

Induced Cooperation in E-Collaboration

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INTRODUCTION

Groups are increasingly using collaborative technology such as a group decision support system (GDSS) to communicate electronically. Electronic communication channels may influence the behavior and strategy that individuals in a group employ to share information and collaborate (Barua & Whinston, 1995). When members in a group are not cooperative, they can become competitive; they may play games to maximize their rewards at the expense of others in the group; some individuals may even exchange untruthful information and utilize the information asymmetry to maximize their own rewards at the expense of others.

A task that is often faced by organizational decision makers is a mixed-motive negotiation task (McGrath, 1984) where the parties have mixed motives: cooperate and compete. For a mixed-motive task, a GDSS should anticipate the games that members may play and provide decision-modeling tools and incentive structures that discourage dysfunctional gaming behavior to encourage truthful information exchange.

This paper presents a game theoretic view of collaborative work and suggests that the design of effective GDSS tools should be guided by the way the tool discourages dysfunctional gaming behavior. We present an illustrative experimental study that investigates the influence of communication channel, incentive structure, and problem modeling tools on decision performance, diversity of solutions, and information exchange truthfulness in collaborating groups.

BACKGROUND

A GDSS may help disseminate information to group members, but it cannot force the group to “think” (Dennis, 1996). Thinking is a form of information processing and providing a problem-modeling tool that will process the input data parameters to generate information can aid the group members to “think.” The effectiveness of a problem-modeling tool depends on the quality of the underlying parameters.

Each individual in a group has his/her own set of objectives, private information, and interpretation of the problem. Nevertheless, each must develop a consistent shared interpretation of the problem. A GDSS may help the group members develop a shared interpretation, but it cannot help identify an optimal solution if group members do not share their private information or if they exchange untruthful information.

Problem-modeling tools of a GDSS can incorporate incentive structures that affect the decision-making process and outcomes. Incentive structures can influence the strategy that individuals employ to protect their stakes in the organization, the decision of whether or not to share information, and the decision of what type of information to share. Electronic communication may affect the truthfulness of the information that members in a group exchange in an effort to develop a shared cooperative context (Zack, 1993). In the absence of a shared cooperative context, members may misrepresent their information and engage in deceptive behavior to engage in a game to mislead others in an effort to maximize their individual payoffs, sometimes at the expense of the group's payoffs.

A GAME THEORETIC VIEW

We view a GDSS group interaction as an N -person game where $v(N)$ is the worth of the N individuals working together for a *grand* coalition. This coalition involves all N members and provides the highest total payoff. It is possible for some members to form their own coalition instead of working within the grand coalition scheme. In this case, $v(S)$ for $S \subseteq N$ is the worth of coalition S .

A group is often created because the members can achieve a higher outcome if the N individuals work together than if they work alone. That is, there is synergy between group members and the effort of members has a super-additive property. The payoff that results from the grand coalition, $v(N)$, is divided among the N members in such a way that the allocations to all members referred to as imputations $(x_1, \dots, x_1, \dots, x_N)$ do

not exceed the total payoff generated from the grand coalition. Each member has an incentive to cooperate and engage in the grand coalition if his share of the grand coalition exceeds what she can achieve by working alone. A grand coalition can be broken because often in many types of cooperative games the unanimous consent of all players is needed to achieve the joint payoff $v(N)$.

Incentives can induce members to adopt a *cooperative* orientation or an *individualistic* orientation (Deutsch, 1973). With the cooperative orientation, one has an incentive to do well while being concerned about the payoff that others receive. With an individualistic orientation, one has an incentive to do as well as he can without concern for the payoff for others in conflict situations. Deutsch (1973) suggests that mutual awareness of a shared cooperative orientation is likely to help establish mutual trust. Mutual trust can positively influence information sharing; whereas, mutual awareness of a shared individualistic orientation is likely to result in a relationship of mutual suspicion that can negatively influence information sharing. Members in a group generally negotiate on the basis of their perceptions of the other person's trustworthiness and fairness and communication channel can influence these perceptions.

COMMUNICATION IN GDSS

Communication channel may affect group interaction and information exchange. A GDSS designed for distributed members interacting at the same time is a distributed GDSS or DGDSS. Prior research suggests that DGDSS groups communicate differently than do face-to-face GDSS groups (FGDSS), and that design requirements for a GDSS that supports each of these groups are substantially different (Hightower & Sayeed, 1996).

FGDSS uses a rich communication channel while DGDSS uses a lean electronic communication channel (Short, Williams, & Christie, 1976). Lean channels of communication and low social presence characterize insensitive, cold, and impersonal environments. Low social presence, however, makes it more difficult to establish a shared cooperative context (Zack, 1993). With a shared cooperative context, members perceive

higher levels of cooperation that can lead to more truthful exchange of information. Much of the nonverbal and verbal communication cues that form a normal part of human interaction are filtered in a DGDSS group, resulting in lower social presence and potentially less truthful exchange of information.

Social influence theory (SIT) (Fulk, Schmitz, & Steinfield, 1990) questions the basic assumptions of media richness theory (MRT) (Daft & Lengel, 1986) and postulates that media perceptions are, in part, socially constructed, vary by user and the social context, are subjective, and that making choices about media is retrospectively and subjectively rational.

Incentive structure may induce a social context (i.e., cooperative or individualistic). Social context can, in turn, mitigate media perceptions. Incentive structures can also influence the degree of equivocality in a task, and communication channels may intensify the level of conflict that an incentive structure promotes. Hence, a rich channel may be a better fit for group-based incentive (i.e., higher equivocality), and a lean channel a better fit for individual-based incentive (McGrath & Hollingshead, 1993). In addition, high levels of social presence may promote truthful information exchange, making it more appropriate for group-based incentive. FGDSS groups using a face-to-face communication channel may find it easier to define issues together to develop common ground (Nyhart & Dauer, 1986). This implies that for group-based incentive, where building common ground is more crucial than it is for individual-based incentive, a FGDSS may be more appropriate than a DGDSS.

A DGDSS may have a negative effect on mixed-motive tasks in that it can foster the view of negotiation as a win-lose situation (Rhee, Pirkul, Jacob, & Barkhi, 1995). Negotiators with a win-lose orientation become more individualistic and may not exchange truthful information. By depersonalizing communication, "lean" media induce group members to exchange minimal information because the parties may not think the information is important to communicate. We study the impact of communication mode and incentive structures on group interaction, performance, and information exchange in groups using either a Level One GDSS (i.e., providing communication support) or a Level Two GDSS (i.e., providing communication and problem modeling support) (DeSanctis & Gallupe, 1987).

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