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Information Sampling and Group Decision Making: The Effects of an Advocacy Decision Procedure and Task Experience

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Abstract

Group discussions tend to focus on information that was previously known by all members (shared information) rather than information known by only one member (unshared information). If the shared information implies a suboptimal alternative, this sampling bias is associated with inaccurate group decisions. The present study examines the impact of two factors on information exchange and decision quality: (a) an "advocacy" group decision procedure vs. unstructured discussion and (b) task experience. Results show that advocacy groups discussed both more shared and unshared information than free discussion groups. Further, with increasing experience, more unshared information was mentioned in advocacy groups. In contrast, there was no such increase in unstructured discussions. Yet, advocacy groups did not significantly improve their decision quality with experience.

Information Sampling and Group Decision Making:
The Effects of an Advocacy Decision Procedure and Task Experience

Many important decisions in organizations as well as in everyday life are made by small groups rather than by individuals. Compared to individual decision making or social aggregations of individual votes (i.e., several persons make an individual decision, and these individual decisions are combined by a decision rule such as the majority rule), group decision making requires more time and effort among the persons involved. Thus, to justify this "investment", group decision making has to produce an added value in relation to the above-mentioned simpler forms of decision making.

Two frequent assumptions about what this added value could be refer to a) *knowledge gains* among the group members and b) *improved decision quality* (e.g., McGrath, 1984). Within a group discussion, diverse knowledge and different perspectives about a decision problem can be exchanged. As a consequence, each group member should learn new information about the decision problem, and, independently of how the group decides, might benefit from this information later on (e.g., if difficulties arise in the implementation phase). In addition, the broader knowledge base should allow the group to make better decisions than each member could have made based on his/her own knowledge alone (Hastie, 1986).

For both knowledge gains and improved decision quality, so-called *unshared information* (Stasser & Titus, 1985) is particularly important. Unshared information refers to information that is known by only one group member prior to discussion, whereas so-called *shared information* is available to all group members before the discussion. If unshared information is discussed, all but one group member learns new information about the decision problem, whereas shared information does not add anything new if it is discussed.

Thus, knowledge gains are possible if unshared information exists and if this unshared information is discussed in the group.

These conditions are not sufficient for the second added value mentioned above, namely the potential of group decision making to improve decision quality compared to individual decisions or social combinations of individual votes. If both shared and unshared information have the same decisional implication (e.g., if both types of information are in favor of the same candidate in a personnel selection task), the same alternative that appears best prior to discussion should also appear best after discussion. These types of situations are labeled *manifest profiles* (Lavery, Franz, Winquist, & Larson, 1999). On the contrary, if unshared information has a different decisional implication than shared information has (e.g., unshared information is in favor of candidate A, whereas shared information is in favor of candidate B), and if the unshared information implies the best choice (i.e., the best alternative given all pieces of information available to the group), group decision making has the potential to improve decision quality. These types of situations are labeled *hidden profiles* (Stasser, 1988) because the best solution is hidden from the individual group members; it can only be detected if the members' diverse knowledge is integrated in a group discussion.

Unfortunately, research on information pooling in group decision making consistently reveals that both possible added values (knowledge gains and improved decision quality) are seldom realized (for overviews, see Mojzisch & Schulz-Hardt, 2005 as well as Stasser & Birchmeier, 2003). Group discussions focus on members' shared information (*sampling bias*); that is, groups mention and repeat shared information more often than unshared information (e.g., Larson, Christensen, Abbott, & Franz, 1996; Stasser, Stewart, & Wittenbaum, 1995; for a summary see Wittenbaum & Stasser, 1996). In certain respects,

groups largely discuss what all members have known before. This, of course, works against the occurrence of knowledge gains among group members.

In addition, groups mostly fail to solve hidden profiles (e.g., Larson, Christensen, Franz, & Abbott, 1998; Lavery et al., 1999; Stasser & Stewart, 1992; Stasser & Titus, 1985). Instead, they predominantly choose the alternative that is implied by their members' shared information (Larson et al., 1998; Stasser & Stewart, 1992) – even if this alternative is suboptimal on the basis of all information available to the group (hidden profile). As a consequence, their decisions are seldom better than the decisions that their members would have made individually. In sum, group decision making is dominated by shared information, and this dominance counteracts knowledge gains and improvements in decision quality that could be derived from unshared information.

How Can the Dominance of Shared Information Be Reduced?

As it seems, group decision making does not automatically produce an "added value" that corresponds to the expenditures (time, effort) it requires. Thus, if one does not want to generally abstain from having groups make decisions, it is important to develop procedural interventions that help groups to realize their potential. As both added values discussed above, namely knowledge gains and improved decision quality, require groups to discuss and integrate their members' unshared information, such interventions would have to facilitate the pooling of unshared information and thereby reduce the sampling bias towards shared information. However, to date the search for such interventions has not been very successful. For example, structuring the discussion by instructing group members to collect all information before they state their preferences did not attenuate (or even increase) the sampling bias (Larson, Foster-Fishman, & Keys, 1994; Mennecke, 1997; Stasser, Taylor, & Hanna, 1989). Using computer-mediated interaction instead of face-to-face discussion largely

failed to reduce this bias (Dennis, 1996; Hollingshead 1996; Straus, 1996; but see Lam & Schaubroek, 2000). Holding group members accountable for their decision also did not counteract the dominance of shared information (Stewart, Billings, & Stasser, 1998). Finally, even forewarning the group members that their individual information differs did not affect the sampling bias (Stasser et al., 1995).

There have been some successful attempts to reduce the dominance of shared information, but most of these attempts are difficult to apply to decision-making groups in practice. For example, the sampling bias was attenuated when information load decreased (Stasser & Titus, 1987), when the task appeared to be intellective rather than judgmental (Stasser & Stewart, 1992), and when group members were made aware of where to look for unshared information (Schittekatte, 1996). However, information load and task structure can hardly be influenced in real-group decision making. In addition, in practice, hardly anyone knows prior to group discussion which information is shared and which information is unshared. In sum, the problem of finding a successful and practicable intervention against the dominance of shared information is still largely unsolved.

