A COMPREHENSIVE MODEL OF ANONYMITY IN COMPUTER-SUPPORTED GROUP DECISION MAKING

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Abstract

Drawing on recent theoretical efforts, a three dimensional model of anonymity in computer-supported group discussion is developed. Applying this model to a review of empirical literature shows that studies of the idea generation phase of decision making have dominated this literature, and that the role of anonymity in discussion and consensus reaching has received much less attention. Propositions on the effects of anonymity on consensus decision making discussions are developed. It is argued that anonymity removes some tools of persuasion and increases the difficulty of coordinating discussion. It is proposed that participants in anonymous discussions will find substitutes for the persuasion and coordination functions served by identity cues. It is also proposed that the degree of anonymity is affected by acquaintance among group members, and that anonymity changes over time.

Keywords: Anonymity, group support systems.

1. INTRODUCTION

Anonymity has been hailed as one of the cardinal benefits of computer-based group support systems, especially among practitioners (Dennis et al. 1990; Nunamaker et al. 1993; Wilson and Jessup 1995). Anonymity is thought to facilitate participation by reducing social barriers associated, for example, with differences in social status and power within groups (Spears and Lea 1994). Anonymous expression, therefore, should equalize the opportunities for all group members to contribute their ideas and opinions, and as a result of this broader information sharing group decision making should improve (Rao and Jarvenpaa 1991). But anonymity has also been argued to affect group discussion and decision making in ways that may not be so positive. Anonymity may increase conflict and negatively toned discussion, social loafing, unproductive and non-task oriented periods, and difficulty in reaching consensus (Jessup and George 1997; Valacich et al. 1992). When the literature on anonymity is closely examined it becomes clear that our understanding of anonymity's effects, separate from other features of electronic group support, is limited. This limitation can be attributed to both empirical and theoretical reasons.

Empirically, the research on anonymity has focused primarily on one aspect of group decision making—idea generation—and much less on the information exchange, consensus reaching, and choice-making facets of the decision-making process (Dennis 1996; Weisband 1994). A second empirical issue is that it is difficult to generalize across the results from different groups of researchers because of differences in technologies, tasks, and experimental paradigms (cf. Hollingshead and McGrath 1995). These empirical issues have theoretical implications. The variation in research procedures means that different kinds of anonymity may have been operationalized in different studies. Until very recently (e.g., Valacich et al. 1992; Hayne et al. 1994), little consideration has been given to the conceptual definition of anonymity and the notion that anonymity is a multifaceted construct. This further complicates attempts

to generalize across studies. It is argued here that, as a result, the effects of anonymity on decision making in computer-supported groups remains poorly understood.

In the current paper a comprehensive model of anonymity is proposed and will be used to review empirical research on anonymity in computer-supported group decision making. Drawing upon this review, propositions for future research will then be developed.

2. ANONYMITY IN COMPUTER-SUPPORTED GROUP DECISION MAKING

Anonymity has been operationally defined in the existing empirical literature as not having participants' real names attached to their inputs. Some studies have created anonymity by having nothing whatever attached to participant input (e.g., Jessup et al. 1990a; Jessup and Tansik 1991), while others have supplied the anonymous participants with nominal labels or pseudonyms (e.g., Hiltz et al. 1989; Siegel et al. 1985; Weisband et al. 1995). The assumptions underlying these practices are that participants will be disabled from identifying authors of specific statements, that anonymity is a dichotomous construct, that a group's state of anonymity is fixed, and that anonymity is an objective characteristic of the situation. Recent theoretical work has challenged these assumptions (Hayne et al. 1994; Valacich et al. 1992).

Valacich et al. argued that anonymity is more complex than a static switch that can simply be turned on and off. They suggested that anonymity is subjectively experienced and that participants can feel varying *degrees* of anonymity and different *kinds* of anonymity. The degree of anonymity depends on features of the technology and the specific situation. For example, participants might feel less anonymous if their comments are displayed simultaneously as they are typed than if there is a delay between typing and display.

