

From Cooperative to Motivated Information Sharing in Groups: Moving Beyond the Hidden Profile Paradigm

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A seminal study conducted by Stasser and Titus (1985) found that groups often make suboptimal decisions on tasks structured as hidden profiles because they tend to discuss and incorporate into their decisions information that is shared (known to all members) at the expense of information that is unshared (known to a single member). In other words, groups are not able to take advantage of the unique knowledge and expertise of their members. Over the past 19 years this unsettling finding has stimulated much research that seeks answers to the questions: why and under what conditions will groups favor shared information over unshared information in their collective decisions? This article presents a review and a critique of the literature on collective information sharing that was initiated by the Stasser and Titus study. The preponderance of research in the Stasser and Titus tradition carries with it strong theoretical assumptions that bear little mundane realism to natural decision-making groups. For example, group members are presumed to work cooperatively with one another, to be unbiased, and to present information in an objective manner. In contrast, this paper lays out the perspective that information exchange is a motivated process whereby members deliberately select what information to mention and how to mention it to particular members in order to satisfy goals.

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A seminal study by Stasser and Titus (1985) has influenced the direction of small group research for the past 18 years. In that study Stasser and Titus discovered that

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groups often make suboptimal decisions on tasks structured as hidden profiles, because they tend to discuss and incorporate into their decisions information that is *shared* (known to all members) at the expense of information that is *unshared* (known to a single member). In other words, groups are not able to take advantage of the unique knowledge and expertise of their members. The groundbreaking work of Stasser and Titus has inspired scholars in psychology, communication, and management to study the information-sharing process in small decision-making groups, and for good reason. With organizations relying increasingly on groups to make decisions (Devine, Clayton, Philips, Dunford, & Melner, 1999) the effectiveness of the collective information-sharing process has grave implications for the quality of decisions and performance in organizations. Given the demands of an increasingly diverse workplace (Jackson, 1992), members of work groups must learn how to pool effectively resources and knowledge from among members with heterogeneous expertise and experience. The literature to date paints a gloomy picture of group members' ability to exchange fully their information and reach optimal decisions.

This paper presents the perspective that the paradigm used for studying collective information sharing does not capture many features of information exchange that likely operate in organizational groups. Consequently, it is hard to know the extent to which the largely laboratory-based, experimental findings apply to information sharing in the workplace. This paper begins with an overview of the collective information-sharing paradigm and a review of the major findings and theories. Second, the paper outlines assumptions about collective information sharing that have emerged from this traditional paradigm, why these assumptions may not hold for many natural decision-making groups, and propositions about collective information sharing that extend the paradigm to include a broader range of natural group decision-making situations. These propositions represent the foundation for the development of an alternative framework that views members as motivated communicators and members' goals as mediating the relations between features of the decision context and information exchange in groups.

The Collective Information-Sharing Paradigm

Most research that has examined information sharing in decision-making groups is modeled after the early experiments of Stasser and colleagues (e.g., Stasser, Taylor, & Hannah, 1989; Stasser & Titus, 1985, 1987). In this paradigm, initially unacquainted undergraduate students work in small groups of three to six members on a decision-making task. The decision task requires selecting from among hypothetical decision alternatives: the best student body president candidate (e.g., Stasser & Titus, 1985, 1987), the optimal job candidate to hire (e.g., Wittenbaum, 1998), the best drug to market (e.g., Kelly & Karau, 1999), the correct diagnosis of a medical case (e.g., Larson, Christensen, Abbot, & Franz, 1996, 1998a), the best company for

investment (e.g., Hollingshead, 1996b; McLeod, Baron, Marti, & Yoon, 1997), or the guilty suspect in a homicide investigation (e.g., Stasser & Stewart, 1992).

Members read information about the decision alternatives with an understanding that they may have some information that other members do not have. Information is distributed such that some information is known by all members (i.e., shared information) and other information is known by a single member (i.e., unshared information). Often information is distributed among members as a *hidden profile* such that information supporting the best alternative is largely unshared. Thus, members enter discussion preferring a suboptimal alternative, and determination of the best decision alternative is possible only if members pool their unique knowledge.

After members read the information and indicate their individual preferences, the experimenter takes the information from them. Then, members discuss the information and alternatives from memory in an unstructured and recorded discussion. The group discussion ends when members collectively have decided upon the best alternative. The decision rule is typically unspecified. Discussion content is coded from recordings and the proportion of shared and unshared information that was mentioned (out of that which was available in the total pool) is analyzed.

At least 23 studies that have used this paradigm, or a slight variation of it, have found a consistent effect: groups rarely discover the hidden profile and discuss proportionally more shared than unshared information (Cruz, Boster, & Rodriguez, 1997; Dennis, 1996a, 1996b; Devine, 1999; Franz & Larson, 2002; Kelly & Karau, 1999; Lam & Schaubroeck, 2000; Larson et al., 1996, 1998a; Larson, Foster-Fishman, & Franz, 1998b; Larson, Foster-Fishman, & Keys, 1994; Lavery, Franz, Winkquist, & Larson, 1999; Parks & Cowlin, 1995; Savadori, van Swol, & Sniezek, 2001; Schittekatte & van Hiel, 1996; Stasser et al., 1989; Stasser & Titus, 1987; Stasser, Vaughan, & Stewart, 2000; Stewart & Stasser, 1995; van Hiel & Schittekatte, 1998; Winkquist & Larson, 1998; Wittenbaum, 1998, 2000). In addition, not only is shared information more likely than unshared information to be mentioned initially, but members are more likely to repeat shared information than unshared information after it is mentioned (Larson et al., 1994, 1996, 1998a; Parks & Cowlin, 1995; Savadori et al., 2001; Schittekatte & van Hiel, 1996; Stasser et al., 1989; Winkquist & Larson, 1998). When information is distributed as a hidden profile, this discussion bias toward shared information impairs group members' ability to determine the best decision alternative relative to groups with all shared information (e.g., Stasser et al., 1989; Stasser & Titus, 1987). The research attention paid to understanding the underlying causes of this discussion bias is, undoubtedly, driven by the implications that it has for group decision quality.

A Brief Review of the Collective Information-Sharing Literature

Much of the research that followed in the footsteps of Stasser's original studies was aimed at increasing group members' discussion of unshared information and improving the ability of groups to determine the best solution in a hidden profile

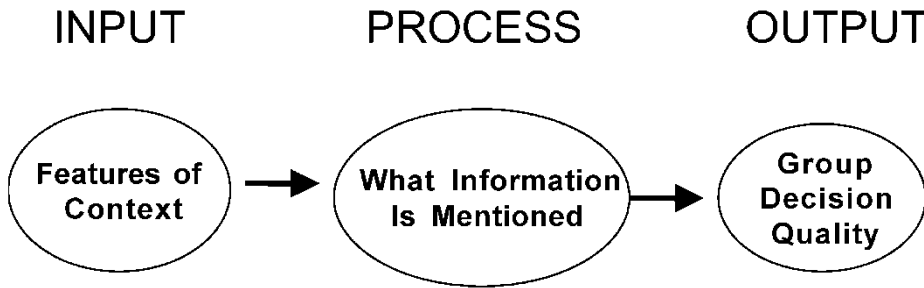


Figure 1 The traditional framework for understanding information sharing in decision-making groups with a hidden profile task.

task. This research was guided by the framework shown in Figure 1; namely, that certain factors influence the relative amounts of shared and unshared information that are discussed by groups. Factors that increase the amount of unshared relative to shared information presented during group discussions are expected to lead to the discovery of the hidden profile, and ultimately higher quality group decisions.