To find a solution to this problem, it is essential to understand the mechanisms mediating this phenomenon. As Winquist and Larson (1998) point out in their integrative "dual process model", two kinds of processes are responsible for the fact that group discussions and group decisions are dominated by shared information. The first is based on the probabilistic (quasi "automatic") sampling advantage of shared information: for shared information *not* to be mentioned during group discussion, it is necessary that *all* group members either forget to mention this information or have no motivation to do so. On the contrary, for unshared information not to be mentioned, it is sufficient that the one member holding this information fails to do so (Stasser & Titus, 1987). As a consequence, more

shared than unshared information is discussed; and since information that has not been pooled during group discussion can hardly affect the final group decision, shared information is more likely to influence the final decision than unshared information (Larson et al., 1998; Winquist & Larson, 1998).

However, Larson and his colleagues (e.g., Larson et al., 1996; Larson et al., 1998; Larson et al., 1994) have shown that this probabilistic sampling advantage of shared information is reduced over time: To the extent that the group members want to avoid redundancy, more unshared information is mentioned later on simply because more of the shared than of the unshared information had been mentioned before. As a consequence, the chances of discussing and integrating unshared information become better the longer the group engages in information exchange. At this point, the second process contributing to the dominance of shared information becomes important. This process is based on the group members' individual pre-discussion preferences. Group members often use group discussion as a means to communicate and negotiate their individual preferences rather than as a tool for information exchange (Gigone & Hastie, 1993, 1997). They try to reach consensus based on their individual preferences, and they predominantly mention information that is consistent with these preferences (Dennis, 1996). As soon as the members explicitly agree on a particular alternative, exchanging new information becomes relatively meaningless to group members. As a consequence, the heightened chances of unshared information to be discussed and integrated during later phases of the discussion are not realized; instead, group discussion and group decision are largely based on shared information.

This is particularly unfortunate in a hidden profile situation. Since in a hidden profile, the superior alternative is hidden from the group members given their individual information, most or all group members enter the discussion with a preference for a *suboptimal*

alternative. Thus, preference exchange and negotiation hardly ever results in premature consensus on the superior alternative. Instead, the group typically reaches consensus on that suboptimal alternative that is best supported given the members' individual pre-discussion information (Gigone & Hastie, 1993, 1997; Lavery et al., 1999). New information that could indicate the incorrectness of this premature consensus and lead to the detection of the superior alternative is unlikely to be sampled during discussion (Schulz-Hardt, Frey, Lüthgens, & Moscovici, 2000) and, thus, unlikely to be integrated into the group decision.

Given these mediating mechanisms, conflict and controversy among group members should counteract the dominance of shared information. More specifically, if group members disagree about what alternative should be preferred, the likelihood of implicit or explicit premature consensus should be reduced and it should be more likely that the group engages in intensive information exchange (Winquist & Larson, 1998). Particularly, group members should be more interested in exchanging new (i.e., unshared) information to resolve their disagreement and to find the best solution.

Consistent with these assumptions, Brodbeck, Kerschreiter, Mojzisch, Frey, and Schulz-Hardt (2002) have shown that increases in pre-discussion dissent correspond to increases in the amount of information revealed, and subsequently the hidden profile is more likely to be solved. In support of this line of thought, Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, and Frey (2005) recently demonstrated that groups benefit from pre-discussion dissent even if none of the group members initially favors the best choice. Groups with pre-discussion dissent had higher knowledge gains among their members and were more likely to solve the hidden profile than groups without pre-discussion dissent, and these effects were brought about by more discussion intensity and less discussion bias in dissent groups. In sum, controversy about the alternative to be chosen facilitates both possible "added values" of

interactive group decision making that have been outlined at the beginning, namely knowledge gains and improved decision quality.

Contrived Dissent as a Possible Counterforce to the Dominance of Shared Information

Although controversy in the group decision process counteracts the dominance of shared information, ensuring this controversy by creating groups of members with diverging individual pre-discussion preferences often may not be possible from a practical point of view. Specifically, this can be done only if group composition is not fixed and if the individual preferences of possible group members are known prior to discussion. Hence, a different strategy is needed for existing groups such as, for example, organizational boards.

The literature on strategic (group) decision making (e.g., Schwenk, 1988) offers a good starting point for the development of such an intervention: To avoid the uncritical acceptance of particular solutions, so-called "dialectical" techniques that implement a controversial debate independent of group members' actual preferences have been developed (for overviews, see Katzenstein, 1996; Mason & Mitroff, 1981). Of these techniques, the two best known ones are "devil's advocacy" (Herbert & Estes, 1977) and "dialectical inquiry" (Mason & Mitroff, 1981). As dialectical decision procedures are the "institutionalized counterpart" of (actual) preference diversity, and as preference diversity has been shown to counteract the dominance of shared information in group decision-making, the primary purpose of our experiment reported below was to test whether this facilitative effect also can be found for a dialectical decision procedure.

This question has not been investigated before. Of course, a large number of studies has shown that dialectical techniques generally improve the quality of group decision processes and group decisions (for an overview, see Schwenk, 1990; for more recent studies, see, for example, Schulz-Hardt, Jochims, & Frey, 2002; Valacich & Schwenk, 1995).

However, these effects are difficult to generalize to the situation we are dealing with for the following reason: In the group tasks typically used to investigate the effectiveness of dialectical decision procedures, all group members receive identical information about the decision problem. (They may, of course, hold diverse background knowledge about the topic, but this has never been assessed in the corresponding studies.) Thus, if one finds that better decisions are made in groups using a dialectical procedure, this effect may be an individual-level effect: Being forced to consider a problem from different perspectives might help a decision maker to make better use of his or her own individual information. In line with this assumption, earlier research on dialectical procedures that has focussed on individual decision makers who, for example, are forced to consider a written proposal of a devil's advocate or two conflicting statements about the decision problem (dialectical inquiry), has demonstrated exactly these facilitative effects at the individual level (e.g., Schwenk, 1984; Schwenk & Cosier, 1980). On the contrary, we are interested in *group-level* effects, namely how groups can realize specific gains in knowledge (pooling unshared information) or decision quality (solving hidden profiles) that would not be possible for their members if they worked on the decision problem individually. The question tested here for the first time is whether these group specific gains are facilitated by a dialectical decision procedure.

