

CONTENT FACTORS INFLUENCING ACCURACY OF AUTHORSHIP
ATTRIBUTIONS FOR ANONYMOUS, MEDIATED BRAINSTORMING COMMENTS

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ABSTRACT

Attributions about the identity of anonymous comments' authors in 32 small groups using a Group Support System were significantly more accurate than chance guessing, and were influenced by greater average strength of prior group communication, less perceived anonymity, and more humorous comments, but not by vividness and length of text.

FOUNDATIONS AND HYPOTHESES

A consequential feature of some Group Support Systems (GSS) is the "anonymous" condition, i.e., individuals can create messages and express preferences or vote without identifying themselves or being identified by others. Potential advantages of anonymous participation include decreased evaluation apprehension, decreased member domination, decreased conformance pressure and decreased status competition, which can lead to increased exploration of alternatives and surfacing of assumptions, resulting in an increase in group production and satisfaction (Connolly et al., 1991; Hiltz et al., 1989; Jessup et al., 1990; Jessup & Tansik, 1991; McLeod, 1997; Pinsonneault & Heppel, 1998; Weisband, 1994). Potential disadvantages include social loafing, failure to listen, disinhibition, lack of accountability, risk of breach, hidden credentials, de-individuation, and poor socialization, which can lead to decreased effectiveness and group dissatisfaction (Gavish & Gerdes, 1998; Valacich et al., 1992). A participant's social experience of anonymity may not completely correspond to the technical implementation of anonymity. Might participants really try to determine who has typed in a particular message in a technically anonymous GSS session, with any level of accuracy? Recent studies (Bhappu et al., 1997; Connolly et al., 1991; Hayne & Rice, 1997; Jessup et al., 1990; Scott et al., 1999) have found mixed evidence.

Attribution theory argues that people make attributions about others and use these attributions to predict and evaluate actions (Kelley, 1967). However, a wide range of cognitive biases and errors exist, implying both inaccurate attributions and inappropriate evaluations, potentially influencing social decision-making (Blount, 1995; Hayes & Hesketh, 1989). H1: Members of GSS groups will (H1a) make attributions and (H1b) make accurate attributions as to authorship of technically anonymous comments. Salient, especially vivid, cues are the basis for forming impressions and evaluating others (Taylor & Fiske, 1978). In spite of research that presumes CMC and GSS filter out

most such social cues, some researchers argue that text-based media may still convey substantial emotional and personal content (Rice & Love, 1987) and that users may develop ways of increasing social cues over time (Walther, 1992). H2: Attributions of the source of technically anonymous comments are more accurate for more (H2a) vivid, (H2b) longer, and (H2c) more evaluative and detailed comments. In line with Walther's (1992) propositions about impression development in computer-mediated interactions, and Rice's (1987) discussion of the importance of network structure for understanding the use of computer-mediated systems, greater interaction among group members should provide a stronger basis for identifying otherwise technically anonymous comments from other members. H3: Accuracy of attribution of authorship of technically anonymous comments is positively associated with (H3a) longer membership in a group, (H3b) greater strength of one's prior communication within the group, and (H3c) greater centrality in the group's prior communication network. Perceptions and importance of anonymity in a GSS session may vary across individuals, and thus may influence the extent to which a participant will put effort into making attributions, or believe that their, and others', attributions are more or less accurate (Scott et al., 1999). H4: Accuracy of attribution of authorship of technically anonymous comments is (H4a) negatively associated with greater perceived anonymity, and (H4b) positively associated with greater importance of anonymity.

METHOD

Participants were MBA students engaged in an 18 month, intensive, full-time program, where students were encouraged to form groups for the duration. A total of 32 groups were formed: 9 groups of three, 18 groups of four, and 5 groups of five persons. The experiment was conducted six months after the beginning of the program. The GSS used was Group Systems™ (Nunamaker et al., 1991). The tool within Group Systems used to gather technically anonymous comments for this study was Topic Commenter, which supports idea sharing through textual comment entry about user-selectable topics during brainstorming sessions.