Researchers have experimentally induced many group- and member-level factors in the interest of attenuating the discussion bias. Stasser (1992, 1999) and Wittenbaum and Stasser (1996) provided past reviews of the collective information-sharing literature. Because the literature has grown since these reviews, the major findings to date are briefly reviewed. The literature review is organized into seven types of factors that have been examined: (a) information type and distribution, (b) task features, (c) group structure and composition, (d) temporal features, (e) member characteristics, (f) discussion procedures, and (g) communication technology.¹

Information Type and Distribution

Features of the information and its distribution among members are the factors most studied by researchers. Manipulating the sharedness of information is essential to demonstrating the discussion bias. Most studies distinguish between shared and unshared information. Some, however, have additionally defined partially shared information as that known by some but not all group members. Information is more likely to be discussed as the number of members who know it increases. Shared information is mentioned more than partially shared information, which is discussed more than unshared information (Cruz et al., 1997; Schittekatte & van Hiel, 1996). Attempts to increase the salience of unshared information have been successful; group members recall more unshared pictures than words (Stewart & Stewart, 2001) and unshared information is more likely mentioned when it appeared in boldface than normal font (Schittekatte & van Hiel, 1996). Information is discussed more when it is negative rather than positive, regardless of its sharedness (Stewart, 1998). When information is distributed as a hidden profile, unshared information is most likely discussed when members have a low percentage of shared information relative

to unshared information and a low amount of total information (Hightower & Sayeed, 1995; Schittekatte, 1996; Stasser & Titus, 1987).

Contrasting the decision quality of groups with a hidden profile versus those with all shared information illustrates the performance impairment of the discussion bias. Some studies have distributed information to vary the prediscussion preferences for the decision alternatives among members. Prediscussion disagreement among all members regarding which alternative is best improves hidden profile performance (Brodbeck, Kerschreiter, Mojzisch, Frey, & Schulz-Hardt, 2002), increases unshared information discussed (Hightower & Sayeed, 1996), and facilitates fast and thorough information exchange (Parks & Nelson, 1999). When at least one member favors the correct alternative prior to discussion, groups are much more likely to discover the hidden profile (Hollingshead, 1996b). When members receive information that strongly biases them to prefer a wrong alternative before discussion, their solution of a hidden profile suffers (but surprisingly, their preference for shared information decreases) relative to if members mildly prefer a wrong alternative before discussion (Kelly & Karau, 1999). In sum, lessons learned from examining features of the information and its distribution among members suggest that information pooling and group decision quality are improved when unshared information is salient and abundant and when members disagree on the best option.

Task Features

Features of the actual and anticipated group task affect information exchange and hidden profile solution. When members collectively recall information during discussion, they mention more information (albeit, mostly shared) than when they select among the decision alternatives (Stewart & Stasser, 1995). The information-pooling superiority of collective recall groups is further enhanced when members anticipate the collective recall task before discussion: members who know that they will recall information in a group mention more unshared information than members who mistakenly believe that they will engage in group decision making instead of recall (Stasser et al., 2000). The benefit of anticipating collective recall may be due to members attending to information that they think others will not remember in order to increase the group's recall output (Wittenbaum, Stasser, & Merry, 1996).

Hollingshead (1996b) found that when face-to-face groups rank the decision alternatives in order of preference, they mention more information and solve a hidden profile better than groups who choose one best alternative. When members do choose among decision alternatives, they discuss less information as the number of alternatives increases (Parks & Cowlin, 1995). Believing that the task is important does not increase the amount of information discussed, but it does slow the rate at which information is mentioned and lengthens discussions (Larson et al., 1994).

Several studies have manipulated task demonstrability—the extent to which the decision task is solvable or has a right answer (Laughlin, 1980). Stasser and Stewart (1992) found that when members view the hidden profile task as solvable

(i.e., intellectual) they share information more thoroughly and choose the best alternative more often than when members think the group decision is a matter of judgment (i.e., judgmental). This effect of task demonstrability on hidden profile solution has been difficult to replicate in subsequent studies (Botero & Wittenbaum, 2002; Franz & Larson, 2002; Schittekatte, 1996; Stewart & Stasser, 1998). In conclusion, the literature examining task features suggests that structuring the group's task to aid information exchange is best done by having members rank order the alternatives and anticipate recalling information during discussion.

Group Structure and Composition

Factors affecting the group's structure, such as the group's size, composition, norms, and roles, influence information sharing and hidden profile solution. The size of the group affects information exchange, although the effects of group size are mixed. Cruz et al. (1997) found that eight-person groups solved a hidden profile better and discussed more unshared information than four-person groups, whereas Stasser et al. (1989) showed that six-person groups mentioned more shared information than three-person groups. Six-person groups mentioned and repeated more unshared clues that were critical for solving a homicide investigation compared to three-person groups, probably because the former group discussions were longer (Stasser & Stewart, 1992). Mennecke (1997) contrasted the information mentioned between four- and seven-person groups and found no differences. Overall, the findings suggest that larger groups may be better than smaller ones at pooling information, although the effect is not consistent.

The norms and roles in a group affect members' likelihood of communicating unique knowledge. Only one study to date has induced group norms. Postmes, Spears, and Cihangir (2001) found that when groups have a norm of critical evaluation, they are more likely to solve correctly a hidden profile and positively value unshared information compared to groups with a consensus norm. Expert roles have been the most studied type of roles influencing the information that members discuss. Groups were more likely to discuss unshared information and correctly solve a hidden profile when members were known experts (Stasser, Stewart, & Wittenbaum, 1995; Stasser et al., 2000; Stewart & Stasser, 1995). Also, unshared information was better remembered by members after discussion in groups composed of experts rather than nonexperts (Stewart & Stasser, 1995).

Several studies have examined group composition effects. The effect of member familiarity on information sharing is mixed. One study found that groups composed of friends solved a hidden profile better than groups composed of strangers (Gruenfeld, Mannix, Williams, & Neale, 1996). When all information was shared before discussion, however, strangers outperformed friends. Mennecke and Valacich (1998) showed that groups composed of members with an established relationship mentioned less unshared information than ad hoc groups of strangers. They found no effect of composition on hidden profile solution. Groups containing members with task and team experience discussed less unshared information and performed

worse than groups containing members without such experience (Kim, 1997). In all of these studies composition was homogeneous with respect to status within groups. Hollingshead (1996a) varied whether groups were homogeneous or heterogeneous with respect to member status and found that equal status groups solved a hidden profile better than mixed status groups. When members were placed in an inter-group context, however, mixed-sex groups mentioned more unshared information than same-sex groups (van Hiel & Schittekatte, 1998). Groups containing an informed minority solved a hidden profile better than groups with an uninformed minority (Stewart & Stasser, 1998).

Given the disparity in findings, it is difficult to know at this point how to compose groups based on status and familiarity to maximize effective information sharing. One recommendation is to make group members aware of one another's expertise and establish a critical evaluation norm to improve members' pooling of information and decision quality.

Temporal Features

Two temporal processes have been examined thus far; the effects of time pressure and the timing of when shared and unshared information are introduced into discussion. Three studies suggest that having ample time facilitates information exchange. Members mentioned more unshared information when they had ample time to learn the information before discussion (Fraidin, 2002). Parks and Cowlin (1995) found that groups discussed more unshared information and at a slower rate with a 30-minute rather than a 5-minute discussion time limit. Likewise, Bowman and Wittenbaum (2002) observed that group members with low time pressure during discussion solved a hidden profile more often and reported discussing more unshared information than those with high time pressure. These findings contrast with Kelly and Karau's (1999) research in which high time pressure groups discovered the solution to a hidden profile more often than low time pressure groups, particularly when members strongly preferred an incorrect alternative before discussion.