The technique we used for these purposes is a variant of the dialectical inquiry procedure (Mason & Mitroff, 1981) that we specifically designed for decision problems with multiple, fixed alternatives (in contrast to strategic decision problems where fixed alternatives often do not exist prior to discussion). In this *advocacy procedure*, each alternative has a proponent independent of group members' actual preferences. In our experiment, a decision problem with three alternatives is used, and each member of a three-person group is instructed to argue for one of three alternatives by mentioning positive

aspects of this alternative or negative aspects of the other alternatives. These roles are rotated within each discussion; that is, each group member acts as an advocate for each alternative for some time. This rotation is designed to serve two purposes: first, rotating the roles should prevent the group members from identifying too much with their proposed alternative, which might discourage them from open-mindedly exchanging information (cf. also Katzenstein, 1996). Second, rotating the roles is the only way to guarantee that all information *can* be mentioned. For instance, if a group member has an unshared negative piece of information about alternative B but plays an advocate for B throughout the discussion, this information will never be mentioned.

Experimental Aims and Hypotheses

The current experiment was designed to test whether the advocacy procedure outlined above reduces the dominance of shared information in group discussions and group decision making. For these purposes, the hidden profile paradigm (see introduction) was used. Theoretically, the advocacy procedure should yield two effects: on the one hand, although the group members may still have individual preferences in favor of a suboptimal alternative, the advocacy procedure should preclude the group members from prematurely aggregating their preferences, and, in turn, intensify their information exchange. We thus propose

Hypothesis 1. Advocacy groups pool both more shared and unshared information than free discussion groups.

Since premature consensus specifically decreases interest in detecting new aspects of the decision problem after an immediate common representation (mostly based on shared information) has been formed, using an advocacy procedure that prevents explicit consensus (by avoiding an exchange of preferences) or implicit consensus (by ensuring that information

is discussed independently of the group members' preferences) should particularly facilitate the exchange of unshared information. This leads to

Hypothesis 2. The sampling bias will be attenuated in advocacy groups as compared to free discussion groups.

Since discussing unshared information at length is associated with detecting the best alternative and, thus, improved decision quality (cf. Brodbeck et al., 2002; Larson et al., 1998; Winquist & Larson, 1998), using the advocacy procedure should result in more accurate decisions than unstructured discussions.

Hypothesis 3. Advocacy groups make better decisions than free discussion groups.

However, it is conceivable that the positive effects of the advocacy procedure do not fully materialize after one task trial. As shown by Schweiger, Sandberg, and Rechner (1989), the effectiveness of dialectical discussion techniques increases with experience. This is plausible since at the beginning group members often find it unusual and even somewhat irritating to argue in favor of a position they do not authentically hold, and with increasing experience they are better able to strongly act out the dialectical debate. Thus, a more realistic assessment of the advantages and disadvantages of such a technique is possible if a series of task trials is performed. Four consecutive task trials were designed for our experiment. We expect that each of the advantages of advocacy groups compared to free discussion groups outlined in Hypotheses 1, 2, and 3 will increase over task trials. This leads to the following hypotheses:

Hypothesis 4. Over task trials, the exchange of both shared and unshared information will increase more in advocacy groups than in free discussion groups. That is, the decision-procedure effect predicted in Hypothesis 1 will be qualified by an ordinal interaction with experience.

Hypothesis 5. The attenuation of the sampling bias in advocacy groups compared to free discussion groups (Hypothesis 2) will increase with experience. That is, we predict an ordinal three-way interaction among decision procedure, experience, and type of information (shared vs. unshared).

Hypothesis 6. Decisions made by advocacy groups will improve more than decisions made by free discussion groups. That is, the difference in decision quality between advocacy and free discussion groups (Hypothesis 3) will increase over task trials.

Concerning the experience factor it should be noted that this is the first experimental study using the hidden profile paradigm in which groups perform more than two consecutive task trials. Therefore, on an exploratory basis we can also examine whether information pooling and decision quality in free discussions will simply become better with increasing task experience.

Even if we find that the advocacy procedure reduces the dominance of shared information, this does not automatically mean that the use of this procedure can be recommended for decision-making groups in practice. In particular, it is possible that the advocacy procedure improves decision quality if the shared information is in favor of a suboptimal alternative (hidden profile), but at the same time reduces decision quality if the shared information is largely representative of the full set of information. In the latter case of a manifest profile, the advocacy method might dissuade the group members from choosing the correct alternative, and because in reality prior to group discussion nobody knows whether the situation is a hidden profile or a manifest profile, this would be a major drawback of the advocacy technique. To test this possibility, the fourth task was designed as a manifest profile with shared and unshared information favoring the same alternative. As a consequence, the hypotheses regarding decision quality (Hypotheses 3 and 6) only refer to the

first three task trials. Since the fourth task (the manifest profile) contains the same amount of shared and unshared information as the first three, Hypotheses 1, 2, 4, and 5 refer to all task trials.

Method

Design

The experimental design is a mixed factorial design with advocacy versus free discussion condition as a between-groups factor and experience (task trials one to four) as a within-groups factor. Fourteen groups were run in each experimental condition.

Participants

Eighty-four students from the University of Munich (44 female, 40 male, average age 24 years) participated in our study. All participants received 15 German marks (i.e., about seven dollars) as a reward for their participation. In addition, each participant was paid a bonus of up to 10 marks depending on collective group performance in all four task trials: for each correctly solved task trial, each group member received an additional two and a half marks.

Task

Four cases (A, B, C, D) were created requiring three-person groups to decide which one of three alternatives is best suited for a certain claim. In case A, participants were asked to imagine that they were looking for an apartment to rent, with three apartments to choose from. In case B, participants had to decide which of three business premises would be most suitable for a sports store. In case C, the participants had to choose the best candidate from three applicants for a managerial position. In case D, participants had to decide which of three academic candidates was best qualified for a professorship at a psychology department. All cases were rotated across the four task trials in such a way that two three-person groups,

one for each experimental condition, had the same random sequence of task trials (sibling groups). To make this rotation possible, a hidden profile and a manifest profile version of each case was constructed. Note that for all groups the fourth task trial contained the manifest profile.

In a first pilot study with $N = 20$ students, approximately 80 attributes were rated for each of the four cases with respect to how desirable and how important they were considered to be for the different claims. Based on these ratings, 45 attributes that were unambiguously positive (i.e., desirable and important), neutral (i.e., neither desirable nor undesirable nor important), or negative (i.e., undesirable and important) were chosen per case. To create realistic profiles, extremely undesirable attributes were avoided. An example of a positive item is "The store is conveniently located for customers." An example of a neutral item is "The candidate was born in Offenbach." An example of a negative item is "The residential area in which the apartment is located is unsafe."

