizer (IO) and Electronic Brainstorming (EBS) tools in GROUPEXTREMS V (Dennis, et al. 1988) were used in this study.

#### 3.4 Research Design

The study reported here is a part of a larger study which employed a 3 (no anonymity, source anonymity, and participant anonymity) x 2 (high and low issue controversiality) factorial design. Groups

were assigned randomly across the six experimental conditions while balancing the gender composition and education level (i.e., undergraduate or graduate) across the experimental conditions to the extent possible.

While anonymity was manipulated as described below, initial difference in opinions was not manipulated. The absence or presence of one or more group members having prediscussion opinion different from others was used to assign groups to appropriate "initial difference in opinions" condition in the data analysis. When all members of a group had the same prediscussion opinion, the group was assigned to the condition of "absence of difference in initial opinions." Remaining groups were assigned to the condition of "presence of difference in initial opinions."

Anonymity was manipulated as follows. In the non-anonymous condition, the subjects were told who their groups members were and the EBS was configured such that comments were tagged with their author's name. In the source anonymity condition, the subjects were told who their groups members were but the EBS was configured such that comments were *not* tagged with their author's name. In the participant anonymity condition, the subjects were *not* told who their groups members were and the EBS was configured such that comments were *not* tagged with their author's name. It was possible to implement the last condition since two groups that were administered the same anonymity condition were present during each experimental session.

Manipulation checks support our intended anonymity manipulation. Subjects were asked three questions in a post-test questionnaire: (a) whether they felt that their team members were able to trace their comments to them (1 = yes, 2 = not sure, 3 = no), (b) whether they felt that the experimenters would be able to trace their comments to them (1 = yes, 2 = not sure, 3 = no), and (c) whether they could identify their team members (1 = cannot identify at all who were members of team, 2 = can identify some, 3 = can identify all members). Responses were averaged across group members to obtain group level responses. The analysis reported below is based on group level responses.

Subjects in non-anonymous condition were more likely to report that they felt that their team members were able to trace their comments to them (means = 1.08, 2.41, and 2.51 and sd = .24, .41, and .37 respectively for non-anonymous, source anonymity, and participant anonymity conditions;  $F = 94.39$ ,  $p < .001$ ; mean in non-anonymous condition significantly different from means in source and participant anonymity conditions based on multiple comparison Tukey test at  $\alpha < .05$ ). Subjects in non-anonymous condition were more likely to report that the experimenters would be able to trace their comments to them (means = 1.29, 1.98, and 1.94 and sd = .30, .44, and .29 respectively for non-anonymous, source anonymity, and participant anonymity conditions;  $F =$

21.77,  $p < .001$ ; mean in non-anonymous condition significantly different from means in source and participant anonymity conditions based on multiple comparison Tukey test at  $\alpha < .05$ ). Subjects in non-anonymous and source anonymity conditions were more likely to report that they could identify the other members of their group (means = 2.57, 2.09, and 1.09 respectively and  $sd = .37, .43, \text{ and } .12$  for non-anonymous, source anonymity, and participant anonymity conditions;  $F = 85.82, p < .001$ ; mean in non-anonymous condition significantly different from means in source and participant anonymity conditions and mean in source anonymity condition significantly different from mean in participation anonymity condition based on multiple comparison Tukey test at  $\alpha < .05$ ).

We did not focus on the effects of issue controversiality in the current study. For the sake of completeness, however, we briefly describe this manipulation. In the high issue controversiality condition, the issue "The best way to control AIDS is through widespread, mandatory testing" was presented to the subjects and in the low issue controversiality condition, the issue "Public education efforts to reduce the spread of AIDS among young people should focus more on encouraging them to practice safe sex." The effect of different issues was controlled for statistically in the data analysis. Since the balancing of groups on the basis of gender composition and education level was performed across controversiality conditions and not across initial difference in opinions condition, we controlled for the effect of gender composition and education level statistically in the data analysis. We also controlled for the effect of different semesters statistically in the data analysis.

### 3.5 Procedure

Participants were greeted by a facilitator as they entered the Decision Room and randomly assigned to terminals designated for their group. Participants were introduced to other members of their group if they were in non-anonymous or source anonymity conditions. Two groups were present in the Decision Room during each experimental session.

