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Biased Information Search in Homogeneous Groups: Confidence as a Moderator for the Effect of Anticipated Task Requirements

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When searching for information, groups that are homogeneous regarding their members' prediscussion decision preferences show a strong bias for information that supports rather than conflicts with the prevailing opinion (confirmation bias). The present research examined whether homogeneous groups blindly search for information confirming their beliefs irrespective of the anticipated task or whether they are sensitive to the usefulness of new information for this forthcoming task. Results of three experiments show that task sensitivity depends on the groups' confidence in the correctness of their decision: Moderately confident groups displayed a strong confirmation bias when they anticipated having to give reasons for their decision but showed a balanced information search or even a disconfirmation bias (i.e., predominately seeking conflicting information) when they anticipated having to refute counterarguments. In contrast, highly confident groups demonstrated a strong confirmation bias independent of the anticipated task requirements.

Keywords: *information seeking; selective exposure; confirmation bias; group decision making; group confidence*

Individuals as well as groups often have a biased approach to new information in nonroutine decision making (Frey, 1986; Janis & Mann, 1977). Numerous studies within the framework of cognitive dissonance theory (Festinger, 1957) have shown that people prefer supporting

(consonant) compared to conflicting (dissonant) information if they have decided voluntarily and with a certain degree of commitment on a particular alternative (e.g., Fischer, Jonas, Frey, & Schulz-Hardt, 2005; Jonas, Graupmann, & Frey, 2006; Jonas, Schulz-Hardt, & Frey, 2005). This preference for supporting information is often referred to as *confirmation bias*.¹ Supporting evidence for this confirmation bias comes from different areas in social psychology, for example, research on attitudes (Lundgren & Prislin, 1998), social stereotypes (Johnston, 1996), expectations in negotiations (Pinkley, Griffith, & Northcraft, 1995), and self-serving conclusions (Holton & Pyszczynski, 1989). Furthermore, additional findings suggest that this confirmation bias is not restricted to final decisions but also arises after preliminary decisions (preference judgments; Jonas, Schulz-Hardt, Frey, & Thelen, 2001).

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Recent studies provide evidence that such biased information-seeking processes also occur in groups (Schulz-Hardt, Frey, Lüthgens, & Moscovici, 2000; Schulz-Hardt, Jochims, & Frey, 2002). In particular, Schulz-Hardt et al. (2000, Experiment 3) have shown that homogeneous groups (i.e., groups in which all members had chosen the same decision alternative individually) are more biased in their information search than would have been predicted on the basis of each member's individual information requests (nominal group information search). In contrast, the information requests of heterogeneous groups have been found to be less biased compared to this baseline. These findings substantiate the notion that the confirmation bias found in homogeneous groups actually reflects group processes and cannot be explained by simply combining individual confirmation biases.

Several authors have stressed the possible negative consequences of biased information seeking in groups that are responsible for making important decisions. Janis (1982) and Nemeth and Rogers (1996), for example, emphasize that in groups, biased information seeking may result in potential warning signals' being overlooked and erroneous decisions with severe negative consequences being unwittingly made. This would not pose a significant threat to group decision quality if decision-making groups outside the laboratory consisted primarily of members with heterogeneous decision preferences. However, decision-making groups in practice are often homogeneous with respect to their members' preferences. Reasons for this include selection effects and socialization processes that lead to group members' sharing similar opinions (e.g., in managerial boards or political decision-making groups; cf. Schein, 1968). Therefore, the biased information search found in homogeneous groups poses a significant threat to group decision quality when the group task would benefit from conflicting information's being taken into account (Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006).

However, group homogeneity would be less of a problem if homogeneous groups were able to detect when it is necessary to consider conflicting information (and when it is not) and if they were capable of adapting their information search pattern if necessary. Unfortunately, we do not know whether they have this capability. In other words, it has not been determined whether homogeneous groups "blindly" seek confirmation of their beliefs irrespective of their tasks or whether they are sensitive to the specific demands of their current tasks. To answer this question, we focus on the interplay between homogeneity of opinion in a group and the requirements of the task the group has to perform. More specifically, we look at the information search after decisions in homogeneous groups and

examine whether, and to what extent, different anticipated task requirements affect the groups' preferences for supporting and conflicting information.

Group Information Seeking and Anticipated Task Requirements

On the basis of previous studies on confirmation bias in group information search (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002) it is not possible to specify whether information search in homogeneous groups is sensitive to situational requirements. In these studies, groups worked on a decision task (e.g., to invest in country A or country B). After a preliminary group decision, the group was offered additional information about the two decision alternatives. Each piece of information (e.g., evaluations by experts) was characterized by a main thesis indicating whether the corresponding piece of information would support or contradict the group's preliminary decision; on the basis of these main theses, each group selected the pieces of information that should be read (by all group members). Homogeneous groups (i.e., groups where all members preferred the preliminary decision) exhibited a strong preference for information supporting their decision (i.e., they showed a confirmation bias). However, because they expected that the subsequent group task would be to make a final decision (and, perhaps, to discuss how this decision should be implemented), two completely different processes could have led to this confirmation bias: On one hand, the homogeneous groups might have been convinced that they had found the correct choice, rendering conflicting information unnecessary, and they might have tried to bolster this decision with supporting information. Such (retrospectively oriented) bolstering behavior would make them relatively insensitive to situational requirements that render conflicting information useful. On the other hand, they might have been concerned with how the final decision can be implemented, and to promote this implementation they might have focused on supporting information. Such behavior would be future oriented and would imply that homogeneous groups are sensitive to task requirements.

To test whether homogeneous groups are sensitive to situational requirements, we need to extend the experimental paradigm described previously. As outlined in the next section, such an extended paradigm exists in research on individual information search (Canon, 1964; Freedman, 1965); it operates by letting the participants anticipate different tasks following their decision and their information search. In our present experiments, we transferred this method to group information search.