Each task was designed such that the full information proved alternative A to be the best choice (9 positive, 3 neutral, and 3 negative facts), alternative C to be second best (6 positive, 6 neutral, and 3 negative facts) (see Table 1), and alternative B to be the least desirable (6 positive, 3 neutral, and 6 negative facts). In a second pilot study with $N = 20$ individuals, alternative A was considered the best alternative for the four cases by at least 18 out of 20 individuals, $\chi^2(2) = 28.90$, $p < .01$. Moreover, alternative C was considered to be the second best alternative by at least 14 out of 20 individuals, $\chi^2(2) = 12.40$, $p < .01$, whereas alternative B was considered to be the least desirable alternative by at least 15 out of 20 individuals, $\chi^2(2) = 15.70$, $p < .01$. Hence, we can conclude that most people perceive the rank orders of the three alternatives as intended if they are in possession of full information.

To create the hidden profiles, group members were given only partial information. They each received a preponderance of information favorable toward alternative B and unfavorable toward alternative A. As shown in Table 1, in each of the first three cases, there were 3 positive, 3 neutral, and 3 negative facts about alternative A, 6 positive, 1 neutral, and 2 negative facts about alternative B, and 4 positive, 2 neutral, and 3 negative facts about alternative C. Hence, the information distributed to each group member was in favor of alternative B, followed by alternative C and alternative A. The labeling of alternatives, of course, was changed for different task trials. For the sake of clarity and simplicity, methods and results are presented with fixed labels.

The fourth task trial differed from the first three in that all group members received individual information in favor of the correct alternative (manifest profile). Therefore, group members were presented information favoring the best alternative A (7 positive, 1 neutral, and 1 negative fact), followed by C (4 positive, 2 neutral, and 3 negative facts) and B (2 positive, 3 neutral, and 4 negative facts).

Procedure

Participants were randomly assigned to the experimental conditions. In accordance with the standard procedures reported in the hidden profile and information pooling literature, a cover letter described the objective of the study as an examination of effective group decision-making. Participants were informed that, as in the real world, they would not receive exactly the same information as their fellow group members. However, they were assured that all the information provided in the profiles was consistent and true. Finally, the experimenter told the participants that one of the alternatives was clearly the best one on the basis of the complete information set and that each correct group decision would be rewarded with a bonus of 2.50 German Marks per group member.

Participants studied the case material for case 1 (which took approximately five minutes) and then indicated which alternative they preferred individually on a personal record sheet. Afterwards, the case material was collected. Groups were then instructed to discuss the three alternatives and reach an unanimous decision on a rank order with respect to these alternatives. At the end of the discussion, participants noted the final group decision on a separate sheet. Subsequently, participants noted their personal post-discussion preference on an individual questionnaire. Next, the second case was conducted in the same manner, followed by cases 3 and 4. Feedback on whether group decisions were correct was not given until the debriefing session.

Decision procedure. In the advocacy condition, the participants were told that during the discussion, each member would act as an advocate for each alternative for some time. The advocate for an alternative was to argue in favor of this and against the other alternatives. It was emphasized that the presentation of information should be undertaken independently of their actual preference. In the course of the discussion, advocacy roles were rotated; that is, during the first 3 minutes, the first group member was an advocate for alternative A, the second for alternative B, and the third for alternative C. (In addition, order of advocacy was also rotated across task trials. That is, in the second task, the first group member was an advocate for alternative B, etc.). After 3 minutes the roles changed, that is, the first group member was now an advocate for alternative B, the second for C, and the third for A. (Pilot testing revealed that in each advocacy phase, the information exchange strongly declined after approximately 2 minutes. Hence, we assumed that 3 minutes were sufficient for one advocacy phase.) Finally, after a further 3 minutes, the roles changed again. The first group member now advocated alternative C, the second alternative A, and the third alternative B. After these 9 minutes of structured discussion, the group was free to discuss

any additional points they considered to be important and then had to reach a group decision on a rank order for the alternatives. For this decision making phase, 4 minutes were given. To hold discussion time constant to some extent, participants in the free discussion condition were told that they had 13 minutes to reach a consensus, and, to avoid hasty decisions, they were kindly requested to discuss the alternatives for at least 9 minutes. It should be emphasized that the key findings of the analyses reported below remain stable when taking discussion time into account. After task trial 4 was finished, the experimenter thanked the participants, paid them for their participation, explained the purpose of the experiment, and asked them not to discuss the experiment with others. The whole experiment lasted about two and a half hours.

Dependent Measures

Measures of discussion content. Each group discussion was video taped. The videotapes were coded by two research assistants both of whom were unaware of the present study's hypotheses. For a statement to be counted as a correct recall of an informational item, the group members had to link the information to the alternative explicitly or by context. One of the two coders coded all 112 group discussions (28 groups × 4 cases). To estimate coding reliability, the second coder independently coded 16 randomly selected discussions, 4 for each case and 8 for each experimental condition. Given the relatively objective nature of the coding, it is not surprising that reliability was very high. An item-by-item comparison revealed that the coders agreed 99% of the time. Thus, the coding of the first coder was used. Two measures were created for information exchange: (1) proportion of shared information mentioned and (2) proportion of unshared information mentioned (see Larson et al., 1996, 1998). In accordance with the literature on information pooling in groups, we also analyzed repetitions of shared and unshared information. However, since no hypotheses had been

formulated with regard to repetitions, we abstain from reporting these results. These analyses are available from the authors upon request.

Outcome measures. Decision quality was measured on a six-point scale based on the rank order among the three alternatives; this scale was developed by McLeod, Baron, Marti, and Yoon (1997). Values of 6 and 5 were assigned to the two rank orders placing alternative A first (A > C > B and A > B > C, respectively). Values of 4 and 3 were assigned to the two rank orders placing alternative A second (C > A > B and B > A > C, respectively). Values of 2 and 1 were assigned to the two rank orders placing alternative A third (C > B > A and B > C > A, respectively).