Each experimental session consisted of three phases and lasted for approximately 90 minutes. Phase I was a 15 minute training session designed to acquaint participants with the EBS tool. Phase II involved the experimental task and consisted of three parts. First, participants used the IO tool for 10 minutes to privately note their agreement or disagreement with the issue presented to them and type the reasons justifying their position. Second, participants used the EBS tool for 20 minutes to discuss the issue with their group members. Subjects were instructed to arrive at a judgement about the issue as a group. Only electronic discussion, i.e., discussion through the EBS, was permitted. Third, participants again used the IO tool for 10 minutes to privately note their agreement or disagreement with the issue presented to them and type the reasons justifying their position.

During phase III, the participants were administered a post-test questionnaire designed to check manipulations and measure relevant process and outcome variables.

### 3.6 Operationalization of Key Constructs for Model Testing

**Source Anonymity.** Source anonymity was operationalized as a dummy variable. It was coded as 1 for source anonymity condition and 0 otherwise.

**Participant Anonymity.** Participant anonymity was operationalized as a dummy variable. It was coded as 1 for participant anonymity condition and 0 otherwise.

**Initial Difference in Opinions.** Initial difference in opinions was operationalized as a dummy variable. It was coded as 0 when all members of the group had the same prediscussion opinion about the issue presented to them and 1 otherwise.

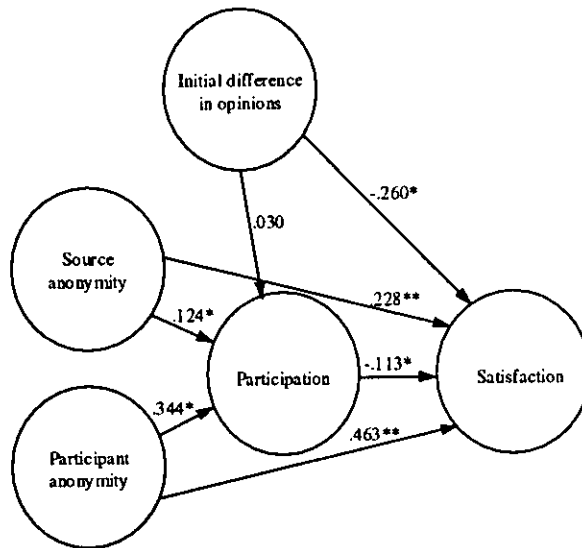
**Participation.** Participation was operationalized using three indicators: the number of comment blocks (Valacich, Dennis, and Nunamaker 1992), the number of words, and the number of characters typed by a group (Connolly, Valacich and Jessup 1990; Dennis, Valacich, and Nunamaker 1990). Comment blocks, words, and characters were counted using EMS transcripts of group discussions. A comment block is defined as a block of text (a maximum of five lines) entered by a participant during each system iteration (Valacich, Dennis and Nunamaker 1992).

**Satisfaction.** Satisfaction was operationalized using two questionnaire items. One measured satisfaction with the outcome of the discussion (1 = very dissatisfied, 3 = neither satisfied nor dissatisfied, 5 = very satisfied) and another measured satisfaction with the discussion (1 = very dissatisfied, 3 = neither satisfied nor dissatisfied, 5 = very satisfied). Since the group was the unit of analysis, group level measures of the satisfaction items were obtained by aggregating responses of subjects within each group.

### 3.7 Data Analysis

The data collected in the present study was analyzed using Partial Least Squares (PLS). Relevant details about PLS are given in the appendix.

Figure 2 and Table 1 present the results for the study's main predictions. The results in Figure 2 were obtained using the complete sample of data ( $n = 55$ ).<sup>3</sup> Results from full sample analysis were also employed to determine the reliability and validity of participation and satisfaction measures. Results in Table 1 were obtained using two subsamples ( $n = 25$  and  $n = 30$ ) corresponding to absence and presence of initial difference in opinions. Data for each of these subsamples was analyzed



\* 1-tail  $p < .001$ , \*\* 2-tail  $p < .001$ , otherwise not significant

**Figure 2. Result of PLS Analysis of Hypothesized Model**

**Table 1. Difference in Path Coefficients in Absence and Presence of Initial Difference in Opinions**

Path from to		Path Coefficient		t-value for (A - B)*	Significance
		Opinions are different A	Opinions are not different B		
Source anonymity	Participation	-.320	.324	-.307	2-tail $p < .005$
Participant anonymity	Participation	.524	-.042	3.93	1-tail $p < .001$
Source anonymity	Satisfaction	.042	-.159	7.30	1-tail $p < .001$
Participant anonymity	Satisfaction	.599	.011	7.43	1-tail $p < .001$
Participation	Satisfaction	-.285	-.021	-6.84	1-tail $p < .001$

\*1-value based on jackknifing estimates of coefficients and std. error.