Individual Information Seeking and Anticipated Task Requirements

In their experiments on confirmatory information search among individuals, carried out in the framework of cognitive dissonance theory, Canon (1964) and Freedman (1965) manipulated the type of task their participants anticipated following the information search. Canon's participants had to make decisions on business problems and were told either that they would have to refute counterarguments later in a debate or that they would have to defend their position later in a written essay. After the participants had made their decision, and before these tasks were to be carried out, participants were given the opportunity to select, by their titles, from among five articles that commented on the problem (two pro, two contra, one neutral). The title of each article allowed participants to identify which side of the problem the article advocated. Canon predicted that participants anticipating a debate would prefer conflicting information because familiarizing oneself with the conflicting arguments would help invalidate them later in the debate. In contrast, participants who anticipated having to write an essay should prefer consonant articles because supporting arguments help develop a justification for the decision. Canon's results confirmed his predictions: Participants expecting to refute counterarguments in a debate were more likely to choose conflicting information, whereas participants expecting to write an essay explaining their decisions were more likely to choose supporting information. Freedman replicated these findings.

The Present Research

The previously mentioned studies have shown that individuals are capable of adapting their biased information search behavior to the requirements of a forthcoming task. In the present research, we used this anticipated task manipulation to find out whether homogeneous groups—which have been shown to exhibit a strong confirmation bias if the only task they anticipate is having to make a final decision—adapt their information search to the requirements of the anticipated forthcoming group task. In Experiments 1a and 1b, we compared the information search in groups expecting to have to give reasons for their decision with the information search in groups expecting to have to refute counterarguments in two different samples. To test the generalizability of our findings, we used a military personnel sample in Experiment 1a and a college students sample in Experiment 1b. Apart from that (and the fact that a particularly relevant decision case was chosen for each sample), the experiments are identical. In Experiment 2, we tested a possible moderator for

differences observed in Experiments 1a and 1b, namely, the groups' confidence in their decision.

EXPERIMENTS 1A AND 1B

Experiments 1a and 1b are based on the same experimental design and were carried out simultaneously. We report these experiments in parallel to allow a direct comparison of the results.

Method

Participants and Design

Experiment 1a. One hundred fifty-two trainee sergeants (all male, 19 to 24 years old) from the naval college in Plön (a town in northern Germany) participated in this study. The participants formed 44 three-person groups, which were homogeneous in terms of their members' individual decision preferences. The investigation took place in the rooms of the naval college and was integrated into the lessons. The experiment is based on a 2 (anticipated group task: justify the decision vs. refute counterarguments) \times 2 (type of information: supporting vs. conflicting) factorial design with repeated measurement on the second factor.

Experiment 1b. One hundred twenty-three students (63 females and 60 males, 16 to 18 years old) from the high school and college levels of two gymnasiums in Bad Schwartau (a town in northern Germany) participated in this study. Participants formed 41 three-person groups, which were homogeneous in terms of their members' individual decision preferences. Only same-sex groups were built.² The investigation took place in the rooms of the gymnasiums and was integrated into the lessons. Experiment 1b is based on the same experimental design as Experiment 1a.

Procedure

Experiment 1a. About 30 trainee sergeants participated in each experimental session. At the beginning of the session, the experimenter introduced herself and her assistants and informed the participants that the present investigation was concerned with the question of whether a professional army (replacing the current military service for every young man) should be established in Germany. This decision problem was chosen because it was known to induce high involvement in the military staff. Participants were informed that to find out what military staff think about this question, a series of investigations were being performed in different military units.

All participants then thought about the question themselves and made a preliminary individual decision.

Once the participants had reached a decision, they memorized their personal numerical code that they were asked to use for all further questionnaires to guarantee anonymity. Participants were assigned to homogeneous three-person groups on the basis of the decision taken, and the groups were distributed as evenly as possible among the two experimental conditions. The remaining participants were assigned to a different experiment. Each group was seated at a separate table. The groups were informed that after a discussion lasting approximately 10 min, they should come to a preliminary group decision. The groups wrote their preliminary decision on a prepared form and indicated on a scale from 0 to 10 how certain they were about the correctness of their decision.

Before the subsequent information search, the anticipated group task was manipulated similar to the way Canon (1964) and Freedman (1965) introduced this factor for individuals: Groups in the *justify decision* condition were told that afterward they would have to give reasons for their decision in a short essay, whereas groups in the *refute counterarguments* condition expected to participate in a written debate during which they would have to refute arguments against their decision. In line with Canon and with Freedman, we reasoned that supporting information should be more useful if the groups had to justify their decision, and conflicting information should be more useful if they had to refute counterarguments because the conflicting information would give them advance knowledge of these counterarguments.

After the experimenter and her assistants had made sure that all group members had fully understood their group's task, the groups were informed that to prepare for their task (justify the decision vs. refute counterarguments), additional information about the decision problem was available. This additional information consisted of 10 statements written by experts on military politics. Each statement was said to be about one page in length and was summarized by a main thesis (one sentence). From this main thesis it was obvious whether the corresponding article argued in favor of or against a professional army. All the main theses were written on a sheet of paper handed out to the participants. Five of the corresponding articles favored, and the other five opposed, a professional army. Groups were asked to mark the main theses of the articles they wanted to read later; they could request as many articles as they wanted. Before filling in the request form, groups learned that each selected article would be handed out to, and should be read by, each group member to make sure that all members had exactly the same information at their disposal when the forthcoming group task started. In fact, this instruction was given to ensure that the group members had to negotiate

about the information requests and thereby guarantee that the group information search was a group product.

After the request forms for the group information search had been collected, the experiment was over. Participants were informed in detail about the aims of the investigation, especially why no reading of the articles and no writing of the essay or no debate were necessary. Finally, they were thanked for their participation and dismissed.