Valacich et al. proposed that anonymity can be divided into two kinds: *content* and *process*. They define content anonymity as "the extent to which group members can identify the source of a particular contribution by recognizing the author through an identifier embedded in the contribution," and process anonymity as "the extent to which group members can determine who is participating by directly observing who is making a contribution" (p. 225). It is not difficult to comprehend how the degree of these two types of anonymity can vary independently of each other. For instance, in a large group where members are in the same room, but not able to see each other's computer screens, the members can observe who is present and what percentage of the group is typing at a given moment, but cannot match contributions to specific people. This example describes low process and high content anonymity.

Hayne et al. argued that the Valacich et al. conceptualization did not go far enough, and introduced a distinction between *social* and *technical* aspects of anonymity. They maintained that the Valacich et al. model conceptualized anonymity as a technical feature, as does all of the existing empirical research. Hayne et al. contended that participants' subjective experience of anonymity may not match the technically defined condition of anonymity. This subjective experience refers to social anonymity, which they define in terms of the ability of group members to use the stylistic characteristics and stated positions available in text-based comments to make attributions of comment authorship. Hayne et al. argue that social anonymity can be low, even when technical anonymity is high. They also divided their social anonymity into two types: *source dissociation* and *identitylessness* (Licker 1992). Source dissociation refers to a feeling that others cannot identify one as the source of specific messages, while identitylessness is associated with feeling that others don't know that one is a participant or what one's role in a session might be.

Hayne et al. argued explicitly that their two kinds of anonymity do not correspond to the content and process anonymity proposed by Valacich et al. But it is argued here that these two independent models can be combined conceptually into a single model. Despite Hayne et al.'s assertions to the contrary, it is nevertheless reasonable to perceive that their definition of source dissociation indeed corresponds with the Valacich et al. definition of content anonymity. Both of these definitions are concerned with the ability to match specific statements to specific individuals, but differ in whether this ability is mediated by technical or social mechanisms. Similarly, Hayne et al.'s identitylessness can be seen as corresponding to Valacich et al.'s process anonymity, in that both involve the ability to identify who is participating. Again, the differences between them are based on whether social or technical means create the conditions.

These arguments thus lead us to the proposition that these two different anonymity models can be related to each other by means of three dimensions. The first dimension is concerned with the *mechanism* of producing anonymity and can be divided into *social* and *technical*, following Hayne et al. Technical anonymity refers to the mechanical practices used to dissociate individuals from their inputs. These practices include suppressing real names and physically separating participants. The level of technical anonymity, once established, does not change. Social anonymity refers to individuals' subjective experience of anonymity—whether they believe they are anonymous and whether they believe others are anonymous to them. Social anonymity is variable and depends on numerous aspects of the communication situation such as the nature of the relationships among the communicants, the number of communicants, the information exchange requirements of the task, and the amount of time the communicants spend together.

The second dimension is concerned with the *domain* of anonymity and can be divided into *message source* and *participant presence*. The message source category refers to the ability to attribute specific messages to a specific source. Referring back to the mechanism dimension, this attribution ability can be mediated by either technical or social mechanisms. Thus, Valacich et al.'s content anonymity is defined as technically mediated anonymity about the specific source of messages, and Hayne et al.'s source dissociation anonymity as socially mediated anonymity about the specific sources of messages. The participant presence category refers to knowledge about the presence of other group members. This includes knowing the number of group members, knowing whether a particular individual is a member, knowing general characteristics of the other group members, and knowing how much any one group member participates. Again, this knowledge can be obscured by technical or social means. Valacich et al.'s process anonymity thus refers to technical means of obscuring information about participants' presence, and Hayne et al.'s identitylessness refers to social means of obscuring this information.

