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Combined Effects of Knowledge About Others' Opinions and Anticipation of Group Discussion on Confirmatory Information Search

Andreas Mojzisch

Stefan Schulz-Hardt

Georg-August-University

Rudolf Kerschreiter

Dieter Frey

Ludwig-Maximilians-University

There is conclusive evidence that information search processes are typically biased in favor of the information seeker's own opinion (confirmation bias). Less is known about how knowledge about others' opinions affects this confirmatory information search. In the present study, the authors manipulated feedback about others' opinions and anticipation of group interaction. As predicted, the effect of knowledge about others' opinions on confirmatory information search depended on whether participants anticipated interacting with these others. Specifically, minority members anticipating a group discussion exhibited a particularly strong confirmation bias, whereas minority members who did not anticipate a discussion predominantly sought information opposing their opinion. For participants not anticipating group interaction, confidence about the correctness of one's decision mediated the impact of knowledge about others' opinions on confirmatory information search. Results are discussed with regard to the debiasing effect of preference heterogeneity on confirmatory information search in groups.

Keywords: *information search; confirmation bias; anticipated group interaction; minority and majority influence*

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Throughout our lives, we actively search for and deal with new information. Remarkably, a large body of evidence shows that individuals have a tendency to predominantly seek information supporting their opinions as opposed to conflicting information. For example, individuals have been found to favor information supporting their attitudes (Lundgren & Prislin, 1998), previous decisions (Frey, 1986), and stereotypes (Johnston, 1996). This biased information search is likely to strengthen the information seekers' adherence to their position, even if this position is not justifiable based on all of the available information (Pinkley, Griffith, & Northcraft, 1995).

Experimental studies on biased information search have predominantly been carried out within the framework of cognitive dissonance theory (Festinger, 1957). These studies have demonstrated that the preference for supporting compared to conflicting information occurs when individuals have decided voluntarily and with a certain amount of commitment on a particular decision alternative (cf. Frey, 1986). In a prototypical study, participants make a real or hypothetical decision and are subsequently offered additional pieces of information in the form of statements by experts or former participants. Half of the statements argue in favor of and the other half against the participants' decision. Each statement is summarized by a main thesis that makes it clear whether the statement supports or conflicts with the participants' decision. On the basis of these main theses, participants are asked to select which statements they would like to read. If a participant chooses more supporting than opposing statements, confirmatory information seeking is said to occur. We refer to this preference for supporting over conflicting information as *confirmation bias*.

Recent studies on biased information search in the context of decision making have shown that biased information search is not restricted to situations in which a final decision has been made but can also occur after preliminary decisions (Fischer, Jonas, Frey, & Schulz-Hardt, 2005; Jonas, Schulz-Hardt, Frey, & Thelen, 2001). Furthermore, biased information search can be generalized to situations in which new information is sought sequentially rather than simultaneously (Jonas et al., 2001). Finally, biased information search has also been demonstrated in the area of group decision making (Kerschreiter, Schulz-Hardt, Mojzisch, & Frey, in press; Schulz-Hardt, Frey, Lüthgens, & Moscovici, 2000; Schulz-Hardt, Jochims, & Frey, 2002).

All in all, there is conclusive evidence that a person's own opinion influences his or her information search. By contrast, far less is known about how the *opinions of others* affect this behavior. To illustrate, imagine you are a member of a management board and have to decide whether the contract of a manager should be extended or not. After careful consideration,

you favor extending the contract. Then you learn that two other members of the board favor letting the manager go. Will this knowledge make you even more biased in your information search, or will it make you concentrate on information that contradicts your opinion? In the same way, if the two other members agree with you, will this knowledge influence the extent to which you bolster your opinion by searching for supporting information?

Knowledge about such influences would have important implications for group research. For example, previous research has demonstrated that groups in which all members prefer the same decision alternative prior to group discussion show a more pronounced confirmation bias after discussion than do groups in which members expressed prediscussion disagreement (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002). In these studies, groups first discussed a decision problem and were then given the opportunity to select additional information that either supported or conflicted with the decision of the group (similar to the studies on biased information search at the individual level). Although these studies unequivocally showed that dissent debiases group information search (i.e., groups consisting of members with heterogeneous decision preferences search for information in a more balanced way than do groups consisting of members with homogeneous decision preferences), it is unclear whether this effect is because of the expression of dissent during group interaction or because of merely learning that other group members prefer different decision alternatives. To better understand the effects of dissent, research that isolates the effects of learning whether others hold a similar or a different position on biased information search is needed. Stated differently, what is missing so far is a baseline that allows the debiasing effect of prediscussion dissent in groups to be more accurately interpreted.