Experiment 1b. The course of Experiment 1b was similar to that of Experiment 1a except, as noted previously, the groups consisted of high school and college students facing a different decision problem (adapted to suit the student sample). The decision problem dealt with the question of whether the time students spend in college in Germany should be reduced by 1 year (and thereby brought in line with the majority of other European countries). Both alternatives (reduction of the time spent in college by 1 year vs. no reduction) were again supported by an identical number of arguments that had been constructed to be equally strong.

Results and Discussion

Check for Possible Interfering Effects

In both experiments, no significant differences in the search for supporting and conflicting articles were found between supporters and opponents of a professional army or a reduction of college time, respectively. Similarly, participants' age (or sex in Experiment 1b) had no influence on information search.

Information Search

Experiment 1a. Table 1 shows the cell means of the information search. The conditions did not differ with respect to the overall number of articles requested, $F(1, 42) < 1$. Instead, a significant main effect for type of information emerged, $F(1, 42) = 49.31$, $p < .001$, $\eta_p^2 = .54$, indicating a clear preference for supporting ($M = 2.34$, $SD = 0.96$) compared to conflicting ($M = 0.86$, $SD = 1.03$) articles. Separate t tests against zero revealed a significant confirmation bias (i.e., the difference value between the number of chosen supporting and conflicting articles) for justify decision groups ($M = 1.29$, $SD = 1.33$) and refute counterarguments groups ($M = 1.70$, $SD = 1.49$), $t(23) = 4.74$, $p < .001$, and $t(19) = 5.10$, $p < .001$, respectively. However, no differences in the information search between justify decision groups and refute counterarguments groups could be observed ($F < 1$). This pattern of results did not change when the supporting and conflicting articles requested were analyzed separately ($F = 1$ and $F < 1$, respectively).

TABLE 1: Information Search Dependent on Group Task in Experiment 1a

Group Task	Information					
	Supporting ^a		Conflicting ^a		Confirmation Bias ^b	
	M	SD	M	SD	M	SD
Justify decision ($n = 24$)	2.21	1.02	0.92	1.18	1.29	1.33
Refute counterarguments ($n = 20$)	2.50	0.89	0.80	0.83	1.70	1.49

a. Supporting articles are articles that confirm the correctness of the preliminary group decision, whereas conflicting articles dispute the correctness of this decision.

b. The confirmation bias corresponds to the difference between the number of chosen supporting articles and the number of chosen conflicting articles.

TABLE 2: Information Search Dependent on Group Task in Experiment 1b

Group Task	Information					
	Supporting ^a		Conflicting ^a		Confirmation Bias ^b	
	M	SD	M	SD	M	SD
Justify decision ($n = 21$)	2.62	1.50	1.14	1.06	1.48	2.04
Refute counterarguments ($n = 20$)	1.75	0.97	1.95	1.23	-0.20	1.99

a. Supporting articles are articles that confirm the correctness of the preliminary group decision, whereas conflicting articles dispute the correctness of this decision.

b. The confirmation bias corresponds to the difference between the number of chosen supporting articles and the number of chosen conflicting articles.

Experiment 1b. Table 2 shows the cell means of the information search. As in Experiment 1a, the conditions did not differ with respect to the overall number of articles requested, $F(1, 39) < 1$. Instead, results revealed a main effect for type of information, $F(1, 39) = 4.12$, $p = .050$, $\eta_p^2 = .10$, indicating a preference for supporting ($M = 2.20$, $SD = 1.33$) compared to conflicting ($M = 1.54$, $SD = 1.21$) articles. In contrast to Experiment 1a, the interaction between information type and anticipated group task became significant, $F(1, 39) = 7.09$, $p = .011$, $\eta_p^2 = .15$, because the confirmation bias in justify decision groups ($M = 1.48$, $SD = 2.04$) was much stronger than in refute counterarguments groups ($M = -0.20$, $SD = 1.99$), which even show a small disconfirmation bias. Separate t tests show that the confirmation bias of justify decision groups differs significantly from zero, $t(20) = 3.32$, $p = .003$, whereas the (dis-)confirmation bias of refute counterarguments groups does not reach significance, $t(19) = -0.45$, $p = .658$.

So far, the results of Experiments 1a and 1b have replicated previous findings showing that homogeneous groups predominantly seek information supporting the group's preliminary or final decision (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002). However, the results of Experiment 1a and Experiment 1b seem to contradict each other with regard to our main research question, namely, whether the information search in homogeneous groups is sensitive to the usefulness of the information for the anticipated group task. Whereas in

Experiment 1a the groups' preference for supporting compared to conflicting information was independent of the anticipated group task, a significant interaction between type of information and anticipated group task became evident in Experiment 1b.

Confidence in the Decision

The differences in the information search observed in Experiments 1a and 1b call for a closer look at differences between the two experiments that might account for the contradictory results. First, different samples and, consequently, different decision tasks were used in Experiments 1a and 1b. Obviously, it is possible that this might have influenced the results. However, a closer inspection of the results reveals another explanation for the differential results of Experiments 1a and 1b. According to the *heuristic-systematic model* of persuasion (HSM; cf. Chaiken, Liberman, & Eagly, 1989; see also Chaiken & Trope, 1999), a decision maker's motivation to engage in more systematic, effortful ways of information processing is contingent on the perceived sufficiency of the information already available. According to this *sufficiency principle* of the HSM, the discrepancy between actual and desired levels of confidence is the fundamental motivator of processing effort. The sufficiency principle asserts that people will exert cognitive effort only if they have not yet attained a sufficient degree of confidence about being able to pursue their

goals. If individuals or groups perceive their current state of knowledge as insufficient—that is, the actual confidence is lower than the sufficiency threshold on the confidence continuum—they are proposed to exert cognitive effort to close the gap between actual and desired levels of confidence. In contrast, if the actual confidence equals or exceeds the desired confidence, individuals or groups will be unlikely to engage in effortful processing of information. Adapting group information search to the requirements of a forthcoming task requires effort because groups have to consider which pieces of information are useful for these purposes. In contrast, simply following the dominant strategy of homogeneous groups, namely, to search for supporting information, requires less effort, particularly given that processing supporting information is less effortful than processing conflicting information (e.g., Edwards & Smith, 1996). Thus, it can be predicted that homogeneous groups that are highly confident about already having made the correct decision will hardly adapt their information search to situational requirements, whereas less confident homogeneous groups will do so.

