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Biased Group Decision-Making and the Effect of Computer-Mediated Communication: Separating the effects of Anonymity, Voting and Blind Picking

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Abstract. The influence of communication technology on group decision-making has been examined in many studies. But the findings are inconsistent. Some studies showed a positive effect on decision quality, other studies have shown that communication technology makes the decision even worse. One possible explanation for these different findings could be the use of different Group Decision Support Systems (GDSS) in these studies, with some GDSS better fitting to the given task than others and with different sets of functions.
This paper outlines an approach with an information system solely designed to examine the effect of (1) anonymity, (2) voting and (3) blind picking on decision quality, discussion quality and perceived quality of information.

Keywords: Hidden Profile, Group Decision Making, Computer-Mediated Communication, Computer Support, Information Sharing, Design Science, Anonymity, Voting, Blind Pick, Social Validation, Conformity Pressure, Ownership Bias.

1 Introduction and Motivation

Decisions today are getting more and more complex, so most decisions are made in groups [1, 2]. The idea behind this is simple; more people got more unique information and should therefore make better decisions. Thirty years ago Stasser & Titus [3] have shown, that most of the unique information is not shared in group discussion which leads to poor decisions. This has impact on e.g. companies, public institutions, governments and individuals, everywhere where decision means an investment of resources, time or money.

In 2004 Wittenbaum et al. [4] made a review of the literature on collective information sharing and predicted that communication technology may address these problems and help increase the decision quality and the sharing of information during group discussion. In addition to these predictions Lu et al. [5] published a meta-analysis of the last 25 years of hidden profiles in group decision-making in 2012 and described an effect of computer-mediated communication on discussion quality and decision quality. But the results of these studies are inconsistent and neither of these

effects could be reported in the meta-analysis. Some studies report that computer-mediated communication improve information sharing compared to face-to-face (FTF) communication during group discussion [e.g. 6, 7]. Other studies have shown a decrease in information sharing and group performance compared to FTF communication [e.g. 8–10]. A possible explanation for these inconsistent results could be the use of Group Decision Support Systems (GDSS) in these studies. Different GDSS have been used with a different set of features each. Some of them could have assisted the given task less than others, leading to negative results. The fitting of communication technology to the given task is important to provide any benefit [11]. In addition to this it is difficult to separate different effects for single features e.g. anonymity because each GDSS offers a bundle of features.
This paper will outline a theoretical approach to design and evaluate an artifact, which will encounter these problems and separately examine the effect of anonymity, voting and blind picking on decision quality, discussion quality and perceived quality of information.

2 Theoretical Framework

Group decision-making research has shown that different kinds of biases influence group decision-making and therefore reduce decision quality. This study will focus on three of these biases. (1) The ownership bias, which describes the effect of the ownership of information on the perceived quality of information. The owner of a information rates the quality of his own information higher than the information from others [12, 13]. (2) Another type of bias is the effect of conformity pressure. Group members tend to only share information, which is consistent with the opinion of the majority to keep group conformance. Sharing of information supporting a minority opinion is prohibited [14, 15]. (3) And the social validation bias which assumes, that shared information is discussed more frequently than unshared information because shared information can be socially validated from more people [16–18] and thus leads to a higher perceived quality of this information [19].

As stated before computer-mediated communication may help to improve these impairments. In particular the effects of anonymity, blind picking and voting. Anonymity may lead to a decrease in conformity pressure and an increase in sharing of information supporting a minority [20]. Additionally anonymity may decrease the effect of the ownership bias because the shared information is assigned to the group instead of a single person. Another possibility to decrease conformity pressure is to use computer-mediated communication to avoid letting group members know if they are part of the majority or minority. They have to pick their option blind, without knowing the preferences of the other group members. To assist social validation and therefore increase the acceptance and perceived quality of information a voting system will be used where the participants can up-vote helpful information and social validate them in this way. Table 1 gives an overview of the presented hypotheses in this chapter.