Results

Discussion Content

To test the effects of the advocacy procedure and task experience on information sampling during discussion, a 2 X 2 X 4 (Condition X Information Type: shared vs. unshared X Task Trials) ANOVA with repeated measures on the two latter factors was conducted. The corresponding means for the experimental conditions across task trials are shown in Table 2. ANOVA data are displayed in Table 3. There was a main effect for information type. Across task trials, more shared (M = 73%) than unshared (M = 42%) information was discussed. Hence, consistent with previous research, the sampling bias was replicated. The main effect for condition was also significant. Across all four task trials, advocacy groups (M = 60%) discussed more information than free discussion groups (M = 53%). This effect was due to advocacy groups discussing both more shared (M = 76%) and unshared (M = 44%) information than free discussion groups (M = 69%, M = 38%), respectively. Thus, the data provide strong support for Hypothesis 1. It should be noted that advocacy groups discussed longer than control groups. However, additional analyses showed that advocacy groups

discussed more information per minute than control groups, $F(1, 26) = 15.58$, $p < .01$, MSE = 2.05, Cohen's $f = .78$.

In contrast to Hypothesis 2, the sampling bias overall was not significantly attenuated in advocacy groups as compared to free discussion groups. The corresponding interaction between condition and information type was not significant (see Table 3). In addition, there was no significant interaction between condition and experience. Advocacy groups did not show a significantly stronger increase in information exchange over task trials than free discussion groups. Thus, Hypothesis 4 receives no support from the data. It should be noted that in both cases, the statistical power to detect a medium effect size (Cohen, 1988) was small (power = .51, power = .36, respectively).

However, as proposed by Hypothesis 5, the three-way interaction of condition, experience, and information type was significant (see Figure 1). Whereas advocacy groups discussed more unshared information than free discussion groups in task trials 3, $d = 0.77$, and 4, $d = 1.15$; no clear differences were found in task trials 1, $d = 0.16$, and 2, $d = 0.48$. In contrast to unshared information, the differences between advocacy groups and free discussion groups for exchange of shared information were relatively stable. Hence, the three-way interaction was due to advocacy groups discussing more unshared information in later task trials, whereas no such increase occurred for free discussion groups.

Group Decision Quality

Table 4 displays the proportion of correct group decisions for both the advocacy and the free discussion condition over task trials as well as the decision quality scores for the rank order of alternatives. Groups were more successful in solving a manifest profile (89%) than in solving a hidden profile (7%), $Z = 4.70$, $p < .01$. Accordingly, with regard to the decision quality scores, group decisions were more accurate when the case involved a manifest profile

(M = 5.36) than when the case involved a hidden profile (M = 2.40), $t(27) = 12.85$, $d = 3.52$, $p < .01$. Further, for each of the three hidden profile tasks, χ^2-tests of the rate of actual correct decisions against an expected value of .33 revealed that there were significantly fewer correct decisions than would be expected by chance, M = 14%, $\chi^2(1, N = 28) = 4.44$, $p < .05$; M = 0%, $\chi^2(1, N = 28) = 13.70$, $p < .01$; M = 7%, $\chi^2(1, N = 28) = 8.47$, $p < .01$, respectively. In contrast, given a manifest profile, group decisions were more accurate than would be expected by chance, M = 89%, $\chi^2(1, N = 28) = 40.12$, $p < .01$. To test the effects of the advocacy procedure and task experience on the group decision quality scores, a 2 (Condition) X 4 (Task Trials) ANOVA with repeated measures on the last factor was conducted. ANOVA data are displayed in Table 5. Neither the effects for condition nor for the interaction were significant. Thus, Hypotheses 3 and 6 do not receive support from the data. However, in both cases, the statistical power to detect a medium effect size (Cohen, 1988) was small (power = .51, power = .36, respectively).

Discussion Content and Pre-discussion Preferences as Predictors for Group Decision Quality

The analyses of the experimental design with regard to discussion content and group decision quality reveal an interesting situation: Whereas the advocacy procedure facilitated the exchange of both shared and unshared information and, with increasing number of task trials, particularly the introduction of unshared information benefited from the procedure, group decision quality was unaffected by the advocacy procedure. This unexpected pattern of results could be due to the fact that group decisions might have been largely unrelated to discussion content. In some previous information pooling studies (e.g., Gigone & Hastie, 1993, 1997; Lavery et al., 1999), group judgments and group decisions were primarily

determined by members' pre-discussion preferences, whereas discussion content had little or no influence on the final decision.

To examine this possibility, we ran two regression analyses (one for the three hidden profiles and one for the manifest profile) with final group decisions as the criterion (decision quality scores) and initial group member preferences (decision quality scores averaged across group members) and proportion of unshared information discussed as predictors. The separate treatment of the hidden profile cases and the manifest profile was necessary because in a manifest profile, shared and unshared information have the same decisional implication. Hence, individual pre-discussion preferences should be largely in favor of the best alternative, and discussing unshared information should not alter these preferences. As a consequence, one should not expect discussion of unshared information to be a predictor of group decision quality in a manifest profile. In contrast, in a hidden profile, unshared information has a different decisional implication than does shared information. As a consequence, individual pre-discussion preferences should be largely suboptimal, and the more unshared information is discussed, the better the chances for an improvement in group decision quality should be. Thus, discussion of unshared information could be a predictor of group decision quality in hidden profiles.

In line with these considerations, a paired-samples t-test showed that decision quality in members' initial pre-discussion preferences was higher for the manifest profile case (M = 5.36, SD = 1.09) than for the average of the three hidden profile cases (M = 1.85, SD = 0.67), $t(83) = 24.73$, $p < .01$, d =3.88. In a multiple regression analysis for the manifest profile case, group member preferences received a significant regression weight when predicting group decision quality, $\beta = .56$, $p < .01$, whereas the regression weight for proportion of unshared information discussed was not significant, $\beta = .22$, *ns.* As mentioned above, this is not

surprising in a manifest profile. However, the regression analysis for the hidden profile cases (in this analysis, each group contributed three cases. That is, the analysis involved 84 cases) revealed the same result: Initial group member preferences significantly predicted final group decisions, $\beta = .51$, $p < .01$, whereas proportion of unshared information discussed did not, $\beta = .08$, *ns*. Similar results are obtained if, instead of unshared information, other measures of discussion content (e.g., sampling bias) are used as predictors of the final group decision. In sum, discussion content hardly played a role for group decision quality, and group decisions seem to have been largely determined by initial preferences – even in the hidden profile cases.