Unfortunately, the two existing studies that were designed to investigate the effect of learning other persons' opinions on biased information search yielded contradictory results. In the first study (Levine & Russo, 1995), participants were led to believe that they would discuss a controversial issue—the question of whether the insanity defense should be retained or abolished—with five other people. Furthermore, they were informed that they belonged to either a majority or a minority faction and that the minority was composed of either one or two persons. Prior to the discussion, participants could read arguments supporting or opposing their position. Levine and Russo (1995) observed that participants in all experimental conditions spent more time reading supporting than opposing arguments. Moreover, participants who anticipated being the only minority member in a group discussion exhibited a particularly strong confirmation bias. In the

second study (Nemeth & Rogers, 1996), participants who opposed proposals restricting college dormitory life were informed that either a minority (20%) or a majority (80%) of the student population and of their own experimental group favored the proposals. Afterward, they were given the opportunity to read articles detailing the reasons for opposing or favoring the proposals. Nemeth and Rogers (1996) found that participants exposed to minority dissent (i.e., majority members) searched for approximately the same number of articles supporting versus conflicting with their opinion, whereas participants exposed to majority dissent (i.e., minority members) searched for more conflicting articles than supporting articles. In other words, although majority members searched for information in an unbiased fashion, minority members searched for information consistent with the majority position, that is, they exhibited a *disconfirmation bias*. In summary, although Levine and Russo (1995) found that minority members were particularly biased in favor of supporting information, Nemeth and Rogers (1996) obtained the opposite result, namely, that minority members showed a pronounced preference for conflicting information.

At this point, one might wonder whether there are any differences between the two studies that might account for the contradictory results. One important difference concerns the anticipation of discussion. Although Nemeth and Rogers (1996) simply informed their participants about other persons' opinions, Levine and Russo (1995) led participants to expect that they would participate in a face-to-face discussion with those others. Knowing that others agree or disagree is, however, somewhat different from anticipating a discussion with those others. Specifically, it is conceivable that the two experimental settings are linked to different motivations.

According to the multiple-motive heuristic-systematic model (HSM; Chaiken, Giner-Sorolla, & Chen, 1996; Chen & Chaiken, 1999), three broad motives can be distinguished that predict the direction of information processing. *Accuracy motivation* refers to the desire to hold beliefs and attitudes that are objectively valid. Accuracy-motivated individuals aim to understand the other persons' opinions and, therefore, search for information in a balanced or even self-critical way (Lundgren & Prislin, 1998). *Defensive motivation* refers to an orientation toward reinforcing important self-defining attitudes and beliefs. Defensive-motivated individuals aim to maintain the stability of their cognitive system and, therefore, search for information supporting their self-defining attitudes (Lundgren & Prislin, 1998). Finally, *impression motivation* refers to the desire to hold and express attitudes and beliefs that are called for by the current interpersonal situation. Specifically, if the opinions of significant others are known to the

information seeker and if the information seeker's opinion has not been disclosed to these others, a bias in the direction of the other persons' opinions has been found to occur. By contrast, if the information seeker's opinion is revealed to significant others, as, for example, at the beginning of a group discussion, a confirmation bias emerges to make the opinion justifiable to these others (Jonas, Schulz-Hardt, & Frey, 2005; Lundgren & Prislin, 1998; Tetlock, 1992).

By drawing on the multiple-motive HSM, we propose that the mere awareness of being in the minority induces a motivation to find out whether the majority position is correct or not. Thus, people who are exposed to majority dissent but who do not anticipate a discussion should search for information consistent with the majority position on the basis of *accuracy concerns*. By contrast, if minority members anticipate a discussion and know that their opinion will be disclosed to the others, which is the case in most group discussions because preferences are usually exchanged at the outset (Gigone & Hastie, 1993), they should be motivated to bolster and justify their position by searching for supporting information on the basis of *self-presentation concerns*. Stated differently, merely learning that the majority disagrees facilitates *accuracy motivation*, and this motivation induces a self-critical information search. By contrast, the anticipation of being a minority member in a forthcoming group discussion induces *impression motivation* and, hence, leads to confirmatory information search.