In summary, it is conceivable that future task requirements do not influence information search when groups are very confident. When we take into account that the decision problem used in Experiment 1a was chosen to present a case that was relevant for the participating soldiers, it is possible that many of the soldiers already had a very clear opinion on the topic, reflected in very high decision confidence. To investigate this idea, we decided to analyze the information search of highly confident and moderately confident groups separately.

Experiment 1a. At first, we compared justify decision groups and refute counterarguments groups with respect to confidence. No significant differences were found, $F(1, 42) = 1.51, p = .227, \eta_p^2 = .04$. Interestingly, however, 50% of the groups in Experiment 1a reported the highest confidence rating possible (i.e., 10). Thus, as suspected, a fairly high percentage of groups did not have any doubts about the correctness of their decision. Obviously, with a median of 9.50 on a confidence scale from 0 to 10 in Experiment 1a, the groups below the median cannot be considered to have experienced only moderate confidence in their decision. Therefore, we did not split the groups in Experiment 1a at the median but used a more reasonable confidence criterion to distinguish highly confident (i.e., confidence ratings of 9 or 10) from moderately confident (i.e., confidence ratings of 8 and below) groups. A significant interaction between this confidence factor and anticipated group task, $F(1, 40) = 4.66, p = .037, \eta_p^2 = .10$, indicated that information search in moderately confident groups followed the task sensitivity pattern: Whereas the moderately confident justify decision groups exhibited a

strong and significant confirmation bias ($M = 1.64, SD = 1.21, t(10) = 4.50, p = .001$, for a t test against zero, this confirmation bias was lower in the moderately confident refute counterarguments groups ($M = 0.83, SD = 2.32, t(15) = 0.95, p = .356$, for the contrast between both conditions and did not differ significantly from zero in this condition, $t(5) = 0.88, p = .419$). In contrast, among the highly confident groups, both the justify decision groups ($M = 1.00, SD = 1.41, t(12) = 2.55, p = .025$, and the refute counterarguments groups ($M = 2.07, SD = 0.83, t(13) = 9.35, p < .001$, exhibited a significant confirmation bias, with the bias in the latter condition being significantly stronger than the bias in the former condition, $t(25) = -2.42, p = .023$.³ Hence, information search in highly confident homogeneous groups clearly did not follow the pattern of task sensitivity.

Experiment 1b. Again, no significant differences between justify decision groups and refute counterarguments groups were found with respect to confidence, $F(1, 39) < 1$. In Experiment 1b, however, only 20% of the groups reported the maximum confidence rating possible (i.e., 10) compared to 50% of the groups in Experiment 1a. To learn more about possible moderator effects of high group confidence, we divided the groups in Experiment 1b into highly confident (i.e., confidence ratings of 9 or 10) and moderately confident (i.e., confidence ratings of 8 and below) groups. When entering the confidence median split as an additional factor in the analysis, the results again show a (marginal) interaction between the confidence factor and the anticipated group task, $F(1, 37) = 3.35, p = .075, \eta_p^2 = .08$.

To break down this interaction, effects of task anticipation on the confirmation bias were analyzed separately for moderately confident and for highly confident groups. As in Experiment 1a, the highly confident groups showed a similar confirmation bias in both task anticipation conditions for justify decision groups ($M = 1.33, SD = 1.80, t(8) = 2.22, p = .057$, and refute counterarguments groups ($M = 1.00, SD = 1.69, t(7) = 1.67, p = .138$). Both conditions did not significantly differ from each other, $t(37) = 0.35, p = .725$. In contrast, and again as in Experiment 1a, within the subgroup of the moderately confident groups only the justify decision groups exhibited a significant confirmation bias ($M = 1.58, SD = 2.27, t(11) = 2.41, p = .035$, whereas this time the refute counterarguments groups even exhibited a disconfirmation bias ($M = -1.00, SD = 1.81, t(11) = -1.92, p = .082$). The difference between both conditions was significant, $t(37) = 3.27, p = .002$. Thus, these results structurally replicate the findings of the similar analysis in Experiment 1a.

In summary, although at first glance Experiments 1a and 1b seem to have yielded contradictory results with

regard to the effects of task anticipation on the confirmation bias, these results reveal striking parallels if group decision confidence is taken into account as a moderator: Highly confident groups exhibited a confirmation bias, irrespective of whether they anticipate having to justify their decision or having to refute counterarguments. In contrast, moderately confident groups exhibited a confirmation bias only if they anticipated they would have to justify their decision; no such bias was found if they anticipated they would have to refute counterarguments. Because the proportion of moderately confident groups was higher in Experiment 1b than in Experiment 1a, the latter (task-sensitive) pattern dominated in Experiment 1b when confidence was not taken into account, whereas the former (task-insensitive) pattern dominated in Experiment 1a. When we consider the overall high level of confidence, and the relatively small differences in confidence between moderately and highly confident groups, the post hoc test of our hypothesis seems conservative. Accordingly, it is even more impressive that the results show the expected difference between moderately and highly confident groups.

However, this interpretation of an interaction between group confidence and anticipated group task on group information search in homogeneous groups should be treated with caution because the confidence factor was generated *ex post*, based on our measurements of group confidence. A direct test of this interactive effect requires an experimental manipulation of group confidence (in addition, and orthogonal, to the anticipated group task manipulation). This was done in Experiment 2.