Larson (1997) developed a computer program that models the entry of shared and unshared information into discussion. His program captures a consistent temporal effect that his empirical studies show; namely, group members mention shared information earlier in discussion than unshared information (Larson et al., 1994, 1996, 1998a, 1998b). In part, members mention unshared information later during discussion when they have run out of shared information to discuss. Both the timing and time pressure effects suggest a consistent finding; longer discussions result in more thorough information exchange.

Member Characteristics

Most of the factors that researchers have implemented to improve information sharing were induced at the group level. A decade after Stasser and Titus (1985)

published their first information-sharing study, researchers began asking how members within a group differ in their information sharing. Groups often have a member who plays the role of leader. Leaders have been shown to repeat more information than nonleader members (Botero & Wittenbaum, 2002; Larson et al., 1996). In particular, leaders initially repeat more shared information than nonleaders and, over time, repeat more unshared information as well (Larson et al., 1996, 1998a). Directive, as opposed to participative leaders, were particularly likely to repeat unshared relative to shared information. Leaders help to keep information alive by bringing it back to members' attention. Nevertheless, directive leaders can have a deleterious effect on hidden profile solution if they advocate their incorrect preference in the group (Cruz, Henningsen, & Smith, 1999).

Member status and expertise facilitate information pooling. Expert members mentioned more information than nonexpert members, especially when their expert status was known and the task was intellective (Franz & Larson, 2002). The only sex difference to date has shown that men mention more total information than women (Propp, 1995). In heterogeneous status groups, members with high task-relevant status (i.e., prior task experience) mention shared and unshared information with equal frequency, whereas low status members mention more shared than unshared information (Wittenbaum, 1998, 2000). Moreover, high status members favor unshared information in their repetitions, and the unshared information of high status members is better recalled after discussion than that of low status members (Wittenbaum, 2000). These effects were not observed when status and expertise were inversely related, such that low status members had unshared information necessary for solving the hidden profile (Hollingshead, 1996a). In that study the information-poor high status members mentioned more shared information and had more influence on the final group decision than the information-rich low status members. Information-rich members had influence only when they were elevated to have equal status with information-poor members.

Unless one has high status, communicating shared information may be a method of gaining status (Wittenbaum, Hubbell, & Zuckerman, 1999). Minority members who hold much shared information (i.e., cognitively central members) have more influence in the group compared to members who hold much unshared and little shared knowledge (i.e., cognitively peripheral members; Kameda, Ohtsubo, & Takezawa, 1997). Cognitively peripheral members may have less decision influence because they engage in fewer speaking turns and offer less information than cognitively central members (Sargis & Larson, 2002). Given the apparent superiority of being cognitively central, the findings of Larson, Sargis, Elstein, and Schwartz (2002) are surprising. Cognitively peripheral members were judged as more influential than cognitively central members. In that study it is possible that members' high amount of expertise may have equalized the effects of cognitive centrality. Together, the findings regarding member characteristics suggest helpful advice for facilitating the information sharing of members with valuable unshared information; assign them to a high status position such as group leader or acknowledge their expertise to others.

Discussion Procedures

Some researchers have attempted to improve information pooling in groups by varying discussion procedures. In the traditional information-sharing paradigm members discussed information from memory. More recently, researchers have allowed members to access information during discussion so that information exchange is not memory-dependent (e.g., Cruz et al., 1999; Graetz, Boyle, Kimble, Thompson, & Garloch, 1998; Gruenfeld et al., 1996; Lavery et al., 1999; Postmes et al., 2001; Savadori et al., 2001). Hollingshead (1996b) varied members' access to information during discussion and found that members who kept their information sheets during discussion mentioned more information than those who relied on memory. Access to information during discussion did not affect hidden profile solution, however. Bowman and Wittenbaum (2002) showed that access to information during discussion does improve hidden profile solution when the information sheets identify which pieces are shared and which are unshared. Consideration of unshared information can be improved even when members discuss information from memory; if members can request a viewing of the information during discussion, they are more likely to repeat unshared information (Parks & Cowlin, 1996).

Implementing discussion procedures has had mixed success in improving information exchange. Structuring discussion increased the total amount of information (albeit, mostly shared) discussed relative to an unstructured discussion (Mennecke, 1997; Stasser et al., 1989). Two types of dialectical inquiry methods failed to influence information sharing or hidden profile solution (Devine, 1999). Providing members with a decision balance sheet during discussion did not affect information pooling or decision quality (Savadori et al., 2001). A judge-advisor system has some benefits; however, judges mentioned more unshared information than advisors and both mentioned more than group members in an unstructured discussion (Savadori et al., 2001). Judges, unlike advisors, did not favor shared information in the mentioning or repetition of information. Hunton's (2001) shared cognition awareness training shows promise for attenuating the discussion bias favoring shared information, and Larson et al. (1994) showed that training increased total information mentioned.

In summary, the literature on discussion procedures suggests that providing members with access to information during discussion will not hurt and may help the group's pooling of information and decision quality. More research is needed on formal discussion procedures to determine why some procedures improve information sharing and decision quality and others do not.

Communication Technology

The most recent explosion of research has examined the influence of communication technologies on information exchange in groups. In some cases computer-mediated communication (CMC) improves information sharing and decision quality relative

to face-to-face communication (FTF). Straus (1996) found that CMC groups relied less on shared information than those using FTF. Groups using group support systems (GSS) mentioned more information than non-GSS groups (Dennis, 1996a, 1996b). In one study GSS groups mentioned more unshared information than non-GSS groups (Dennis, Hilmer, & Taylor, 1998). Lam and Schaubroeck (2000) showed that group decision support systems (GDSS) increased mentions of unshared information and improved hidden profile solution relative to FTF, especially when member preferences were in conflict before discussion.

In other studies computer technology impairs information exchange and hidden profile solution. Graetz et al. (1998) revealed that CMC groups were less likely to solve correctly a hidden profile relative to FTF groups and telephone-supported groups. Hightower and Sayeed (1995, 1996) found that groups using CMC favored shared information during discussion more than FTF groups. Hollingshead's (1996a, 1996b) research showed an information suppression effect of CMC, such that CMC groups discussed less shared and less unshared information than FTF groups. This effect may explain why factors that improved group discussion of unshared information (e.g., rank-order procedure) had a positive impact in FTF groups but no effect in CMC groups (Hollingshead, 1996b).

In many cases use of information technology failed to affect group decisions (Dennis, 1996a, 1996b; Hollingshead, 1996a; Mennecke & Valacich, 1998). Given the ever-increasing importance of technology as a means of communication and information exchange in organizations, many researchers are now using CMC as the default medium for studying information sharing in decision-making groups (e.g., Fraidin, 2002; Mennecke, 1997; Postmes et al., 2001; Sassenberg, Boos, & Klapproth, 2001). Because people are becoming more sophisticated users of communication technologies, it is very possible that the negative effects of CMC observed in studies of collective information sharing in the mid-1990s may not replicate today.

Theoretical Explanations for the Discussion Bias

Researchers have proposed three possible explanations for the discussion bias in favor of shared information: (a) the higher probability for recalling shared vs. unshared information, (b) members' preference-consistent evaluation of information in the hidden profile paradigm, and (c) social comparison processes.