When all participants at each separate session were settled, the participants were given a pre-session communication network roster that asked each subject to indicate the extent to which they had previously communicated with each other listed member of the group on any topic, using any communication channel (from 0=never to 7=several times a day). A "who-to-whom" matrix was constructed from the pre-session communication roster indicating the level of interaction each group member *i* reported having with each group member *j*. The mean total communication divides the column total (a more reliable measure than using row data, because it does not rely on the single respondent's possibly systematically biased reporting) by the group size less one (to control for different numbers of potential communicators across the groups) ($M=3.95$, $sd=1.1$). The standardized betweenness centrality measures the extent to which each group member lies on the shortest communication paths between all other pairs in the group (Freeman, 1979) ($M=.57$, $sd=.31$).

The facilitator then discussed the pros and cons of traditional and electronic meetings. The various tools in Group Systems were then demonstrated and the entire class was asked to log into Group Systems (and thus their groups). They were then specifically instructed to "discuss four issues relating to your feelings about privacy and ethical use of information in the work environment" (each in its own window): Keeping a secret record on your employees; Monitoring e-mail of your employees without their knowing it; Copying commercial software from a friend who has bought it;

and Automating some employees out of their jobs to save money. The session consisted of members entering comments under each issue and reading and responding to other members' comments, in whatever order they chose. There was no indication via the GSS features as to who entered which comment; i.e., the comments were technically anonymous. The Topic Commenter session for each group lasted 45 minutes.

A post-session questionnaire included three topics. The first was individual-level questions, including age of the 124 participants ($M=31.5$ years, $sd = 5.9$); years since undergraduate degree ($M=8.0$; 5.8); and gender (51% were female); Duration of group membership (in months) ($M=4.0$, $sd=1.2$); Perception of anonymity (how anonymous they felt they actually were during the Topic Commenter part of the meeting, from 1=not at all to 7=completely) ($M=3.5$, 1.9); Importance of anonymity (how important it was to them for the Topic Commenter part of this meeting to be anonymous, from 1=unimportant to 7=crucial) ($M=3.5$, 2.3).

The second was a listing of all the actual comments participants entered for their respective group (added to the post-session questionnaire template 10 minutes before the end of the comment and discussion session). The number of comments for each group ranged from 17 to 72 ($M=36.1$, $sd=13.9$) and was not correlated with group size ($r=.03$). Vividness of each comment was coded by an independent rater, who was blind to the experimental conditions, assigning a number from 1 to 5 depending on how "vivid" the comment was ($M=2.3$, $sd=.76$). An example of a highly vivid comment is: "Probably, you see, when I confronted her, she told me she took the money to pay her fuel bill, she had run out of oil to heat the house, and her kids were cold, this was in Yellowknife. Do you think I'll rot in H...?" Coding of a random sample of 122 comments by one of the researchers produced a Scott's inter-coder reliability pi of .74%. The number of words in each comment was counted, not including common "stop" words ($M=19.5$, $sd=15.2$). Evaluative tone of each comment was coded by an independent rater using Connolly et al.'s (1991) group discussion coding scheme, which included Proposes Solution; Supportive Remark; Supportive Argument; Solution Clarification; Problem Clarification; Critical Remark; Critical Argument; Query Solution; Query Proposal; Humorous remark (added to the coding scheme); Remark about the system or its operation; Remark about the interpersonal processes of the group; Remarks that are "off the topic"; and Uncodable text. The same sample of 122 comments produced reliability pi of .72%. Presence of cues was indicated by responses to an open-ended question asking whether there were any events during the meeting that made it easy for the respondent to identify others' comments.