EXPERIMENT 2

The goal of Experiment 2 was to provide a more rigorous test of the idea that task sensitivity of homogeneous groups' information search depends on the groups' confidence in the correctness of their decision. Specifically, we predicted that anticipated task requirements influence confirmatory information search in homogeneous groups only when the groups' confidence does not exceed moderate levels. Consequently, Experiment 2 differed from Experiments 1a and 1b in that confidence in the decision was introduced as an additional experimental factor. To experimentally manipulate the groups' confidence in the decision, we adapted a technique used in studies on the *explanation effect*. These studies provide convincing evidence that the generation of arguments supporting a particular position increases the participants' confidence that this position is valid (for an overview, see Koehler, 1991). Therefore, we decided to manipulate confidence by instructing participants either to consider why they were especially

qualified to make an appropriate decision (high-confidence condition) or to consider why it would be difficult for them to make an appropriate decision (moderate-confidence condition). Pretests had shown that this kind of confidence manipulation is more successful than simply telling the participants that they were qualified or not qualified to make an appropriate decision on a certain case.

Method

Participants and Design

Ninety-nine students (51 females, 48 males) from the college level (between 18 and 21 years old, $M = 18.63$, $SD = 0.86$) of three colleges in Munich, Germany, participated in this study. The students formed 33 three-person groups, which were homogenous with regard to their members' individual decision preferences. One group was excluded from the analysis because of incomplete data. The investigation took place in the rooms of the colleges and was integrated into the lessons. The experiment is based on a 2 (group confidence: high vs. moderate) \times 2 (anticipated group task: justify the decision vs. refute counterarguments) \times 2 (type of information: supporting vs. conflicting) factorial design with repeated measurement on the third factor.

Procedure

About 24 students participated in each experimental session. At the start of each experimental session, participants were divided into two large groups, both of approximately the same size, and led to two adjacent rooms. The same decision problem as in Experiment 1b was used. The experimenters, one for each room, introduced themselves and their assistants and informed the participants that the investigation deals with the question of whether the time students spend in college in Germany should be reduced by 1 year.

Before the participants were asked to decide individually whether the number of school years should be reduced, their confidence in their capability of reaching an optimal decision was manipulated (cf. Koehler, 1991). To induce *high confidence*, participants in one room were asked to consider why they were especially qualified to make an appropriate decision on this matter and to write down the most important reason on a form. To induce *moderate confidence*, participants in the other room were asked to consider why it would be rather difficult for them to make an appropriate decision on this matter and to write down the most important reason on a form.

All participants were then invited to think about the question themselves and to make a preliminary individual

decision. When all participants had come to an individual decision, they were assigned to homogeneous groups of three on the basis of the decision taken. The remaining participants were assigned to a different experiment.

After the group assignment, the groups were distributed as evenly as possible among the two levels of the group task factor and were led to four separate rooms, one for each experimental condition. Each group was seated at a separate table. Immediately before the group discussion started, the manipulation of confidence in the capability of reaching an optimal decision was repeated. This time, participants in the high-confidence condition were asked to state arguments why they thought they would be especially qualified to make an appropriate decision, whereas participants in the moderate-confidence condition were asked to state arguments why they thought it would be rather difficult for them to make an appropriate decision. In both confidence conditions, the experimenter repeated and summarized the main arguments. This modified brainstorming technique was limited to approximately 5 min. It sustained the confidence manipulation of the first part of the experimental session and ensured that the manipulation affected confidence at the group level.

Next, as in Experiments 1a and 1b, the groups were informed that after a discussion lasting approximately 10 min they should come to a preliminary group decision. The groups wrote their preliminary decision on a prepared form and indicated on a scale from 0 to 10 how certain they were about the correctness of their decision. After that, the experiment continued with the information search.

The anticipated group task was manipulated in the same way as in Experiments 1a and 1b. That is, whereas half of the groups expected that they would subsequently have to justify their decision, the other half of the groups expected to have to refute counterarguments in a written debate. Again, the experimenters made sure that all group members had fully understood their group's task before the information search began. The procedure of the information search was identical to that in Experiments 1a and 1b.

After the request forms for the information search had been collected, the experiment was over. Participants were informed in detail about the aims of our investigation (especially why no reading of the articles and no writing of the essay were necessary). They were thanked for their participation and dismissed.

Results and Discussion

Check for Possible Interfering Effects and Manipulation Check

Neither participants' age nor the chosen alternative (reduction of the time in college by 1 year vs. no reduction) had any significant influence on information

search. To check the experimental manipulation, the confidence the groups experienced in their decisions was compared between high- and moderate-confidence conditions. As expected, the confidence ratings of the groups in the high-confidence condition ($M = 8.69$, $SD = 1.40$) were significantly higher than the confidence ratings of groups in the moderate-confidence condition ($M = 7.38$, $SD = 1.45$), $F(1, 30) = 6.76$, $p = .014$, $\eta_p^2 = .18$. We therefore conclude that our manipulation was successful.

Information Search

In Table 3 the cell means of the information search are shown. The four experimental conditions do not differ with respect to the overall number of articles requested, $F(3, 28) < 1$. In a 2 (group confidence: high vs. moderate) \times 2 (anticipated group task: justify the decision vs. refute counterarguments) \times 2 (type of information: supporting vs. conflicting) ANOVA with repeated measurement on the third factor, interactions between both experimental factors and the type of information factor became significant, showing that group task, $F(1, 28) = 5.41$, $p = .028$, $\eta_p^2 = .16$, and group confidence, $F(1, 28) = 5.41$, $p = .028$, $\eta_p^2 = .16$, moderate the confirmation bias. However, as predicted, both interactions were qualified by a significant three-way interaction, $F(1, 28) = 4.38$, $p = .046$, $\eta_p^2 = .14$, showing that the confirmation bias was moderated by group task and group confidence interactively.