A third dimension is proposed as necessary to complete the distinctions between the Valacich et al. and the Hayne et al. models, and that is the *perspective* of anonymity. This dimension is concerned with the direction of anonymity, self →others versus others → self (Spears and Lea 1994). The self → others perspective of anonymity refers to an individual's ability to identify or make attributions about the other members in the group, while the others → self refers to the ability of the others to identify or make attributions about that individual. If we compare Hayne et al.'s definition of source dissociation with Valacich et al.'s definition of content anonymity for example, it appears that these definitions differ not only along the dimension of the mechanism for producing anonymity, but also in the perspective of anonymity. Hayne et al. define source dissociation in the direction of others → self attribution of specific communication, while Valacich et al. define content anonymity in the direction of self → others attribution of specific communication. Hayne et al.'s identitylessness and Valacich et al.'s process anonymity differ from each other similarly along the perspective dimension. A graphic representation of the model proposed appears in Figure 1 and will be referred to throughout the discussion of the empirical work which follows.

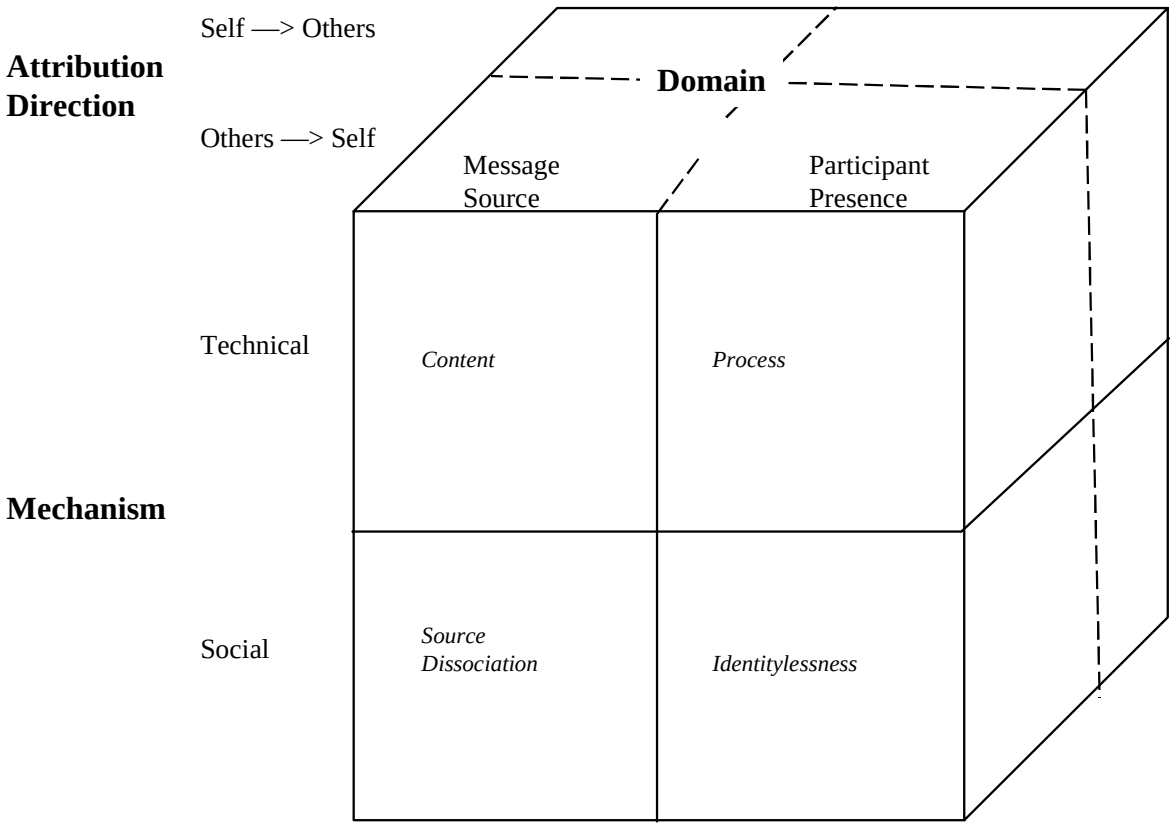

Figure 1. Proposed Anonymity Model

3. EMPIRICAL STUDIES OF ANONYMITY

The large majority of the research on anonymity has examined its effects on divergent decision-making processes (McGrath 1984) such as generating solutions, ideas or plans (e.g., Beauclair 1989; Connolley et al. 1990; George et. al. 1990; Jessup et al. 1990a, 1990b; Jessup and Tansik 1991; Nunamaker et al. 1987; Valacich et al. 1991; Wilson and Jessup 1995). While a few individual studies have found anonymity to have no effects on idea generation (e.g., Beauclair 1989; George et al. 1990; Valacich et al. 1991), on balance these studies show that anonymous groups produce more and higher quality ideas than do identified groups.

The anonymous conditions in the studies cited above were created by not attaching participants' real names or any other labels to their contributions and the identified conditions were created by attaching the real names. In terms of the proposed model of anonymity, these studies imposed high technical anonymity across domains (i.e., message source and participant presence), and across both perspectives (i.e., self → others and other → self). These practices thus reduced the technical ability for all group members to make authorship attributions or to know much about each other's overall participation.

The manipulation checks used in some of these lab studies to ensure technical anonymity can actually be taken as measures of social anonymity in that they ask participants to report their subjective experience of anonymity. These measures show that absolute technical anonymity was not necessarily accompanied by absolute social anonymity.