**Table 2. Factor Loadings, Composite Scale Reliability, and Average Variance Extracted to Assess Reliability of Measures**

Construct	Measures	Factor Loading	Composite Scale Reliability	Average Variance Extracted
Participation	Total # of comments	.785	.86	.66
	# of words	.865		
	# of characters	.792		
Satisfaction	with discussion	.869	.90	.82
	with outcome	.939		

**Table 3. Average Variance Extracted by Constructs (diagonal elements) and Variance Shared between Constructs (off-diagonal elements) to Assess Convergence and Discriminant Validities of Measures**

	Participation	Satisfaction
Participation	.66	
Satisfaction	.01	.82

separately using a model similar to the one in Figure 2 except that the construct representing initial difference in opinions and the links from it were removed.

## 4. RESULTS

### 4.1 Reliability and Validity of Participation and Satisfaction Measures

The reliability of measures was assessed by

- (a) examining the factor loadings of measures; a common rule of thumb is that the factor loadings should exceed .7 since this implies that less than half of measure's variance is due to error (Fornell, Tellis, and Zinkhan 1982);
- (b) computing a construct's composite scale reliability (Fornell and Larcker 1981), a measure of internal consistency similar to Cronbach's alpha; Fornell and Larcker (1981) recommended using a criterion cut-off of .7 or more; and by
- (c) examining the average variance extracted by the construct from measures; Fornell and Larcker (1981) recommended using a criterion cut-off of .5 or more.

Table 2 shows the factor loadings, composite scale reliabilities, and average variance extracted based on PLS analysis of full sample data. All measures in Table 2 meet the above criteria for reliability.

Convergent and discriminant validity of measures of participation and satisfaction was assessed by examining whether these constructs share more variance with their measures than with each other (Carmines and Zeller 1979). A matrix is provided in Table 3, in which the diagonal elements show the average variance shared by a construct with its measures while the off diagonal element represents the variance shared by participation and satisfaction. For adequate convergent and discriminant validity, the diagonal elements should be greater than the off diagonal element. This criterion was met thereby supporting convergent and discriminant validity of measures of participation and satisfaction.

### 4.2 Test of Hypothesized Model

- 1) The results support the hypotheses that source and participant anonymity increase participation (std. reg. coeff. = .124 and .344 respectively, both significant at 1-tail  $p < .001$ ). Also, participant
- 2) anonymity had a stronger effect on participation than source
- 3) anonymity (1-tail  $p < .01$ ). Contrary to hypotheses, source and



participant anonymity increased satisfaction (std. reg. coeff. = .228 and .463 respectively, both significant at 2-tail  $p < .001$ ).  
However, as expected, participant anonymity increased satisfaction more than source anonymity (1-tail  $p < .01$ ). The results do not support the hypotheses that initial difference in opinions will affect participation (std. reg. coeff. = .030, 2-tail  $p < .8$ ). Initial difference in opinions, however, affected satisfaction negatively as expected (std. reg. coeff. = -.260, 1-tail  $p < .001$ ). As hypothesized, participation reduced satisfaction (std. reg. coeff. = -.113, 1-tail  $p < .001$ ).

Contrary to expectation, the change in the effect of source anonymity on participation due to presence of initial difference in opinions was negative (change in effect significant at 2-tail  $p < .01$ ). As expected, the change in the effect of participant anonymity on participation due to presence of initial difference in opinions was positive (change in effect significant at 1-tail  $p < .001$ ). As hypothesized, the changes in the effects of source and participant anonymity on satisfaction due to presence of initial difference in opinions were positive (changes in effects significant at 1-tail  $p < .001$ ). Consistent with the hypothesis, the change in the effect of participation on satisfaction due to presence of initial difference in opinions was negative (change in effect significant at 1-tail  $p < .001$ ).

## 5. DISCUSSION

For the most part, the results confirm the hypothesized model. We address the following results which were in the unexpected direction: (1) in presence of initial difference in opinions, source anonymity was less effective at encouraging participation for groups than in absence of initial difference in opinions and (2) source and participant anonymity increased satisfaction.