To decompose this three-way interaction, effects of task anticipation on the confirmation bias were analyzed separately for the moderate-confidence conditions and the high-confidence conditions using planned contrasts. In the moderate-confidence condition, the two group task conditions significantly differed with respect to the confirmation bias, $t(28) = 3.12$, $p = .004$. Whereas the justify decision groups showed a significant confirmation bias ($M = 2.13$, $SD = 1.36$), the refute counterarguments groups searched for information in a balanced way ($M = -0.25$, $SD = 1.75$). Separate t tests show that the confirmation bias in the justify decision groups differs significantly from zero, $t(7) = 4.43$, $p = .003$, whereas the confirmation bias in the refute counterarguments groups does not reach significance, $t(7) = -0.40$, $p = .699$.

In contrast, in the high-confidence condition, no differences between the two group task conditions were observed regarding the confirmation bias, $t(28) = 0.16$, $p = .871$. Both the justify decision groups ($M = 2.25$, $SD = 1.58$) and the refute counterarguments groups ($M = 2.13$, $SD = 1.36$) showed a substantial confirmation bias. Separate t tests demonstrate that the confirmation bias differed significantly from zero in the justify decision groups, $t(7) = 4.03$, $p = .005$, and the refute counterarguments groups, $t(7) = 4.43$, $p = .003$.

The main goal of Experiment 2 was to provide a clear-cut test of the idea that the effect of different task

TABLE 3: Information Search Dependent on Group Confidence in the Decision and Group Task in Experiment 2

Group Task	Information					
	Supporting ^a		Conflicting ^a		Confirmation Bias ^b	
	M	SD	M	SD	M	SD
Moderate-confidence groups						
Justify decision ($n = 8$)	3.25	1.04	1.13	0.83	2.13	1.36
Refute counterarguments ($n = 8$)	1.88	0.99	2.13	1.73	-0.25	1.75
High-confidence groups						
Justify decision ($n = 8$)	3.00	1.41	0.75	0.71	2.25	1.58
Refute counterarguments ($n = 8$)	3.00	1.07	0.88	0.83	2.13	1.36

a. Supporting articles are articles that confirm the correctness of the preliminary group decision, whereas conflicting articles dispute the correctness of this decision.

b. The confirmation bias corresponds to the difference between the number of chosen supporting articles and the number of chosen conflicting articles.

requirements on biased information search in homogeneous groups depends on the groups' confidence in the correctness of their decision. This attempt was successful. Groups in the moderate-confidence condition showed a strong confirmation bias when they expected they would have to justify their decisions, whereas no such bias occurred when the groups expected they would have to refute counterarguments. In contrast, groups in the high-confidence condition showed a substantial confirmation bias independent of the task they expected to complete. In summary, Experiment 2 demonstrates that the contradictory results of Experiments 1a and 1b can in fact be attributed to the different levels of confidence the groups experienced in their decisions (i.e., very high confidence in Experiment 1a and only moderate confidence in Experiment 1b) and that taking group confidence into account is necessary to make meaningful predictions with regard to homogeneous groups' task sensitivity in information search.

GENERAL DISCUSSION

When searching for information, homogeneous groups show a strong bias for information that supports, rather than conflicts with, the prevailing opinion in the group (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002). The present research was designed to explore whether homogeneous groups blindly seek confirmation of their beliefs irrespective of the anticipated forthcoming task or whether they are sensitive to the usefulness of the information for the groups' forthcoming task. At first glance, the results of Experiments 1a and 1b seemed to contradict each other: Whereas in Experiment 1a the groups' anticipated task had no influence on information-seeking behavior (i.e., the groups showed a pronounced confirmation bias irrespective of their anticipated task), in Experiment 1b the groups faced with justifying the decision showed a strong confirmation bias and the

groups faced with refuting counterarguments showed no confirmation bias, thus indicating task sensitivity. A closer look at the differences between the two experiments revealed that a large proportion of groups in Experiment 1a gave extraordinarily high ratings about their confidence in the correctness of their decision, which might have reduced these groups' task sensitivity in information search. As expected, the task-sensitive information search pattern found in Experiment 1b (i.e., a strong confirmation bias in the justify decision condition and a lower confirmation bias in the refute counterarguments condition) also emerged in Experiment 1a when we differentiated between highly confident and moderately confident groups. Furthermore, differentiating highly confident and moderately confident groups in Experiment 1b revealed that analogous to Experiment 1a, the task-sensitive information search pattern was only present in the moderately confident groups but not in the highly confident groups.

In Experiment 2, we directly manipulated the hypothesized moderator variable group confidence and demonstrated that differences observed in Experiments 1a and 1b can indeed be attributed to the different levels of confidence the groups experienced in the correctness of their decisions. Only groups in the moderate-confidence condition showed a differential information search pattern dependent on the task they expected to perform; in contrast, groups in the high-confidence condition exhibited a strong confirmation bias irrespective of their anticipated task. In sum, we can conclude that the answer to the question of whether homogeneous groups are sensitive to task requirements when searching for new information depends on the confidence the groups experience in their decisions.

As we outlined previously, an explanation as to *why* groups are only sensitive to task requirements when group confidence does not exceed moderate levels can be derived from the HSM (cf. Chaiken et al. 1989; see also Chaiken & Trope, 1999). According to the sufficiency

principle of the HSM, groups should be motivated to exert processing effort only if they have not yet attained their desired level of confidence. To successfully adapt their information search to the requirements of a forthcoming task, groups have to consider which pieces of information are useful for this task. Obviously, this requires more effort than simply searching for supporting information, irrespective of the forthcoming task, particularly given that processing supporting information is less effortful than processing conflicting information (e.g., Edwards & Smith, 1996). However, the hypothesis that homogeneous groups try to reach a certain level of desired confidence has yet to be tested. Therefore, future research should try to measure the desired confidence of the groups to find out if it is the discrepancy between actual and desired levels of confidence that motivates the less confident homogeneous groups to exert the extra effort necessary to adapt their information search to task requirements.