Additional analyses, examining the distribution of pre-discussion preferences in each group for each of the hidden profile cases, confirmed this pattern of results. Note that in the hidden profile cases used in our study, most group members can be expected to prefer the suboptimal alternative B prior to discussion because this alternative is best supported given the members' individual pre-discussion information. In contrast, hardly any member should hold an individual pre-discussion preference for the superior alternative A. Actually, in 64 of altogether 84 cases (76%) the members held consensual pre-discussion preferences for alternative B. In 11 cases (13%) the majority favored alternative B, whereas in 6 cases (7%) the majority or all members favored Alternatives A or C. In 3 cases (4%) each group member favored a different alternative. These latter three cases are not considered in the following analyses because no predictions for the subsequent group choice can be made based on this preference pattern. Of the remaining 81 cases, in 74 cases (91 %) the group decided for the alternative that was initially favored by the majority or all of the group members. Only in six cases (7%) was an alternative chosen that was initially favored only by a minority, and only one emergent decision (1%) was made. Thus, a majority (or a two-third) model predicts the

groups' decisions very accurately (see Laughlin, 1980 as well as Hastie & Kameda, 2005). No significant differences between advocacy and free discussion groups were found.

Discussion

Previous research has shown that the dominance of shared information in group decision making is a robust phenomenon (Stasser & Birchmeier, 2003): Group discussions focus on shared rather than unshared information (Wittenbaum & Stasser, 1996), and group decisions largely reflect the implications of shared information (Larson et al., 1998; Stasser & Stewart, 1992; Stasser & Titus, 1985). As a consequence, most groups fail to enlarge the task-relevant knowledge of their group members and to solve hidden profiles (i.e., situations where shared information is misleading and the best choice can only be found by pooling unshared information). Thus, they fail to realize specific benefits of group decision-making that could outweigh the surplus of resources required compared to individual decision-making. Our experimental results fit this picture: across all four task trials, the groups exhibited a strong sampling bias, that is, they mentioned more shared than unshared information. Across the hidden profile tasks, the correct solution was detected in only 7% of all cases. If we consider only those cases where no group member already had an initial preference for the best alternative by chance, then the frequency of correct solutions even decreases to zero. In other words, no group was successful in detecting a correct solution that no group member had initially preferred.

Effects of Advocacy Procedure and Experience on Information Exchange

To counteract this strong dominance of shared information and, thus, to facilitate the realization of group-specific decision-making benefits, an intervention based on the "advocacy" principle was developed and tested in the present experiment. To prevent an explicit or implicit premature consensus based on group members' individual preferences

and, in particular, to facilitate the exchange of unique (i.e., unshared) information, group members were assigned rotating advocacy roles for the three alternatives. As the results show, this procedure facilitated information exchange overall: groups using the advocacy procedure discussed more information, both shared and unshared, than free discussion groups. Yet, the advocacy procedure did not eliminate the sampling bias; across all four task trials, advocacy groups, as well as free discussion groups, mentioned more shared than unshared information. However, whereas advocacy groups increased the pooling of unshared information from task trial 1 (37%) to 4 (49%), no such increase occurred in free discussion groups. This finding is in line with the results of Schweiger et al. (1989) showing that experience in using dialectical techniques gives rise to higher procedural efficiency. More generally, it also is consistent with the findings of Brodbeck and Greitemeyer (2000) showing that repeated task performance is required until the benefits of structuring information exchange in groups fully materialize. It should be noted that the previous finding that a structured discussion on information exchange did not reduce the sampling bias (e.g., Larson et al., 1994; Stasser et al., 1989) could be also due to inexperienced group members (in none of these studies was more than one group discussion carried out).

However, *why* does the facilitative effect of the advocacy procedure on the exchange of unshared information increase over time? In our view, this finding largely resembles an effect of experience with the use of this technique. In the beginning, the advocacy system poses an unusual constraint on the group members' discussion style: Usually, group members argue according to their preferences (Dennis, 1996). Thus, it is plausible that their preference helps them to mentally organize the information about the decision problem by building two categories, namely one of "preference justifications" and one of "doubts and reservations". If they are then asked to argue as an advocate for different alternatives in different phases of the

discussion, they have to re-organize the available information by, for example, building up a more complex representation with advantages and disadvantages of each of the three alternatives. Over task trials, the participants may have become more familiar with this more complex representation and, thus, may have had easier access to the information required in each specific phase.

Although these considerations are speculative to some extent, there are at least some data that support this interpretation. Regarding the advocacy groups, a post-hoc examination of the first 9 minutes of discussion (these 9 minutes contained the three advocacy phases) and the final discussion phases revealed an effect size of $f = 0.59$ for the first 9 minutes and an effect size of $f = 0.44$ for the final discussion phases. Thus, over time, the group members seem to become familiar with the requirement of arguing independently of their actual preference and arguing for different alternatives in different phases of the discussion.

It also should be noted that experience with such decision tasks per se obviously did not affect the sampling bias; free discussion groups showed no differential increase in the amount of unshared information discussed. Since in all previous studies, groups performed only one or (rarely) two task trials (at least we are not aware of any study with more task trials), it has been suggested that this limitation might result in an overestimation of the sampling bias (Wittenbaum & Stasser, 1996). However, our results imply that the sampling bias not only occurs in newly-formed groups but also in groups more experienced with the task at hand (but see Wittenbaum, 1998).

A different picture may arise if the groups receive accurate feedback after each task trial. Learning that the previous decision was suboptimal may, for example, reduce the impact of group members' individual preferences (since they have learned that these preferences were incorrect) and give rise to a more intensive and less biased information

exchange – which is an interesting question for further research. However, it should be noted that real groups seldom receive such accurate feedback: unless the chosen alternative leads to a complete failure, the group hardly ever realizes that they could have been better off with a different choice.

Decision Quality: Why Was It Unaffected?

Despite the facilitated exchange of unshared information in advocacy groups over task trials, advocacy groups did not make significantly better decisions than free discussion groups, nor did decision quality in advocacy groups significantly improve over time. As the analyses of members' individual preferences showed, group decisions were predominantly determined by these pre-discussion preferences (see Parks & Nelson, 1999, for further confirming evidence), and the results of these analyses applied to advocacy groups as well as to free discussion groups. This finding is in line with Gigone and Hastie (1993) who made a strong claim by suggesting that information pooling during the discussion has no additional impact on group decision-making that goes beyond the impact of information on members' pre-discussion preferences (see also Lavery et al., 1999). In their studies, discussion time was very limited. Hence, our study extends their findings by demonstrating the impact of initial group member preferences on final group decisions even if sufficient time for information exchange is given.