Table 1. Hypotheses overview

H1a	Anonymity may decrease conformity bias and increase information sharing
H1b	Anonymity may decrease ownership bias and increase the perceived information quality of not-owner pieces of information
H2	Blind picking decreases conformity pressure and increases information sharing
H3	Up-voting increases social validation and the perceived quality of information

3 Research Method

The research described in this paper will be structured after the Design Science Research Methodology Process Model[21]. Following this model, the first chapter of this article has shown the problem identification and motivation, followed by a definition of objectives for a solution and a theoretical framework for the artifact design. The next chapter will describe the design and implementation of the artifact. In chapter five a detailed explanation of the artifact evaluation and measurement of performance is given using hidden profiles paradigm as a methodological approach.

4 Artifact Design

To encounter the problem of getting different results for different available GDSS a new web-based artifact is solely designed for this research project. The artifact will allow multiple instances of group decisions with a group size of four. A moderator can then assign participants to these group decisions. Each group decision provides basic functionalities to vote for one of two options and share information with the other users. Additionally each group decision can be configured with a different set of three possible features (table 2), which can either be enabled or disabled. Information can be shared anonymously or with the full name of the user. The second feature shows or hides the result of a pre-discussion voting and the user have either no option to rate the shared information of other users or the option to up-vote shared information. Depending on the experiment there can be none of the options enabled or any possible combination. The following Table 2 shows the possible features in an overview.

Table 2. Overview of the artifact features

		Disabled	Enabled
Features	**Anonymity**	Information is shared with the full name of the group member	Information is shared anonymously
	Blind Pick	Results of the initial vote are visible to all group members	Results of the initial vote are hidden to group members
	Voting	No option for rating shared information	Option for up-voting shared information

5 Performance Evaluation

The artifact has to be evaluated for different feature sets. In a first setting the artifact will be evaluated in the basic configuration with no features enabled (table 2). This consists of information sharing by full name, a group wide result of the initial voting and no up-voting option for shared information, versus groups discussing the same options in FTF meetings. The results will be used as reference values for the forthcoming evaluations. In a second setting only one feature (table 2) per group decision will be enabled and evaluated. The evaluation results of each feature will be compared to the results of the basic configuration to measure the effect of each feature. In a final setting each possible combination of the features will be evaluated. Compared to the results from the single-feature evaluation the interaction effects of the features can be described. Finally all evaluated feature combinations will be compared to the FTF group results to find the best possible feature combination. To provide any benefit for group decisions the performance of the best configuration of features has to be at least as good as the performance of the FTF groups.

For performance evaluation the decision quality, discussion quality and the perceived information quality will be measured for different feature sets of the artifact. Therefore the hidden profiles paradigm will be used with a decision task consisting of two options [22, 6]. The first option contains eight positive, four neutral and four negative pieces of information. A second option is given with only four positive, eight neutral and four negative pieces. Taken all pieces of information together the first option is more positive than the second option and should be preferred. To validate the valence (positive, neutral, negative) of the information pieces a pretest will be held with a larger set of information pieces and only the pieces with the highest reported valence will be selected for artifact evaluation.

At the beginning of evaluation the participants will be assigned to groups of four participants each and get a written introduction, which contains a predefined set of

information. The containing information is either shared or unshared. Shared information is common and known to all group members. Unshared information is unique and only possessed by one group member. The initial information distribution is manipulated to favor option B and only if the unique, unshared information is shared with the other group members option A can be identified to be the better option. Now the group members start to use the artifact. In an initial vote for one of the options the pre-discussion preference of the group members is determined. After voting the group members can start using the artifact for discussion. Therefore the artifact provides predefined features (Table 2). When the group members have decided that enough information is shared or a given amount of time has passed, all group members have to vote again for one of the options. After post-discussion voting every group member has to rate the perceived quality of all information, shared and unshared, for both options to determine the perceived quality of information [18]. Decision quality will be measured at which ration the group members succeeded to detect the hidden profile and vote for the better option A [4]. Additionally the discussion quality will be measured at which ratio unshared information is mentioned through group discussion.

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