Collective Information-Sampling Model

The discussion bias in favor of shared information first was explained as due to probability (e.g., see Stasser, 1992). According to Stasser's (1992) information-sampling model information is randomly sampled for discussion from members' memory. One presumption is that group members will mention any piece of information that they recall. So, making information more memorable increases its likelihood of being mentioned and thus discussed. Additionally, increasing the number of members in the group who know a piece of information increases the likelihood that the

information will be discussed. If information is being randomly sampled from members' memories, then shared information is more likely than unshared to be discussed because there are more members' minds from which shared information can be sampled. Therefore, shared information has a sampling advantage over unshared information.

This sampling advantage can be mathematically demonstrated when holding constant many factors that typically vary in natural groups. For example, the model assumes that all items of information are equally memorable and all members are equally likely to mention information. The purpose of the model is not to predict information discussion in natural group settings but rather to show that probability alone can explain the discussion bias under certain (albeit unnatural) conditions. Following from Stasser's model the process of group members discussing information became known as information sampling.²

One conclusion drawn from Stasser's (1992) model is that the discussion bias impairs group decision quality when information is distributed as a hidden profile. A clearer picture of the relation between discussion content and group decision quality was proposed by Winquist and Larson (1998). They suggested that discussing shared information does not impact group decisions. Instead, drawing on the research of Gigone and Hastie (1993, 1997), shared information has its impact on decisions via pre-discussion preferences. Shared information largely affects group decisions because such information shapes each member's pre-discussion preference. Gigone and Hastie (1993, 1997) referred to the undue influence of shared information on group decisions as the common knowledge effect. Alternatively, discussing unshared information does influence group decision quality. In particular, increases in mentions of unshared information improve the chances of groups choosing the optimal decision alternative in a hidden profile. Therefore, the concern about groups neglecting unshared information during discussion is legitimate, in doing so group decision quality will suffer if the information is distributed as a hidden profile.

Preference-Consistent Evaluation of Information

A second reason why groups prefer shared information during discussion stems from the association between members' prediscussion preferences and shared information in the hidden profile paradigm. When information is distributed as a hidden profile, the unshared information is supportive of the best alternative and the shared information is supportive of a suboptimal alternative. Therefore, preferences for alternatives are confounded with information type (shared versus unshared). Greitemeyer and Schulz-Hardt (2003) showed that group members evaluate preference-consistent (i.e., mostly shared) information more favorably than preference-inconsistent (i.e., mostly unshared) information. The evaluation bias in favor of preference-consistent information can explain why group discussion favors shared information. Because shared information largely supports members' initial preferences, it is evaluated as more important and therefore more worthy of

discussion than unshared information. Even exposing members to all information after having read a hidden profile does not improve decision quality because members engage in biased information processing to maintain their initial preferences. Greitemeyer and Schulz-Hardt claimed that the dominance of shared information during discussion and poor group performance on a hidden profile task can be explained solely as an individual-level cognitive bias, but their explanation does not account for why shared information is favored during discussion over unshared when both types of information support members' preferences (i.e., in a manifest profile; Lavery et al., 1999).

Social Comparison

A third possible explanation for the discussion bias relies on social comparison processes (Festinger, 1954). In uncertain situations, such as while working on an unfamiliar task, group members may look to others to evaluate the relative importance of their information. Hearing that others possess the same information may make that information appear more valuable, important, and relevant. Research supports the notion that shared information is evaluated as more important, relevant, and accurate than unshared information (Postmes et al., 2001, Wittenbaum et al., 1999). Moreover, members are evaluated as more task-capable when they communicate shared instead of unshared information (Wittenbaum & Bowman, 2004; Wittenbaum et al., 1999; Wittenbaum & Park, 2001). Encouragement and validation from others when shared information is mentioned may lead members to favor repeating such information. Therefore, the advantage of this explanation lies in its ability to account for the tendency of group members to repeat, rather than to mention, shared information. It is important to note that the benefits of communicating shared information likely vary by context. In group decision-making situations with less uncertainty, for example, when members have assigned roles based on expertise, the value of shared information to group members may appear relatively less important (cf. Stasser et al., 1995).

Summary

Over the past 19 years, the theoretical explanations for the discussion bias have shifted from reliance on mathematical probability to highlighting the role of human cognition and motivation. This transition reflects a desire to incorporate processes into the theoretical models that mirror those of natural decision-making groups. The approach taken in this paper shifts theory about collective information sharing beyond the hidden profile paradigm and mathematical modeling to a view of group members as motivated communicators. The next section outlines assumptions of the collective information-sharing paradigm and challenges them with new ideas regarding how information exchange likely occurs among decision-making group members in natural settings.

Assumptions of the Collective Information-Sharing Paradigm

The preponderance of research in the Stasser and Titus (1985, 1987) tradition carries with it strong theoretical assumptions that bear little resemblance to many naturalistic group decision-making situations and limit the applicability of the hidden profile paradigm. In this section, assumptions about collective information sharing that have emerged from this traditional paradigm are identified, why these assumptions may not hold for many natural decision-making groups are discussed, and six propositions about collective information sharing that extend the paradigm to include a broader range of natural group decision-making situations are offered. These propositions are not meant to establish testable components of a theory. Rather, they represent beginning ideas for a framework that views members' goals as mediating the relations between features of the decision context and information exchange in groups.

Information Sharing is Unbiased

Inherent in Stasser's (1992) collective information-sampling model is the assumption that members are unbiased communicators. That is, members will communicate any piece of information that is recalled, they do not show a preferential leaning toward any particular type of information. This assumption was required for Stasser to demonstrate that when holding constant many factors that vary in natural settings, probability alone can explain the group preference for shared information. For a model of information sharing that reflects the types of processes that occur in natural decision-making groups, however, the assumption of unbiased information exchange needs to be revised.

In organizational decision-making groups, information sharing is a biased process. That is, members have a preference for some types of information over others. In particular, members have goals and deliberately select or withhold information that will help them to attain their goals during group discussions. Group members hold many goals in organizations (e.g., Guzzo & Shea, 1992), such as to maintain good relations with the supervisor and co-workers, to attain status in the group, to get preferred decision alternatives adopted by the group, or to be correct. Common distinctions are made between personal and group goals (e.g., Cartwright & Zander, 1968; Guzzo & Shea, 1992; Mackie & Goethals, 1987) and competitive and cooperative goals (e.g., Tjosvold, 1984, 1988). Goal-congruent information may be more likely to be mentioned than goal-incongruent information for these sorts of goals. Other less positively framed goals in organizations may involve saving face, avoiding conflict or change, acting in a manner consistent with organizational norms, or not being labeled a trouble maker. These goals in particular may involve the intentional withholding of information (cf. Morrison & Milliken, 2000). The following proposition is offered:

Proposition 1: Information sharing and withholding in decision-making groups are deliberate processes in the interest of members' goal attainment.

All Group Members Work Cooperatively

Stasser's (1992) information-sampling model assumes that group members work cooperatively with one another toward the common goal of reaching the best collective decision. The body of research reflects this assumption. In the typical information-sharing experiment group members read a combination of shared and unshared information about decision alternatives and are instructed to discuss the information and alternatives to reach a group decision. In order for members to determine the best alternative, they must cooperate and share their information. Thus, all members are given the same incentive to cooperate; member goals are symmetrical.

Even though no other goals or incentives are given to members, they may attend to other incentives, such as to get their own preferred alternative adopted by the group. This behavior may reflect, however, a cooperative motive whereby members feel strongly that their preferred decision alternative is the best one and thus the best answer for the group. The stated group goal—to reach the best decision—likely dominates other individual goals that may naturally develop in the information-sharing experiments.

