

Information Sharing As Story Construction in Group Decision Making

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ABSTRACT

Prior research in group decision-making has shown that group members tend to share and focus on the information that is known to the majority of the group but keep the unique information unshared. Tasks created to study this information pooling phenomenon are referred to as hidden profile tasks. A recent hidden profile experiment showed that group members constructed stories to reach their group decision. The study discouraged this storytelling approach and suggested that technology mediation could provide a way to reduce the likelihood of using this approach in discussion. While our experiment confirmed this story construction approach, we found that in the story construction process the participants considered the important arguments as well as different perspectives. We therefore suggest that the story development approach is rational and that the Story model, an existing group process model well-documented in jury decision making literature, could shed light on the design of collaborative technologies that accommodate or improve such a discussion approach.

Keywords

Guides, instructions, author's kit, conference publications.

INTRODUCTION

One prominent phenomenon in group decision making is that members tend to share information that is already known to the majority of the group and keep unique information unshared (Stasser & Titus, 1985). The unique information that is left unshared and paid little attention to during the group decision making is referred to as "hidden profiles". This phenomenon is found to be robust across various kinds of group activities and researchers have

explored various factors that contribute to the phenomenon, such as the level of members' domain expertise (Stasser, Vaughan, & Stewart, 2000), and social status (Larson, Christensen, Abbott, & Franz, 1996; Stasser, Vaughan, & Stewart, 2000). A recent meta-analysis by Lu, Yuan, and McLeod (2012) synthesized the past twenty-five years of hidden profile studies in social science and psychology. Their meta-analysis showed that despite many efforts to explore the factors of the phenomenon, often the analysis of information pooling is limited to counts of information items in the group discourse. The authors called for future studies to examine discussion content more closely in studying hidden profile tasks.

One recent approach to investigating the discussion content in a hidden profile task is to study the group's discussion style. Introne and Drescher (2013) developed a computational technique to automatically detect topics in the discourse of such a task and examined how the topics evolved during the discourse. They found that naturally conversing groups appeared to work together to combine their information to develop a story, and that to some extent the development of the story helped the groups make a decision. In discussions mediated by their tool, on the other hand, the tendency of participants to use a story in the decision-making process was diminished. Introne and Drescher maintained that while creating a shared and agreeable story seemed to be a recurring theme in natural group decision-making process the arrived at decision did not necessarily reflect the 'best' story. By showing that the mediated discussion exhibited a diminished "story development" processes they implied that the design of group decision making tools should consider techniques that discourage such story construction behavior.

After reading Introne and Drescher's paper, we wondered: is this "story development" style replicable in other non-mediated hidden profile tasks? If so, are these processes irrational and should we discourage them when designing the collaborative technologies to support group decision making tasks? To help us explore answers to these questions, we analyzed four face-to-face hidden profile group discussions that are part of a hidden profile experiment being conducted in our research lab. We coded

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this corpus using a coding schema similar to Introne and Drescher's (2013).

CORPUS AND ITS BACKGROUND

The group discourses in our analysis were from a lab experiment in which four participants discussed face-to-face to solve a murder case; they needed to identify the murderer from four suspects. The scripts were different among the four members, containing both shared information that was common to all members of a group, and unique information that was possessed by only one, two, or three members of a group. In total, there were 58 pieces of information: 35 were shared among all members of the group, 4 among three members, 5 among two members, and 14 were kept to only one group member.

Members had 15 minutes to read the scripts and take notes prior to the group discussion. During the discussion period, the members only had the notes with them and were not allowed to show their notes to other group members. The group discussions were video recorded and transcribed. We analyzed four transcripts in this paper.

Members had all lived in either Canada or the United States from birth to at least age 18 and spoke English as their first language. They received CAD\$10 as reimbursement for their participation, and the teams that obtained the correct answer to the puzzle were entered into a draw to win a \$100 prize (note: the draw has not taken place as the experiment is ongoing).

ANALYSIS OF GROUP DISCUSSION

In identifying the topics in our data, we adapted the model described by Introne and Drescher (2013) to better fit an in-person discussion model. The criteria of coding topics in a discussion were developed through an iterative coding process in collaboration between the two authors. During this process, both authors reviewed and coded the transcript of one discussion, and divided it into topics based on their understandings of that term. The authors then compared their divisions of the topics and discussed any differences between them, both in terms of when and where the topics were divided in the transcript, and in terms of what constituted a new topic vs. a return to a previous topic. After several such iterations, the authors arrived at the comprehensive criteria for coding topics in participant discourse that are described below.