**Effect of source anonymity.** In presence of initial difference in opinions, source anonymity was less effective at encouraging participation for groups than in absence of initial difference in opinions. In fact, source anonymity reduced participation in presence of initial difference in opinions (std. reg. coeff. = -.320, 2-tail  $p < .001$ ), thereby suggesting that anonymity may have increased evaluation apprehension in presence of initial difference in opinions. A potential explanation for this comes from social identity theory which argues that in presence of group membership cues, anonymity increases the salience of the group (Lea and Spears 1991; Spears, Lea, and Lee 1990). In both the non-anonymous and source anonymity conditions, group membership cues were provided by introducing participants to other members of their group. Thus the group is likely to have been more salient to its members in the source anonymity condition than in the non-anonymous condition (Lea and Spears 1991; Spears, Lea, and Lee 1990). Since evaluation apprehension is likely to occur to the extent one perceives the presence of others who may evaluate one's contribution, the evaluation apprehension caused by initial difference in opinions was, perhaps, amplified by the increased

group salience (i.e., salience of others) resulting from source anonymity. In the case of participant anonymity, participants were not introduced to other members of their group and, hence, the group was not salient to participants. Thus it is likely that participant anonymity reduced rather than amplified the evaluation apprehension caused by initial difference in opinions.

**Effect of anonymity on satisfaction.** The study's results indicate that, in general, both source and participant anonymity increase satisfaction. This is inconsistent with evidence from prior studies which suggests that anonymity reduces satisfaction. The negative effect of anonymity on satisfaction observed in prior studies may be partly due to the nature of the issue employed in those studies. Prior EMS studies employed an issue (solving the university's parking problem) for which there is likely to be little difference in opinions among participants (Valacich, Dennis, and Nunamaker 1992). The results of this study indicate that both source and participant anonymity are more satisfying in presence of difference in opinions. When there is little difference in opinions, evaluation apprehension and the incidence of critical remarks are likely to be low and, consequently, the positive component of the effect of anonymity on satisfaction (i.e., increase in satisfaction via reduction in evaluation apprehension and via reduction in the intensity of criticism experienced by participants) may be low such that the negative component of the effect of anonymity on satisfaction outweighs it.

The negative effect of anonymity on satisfaction seen in prior studies may also be partly due to the lack of control for the effect of participation on satisfaction. Since anonymity generally increases participation and participation reduces satisfaction as observed in this study, the effect of anonymity on satisfaction reported in prior studies may be reflecting some of the negative effect of anonymity on satisfaction via participation.

## 6. CONCLUSIONS

In this paper, we took a step toward furthering our understanding about source and participant anonymity in an EMS environment and the interaction of these types of anonymity with initial difference in opinions. In addition to providing evidence that EMS anonymity is a complex variable whose effects are moderated by initial difference in opinions, the study offers (a) insights into the nature of effects of source and participant anonymity, (b) implications for management, and (c) directions for future work on social identity theory. These are discussed below along with the study's limitations.

**Nature of effects of source and participant anonymity.** The results of the study suggest that participant anonymity cannot be thought of as having effects which are similar to but stronger than those of source anonymity. Source anonymity makes a group salient and has the potential to amplify effects which are dependent on the group's salience. Participant anonymity, on the other

hand, does not make a group salient. Thus, relative to source anonymity, it is likely to deflate effects which are dependent on a group's salience. Future EMS research should examine these propositions by studying variables affected by a group's salience (e.g., post-discussion agreement, polarization, etc.) under conditions of source and participant anonymity.

**Implications for management.** Based on the superiority of participant anonymity over source anonymity in increasing participation and satisfaction, we suggest the use of participant anonymity in EBS sessions if higher participation and satisfaction are desired. A key issue is how to implement participant anonymity. If a same-place, same-time EMS is used as in the current study, a group could be divided into subgroups without letting participants know who are the other members in their subgroup. Since participants know the group of which their subgroup is a part, the participant anonymity thus created is not likely to be as strong as when participants are not aware of possible members of their group. Creating participant anonymity in which participants are not aware of possible group members becomes feasible if a different-place EMS is used.

Future work on social identity theory. Lea and Spears suggest that a group's salience will influence the effect of the group's norms on its members. They also suggest that unless a behavior (e.g., participation) is connected to the group's norm, the salience of the group will not affect that behavior. We have no reason to believe that the study's subjects had an existing norm that participation in group discussion is undesirable. Examination of our research materials also does not indicate that we may have inadvertently created a norm among subjects about undesirability of participation. Thus, it does not seem that any social norm about undesirability of participation was at work when salience of the group created by source anonymity suppressed participation in presence of initial difference in opinions. Therefore, our results suggest that even behaviors not connected to a group's norms may be influenced by the group's salience. Future research on social identity theory should examine this issue.