For example, Jessup et al. (1990b) and Connolly et al. (1990) reported that the mean response of group members in their anonymous conditions actually was that they were unsure of whether others in the group or outside of the group could attribute their comments to them. These measures thus suggest that social anonymity was not as high as technical anonymity, particularly in the perspective of others → self attributions. These researchers did not question participants about the other perspective, self → others attributions.

Wilson and Jessup, on the other hand, did ask the participants both whether they were able to attribute comments to specific others and whether other group members in general were able to make these attributions. Interestingly, a majority (76%) of their anonymous participants reported that they could not make the attributions, but a majority (82%) were also unsure whether or not other group members could make the attributions. Again, these results suggest that social anonymity overall was lower than the technical anonymity, and that the degree of anonymity also varied with respect to perspective.

The Hayne et al. study also involved a divergent idea generating task, but they did not actually manipulate anonymity. Rather, the researchers examined only anonymous groups and focused on source dissociation anonymity. Specifically, they were interested in whether, despite technical anonymity, group members who were previously acquainted with each other could accurately identify the authors of specific comments and whether the degree of accuracy would be related to the extent of prior interaction between the members. In terms of the proposed model, these researchers hypothesized that within pre-acquainted groups, social anonymity (source dissociation) would be low, even though technical anonymity (content) was high. They found that the participants were quite willing to make attributions, but were in fact very inaccurate. Further, accuracy was unrelated to prior interaction among the members.

To summarize the research on anonymity and electronic idea generation, the research has shown that technical anonymity is generally beneficial for generating high idea quality and quantity. Some limited evidence, from manipulation check measures, suggests that participants' subjective experience of anonymity (i.e., social anonymity) was somewhat lower than the technical anonymity. But this lower degree of social anonymity did not seem to have an influence on the process of idea generation. In most of the studies cited above, however, the groups generally were not asked to reach consensus, nor to vote on the ideas they generated. In short, most of them did not actually make decisions. Studies that have considered the effect of anonymity on the convergent decision-making processes involved in solution choice and consensus reaching will next be examined.