According to Gigone and Hastie, the common explanation for the dominance of pre-discussion preferences over discussion content in determining group decisions is that group members negotiate their preferences in spite of being open to new evidence that is introduced during the discussion. Group members might also infer the others' preferences from their preference-consistent arguing (Dennis, 1996) and, thus, might notice an implicit convergence

on a particular alternative to be chosen. This explicit or implicit consensus might lead them to largely ignore information mentioned subsequently.

However, whereas such processes may apply to free group discussions, they do not fit the situation in advocacy groups because the advocacy procedure stipulates that group members are to avoid stating their preferences before discussing the information and are called upon to argue independently of their actual preferences. The videotapes show that the groups correctly followed this instruction. Hence, even if the group members knew nothing about the other group members' preferences, and even if sufficient unshared information was exchanged to detect the best choice, group members largely stuck to their suboptimal individual preferences that they had formed prior to discussion.

An explanation for this phenomenon can be derived from a recent study by Greitemeyer and Schulz-Hardt (2003). They first provided their participants with the individual pre-discussion information from a typical hidden profile case. As a consequence, these participants formed suboptimal individual preferences. However, instead of conducting a group discussion, each participant subsequently was given a protocol of a fictitious group discussion, with herself and two other fictitious members as protagonists. In this protocol, the full information about the decision case was discussed. In spite of this full information exchange, and even if the participants did not receive any information about the other group members' preferences, most of the participants held on to their suboptimal initial preference. In contrast, if the participants first received individual information that implied a preference for the best candidate (manifest profile) or received no initial information at all (no initial preference), the majority of the participants made the correct choice.

As an explanation for this maintenance of suboptimal individual preferences, Greitemeyer and Schulz-Hardt (2003) showed that the participants evaluated the discussed

information in line with their initial preferences: Preference-consistent information was judged to be more credible and more important than preference-inconsistent information. This individual "prior belief effect" (Edwards & Smith, 1996; Lord, Ross & Lepper, 1979) mediated the failure to solve the hidden profile. Hence, the failure of groups to solve hidden profiles can be entirely due to individual biases preserving an initial suboptimal preference or, as one might also call them, individual confirmation biases.

Although we have no direct evidence, it is plausible that such preference-consistent evaluation of information was also present in our study and contributed to the strong influence of group members' individual pre-discussion preferences on final group decisions. This biased evaluation may even have been aggravated by the fact that – as it is inevitably the case in a hidden profile – most of the critical information that pointed at the best candidate was not only inconsistent with members' initial preferences but also unshared and, thus, was new to them during discussion and could not be socially validated. Since people attribute higher validity to a) their own information compared to the information of others (Chernyshenko, Miner, Bauman, & Sniezed, 2003; Van Swol, Savadori, & Sniezek, 2003) and b) socially validated compared to socially unvalidated information (Wittenbaum, Hubbell, & Zuckerman, 1999), a strongly biased evaluation of information may have prevented solution of the hidden profile. As a consequence, although group members – particularly in advocacy groups – might have acquired new unshared information indicating that their prior preference was suboptimal, they may have undervalued this information due to biased processing as outlined above and, hence, failed to revise their preferences. Since such evaluation biases against new and preference-inconsistent information were not addressed by the advocacy procedure, this may be an explanation for the fact that the advocacy procedure failed to significantly facilitate the solution of hidden profiles.

With respect to this failure, it should also be noted that a strong type of hidden profiles was used in the present study: Prior to group discussion, all positive information about the correct alternative and all negative information about the worst alternative were unshared. In contrast, all negative information about the correct alternative and all positive information about the worst alternative were shared. Kelly and Karau (1999) called such an information distribution a "strong incorrect preference condition" (p. 1344). Winquist and Larson (1998), in contrast, employed a hidden profile in which each group member held an equal amount of information favoring each alternative prior to the discussion. In contrast to the results of our study, they found that the more unshared information was discussed, the more accurate group decisions were. Thus, it could be that when group members hold strong and almost consensual preferences, group discussion has a high hurdle to take to correct these suboptimal preferences. However, when group member preferences are weak and inconsistent across group members, discussion can overcome the effects of member preferences on group decisions. Hence, it would be interesting to employ the advocacy procedure in a weaker version of a hidden profile, where members' prediscussion preferences are less strongly biased toward the least desirable alternative.

Implications for the Usefulness of Dialectical Procedures

In the beginning, we outlined that group decision making requires more resources than individual decision making and, thus, is expected to produce group-specific benefits. We focused on two such possible group-specific benefits – knowledge gains (learning new information from other group members) and improved decision quality in hidden profiles (detecting superior alternatives that cannot be detected given the members' individual information), both of which are often not realized in group decision making (Mojzisch & Schulz-Hardt, 2005; Stasser & Birchmeier, 2003).

With regard to the practical usefulness of dialectical procedures as a means to facilitate these benefits, the general picture that emerges from our results is that the advocacy procedure tested here is a useful tool for stimulating knowledge gains: It debiases discussion content, facilitates the exchange of unshared information and thereby provides the ground for task-relevant knowledge gains among their members, particularly if group members have the opportunity to familiarize themselves with this technique and use it across different trials. Logically, this debiasing of discussion content is a *necessary* condition for the group to improve decision quality in hidden profile situations. However, it is not a *sufficient* condition, as the lack of advocacy effects for decision quality shows.

The absence of decision quality effects, particularly taking into account that group discussion was facilitated by the advocacy procedure, sheds an interesting light on the nature of the relation between dialectical decision aids and decision quality. Prior research has consistently shown that dialectical procedures improve decision quality in groups (e.g., Schwenk, 1990). However, as we outlined in the introduction, in all of these studies, the effect of dialectical controversy could be due to the fact that group members make better use of their own individual pre-discussion information and, thus, need not have been group-specific. In contrast, in the study reported here, improvements in decision quality were only possible at the group level, namely by exchanging, combining, and integrating group members' diverse knowledge – and no such group-level effects were found for the advocacy procedure. Given that this finding can be validated for other dialectical procedures and other samples, it would constitute a threat as well as a challenge for research on dialectical decision procedures: The threat is that such procedures – in the worst case – might only help groups in situations where one does not need groups (at least not with regard to decision

quality). The challenge then would be to find out how such procedures can be re-designed or supplemented to allow groups to better realize their *group-specific decision quality potential*.