The third was a list of each of the participant's group members with a sequential letter assigned to facilitate the process of assigning authorship to the comments. Participants were asked to make their best guess as to which participant contributed each listed comment. Participants were advised that during the debriefing the following week their accuracy in identifying comments would be reported and the first, second and third place individual and group winners would be recognized in class. In the event that a participant was not completely sure who had made the comment, they were instructed to "please leave the entry blank". These procedures conform to recommended practice (Dodson & Johnson, 1995). After the groups had left the laboratory, but before the Topic Commenter software was shut down, we coded which workstation (and therefore which participant) had entered a particular comment. Number of attributions made by each participant was counted from the surveys. For each comment listed on the comment questionnaire, if person i makes an attribution of authorship to person j then i gets a 1 if correct, 0 if incorrect; the total is summed over all

attributions made to j , and then divided by the total number of attributions person i made, constituting average normalized attribution, or Accuracy G (guessing). This does not presume that i should make attributions to every comment; it only considers when i does make attributions. In this case, if i did not make an attribution for a comment, the value is set to missing, so that non-attributions do not count either as accurate or not accurate. There was no correction for random (as opposed to well-intentioned) guessing (though we do test mean group accuracy scores against chance accuracy for H1b). (We also computed and analyzed Accuracy NG, no guessing, by setting the value, if i did not make an attribution, to zero, but these two measures were highly correlated, $r = .82$, $p < .005$).

RESULTS

The percent of all comments attributed by members of a group ranged from 25% to 64%, with the percent of group comments that individuals attributed authorship to ranging from 9.3% to 100%, and number of group mean attributions from 7.3 to 39.3 ($M=17$, $s.d.=6.1$). These results provide support for H1a. Group mean accuracy ranged from 39-83%, with an overall mean of 57% ($sd=.23$) accuracy across the groups. In a test of accuracy with chance guessing (defined as $1/n-1$, where n = group size), overall and for groups of each of the three different sizes, individuals were significantly more accurate (overall mean chance = .35, $sd=.08$; $t = 11.8$, $p < .000$) than expected by chance guessing. These results provide support for H1b. Neither group size nor the number of comments selected for that group's questionnaire was significantly correlated with individuals' mean accuracy of attributions.

Several people wrote in observations about available social cues such as, "how people express themselves"; "the way they write"; "grammar"; and "just the type of comments led me to assume I knew the person." There is no significant correlation between vividness of (H2a), or numbers of words in (H2b), the comment and accuracy of the attribution. These do not change when considered separately for each type of comment, showing that these results are not contingent on comment content. The comments that participants most significantly accurately attributed were humorous remarks (overall $F=2.5$, $p<.01$), which are the most vivid (overall $F=5.8$, $p<.005$), but almost the shortest kind of comment. These results provide support for H2c.

There is no significant correlation between accuracy and months in the group, rejecting H3a. Mean prior communication was significantly positively correlated with accuracy ($r=.22$, $p<.1$), supporting H3b. People did not feel particularly anonymous, and were not very concerned that these comments should be anonymous, and there were no statistically significant differences among the groups on these measures. Mean communication was positively correlated with months in the group ($r=.45$, $p<.05$) and negatively correlated with perceived anonymity ($r = -.34$, $p<.05$). Network centrality was not significantly correlated ($r=.15$) with attribution accuracy, rejecting H3c. The more that people felt they were anonymous in the GSS session, the less accurate were their own attributions ($r = -.20$, $p<.05$), supporting H4a, while the importance of anonymity to the participants was not significantly correlated with their accuracy ($r = -.03$), rejecting H4b. In a final summary stepwise multiple regression, only mean communication remained as a predictor (standardized Beta = .22, $p < .01$), explaining 4% of the variance ($F=6.1$, $p<.01$), supporting H3c.

DISCUSSION

The results raise at least three important issues. First, what is the influence of attributions in general, and misattributions in particular, on individual evaluations of comments and thus individual decision-making choices in technically anonymous GSS settings? Second, it may well be that due to the levels of accuracy, individual variations, mediation by the GSS, and low general influence of individual attributions on group decisions, that the practical implications are minimal. And third, to what extent have variations in social anonymity in prior technically anonymous GSS studies contributed to the overall contradictory (or even null – see Postmes & Lea, 1998) results of such studies?

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