Theoretical Implications

Two major theoretical implications can be derived from our findings. First, our findings extend previous research on group homogeneity and group information search (especially Schulz-Hardt et al., 2000) by investigating the influence of anticipated task requirements on the search for new information in homogeneous groups. So far, research has neglected the fact that future task requirements are highly relevant for a functional exposure to new information in real life. Taking this reasoning one step further, one might ask how heterogeneous groups would react to future task requirements. As demonstrated by Schulz-Hardt and colleagues (e.g., Schulz-Hardt et al., 2000), groups with heterogeneous decision preferences hardly show any confirmation bias when the only task they expect to perform is making a final decision. Furthermore, heterogeneous groups in general experience lower confidence than homogeneous groups in the correctness of the decision. Therefore, based on our results with moderately confident homogeneous groups it seems conceivable that heterogeneous groups should also be sensitive to future task requirements, as anticipation of having to justify their position induces a confirmation bias, whereas “usually” they do not exhibit such a bias. Consequently, heterogeneous groups should be particularly beneficial for group performance when group performance benefits from adapting the group information search to the varying task requirements. Testing this hypothesis represents an interesting topic for future research.

Second, our results help clarify the influence of confidence on information search. Whereas our experiments with homogeneous groups suggest that sensitivity for task requirements depends on group confidence, no such interaction between anticipated task requirements

and confidence was observed in the earlier studies with individuals (Canon, 1964; Freedman, 1965).⁴ One explanation for this discrepancy could be that the confidence levels reached in (homogeneous) groups are not reached by individuals and that the pattern of results changes only when the confidence in the decision reaches the extraordinarily high confidence levels found in (homogeneous) groups. In line with this reasoning, Sniezek (1992), reviewing the literature on confidence in group decision making, arrived at the conclusion that groups are more confident than individuals and that the confidence of the group members increases with group discussion. In addition, our groups were homogeneous with regard to the members' prediscussion decision preferences. Clearly, learning that all group members share the same decision preference enhances group confidence in the correctness of this decision (cf. Mojzisch, Schulz-Hardt, Kerschreiter, & Frey, 2007). Taken together, this might boost confidence to levels where task sensitivity is no longer given.

However, from the perspective of the HSM (Chaiken et al., 1989), these high confidence levels that are reached in a large proportion of the homogeneous groups lead to an interesting problem: Because highly confident groups should have already reached (or even exceeded) their desired level of confidence, the sufficiency principle would imply that these groups hardly search for information at all or, at least, search for less information than that sought by moderately confident groups. Therefore, it is surprising that we found no differences between highly confident and moderately confident groups in the overall amount of information they sought but only in the quality of the information they sought (i.e., the confirmation bias). One reason for this finding might be that decision makers hold a general belief about the minimal amount of information that one should consider before making a decision and that highly confident as well as moderately confident groups in our experiments had not yet considered this minimal amount of information. In this case, differences between highly confident and moderately confident groups should affect the type of information groups search for but not the quantity of information, which is exactly what we observed in our experiments. Support for this idea also comes from a recent study by Scholten, van Knippenberg, Nijstad, and De Dreu (2007), showing that group members who experienced lower information sufficiency repeated unshared information more often and were more likely to solve a hidden profile. Notably, in the case of a hidden profile most (or all) shared pieces of information are preference consistent, whereas unshared information is predominantly preference inconsistent. Therefore, it is conceivable that the tendency of groups who experienced lower information sufficiency to focus on unshared information is at least

partially due to the fact that these groups showed a less pronounced confirmation bias in the group discussion. Similar to the high- and low-confidence groups in our experiments, groups high and low in information sufficiency in the Scholten et al. study did not differ in the overall proportion of available shared and unshared information exchanged. In summary, future research needs to substantiate which factors motivate the search for new information and the exchange of unshared information when group confidence is high (cf. De Dreu, Nijstad, & van Knippenberg, 2008).

It is interesting to note that the experimental condition in which groups anticipated having to justify their decision is closely related to what has previously been termed *outcome accountability* (i.e., having to account for the decision or judgment outcomes; cf. Lerner & Tetlock, 1999). In contrast to process accountability (which refers to having to account for the way in which decisions or judgments are reached), outcome accountability has been shown to enhance the motivation to leave a positive impression on others and, hence, to result in a pronounced confirmation bias (e.g., Jonas et al., 2005; Lundgren & Prislin, 1998). Therefore, incentives to reach a correct decision created by accountability do not automatically motivate group members to be as accurate as possible when making a decision. Rather, the effects closely depend on the type of accountability involved (process vs. outcome; cf. Lerner & Tetlock, 1999). Similarly, groups do not automatically adapt their information search to future task requirements. Rather, the level of confidence in the correctness of the (preliminary) decision moderates the effects of future tasks requirements.

Practical Implications

In this research, we tried to clarify whether the information search behavior of homogeneous groups poses a problem. We proposed that homogeneous groups have to be considered problematic if these groups show a strong confirmation bias in the information search and do not adapt this confirmation bias to task requirements. By showing that highly confident homogeneous groups were not sensitive to task requirements whereas moderately confident homogeneous groups were, our results suggest that highly confident homogeneous groups are a problem, whereas moderately confident homogeneous groups are not. However, when considering the implications of our findings, some further points should be taken into account.