In contrast, members of organizational decision-making groups may experience a variety of motives. Members may be rewarded if their group performs well but also may attain personal rewards if the group selects a particular alternative. For example, faculty members deciding which job candidate to hire have a desire to hire the best candidate (i.e., a cooperative, group goal). An individual member of the faculty may additionally have a personal incentive to hire a particular candidate because that person is a close friend or has similar research interests. These individual incentives (i.e., competitive goals) may conflict with the group goal to choose the best candidate. In this way members may experience a mixture of motives—both cooperative and competitive goal structures. These conflicts of interest are inherent in organizations, where decision-making groups experience a variety of incentive structures, including cooperative, mixed motive, or competitive (Argote & McGrath, 1993). These incentive structures likely influence what information members are willing to communicate.

Moreover, even under the auspices of a cooperative decision-making context, members within the same group likely differ in their goals and those goals may be asymmetrical. Whereas one member may have a purely cooperative goal, another member may have a mixture of competitive and cooperative goals. Therefore, the incentive structure can vary both between and within groups. Groups may be composed of members with varying motives; some members may be more cooperative or competitive than others. Also, some groups may be more cooperative or competitive than others depending on the composition of members. In the typical information-sharing experiment groups are composed of members with the same cooperative goal. In organizations, purely cooperative or competitive groups may exist, but so may heterogeneous groups composed of members with different motives. The kind of information that a group member selects for discussion likely

depends not only on individual member goals but also on the distribution of incentives among other members in the group. The following proposition is offered:

Proposition 2: Information sharing in decision-making groups depends on the particular goal structure, which varies both within and between groups.

Information is Either Mentioned or Not

In the information-sharing experiments the contents of group discussion are coded to identify which pieces of information were mentioned correctly. Typically, coding is performed liberally; as long as a member mentions the gist of the original item it is coded as a correct mention. The dependent variable is the proportion of shared and unshared information that was correctly mentioned out of the total amounts of each. The information-sharing literature is a collection of studies that simply reflect whether information was mentioned or not. This all-or-nothing approach to viewing information exchange limits the array of processes related to communicating information.

Group members not only are strategic about what information they share and to whom they share it, but they also are strategic about how they mention information. In the interest of satisfying their goals, members may choose to withhold some unshared information. Alternatively, they may communicate it with a goal-biased spin. For example, a faculty member may mention negative unshared information about a preferred job candidate, but do so in a way that frames the information in a more positive way. Information that the candidate definitely plans to live an hour away from the hiring university may be negative to a faculty that values departmental presence and cohesiveness. A faculty supporter of this candidate may divulge the information to other faculty but note that “the candidate may live an hour away for a brief time,” or “the candidate will live an hour away, but with daily commutes, we will not notice the difference.”

In the former quote the communicator misrepresented the unshared information in a way that increased the desirability of the information (i.e., by making the distance seem temporary or not definite). In the latter quote the communicator added an inference that made the information seem not so negative. Using the traditional method of coding in the information-sharing paradigm, both quotes may be counted as a mention of the living at a distance piece of unshared information. What is lost is the subtle frame that the communicator placed on the message.

Goal-directed information sharing not only involves whether information was mentioned, but the manner in which it was mentioned. Members may misrepresent or frame the information in goal-congruent ways. The following proposition is offered:

Proposition 3: Decision-making group members not only mention information, but they misrepresent it and frame it in goal-congruent ways.

Unshared Information is More Important than Shared Information

One assumption made in the information-sharing literature is that unshared information is more important than shared information. The hidden profile information distribution ensures that consideration of the unshared information is critical for reaching the best group decision. Correspondingly, discussion of unshared, but not shared, information is predictive of group decisions in a hidden profile (Winquist & Larson, 1998). If information is distributed such that both shared and unshared information equally support the optimal decision alternative, then neglect of unshared information during discussion is not a concern. Not only does the predominant information distribution artificially make unshared information more important, but also some studies used content for unshared information that was different and more valuable than that for shared information (e.g., Franz & Larson, 2002; Hollingshead, 1996a; Stasser & Stewart, 1992; Stasser et al., 1995; Wittenbaum, 1998, 2000).

Making unshared information higher in quality is based on an assumption that unshared information in work groups is held by experts with valuable, unique knowledge to share. Instead, unshared information need not be more important, valuable, diagnostic, or accurate than shared information in natural work groups. Experts may have inaccurate or biased information, and hidden profile distributions may be rare in natural settings. Depending on the distribution and content of shared and unshared information, unshared information may be more or less critical to discuss than shared information.

The presumed importance of unshared information may reflect researchers' value of task goals over social goals. The collective information-sharing literature privileges group decision quality above all other outcomes for groups or their members. Group members hold both task goals (e.g., to perform well on the task, to advocate for a particular task outcome) and social goals (e.g., to attain status, to manage interpersonal relationships within the group). Favoring shared information during discussion may hamper group members' ability to discover the correct solution to a hidden profile (a task goal), but it may help members to develop trust and interpersonal closeness (a social goal). Shared knowledge may be instrumental in satisfying members' social goals. It helps members to form a common ground, and to relate to and understand one another better (Clark & Brennan, 1991). Additionally, shared information can be used to improve one's image or attain status in the group (Wittenbaum & Bowman, 2004; Wittenbaum et al., 1999; Wittenbaum & Park, 2001).

The value of discussing shared and unshared information is best considered in the context of members' goal satisfaction. If members value the development of social cohesion or status acquisition more than decision quality, then favoring shared information in discussion is a wise choice. The following proposition is offered:

Proposition 4: Either shared or unshared information may be more important depending on the content of the information, the distribution of the information among members and group members' goals.

Hidden Profile Distributions are the Most Interesting

From examining the information-sharing literature, one may infer that hidden profile distributions are the most interesting to study. At least 35 experiments (well over one-half of the literature) used a hidden profile task. Theoretically, the interest in hidden profiles is apparent, it is only under these circumstances that failure to discuss unshared information impairs group decision quality. In other words, hidden profiles represent an opportunity for group decisions to exceed in quality those of members or the aggregation of member preferences. There is no evidence, however, that hidden profiles, particularly those that strongly bias all members to prefer an unattractive option before discussion, exist in natural work groups. Realizing that their model only pertains to hidden profile situations, Winquist and Larson (1998) recommended:

There is a need to better understand the frequency with which hidden profiles occur in natural field settings, as well as the social and organizational factors that give rise to them. Although it is clear that in everyday decision-making groups members frequently possess a mix of shared and unshared information, it is less clear how often that mix is systematically biased such that the unshared information favors a better choice alternative than does the shared information. Shedding light on the frequency and causes of naturally occurring hidden profiles would provide useful information about the external validity of this entire area of research. (p. 376)

Not only may the focus on hidden profiles not reflect the natural information distributions in organizational settings, but it presents an inherent confound. As mentioned earlier, a hidden profile distributes information so that unshared information supports the best alternative and shared information supports a less attractive alternative (the one that members prefer upon entering discussion). Group members' partiality toward shared information may reflect a cognitive bias to evaluate preference-consistent information more favorably than preference-inconsistent information (Greitemeyer & Schulz-Hardt, 2003). Reliance on the hidden profile as the predominant method of distributing information may mean that the collective information-sharing findings are largely the result of preference-consistent evaluation of information rather than group-level processes.

Because of the inherent confound and questions regarding the relative frequency of hidden profiles in organizational settings, researchers would be well advised to expand the study of information exchange to a variety of information distributions. The process of and interest in goal-directed information sharing is not limited to any particular information distribution. Interesting examples of strategic information sharing may be found with distributions of all shared or all unshared information. Shared information can be strategically framed in goal-congruent ways, just as can unshared information. Unshared information may be more susceptible to strategic withholding given that members have total control over concealing it from others. Moreover, information may be used strategically in distributions of shared and

unshared information that have either one best alternative or many desirable options. Work groups may face a situation in which all decision alternatives are acceptable and the group would function well by choosing any one of them. Despite this fact, members may deliberately withhold unshared information from some or all members, or frame information in goal-congruent ways.