According to our criteria, a topic within the discussion should a) be consistent in concept throughout its duration; b) end when the concept broke and a new, clearly distinct concept was introduced to the discussion; and c) be clearly identifiable when (or if) that topic was reintroduced at another point in the discussion. With respect to topic convergence situations, we considered that two topics converged and became a single topic when the concepts underlying both topics were brought together into one new thread or 'concept' within the discussion. Topics could converge multiple times, and more than two topics could

converge at once (although this occurred with relatively low frequency). We differentiated the topic growth situation from the topic convergence one; a topic "grew" when the idea underlying the topic was added to in some way by a new piece of information that was new to the discussion.

For each group discussion, we arranged the topics linearly along the timeline in which they appeared in their original discussion, and made associations where the topics were: (1) returned to at a later point in the discussion, (2) converged into a single topic, and (3) added to one, or more, times across the length of the discussion.

Among the four group discussions, we also examined whether there were topics that appeared in multiple discussions and the frequency with which this occurred.

RESULTS

Our analysis results indicate that a story construction approach does seem to be common in non-technology mediated situations. However, our participants considered important arguments and different perspectives (with respect to the decision problem) while constructing their stories. To illustrate this, we plotted the progression of topics of the four group discussions in Figure 1.

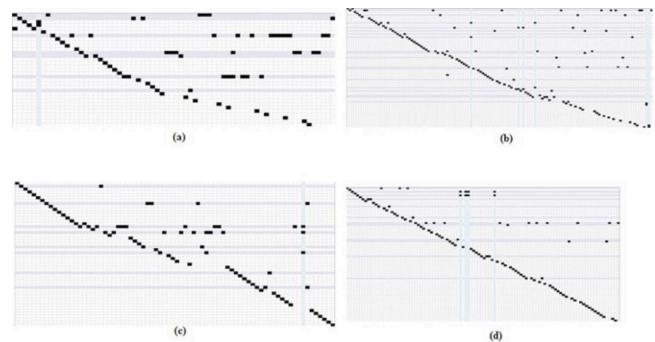


Figure 1. The Progression of Topics in the Four Group Discussions (a, b, c, and d)

In the figure above, rows represent discrete topics that arose during participant discussion, with each new row representing the appearance of a new topic in the discourse. New rows were added in descending order (with the first topic discussed appearing at the top of the graph and subsequent topics appearing below it). Columns in this figure represent changes in topics over time. Unlike the rows, which represent only the appearance of new topics in the discussion, a new column was added to the graph every time there was a change of topic in the discourse – whether the topic brought up was new or recurring. Black marks were added to indicate which topic that was being discussed at each point in the discourse. Returns to a previous topic or elaborations on a previous topic are thus shown as black marks in different columns on the one row representing that topic (highlighted in purple for ease of reading). Convergences of topics in the discussion, in which two topics are connected by the participants in some manner,

are shown as two or more black marks aligning in a single column (highlighted in blue).

In spite of the brevity of the information collected on topic evolution patterns, it is clear that there is a storytelling trend – where one topic (or several topics) were seized upon and elaborated progressively over the course of a protracted discussion. It is equally clear that this is a component of the decision-making process; all the groups tended to return to seminal topics and build upon them until they arrived at satisfactory answers (i.e., the occurrences of the black boxes on the same row in all four graphs). As mentioned earlier, this hidden profile task was to identify the murderer from the list of suspects. The topics that the groups tended to return to and build upon were mainly about the possible group decision, i.e., who among the four suspects would be the murderer. The four groups consistently discussed and added to the topics about the four identified suspects in the script. The other expanded topics, while less consistent, were also about the possible group decision as they considered as suspects individuals whose information appeared in the script but were not identified as suspects by the experimenters.

These topics were approached numerous times at different points of the group discussion. They were approached in two ways: a) from the perspective of a suspect being innocent; and b) from the perspective of a suspect being guilty. The analysis result also suggests that generally the groups identified the murderer as whom they have discussed more reasons for guilt than for innocence (with the exception of Group 4). The groups also seemed to spend more topics discussing strong contenders for the guilty party.

DISCUSSION AND CONCLUSION

Consistent with Introne and Drescher's (2013) study, our topic evolution analysis of the four group discussion transcripts revealed the groups' strong tendencies to construct a story in the reaching of a decision. However, while the groups may not have selected the best option available, our results do not support Introne and Drescher's (2013) idea that their face-to-face approach lacked rationality. The frequent returns-to-topic patterns that can be seen in the figure show a clear and iterative process that was supported by their story-like discourse evolution. Groups in no way disregarded available evidence and, indeed, seemed to value it enough to return to some facts several times in an effort to understand their significance. Particularly in the cases where a potential suspect was (or the potential suspects were) being discussed, the groups would return to that topic multiple times, discussing it from different angles and working collaboratively to use their shared and unique information to formulate a scenario (story) that fit the evidence and allowed them to make a decision. The recursive, collaborative and dynamic nature of group discourse, as supported by a story-building approach to decision-making, appears to be strong and

rational; it does not support the implementation of software that promotes a breakdown of this "story development" process.