On one hand, whether *highly confident homogeneous groups* have to be considered problematic depends on whether the confidence experienced by these groups accurately reflects their decision quality, in other words, whether they are *overconfident*. If, for example, in our experimental setting high confidence

was accompanied by high accuracy (which was not measurable with our decision task), this high accuracy should enable the groups to refute counterarguments even without having considered conflicting information beforehand because in this situation any counterarguments have to be largely invalid by definition. If, however, highly confident groups were not necessarily very accurate, a substantial proportion of these groups might be confronted with serious counterarguments that they had not anticipated. As a consequence, future research needs to investigate whether the higher decision confidence of highly confident homogeneous groups is accompanied by higher decision quality (in which case homogeneous groups would be less of a problem) or whether decision confidence and decision quality are largely independent of each other (in which case homogeneous groups would pose a serious problem). Based on previous research on confidence and decision quality (e.g., Heath & Gonzalez, 1995; Sniezek & Henry, 1989), we assume that the latter is more likely to be the case.

If our assumption turns out to be correct, an important issue to consider in future research is how to prevent overconfidence (especially in homogeneous groups). To give just two examples for possible interventions, group members could be required to provide reasons why their group decision could be wrong (cf. Koriat, Lichtenstein, & Fischhoff, 1980) or a counterfactual mind-set could be activated in the group members (cf. Kray & Galinsky, 2003). It is interesting to note that many of the factors that are known to improve group decision quality (e.g., heterogeneity of opinion; see Schulz-Hardt et al., 2006) should make the decision makers more uncertain about those decisions (cf. Sniezek & Buckley, 1993).

However, as long as being confident does not imply overconfidence, being confident clearly provides benefits as well. Most importantly, being confident means that one is ready for action whereas lack of confidence may lead to inaction. In particular, feeling confident about having made the right decision may foster the development of an action-oriented mind-set (Beckmann & Kuhl, 1984; Gollwitzer & Kinney, 1989) aimed at shielding a behavioral intention during the process of enactment. Indeed, homogeneous groups have been shown to be more effective in implementing a decision than heterogeneous groups (White, Dittrich, & Lang, 1980). Consequently, confidence in group decisions is not something we want to destroy. Therefore, interventions are needed that make group members attend to future task requirements (i.e., reduce overconfidence) while simultaneously preserving the advantage of action readiness (i.e., preserve confidence). Developing such interventions appears to be a very promising avenue for future research.

On the other hand, it is also debatable whether *moderately confident homogeneous groups* are always task

sensitive in practice. In our experiments, it was relatively easy to detect whether adapting the confirmation bias to task requirements is beneficial for task performance. In practice, this often might be less clear. For example, task performance for groups in practice often means decision quality: Groups perform well if they make high-quality decisions. Thus, groups are task sensitive if they abstain from showing a confirmation bias whenever this bias would be detrimental for decision quality. Now, the consequences of biased information search for group decision quality crucially depend on how the information is distributed among the group members before discussion. When the available information is distributed in an unbiased manner, most or all group members should already have a preference for the best decision alternative before the group discussion (“manifest profile”; Lavery, Franz, Winqvist, & Larson, 1999). In this situation, a confirmation bias during the group discussion would have no negative consequences; it should even be beneficial because it speeds up making the correct decision. However, when the available information is distributed in a biased manner, and therefore the group members’ individual information suggests a suboptimal decision alternative (i.e., when a “hidden profile” exists; cf. Brodbeck, Kerschreiter, Mojzisch, & Schulz-Hardt, 2007), a confirmation bias should prevent the group from both tapping its full potential and identifying the best possible decision alternative during group discussion. Indeed, recent studies support the idea that a confirmation bias is detrimental to decision quality when a hidden profile exists (e.g., Kray & Galinsky, 2003; Schulz-Hardt et al., 2006). Unfortunately, it is very difficult for group members to detect whether the information is distributed in a hidden-profile manner because doing so requires them to be very attentive to who holds what information. Thus, more subtle tests of homogeneous groups’ task sensitivity are needed in the future.

As pointed out by Sniezek and Buckley (1993), the ultimate contribution of research on (group) confidence for decision-making theory and practice depends on demonstrating the consequences of (group) confidence for decision-relevant behavior. The studies reported here provide another step in linking confidence to behavior in groups by showing how high confidence can diminish task sensitivity in information search.

NOTES

1. The term *confirmation bias* here has a slightly different meaning from the context of hypothesis testing where it is also often used (e.g., Snyder & White, 1981). In the latter, *confirmatory hypothesis testing* or *confirmation bias*, respectively, means looking for evidence that would confirm a preselected hypothesis—without knowing whether one will find this evidence. In the research on decision

making we are referring to, confirmation bias means requesting information that will support a preselected alternative; thus, the decision maker using this strategy *knows* that he or she will get the confirmation sought.

2. The reason for choosing single-sex groups was that all groups in Experiment 1a (military staff) had been single-sex groups because all participants were males. However, additional data have shown that information search in mixed-sex groups is biased, too (e.g., Schulz-Hardt, Frey, Fago, & Kici, 1999).

3. The same pattern of results is obtained by using the product term of the confidence factor and the group task factor as a continuous variable in a regression analysis, $\beta = 2.28$, $t(40) = 2.18$, $p = .035$. Nevertheless, we use the median-split method in Experiments 1a and 1b to allow direct comparisons with Experiment 2, where group confidence is introduced as an experimental factor.

4. Although in the earlier studies with individuals (Canon, 1964; Freedman, 1965) no interaction effect of anticipated task requirements and confidence was observed, Canon (1964) found a stronger confirmation bias in the information search of participants in the low-confidence condition compared to participants in the high-confidence condition (independent of anticipated task). However, this main effect is difficult to interpret. On one hand, it is not clear whether confidence was successfully manipulated in the Canon study, and on the other hand, this main effect was not observed in the Freedman (1965) study in which the same confidence manipulation yielded a significant manipulation check. Therefore, we refrain from comparing the confidence main effect of the Canon study with our group studies.

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