This example illustrates the interesting possibilities of observing members' strategies for using information when decision quality is not at risk. Regardless of whether the information available to a group is largely shared, largely unshared, or suggestive of one or many attractive alternatives, members must grapple with how to best use the information in order to satisfy their goals. The following proposition is offered:

Proposition 5: The process and importance of goal-directed information sharing in decision-making groups transcends a variety of information distributions.

Information is Shared with All Members

In the typical information-sharing experiment, group members have one opportunity to share information, during the single group meeting. All group members participate in the meeting and any information that is mentioned is told to all members at once. Even in studies in which group members exchanged information via electronic communication (e.g., Dennis et al., 1998; Graetz et al., 1998; Hightower & Sayeed, 1995, 1996; Hollingshead, 1996b; Mennecke & Valachich, 1998), communicating information meant sharing it with all group members. Clearly, the information-sharing paradigm limits options members have to communicate information selectively.

Information sharing in organizational groups likely falls outside of this constraint on most occasions. Given the presumption that information sharing is goal-directed behavior, members' motives likely influence not only what they communicate but to whom. Members may make deliberate choices about to whom they want to share the information and from whom they wish to withhold it. Even if members do not prefer a particular target member to be the recipient of the information, members cautiously may prefer to share information with only one or two other members. For example, unshared information can be risky to communicate because no other members can verify its accuracy (Wittenbaum & Parks, 2001; Wittenbaum & Stasser, 1996). For such information members may feel safer sharing it with few rather than all members. Electronic communication may facilitate selective sharing of information with some but not all members. By allowing members to select the number of and identities of the targets of communication, the information-sharing paradigm would more closely mirror the information exchange process in natural work groups. The following proposition is offered:

Proposition 6: Decision-making group members select the other member(s) with whom to share information.³

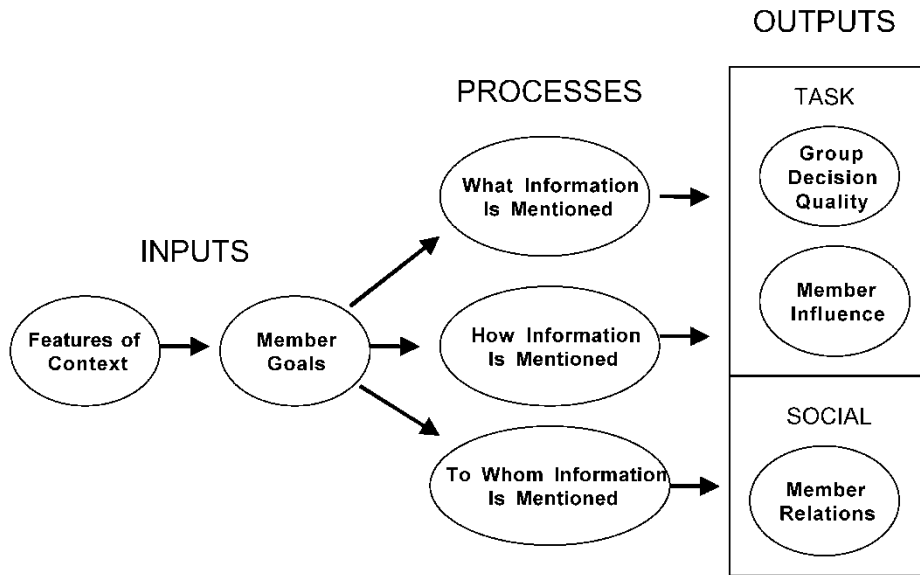


Figure 2 A framework for understanding motivated information sharing in decision-making groups.

Conclusion

The motivated information-sharing framework aims to expand the study of collective information sharing beyond the paradigm established in 1985 by Stasser and Titus.⁴ Figure 2 depicts a revised framework for understanding information sharing in groups. According to this framework, information exchange in decision-making groups is a deliberate process in the interest of members' goal attainment. Group members intentionally select particular members with whom to share information and determine what information to share and how to share it in order to satisfy goals evoked by features of the context (e.g., member characteristics, task type, communication technologies). Members' information-sharing strategies then influence task outcomes (e.g., group decision quality, member influence) and social outcomes (e.g., member relations). Moreover, the particular goals of members vary within groups, with some members embracing group goals and others acting in the interest of individual or competitive goals. Some groups may be relatively more group- or member-centered depending on norms in the organization and characteristics of members.

This critique of the information-sharing literature and new framework for understanding the process as a motivated one represent a first step in inspiring new theory and research in this area. These ideas raise new areas of inquiry that may be tested experimentally in the laboratory or explored in greater depth in the field. For example, motivational processes may be examined in a laboratory setting by inducing group member goals through monetary payments and examining how such goals affect members' framing of communicated shared and unshared information.

Alternatively, field research may investigate how cooperative versus competitive workplace norms influence workers' choices regarding which team members to tell critical unshared knowledge. As scholars begin to study information exchange in decision-making groups as a motivated process, a clearer picture will emerge of how group member goals and features of the context influence the sharing of information and group choices.

Although this critique focuses on how information-sharing processes are shaped by the goals and motives of group members, it is important to acknowledge the potentially powerful effects that the embedding context and external environment have on information-sharing processes in groups (see Hackman, 1999, for an overview of the functions of context for groups in organizations; see also Putnam & Stohl, 1990). Except for a few time pressure studies and one that induced accountability as a context, there has been little research attention devoted to externally induced factors in the hidden profile literature. And, none of the studies has examined natural groups in organizations to assess the impact of external factors.

Take the organization as an example of an embedding context. Management makes decisions about staffing and how group members will be rewarded, imposes deadlines, determines the criteria to be used by the group to evaluate alternatives, and sometimes may even dictate the ultimate choice that the group should reach before it has even deliberated. Thus, many parameters of the group decision-making context are not determined by the group itself, but rather are prespecified by the embedding organizational context. Features of the embedding context and external environment may affect information-sharing processes directly or via the development of members' goals and motives, which in turn affect information-sharing processes.

The present review and critique promises to inspire researchers to approach the study of information exchange in decision-making groups with a freshness that questions traditional assumptions and approaches. The result will be theory and research that better reflect the way that members of natural decision-making groups share information.

Notes

- [1] A table summarizing the factors that have been shown to improve information sharing in groups is available from the first author.
- [2] Because this paper presents the perspective that probability cannot account solely for how information is exchanged in decision-making groups, the term *information sharing* will be used instead of *information sampling*.
- [3] Of course group members cannot control what the recipients will do with that information and with whom they will share it.
- [4] An alternative perspective views Stasser's (1992) model as consistent with a motivated information-sharing framework. According to this perspective, the core information-sampling process is a random one whereby shared information is more likely mentioned because of more sampling opportunities relative to unshared information. Given that the sampling of information is random, there are an infinite number of small causal factors that influence members' sampling of information. The group's task, member characteristics, the group's

environment, and even member goals function as causal factors shifting up and down the proportion of shared and unshared information discussed. That is, member goals simply are another causal factor influencing the random sampling of information, sometimes to favor the mentioning of unshared information. Because there are equally strong causal forces pulling in the opposite direction, these forces cancel one another leaving the basic process still one of simple probability. What is missing from this perspective is an appreciation of the complexity of the information-sharing process that a motivated information-sharing framework captures. Stasser's model cannot explain why members would mention information to some and not all members, frame the same piece of information differently to different members, and delay the timing of mentioning information to select members.