However, it should be clear that we have no guarantee that such a successful modification will be possible. Thus, we might even end up finding that integrating diverse knowledge into superior decisions is a task that should not be conducted by real interacting groups but, rather, by individual decision makers using nominal groups (i.e., collections of individual knowledge) or staff groups as an information base. Comparing such decision modes with (dialectically) supported and unsupported interacting groups in solving hidden profiles is one interesting avenue for future research.

Conclusion

There are at least three features of the present study that represent important advances on previous research concerning biased information pooling in the hidden profile paradigm. First, the present study demonstrates that experience with the task per se is not sufficient to attenuate the sampling bias toward shared information. Second, the advocacy procedure, by implementing a controversial debate independent of group members' real preferences, resulted in an increased exchange of both shared and unshared information. Third, and finally, the use of the advocacy procedure led to an increase in the exchange of unshared information and, hence, a decrease in sampling bias over the course of the four task trials. However, these positive effects of the advocacy procedure were not sufficient to facilitate the solution of the hidden profile tasks. An open question for further research is what additional measures must accompany a dialectical decision procedure to improve decision quality in situations where shared information is misleading.

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Table 1

Distribution of Information About Each Alternative Before Group Discussion (Task Trials 1 to 3)

	Alternative		
Information Type and Valence	A	B	C
Shared information			
Positive	0	6	3
Neutral	3	0	0
Negative	3	0	3
Unshared information			
Positive	9	0	3
Neutral	0	3	6
Negative	0	6	0
Information available to each individual			
Positive	3	6	4
Neutral	3	1	2
Negative	3	2	3
Information available to the group			
Positive	9	6	6
Neutral	3	3	6
Negative	3	6	3

Table 2

Information Exchange During Group Discussion as a Function of Decision Procedure and Experience

	Task trial 1		Task trial 2		Task trial 3		Task trial 4	
	Advocacy	Free discuss.	Advocacy	Free discuss.	Advocacy	Free discuss.	Advocacy	Free discuss.
Proportion of shared information mentioned	.77	.65	.81	.72	.75	.68	.73	.69
Proportion of unshared information mentioned	.37	.40	.45	.40	.46	.36	.49	.35

Table 3

Information Exchange Analysis of Variance

Source	df	F	Cohen's f
	Between subjects		
Condition	1	5.68*	0.47
Condition within-group error	26	(0.06)	
	Within subjects		
Task trials	3	1.43	0.23
Information type	1	577.22**	4.90
Condition X Task trials	3	0.46	0.14
Condition X Information type	1	0.14	0.10
Task trials X Information type	3	0.49	0.14
Condition X Task trials X Information type	3	2.84*	0.33
Condition X Information type within-group error	78	(0.01)	

Note. Values enclosed in parentheses represent mean square errors.

* $p < .05$, ** $p < .01$.

Table 4

Proportion of Correct Group Decisions and Group Decision Quality Scores as a Function of Decision Procedure and Experience

	Hidden profile						Manifest profile	
	Task trial 1		Task trial 2		Task trial 3		Task trial 4	
	Advocacy	Free discuss.	Advocacy	Free discuss.	Advocacy	Free discuss.	Advocacy	Free discuss.
Proportion of correct group decisions	.07	.21	.00	.00	.00	.14	.93	.86
Group decision quality scores	2.4	2.9	1.9	2.3	2.3	2.6	5.3	5.4

Table 5

Group Decision Quality Score Analysis of Variance

Source	df	F	Cohen's f
	Between subjects		
Condition	1	2.80	0.33
Condition within-group error	26	(1.28)	
	Within subjects		
Task trials	3	44.46**	1.30
Condition X Task trials	3	0.12	0.10
Task trials within-group error	78	(1.67)	

Note. Values enclosed in parentheses represent mean square errors.

** $p < .01$.

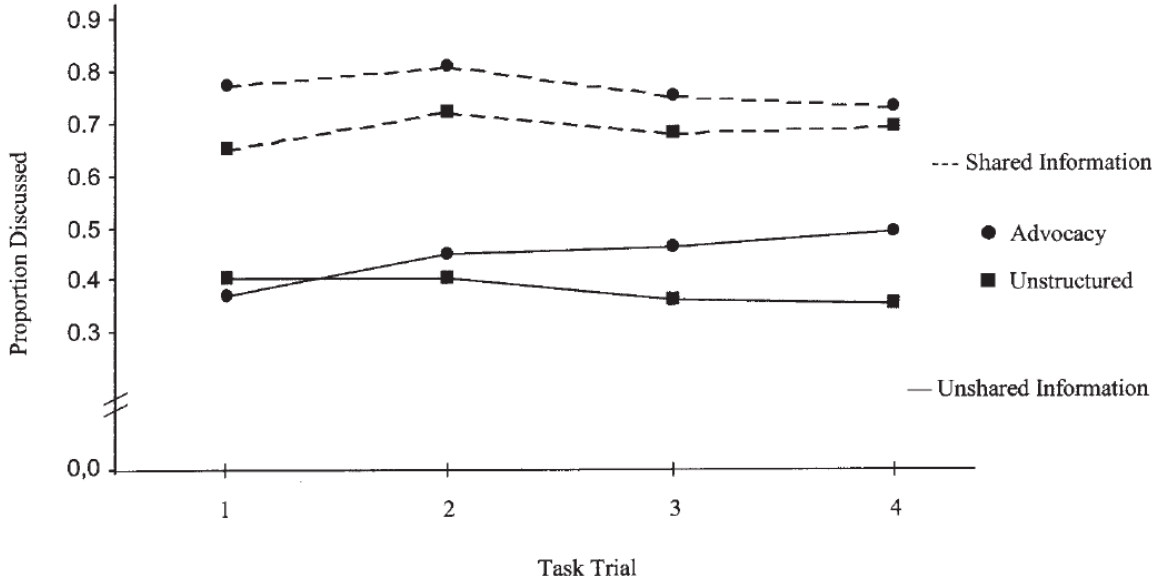

Figure 1 The mean proportion of shared and unshared information correctly mentioned as a function of experimental condition and task trial.