**Limitations of the current study.** The generalizability of the study is limited by its use of ad hoc groups of students whose rewards were not linked to their performance, the relatively short duration of the experimental task, and subjects' lack of experience with the EMS. Meeting processes of organizational groups are likely to be influenced by the culture or behavior norms peculiar to such groups. To the extent the cultural beliefs or norms of organizational groups pertaining to desirability of anonymity, participation, and difference in opinions are different from those of student groups, the applicability of the current study's results to organizational group may be limited. For example, if an organizational group values expressing opinions non-anonymously, anonymity may curtail input by interfering with this norm. Also, organizational groups typically consist of members at different levels of hierarchy or having different social status. In

these groups, evaluation apprehension and, consequently, the impacts of source and participant anonymity are likely to be stronger than in student groups.

## 7. ACKNOWLEDGMENTS

The authors thank anonymous reviewers for their helpful comments.

## 8. REFERENCES

- Bagozzi, R. P., and Fornell, C. "Theoretical Concepts, Measurements, and Meaning." In C. Fornell (Editor), *A Second Generation of Multivariate Analysis*, Volume. 2. New York: Praeger Publishers, 1982.
- Benbasat, I., and Lim, L. "The Effects of Group, Task, Context, and Technology Variables on the Usefulness of Group Support Systems: A Meta-Analysis of Experimental Studies." *Small Group Research*, Volume 24, Number 4, 1993, pp. 430-462.
- Carmines, E., and Zeller, R. *Reliability and Validity Assessment*. Sage University Paper Series on Quantitative Applications in the Social Sciences, No. 07-017. Beverly Hills: Sage Publications, 1979.
- Connolly, T.; Valacich, J.; and Jessup, L. "Effects of Anonymity and Evaluative Tone on Idea Generation in Computer-Mediated Groups." *Management Science*, Volume 36, Number 6, 1990, pp. 689-703.
- DeSanctis, G. L., and Gallupe, B. "A Foundation for the Study of Group Support Systems." *Management Science*, Volume 33, Number 5, 1987, pp. 589-606.
- DeSanctis, G. L.; Sanbamarthy, V.; and Watson, R. G. "Computer Supported Meetings: Building a Research Environment." *Transactions of the Eighth International Conference on Decision Support Systems*. Boston, June 1988, pp. 3-12.
- Dennis, A.; George, J.; Jessup, L.; Nunamaker, J.; and Vogel, D. "Information Technology to Support Electronic Meetings." *MIS Quarterly*, Volume 12, Number 4, 1988, pp. 59-624.
- Dennis, A.; Valacich, J.; and Nunamaker, J. "An Experimental Investigation of the Effects of Group Size in an Electronic Meeting Environment." *IEEE Transactions on Systems, Man, and Cybernetics*, Volume 25, Number 25, 1990, pp. 1049-1056.
- Fornell, C., and Bookstein, F. "Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-Voice Theory." *Journal of Marketing Research*, Volume 19, 1982, pp. 440-452.

Fornell, C., and Larcker, D. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error." *Journal of Marketing Research*, Volume 18, 1981, pp. 39-50.

Fornell, C.; Tellis, G.; and Zinkhan, G. "Validity Assessment: A Structural Equations Approach Using Partial Least Squares." *AMA Educators Proceedings*. 1982, pp. 405-409.

Gallupe, B.; Cooper, W.; Pollard, S.; and Cadsby, J. "Controversiality, Anonymity, and Electronic-brainstorming." Working Paper 92-29, School of Business, Queen's University, 1992.

Jessup, L. M.; Connolly, T.; and Galegher, J. "The Effects of Anonymity on GDSS Group Process With an Idea-generating Task." *MIS Quarterly*, Volume 14, Number 3, 1990, pp. 313-321.

Jessup, L., and Tansik, D. "Decision Making in an Automated Environment: The Effects of Anonymity and Proximity on Group Process and Outcome with a GDSS." *Decision Sciences*, Volume 22, Number 2, 1991, pp. 266-279.

Lea, M., and Spears, R. "Computer-mediated Communication, De-individuation and Group Decision-making." *International Journal of Man-Machine Studies*, Volume 34, 1991, pp. 283-301.