References

- Argote, L., & McGrath, J. E. (1993). Group processes in organizations: Continuity and change. In C. L. Cooper & T. I. Robertson (Eds.), *International review of industrial and organizational psychology* (pp. 333–389). Oxford, UK: Wiley & Sons Ltd.
- Botero, I. C., & Wittenbaum, G. M. (2002, November). *Effects of leadership and task demonstrability on information repetition in decision-making groups*. Paper presented at the annual meeting of the National Communication Association, New Orleans, LA.
- Bowman, J. M., & Wittenbaum, G. M. (2002, November). *Effects of time pressure and informational access on hidden profile solutions in decision-making groups*. Paper presented at the annual meeting of the National Communication Association, New Orleans, LA.
- Brodbeck, F. C., Kerschreiter, R., Mojzisch, A., Frey, D., & Schulz-Hardt, S. (2002). The dissemination of critical, unshared information in decision-making groups: The effects of pre-discussion dissent. *European Journal of Social Psychology*, *32*, 35–56.
- Cartwright, D., & Zander, A. W. (Eds.). (1968). *Group dynamics research and theory* (3rd ed.). New York: Harper & Row.
- Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 127–149). Washington DC: American Psychological Association.
- Cruz, M. G., Boster, F. J., & Rodriguez, J. I. (1997). The impact of group size and proportion of shared information on the exchange and integration of information in groups. *Communication Research*, *24*, 291–313.
- Cruz, M. G., Henningsen, D. D. & Smith, B. A. (1999). The impact of directive leadership on group's information sampling, decisions, and perceptions of the leaders. *Communication Research*, *26*, 349–369.
- Dennis, A. R. (1996a). Information exchange and use in group decision making: You can lead a group to information, but you can't make it think. *MIS Quarterly*, *20*, 433–457.
- Dennis, A. R. (1996b). Information exchange and use in small group decision making. *Small Group Research*, *27*, 532–550.
- Dennis, A. R., Hilmer, K. M., & Taylor, N. J. (1998). Information exchange and use in GSS and verbal group decision making: Effects of minority influence. *Journal of Management Information Systems*, *14*, 61–88.
- Devine, D. J. (1999). Effects of cognitive ability, task knowledge, information sharing, and conflict on group decision-making effectiveness. *Small Group Research*, *30*, 608–634.
- Devine, D. J., Clayton, L. D., Philips, J. L., Dunford, B. B., & Melner, S. B. (1999). Teams in organizations: Prevalence, characteristics, and effectiveness. *Small Group Research*, *30*, 678–711.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, *7*, 117–140.
- Fraidin, S. N. (2002, October). *The collective information sampling model and time pressure*. Poster session presented at the annual meeting of the Society of Experimental Social Psychology, Columbus, OH.

- Franz, T. M., & Larson, J. R., Jr. (2002). The impact of experts on information sharing during group discussion. *Small Group Research*, 33, 383–411.
- Gigone, D., & Hastie, R. (1993). The common knowledge effect: Information sharing and group judgment. *Journal of Personality and Social Psychology*, 65, 959–974.
- Gigone, D., & Hastie, R. (1997). The impact of information on small group choice. *Journal of Personality and Social Psychology*, 72, 132–140.
- Graetz, K. A., Boyle, E. S., Kimble, C. E., Thompson, P., & Garloch, J. L. (1998). Information sharing in face-to-face, teleconferencing, and electronic chat groups. *Small Group Research*, 29, 714–743.
- Greitemeyer, T., & Schulz-Hardt, S. (2003). Preference-consistent evaluation of information in the hidden profile paradigm: Beyond group-level explanations for the dominance of shared information in group decisions. *Journal of Personality and Social Psychology*, 84, 322–339.
- Gruenfeld, D. H., Mannix, E. A., Williams, K. Y., & Neale, M. A. (1996). Group composition and decision making: How member familiarity and information distribution affect process and performance. *Organizational Behavior and Human Decision Processes*, 67, 1–15.
- Guzzo, R. A., & Shea, G. P. (1992). Group performance and intergroup relations in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (pp. 269–313). Palo Alto, CA: Consulting Psychologists Press, Inc.
- Hackman, J. R. (1999). Thinking differently about context. In R. Wageman (Ed.), *Research on managing groups and teams: Groups in context* (Vol. 2, pp. 233–247). Stamford, CT: JAI Press, Inc.
- Hightower, R., & Sayeed, L. (1995). The impact of computer-mediated communication-systems on biased group discussion. *Computers in Human Behavior*, 11, 33–44.
- Hightower, R., & Sayeed, L. (1996). Effects of communication mode and prediscussion information distribution characteristics on information exchange in groups. *Information Systems Research*, 7, 451–465.
- Hollingshead, A. B. (1996a). Information suppression and status persistence in group decision making. *Human Communication Research*, 23, 193–219.
- Hollingshead, A. B. (1996b). The rank-order effect in group decision making. *Organizational Behavior and Human Decision Processes*, 68, 181–193.
- Hunton, J. E. (2001). Mitigating the common information sampling bias inherent in small-group discussion. *Behavioral Research in Accounting*, 13, 171–194.
- Jackson, S. (1992). Team composition in organizational settings: Issues in managing an increasingly diverse force. In S. Worchel, W. Wood, & J. A. Simpson (Eds.), *Group processes and productivity* (pp. 138–173). Newbury Park, CA: Sage Publications, Inc.
- Kameda, T., Ohtsubo, Y., & Takezawa, M. (1997). Centrality in sociocognitive networks and social influence: An illustration in a group decision-making context. *Journal of Personality and Social Psychology*, 73, 296–309.
- Kelly, J. R., & Karau, S. J. (1999). Group decision making: The effects of initial preferences and time pressure. *Personality and Social Psychology Bulletin*, 25, 1342–1354.
- Kim, P. H. (1997). When what you know can hurt you: A study of experiential effects on group discussion and performance. *Organizational Behavior and Human Decision Processes*, 69, 165–177.
- Lam, S. S. K., & Schaubroeck, J. (2000). Improving group decisions by better pooling information: A comparative advantage of group decision support systems. *Journal of Applied Psychology*, 85, 565–573.
- Larson, J. R., Jr. (1997). Modeling the entry of shared and unshared information into group discussion: A review and BASIC language computer program. *Small Group Research*, 28, 454–479.
- Larson, J. R., Jr., Christensen, C., Abbot, A. S., & Franz, T. M. (1996). Diagnosing groups: Charting the flow of information in medical decision-making teams. *Journal of Personality and Social Psychology*, 71, 315–330.