The empirical work from this research tradition has generally shown that computer-supported communication, irrespective of anonymity, interferes with discussion and consensus formation. The difficulty has been attributed to the absence of feedback normally provided by nonverbal cues (Kraut et al. 1982; Short et al. 1976; Siegel et al. 1986; Spears and Lea 1992; Valacich et al. 1992), and to the additional time required for typing than for speaking (Siegel et al. 1986). The effects of anonymity per se on discussion and consensus formation has actually received little empirical attention, and Weisband notes that there is actually little empirical evidence showing that anonymity improves group decision making quality. At present, this writer is aware of four published studies on anonymity in consensus decision making and only one of these can really be considered recent.

Siegel et al. examined groups that discussed choice dilemma problems and made consensus decisions. They compared face-to-face groups with anonymous and identified computer-supported groups communicating through a synchronous conferencing program. The computer-supported group members were in different physical locations and the contributions of each individual group member were labeled with their computer terminal numbers. Siegel et al. reported no effects of anonymity on group process or decision outcomes.

In terms of the proposed anonymity model, these practices most affect the participant presence category of anonymity. Physically separating group members raises the degree of participant presence anonymity, as the physical separation makes it more difficult to know which people are in the group and which group members are participating at any given moment. At the same time, however, providing labels for participants lowers the degree of participant presence anonymity. Having these labels tells participants the number of people in the group and which ones are participating at a given moment. It is difficult to determine what effect, on balance, these countervailing forces had on the overall degree of anonymity in the Siegel et al. study. If the differences between their anonymous and identified conditions were not large in actuality, that might explain Siegel et al.'s null findings with respect to anonymity. They did not report any manipulation checks on the group members' perceptions of anonymity, so we can only speculate that since theirs were ad hoc groups, the degree of social anonymity was relatively high.

Hiltz et al. used a paradigm similar to the one Siegel et al. used. They too compared computer-supported anonymous and identified groups with face-to-face groups working toward consensus decisions for choice-dilemma tasks. The technology they used was also synchronous computer conferencing and they labeled the members of anonymous groups with pseudonyms. Their computer-supported groups were also in physically separate locations. An important difference between this study and the Siegel et al. study was in the research participants themselves. Hiltz et al.'s participants were managers from the same company who knew each other prior to the study, whereas the Siegel et al. participants were ad hoc groups of students. Hiltz et al. found that anonymous groups made less risky choices than did identified groups, but found no effects of anonymity on measures of group interaction process.

The degree of participant presence anonymity would be similar between these two studies. Hiltz et al. also did not report any measures on participants' subjective experience of anonymity. Following the Hayne et al. arguments, however, we might speculate that since the participants were pre-acquainted, their subjective experience (i.e., social anonymity) would have been lower than the technical anonymity. It might be reasonable to speculate further that for this reason, the overall social anonymity in the Hiltz et al. experiment may have been lower than that in the Siegel et al. experiment. If the anonymous participants in the Hiltz et al. study felt unsure that their contributions could not be attributed to them, they might have been inclined, consciously or unconsciously, to go out of their way to make socially desirable responses. Since Hiltz et al. reported that the corporate culture shared by all these participants was a conservative one, their finding that anonymous groups made less risky choices would be consistent with this reasoning. Moreover, the difference in anonymity effects from the Siegel et al. study may reflect that social anonymity is more important in ongoing than in ad hoc groups.

Weisband et al. also used synchronous computer conferencing to support groups in reaching consensus decisions on ethical dilemma problems. They compared four conditions: face-to-face; computer-supported identified; computer-supported anonymous; computer-supported mislabeled. Groups in all four conditions were of mixed social status. In the fourth, "mislabeled" condition, some of the high status members were purposely misidentified as being of low social status. The members of anonymous and mislabeled groups were identified by pseudonyms. Group members were physically located in the same large computer lab and Weisband et al. reported that the seating arrangements made it difficult for the anonymous participants to observe which specific individuals were members of their groups. These researchers reported no effect of anonymity on measures of participation and influence.