Maier, N. R. F. *Problem Solving and Creativity in Individuals and Groups*. Belmont, California: Brooks/Cole Publishing Co., 1970.

Nagasundaram, M., and Dennis, A. "When a Group is Not a Group: The Cognitive Foundation of Group Idea Generation." *Small Group Research*, Volume 24, Number 4, 1993, pp. 463-489.

Nunamaker, J. F.; Dennis, A.; Valacich, J.; and Vogel, D. "Information Technology for Negotiation Groups: Generating Options for Mutual Gain." *Management Science*, Volume 37, Number 10, 1991, pp. 1325-1346.

Pinsonneault, A., and Kraemer, K. "The Impact of Technological Support on Groups: An Assessment of Empirical Research." *Decision Support Systems*, Volume 5, Number 2, 1989, pp. 197-216.

Rao, S., and Jarvenpaa, S. "Computer Support of Groups: Theory Based Models for GDSS Research." *Management Science*, Volume 37, Number 10, 1991, pp. 1347-1362.

Sambamurthy, V., and Poole, M. S. "The Effects of Variations in Capabilities of GDSS Designs on Management of Cognitive Conflict in Groups." *Information Systems Research*, Volume 3, Number 3, 1992, pp. 224-251.

Sambamurthy, V.; Poole, M. S.; and Kelly, J. "The Effects of Variations in GDSS Capabilities on Decision Making Processes in Groups." *Small Group Research*, Volume 24, Number 4, 1993, pp. 523-546.

Spears, R.; Lea, M.; and Lee, S. "De-individuation and Group Polarization in Computer-mediated Communication." *British Journal of Social Psychology*, Volume 29, 1990, pp. 121-134.

Valacich, J. S.; Dennis, A. R.; and Nunamaker, J. F. "Group Size and Anonymity Effects on Computer-Mediated Idea Generation." *Small Group Research*, Volume 23, Number 1, 1992, pp. 49-73.

Wheeler, B.; Mennecke, B.; and Scudder, J. "Restrictive Group Support Systems as a Source of Process Structure for High and Low Procedural Order Groups." *Small Group Research*, Volume 24, Number 4, 1993, pp. 504-522.

Wold, H. "Systems Analysis by Partial Least Squares." In P. Nijkamp, H. Leitner, and N. Wrigley (Editors), *Measuring the Unmeasurable*. Dordrecht: Martinus Nijhoff, 1985.

Zander, A. *Making Groups Effective*. San Francisco: Jossey-Bass, 1982.

## 9. ENDNOTES

1. Valacich, Dennis, and Nunamaker (1992) refer to source and participant anonymity as content and process anonymity.
2. There were two exceptions to this. One group had only three members and another had a mix of undergraduate and graduate students. These groups were excluded from data analysis.
3. Of the 58 groups that participated in the experiment, the following three groups were not included in the analysis: a group that contained three members, a group with both undergraduate and graduate subjects, and a group whose EMS transcript was not saved.

## Appendix

The data collected in the present study was analyzed using Partial Least Squares (PLS), a multivariate analysis technique for testing structural models with latent constructs (Wold 1985). PLS does not make assumptions about data distributions, observation independence, or variable metrics (Fornell and Larcker 1981). A PLS model contains both a structural component representing the relationship among constructs and a measurement component representing the relationship between constructs and their indicators (Fornell and Bookstein 1982). The combined analysis of structural and measurement components facilitates measurement reliability and validity assessments within the context of the theoretical model being tested, thereby acknowledging the dependence of observations on theory in accordance with contemporary philosophy of science (Bagozzi and Fornell 1982).

In PLS, indicators of theoretical variables can be modeled as reflective (resulting from the construct) or formative (combining to form the construct). The indicators of participation, i.e., number of comment blocks, number of words, and number of characters, result from participation and are, hence, modeled as reflective indicators. Since the responses to satisfaction items result from satisfaction experienced by the participants, these items are also modeled as reflective indicators of satisfaction. PLS is insensitive to the modeling of remaining variables in the theoretical model because they have single indicators.

PLS generates estimates of standardized regression coefficients for the paths in a model. A jackknifing procedure was used to assess the significance of these estimates. We employed a p-value of .05 to indicate significance. PLS also generates statistics to test the reliability and validity of indicators of theoretical variables. The results reported in this study were obtained using PLS-Graph (version 2.91.1.06), a graphics-based program for performing PLS analysis.