- Larson, J. R., Jr., Christensen, C., Abbot, A. S., & Franz, T. M. (1998a). Diagnosing groups: The pooling, management, and impact of shared and unshared case information in team-based medical decision-making. *Journal of Personality and Social Psychology*, *75*, 93–108.
- Larson, J. R., Jr., Foster-Fishman, P. G., & Franz, T. M. (1998b). Leadership style and the discussion of shared and unshared information in decision-making groups. *Personality and Social Psychology Bulletin*, *24*, 482–495.
- Larson, J. R., Jr., Foster-Fishman, P. G., & Keys, C. B. (1994). The discussion of shared and unshared information in decision-making groups. *Journal of Personality and Social Psychology*, *67*, 446–461.
- Larson, J. R., Jr., Sargis, E. G., Elstein, A. S., & Schwartz, A. (2002). Holding shared versus unshared information: Its impact on perceived member influence in decision-making groups. *Basic and Applied Social Psychology*, *24*, 145–155.
- Laughlin, P. R. (1980). Social combination processes of cooperative problem solving groups on verbal intellectual tasks. In M. Fishbein (Ed.), *Progress in social psychology* (Vol. 1, pp. 125–155). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Lavery, T. A., Franz, T. M., Winquist, J. R., & Larson, J. R., Jr. (1999). The role of information exchange in predicting group accuracy on a multiple judgment task. *Basic and Applied Social Psychology*, *21*, 281–289.
- Mackie, D. M., & Goethals, G. R. (1987). Individual and group goals. In C. Hendrick (Ed.), *Group processes*. Newbury Park, CA: Sage.
- McLeod, P. L., Baron, R. S., Marti, M. W., & Yoon, K. (1997). The eyes have it: Minority influence in face-to-face and computer-mediated group discussion. *Journal of Applied Psychology*, *82*, 706–718.
- Mennecke, B. E. (1997). Using group support systems to discover hidden profiles: An examination of the influence of group size and meeting structures on information sharing and decision quality. *International Journal of Human Computer Studies*, *47*, 387–405.
- Mennecke, B. E., & Valacich, J. S. (1998). Information is what you make of it: The influence of group history and computer support on information sharing, decision quality, and member perceptions. *Journal of Management Information Systems*, *15*, 173–197.
- Morrison, E. W., & Milliken, F. J. (2000). Organizational silence: A barrier to change in a pluralistic world. *Academy of Management Review*, *25*, 706–725.
- Parks, C. D., & Cowlin, R. (1995). Group discussion as affected by number of alternatives and by a time limit. *Organizational Behavior and Human Decision Processes*, *62*, 267–275.
- Parks, C. D., & Cowlin, R. A. (1996). Acceptance of uncommon information into group discussion when that information is or is not demonstrable. *Organizational Behavior and Human Decision Processes*, *66*, 307–315.
- Parks, C. D., & Nelson, N. L. (1999). Discussion and decision: The interrelationship between initial preference distribution and group discussion content. *Organizational Behavior and Human Decision Processes*, *80*, 87–101.
- Postmes, T., Spears, R., & Cihangir, S. (2001). Quality of decision making and group norms. *Journal of Personality and Social Psychology*, *80*, 918–930.
- Propp, K. M. (1995). An experimental examination of biological sex as a status cue in decision-making groups and its influence on information use. *Small Group Research*, *26*, 451–474.
- Putnam, L., & Stohl, C. (1990). Bona fide groups: A reconceptualization of groups in context. *Communication Studies*, *41*, 248–265.
- Sargis, E. G., & Larson, J. R., Jr. (2002). Informational centrality and member participation during group decision making. *Group Processes and Intergroup Relations*, *5*, 333–347.
- Sassenberg, K., Boos, M., & Klapproth, F. (2001). Knowledge and competence: The influence of expertise on information exchange in computer-mediated communication. *Zeitschrift Fur Sozialpsychologie*, *32*, 45–56.

- Savadori, L., van Swol, L. M., & Sniezek, J. A. (2001). Information sampling and confidence within groups and judge advisor systems. *Communication Research, 28*, 737–771.
- Schittekatte, M. (1996). Facilitating information exchange in small decision-making groups. *European Journal of Social Psychology, 26*, 537–556.
- Schittekatte, M., & van Hiel, A. (1996). Effects of partially shared information and awareness of unshared information on information sampling. *Small Group Research, 27*, 431–449.
- Stasser G. (1992). Pooling of unshared information during group discussion. In S. Worchel, W. Wood, & J. Simpson (Eds.), *Group process and productivity* (pp. 48–57). Newbury Park, CA: Sage.
- Stasser G. (1999). The uncertain role of unshared information in collective choice. In L. L. Thompson, J. M. Levine, & D. M. Messick (Eds.), *Shared cognition in organizations: The management of knowledge* (pp. 49–69). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Stasser G., & Stewart D. (1992). Discovery of hidden profiles by decision-making groups: Solving a problem versus making a judgment. *Journal of Personality and Social Psychology, 63*, 63–426.
- Stasser G., Stewart D. D., & Wittenbaum G. M. (1995). Expert roles and information exchange during discussion: The importance of knowing who knows what. *Journal of Experimental Social Psychology, 31*, 31–244.
- Stasser G., Taylor L. A., & Hanna C. (1989). Information sampling in structured discussions of three- and six-person groups. *Journal of Personality and Social Psychology, 57*, 57–67.
- Stasser G., & Titus W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality and Social Psychology, 48*, 48–1467.
- Stasser G., & Titus W. (1987). Effects of information load and percentage of shared information on the dissemination of unshared information during group discussion. *Journal of Personality and Social Psychology, 53*, 53–81.
- Stasser G., Vaughan S. I., & Stewart D. D. (2000). Pooling unshared information: The benefits of knowing how access to information is distributed among group members. *Organizational Behavior and Human Decision Processes, 82*, 82–102.
- Stewart D. D. (1998). Stereotypes, negativity bias, and the discussion of unshared information in decision-making groups. *Small Group Research, 29*, 29–643.
- Stewart D. D., & Stasser G. (1995). Expert role assignment and information sampling during collective recall and decision-making. *Journal of Personality and Social Psychology, 69*, 69–619.
- Stewart D. D., & Stasser G. (1998). The sampling of critical, unshared information in decision-making groups: The role of an informed minority. *European Journal of Social Psychology, 28*, 28–95.
- Stewart D. D., & Stewart C. B. (2001). Group recall: The picture-superiority effect with shared and unshared information. *Group Dynamics: Theory, Research, and Practice, 5*, 5–48.
- Straus S. G. (1996). Getting a clue: The effects of communication media and information distribution on participation and performance in computer-mediated and face-to-face groups. *Small Group Research, 27*, 27–115.
- Tjosvold D. (1984). Cooperation theory and organizations. *Human Relations, 37*, 37–643.
- Tjosvold D. (1988). Cooperation and competitive dynamics within and between organizational units. *Human Relations, 41*, 41–425.
- Van Hiel A., & Schittekatte M. (1998). Information exchange in context: Effects of gender composition of group, accountability, and intergroup perception on group decision making. *Journal of Applied Social Psychology, 28*, 28–2049.
- Winquist J. R., & Larson J. R. (1998). Information pooling: When it impacts group decision making. *Journal of Personality and Social Psychology, 74*, 74–371.

- Wittenbaum G. M. (1998). Information sampling in decision-making groups: The impact of members' task relevant status. *Small Group Research*, 29, 29–57.
- Wittenbaum G. M. (2000). The bias toward discussing shared information: Why are high status members immune? *Communication Research*, 27, 27–379.
- Wittenbaum G. M., & Bowman J. M. (2004). A social validation explanation for mutual enhancement. *Journal of Experimental Social Psychology*, 40, 40–169.
- Wittenbaum G. M., Hubbell A. P., & Zuckerman C. (1999). Mutual enhancement: Toward an understanding of the collective preference for shared information. *Journal of Personality and Social Psychology*, 77, 77–967.
- Wittenbaum G. M., & Park E. S. (2001). The collective preference for shared information. *Current Directions in Psychological Science*, 10, 10–70.
- Wittenbaum G. M., & Stasser G. (1996). Management of information in small groups. In J. L. Nye & A. M. Brower (Eds.), *What's social about social cognition? Research on socially shared cognition in small groups* (pp. 3–28). Thousand Oaks, CA: Sage.
- Wittenbaum G. M., Stasser G., & Merry C. J. (1996). Tacit coordination in anticipation of small group task completion. *Journal of Experimental Social Psychology*, 32, 32–129.

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