In manipulation checks, Weisband et al. asked the participants if they could determine the social status of the other group members (using their pseudonyms). A higher percentage of individuals in the anonymous condition correctly made this identification (22%) than the researchers would have expected, and an even higher percentage (54%) in the mislabeled condition made the correct identification. These data suggest that social anonymity was lower than technical anonymity in this study. Moreover, the practices of providing pseudonyms for the anonymous participants and having group members in the same physical location may have decreased participant presence anonymity. As

in the Siegel et al. study, one explanation for the lack of differences between the anonymous and identified conditions on participation measures may be related to the use of ad hoc student groups.

George et al. manipulated anonymity in a study that involved both divergent and convergent decision-making processes. In their study, participants generated potential solutions to the given problem using an electronic brainstorming tool. A second electronic tool was used to consolidate the solutions into a single list and a third electronic voting tool was used to choose the best solution from the list. It is important to distinguish between this convergent voting process and the consensus process used in the three preceding studies just discussed. In those studies, consensus was reached when all group members publicly agreed to a single alternative as a group. The George et al. study used a majority rule vote to choose the single alternative.

George et al. did not provide much detail on the manipulation of anonymity, reporting simply that "the GDSS was either *anonymous* or it was not" (p. 405). Presumably the manipulation involved technical anonymity where participant real names were not attached to their contributions. George et al. did report that members of anonymous groups were seated "with two chairs between them and the next person on either side" (pg. 405), to ensure that group members could not see each other's computer screens. The degree of technical anonymity overall appears to be high in this design, although it was not clear whether or not individuals could observe which other people were members of their groups. The researchers reported no measures of subjective perceptions through manipulation checks, but it can be inferred that social anonymity was low since the participants were ad hoc student groups. It is important to note that, of the studies which have examined anonymity in discussion and convergent decision processes, this is the only one to examine decision quality. Anonymity was found to have no main effects on discussion processes or decision quality variables.

Altogether, these four studies have generally found little effect of anonymity on group discussion processes and outcomes. In the studies that used nominal labels for participants, the actual differences produced between the anonymous and identified conditions may have been small.

4. FUTURE DIRECTIONS

The review of the empirical evidence about the effects of anonymity on computer-supported group decision making has shown that systematic differences in research procedures exist between the studies that have examined anonymity's effects on divergent decision-making processes and convergent decision-making processes. These differences have included the type of task, the type of technology, the physical arrangement of group members, and the operationalization of anonymity. Based on these differences, it is argued here that different kinds of anonymity may have been produced in the studies that examined divergent processes and the studies that examined convergent processes. Specifically, the more numerous divergent process studies seemed to produce high technical anonymity and slightly lower social anonymity. The convergent process studies may have produced lower anonymity in the category of participant presence. The degree of anonymity across the perspective dimension was generally unclear for both sets of studies.

These differences point to some useful directions for research on anonymity in computer-supported group decision making. For example, little information exists on the effects of complete technical anonymity on the convergent processes of discussion and choice-making (George et al. 1990 is an exception here). It is thus important to give closer attention to discussion processes under conditions of high technical anonymity because this is the operationalization of anonymity in the group support systems used most widely in industry and in research (e.g., GroupSystems: Dennis et al. 1988; Wagner et al. 1993). At the same time, there is also no information on the effects

of using pseudonyms on brainstorming. Take, for example, the Hayne et al. study where pre-acquainted groups could not identify accurately authors of comments in a brainstorming task. An interesting question is, would these participants' attribution accuracy have improved if their comments had been labeled with pseudonyms?

An often cited benefit of anonymity is the reduction of inequalities in participation and influence associated with social status differences (McLeod 1992, 1996; Rao and Jarvenpaa 1991). But the absence of identity cues removes some of the means of persuasion people are accustomed to in face-to-face communication. It is speculated here that participants in anonymous electronic discussions will thus seek ways to transfer into their text-based messages the persuasive functions served by nonverbal and identity cues in face-to-face discussion. In terms of the proposed anonymity model, this argument means that, in the face of complete anonymity, people will attempt to reduce social anonymity. When the accustomed tools of persuasion are removed by the imposition of technical anonymity, the immediate response may be to reintroduce the cues in other ways. For example, Holmes and Berquist (1990) have argued that knowledge of gender identity serves an important social regulatory function. They showed that when people participate in anonymous discussion groups over electronic bulletin boards, they generally create gender-based identities for themselves early in the interaction and seek the gender identities of others.