Furthermore, a review of the literature shows that similar "story development" approaches to decision making are present in a number of other disciplines, suggesting that this is a natural and ingrained process. For instance, a review of the juror decision-making literature shows well documented "story development" processes in juries during deliberation. Developed by Pennington and Hastie (1991), the Story Model states that jurors arrive at a verdict as a result of a story construction process consisting of three distinct steps: (1) the construction of a story to integrate the evidence and arguments into a representation from which a decision may be made; (2) the construction of verdict categories to represent a juror's understanding of the possible decision outcomes with respect to their story; and (3) the comparing of the constructed story to the verdict categories to determine the best fit of story to outcome. A failure to find appropriate fit results in a verdict of 'not guilty'.

In their initial efforts to construct this model, Pennington and Hastie (1991) used interviews as a way of analyzing the jurors' mental representations. Their analysis coded 'events' to group the participants' trial-oriented statements and inferences, as well as 'nodes' by which disparate events were linked. These two codes are analogous to our 'topics' and 'convergences' respectively. In an approach very similar to the one taken in our study and in Introne and Drescher's (2013) study, these events and nodes were graphed and assessed for patterns within and between decision groups. Analyses suggested a story structure to the jurors' approaches rather than an adherence to other hypothesized structural representations, regardless of the manner in which the information was presented to them - still more evidence of the persistence and power of this decisional model in human psychology. Pennington and Hastie (1991) also showed that story construction was performed throughout evidence presentation in order to arrive at a verdict, rather than as a means of justifying that decision post-hoc.

The discussions between groups' members in our experiment that mirrored those detailed by the Story Model (Pennington and Hastie, 1991) are analogous in two additional aspects. For one, in all four groups of our study there was a distinctly higher ratio of information sharing topics to speculation-type topics early in the discussions, which then reversed as the discussion progressed such that speculation dominated over information sharing. This seems more than coincidentally analogous to steps 1 and 3 in Pennington and Hastie's Story Model, where in step 1, raw information is used to develop a story, and in step 3 the story is 'best-fitted' to an outcome, with guilty-verdict rejections occurring where insufficient evidence was available. Additionally, it is clear that the groups regarded the importance of information relevant to their shared 'Story' as highly as Pennington and Hastie observed in

individuals in another study they performed. This is evident in the over-representation of guilty characters (or, more accurately, of characters deemed guilty by each group) to innocent characters in discussion. For instance, group 4 (the only group to get convict the correct suspect) discussed topics related to that suspect's guilt 11 times, while discussing such topics for the other suspects 4, 3 and 2 times in descending order. Similarly, group 3 discussed topics related to their guilty suspect 13 times, and 7, 5, and 3 times for their other suspects. This further supports an adherence to a story, rather than to evidence, in group decision-making.

Our results and the Story Model suggest that the story construction approach can be rational in, and important to, group decision-making processes. Therefore, it may not be the best design strategy to discourage it when designing the group technologies. We encourage designers to explore ways to enhance a story model approach, working to facilitate and increase its positive outcomes.

In addition to what is known, and has been learned, about the Story model, such a design might be able to account for some of the factors that have not yet been thoroughly examined in decision-making research and support; Hastie (2001) discusses a number of these areas in detail in his review of the literature. He points out, for instance, that very little is known about the factors determining inclusion of one reasoning branch into a mental 'decision-making tree' over another branch; it is clear that very seldom are all consequences considered relevant in decision-making, but it is not known what makes a consequence relevant. The Story Model addresses this as a matter of relevance-based memory, wherein adherence to a developed story results in increased probability of inclusion in a final decision. The Story Model's 'best-fit' principle also applies to other decision-making paradigms – essentially supporting the idea that strengths of relationships between factors and the accepted story determines the likelihood and strength of inclusion in decision-making. This ability to account for and accommodate determinants could be invaluable. At another point, Hastie (2001) made the observation that very little has been discovered regarding the determinants which dictate a changing point for decision-making – that is, the factors which make a specific event desirable in one circumstance and undesirable in another, are poorly understood. Again, this can be addressed, at least in part, by the Story Model's 'best-fit' ideation. Finally, the factors determining the evolution of a decision-making situation over prolonged periods of time are still unknown – and certainly a strong model of collaborative technologies must be able to accommodate the changing situations and outcomes created by such factors. While the Story Model as presented by Pennington and Hastie (1991) does not address this directly, there are indications in several efforts

(including the present study) detailing the Story Model (Introne & Drescher, 2013; Penning & Hastie, 1991) that convergence of ideas plays a role in topic and decision evolution.

The small sample size is a major limitation of our findings. We are conducting additional sessions to further examine this story construction approach and the potential of designing information technologies to support it.

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