> Proposition 1: *In anonymous discussions for consensus decisions, people will find ways in text-based messages to reintroduce persuasive functions served by identity cues.*

Computer-mediated discussion in general is more difficult to coordinate than is face-to-face discussion (Kiesler and Sproull 1992; Rice 1984; Short et al. 1976; Siegel et al. 1986; Spears and Lea 1992; Sproull and Kiesler 1991; Valacich et al. 1992). The primary reason cited is the absence of nonverbal cues which regulate turn taking (Kraut et al. 1982; Short et al. 1976; Siegel et al. 1986; 1976; Spears and Lea 1992; Valacich et al. 1992) and direct attention (Kiesler and Sproull 1992). This results in discussion that is less efficient, less structured and less coherent (Kraut et al. 1982). Anonymity with respect to participant presence in particular would be expected to add to this general difficulty. As has already been noted, most of the limited research on anonymity in computer-supported group discussion has operationalized it by providing nominal labels, which may decrease participant presence anonymity. Little information is available on how complete anonymity, as operationalized by the most popular electronic group support systems, affects discussion coordination.

As in the previous section on persuasiveness, it is argued that anonymous groups will find substitutes for the coordinating function served by nonverbal and identity cues, such as making explicit coordination attempts or frequently polling members for their current opinions. Coordination activity is also important for task completion.

> Proposition 2: *In anonymous discussions for consensus decisions, people will find ways in text-based messages to reintroduce coordinating functions served by identity cues.*

It is intuitively appealing to posit that anonymity, specifically along the social dimension, would be lower within groups of previously acquainted people than within ad hoc groups. Although the Hayne et al. study found low attribution accuracy, their study only looked at one kind of anonymity manipulation. Their findings do not rule out the possibility that the degree of social anonymity would be affected by group history.

> *Proposition 3: The degree of anonymity along the social dimension will be affected by aspects of group history such as the degree of acquaintance among the members.*

As members participate together in anonymous discussions over time, perhaps the degree of anonymity they perceived to exist among them will change (Walther 1993, 1994). It is reasonable to suggest that the most likely

direction of change would be lower anonymity. Despite technical anonymity, people may be able to form impressions of the characters participating in a discussion (Baldwin and Holmes 1992; Holmes and Berquist 1990) and this ability may be facilitated by certain conditions of anonymity more than others. For instance, pseudonyms, which may decrease participant presence anonymity according to the present model, might help in the process of impression formation.

> Proposition 4: *The degree of anonymity, along the social dimension in particular will tend to decrease over time.*

5. CONCLUSION

The model proposed here can help not only in guiding future research efforts but also in making recommendations for practice. For example it would be useful for facilitators of electronic meetings to know how much background about meeting participants should be shared within the group in order to help information sharing while preserving anonymity (cf. Bostrom et al. 1993). If it were found that anonymity tended to decrease over time within an ongoing task group, specific procedures might need to be considered if a group needs to preserve its anonymity. Another question related to the role of time is the differential impact of anonymity on asynchronous versus synchronous communication (cf. Hiltz and Turoff 1992). Anonymity may be preserved longer under asynchronous communication, but at the same time might also increase even further the coordination difficulties. The specific kinds of anonymity that would be most effective under conditions of asynchronous communication would thus be an important question to address. The model presented here can direct future efforts to address such questions as suggested here.

6. ACKNOWLEDGEMENTS

Helpful comments from Scott Elston, Bob Baron, Murray Barrick, Lola Lopes, Jerry Rose, and Joe Walther are gratefully acknowledged.

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