Preliminary evidence supporting the idea that the impact of knowledge about others' opinions on biased information search is moderated by anticipated group discussion is provided in a study by Van Hiel and Franssen (2003). This study investigated the impact of group decision rule (majority vs. unanimous rule) and prospective member status (minority vs. majority member) on the information acquisition bias. Of particular relevance to our hypothesis is the control condition in which participants expected no interaction. In summary, Van Hiel and Franssen found that minorities showed a greater confirmation bias than majority factions, especially when the minorities anticipated a group discussion. Unfortunately, a serious methodological limitation of this study precludes firm conclusions. Although participants in the condition with anticipated group interaction were informed about the opinions of the other participants in their group, participants in the control condition with no anticipated interaction received abstract base-rate information, that is, they were informed that 66% (or 33%) of *all* prior participants agreed with their position. Thus, the manipulation of minority and majority status differed across the two anticipation conditions. As a consequence, the enhanced confirmation bias of minorities anticipating a

discussion might be not because of anticipated interaction but because feedback about others' opinions has more impact if these others are real persons with whom the participants have direct contact.

The Present Study

The purpose of the present study was threefold. First, we sought to provide a methodologically rigorous test of the assumption that the impact of feedback about others' opinions on confirmatory information search is moderated by the anticipation of a discussion with those others. To this end, we orthogonally manipulated two factors: feedback about the opinions of two other participants and anticipation of discussion. By contrast to the Van Hiel and Franssen (2003) study, participants were informed about the opinions of two of the other participants in their experimental session irrespective of whether they anticipated a discussion or not. Our main hypothesis was that the effect of knowledge about others' opinions on information search is moderated by anticipated group interaction. Specifically, in the conditions with anticipated interaction, minority members were predicted to show a substantially higher confirmation bias than majority members (as observed by Levine & Russo, 1995). By contrast, in the conditions with no anticipated interaction, minority members, but not majority members, were expected to show a disconfirmation bias (as observed by Nemeth & Rogers, 1996). Hence, the effect of anticipated interaction should be strongest for minority members because it should turn the disconfirmation bias in the condition with no anticipated interaction into a confirmation bias in the condition with anticipated interaction.

The second goal of the present experiment was to shed light on the processes underlying the interactive effects of knowledge about others' opinions and anticipated group interaction on confirmatory information search. Apparently, the awareness of being in the minority should undermine one's confidence about the correctness of the decision irrespective of whether one anticipates a group discussion or not. However, this decrease in confidence should be differentially related to confirmatory information search depending on whether one anticipates a discussion or not. As outlined above, for minority members who do not anticipate a discussion, the decrease in confidence should induce a motivation to find out whether the majority position is correct or not and, therefore, result in a decreased confirmation bias (or even an increased disconfirmation bias). In other words, the less confident people are, the more they will tend to search for information *opposing* their

opinion (based on accuracy concerns). By contrast, for minority members in the anticipated interaction condition, confidence should be negatively related to confirmatory information search. The less confident minority members are, the more they will doubt that they will be able to maintain their stance in the forthcoming discussion or even persuade the majority members and, hence, the more they will tend to search for information *supporting* their opinion to compensate for this deficiency. In summary, confidence about the correctness of one's decision should mediate the effects of opinion feedback on confirmatory information search, but these mediation effects should be in opposite directions if further group interaction is anticipated versus not anticipated.

The third goal of the present study was to extend past research on the impact of knowledge about others' opinions on biased information search by including both a no-feedback control condition and a homogeneous feedback condition in our experimental design. Note that only one study (Levine & Russo, 1995) has involved a control condition in which participants received no feedback about the distribution of opinions in their group. A no-feedback control condition is important because without such a condition it is not possible to conclude whether differences between the majority and the minority condition are because of minority feedback, majority feedback, or both types of feedback. Moreover, none of the previous studies involved a homogeneous feedback condition, that is, a condition in which participants learned that *all* other participants had reached the same decision. A homogeneous feedback condition is, however, particularly worthy of attention because previous studies in which biased information search was measured at the group level have demonstrated that homogeneous groups exhibit a particularly pronounced confirmation bias (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002). Consequently, it would be instructive to know whether anticipating a discussion with agreeing others or even simply being aware that others agree is sufficient to yield a similarly high confirmation bias to that observed in homogeneous groups.

To summarize, the present study includes four levels of feedback in a decision case with two alternatives: (a) a *homogeneous condition* in which participants were led to believe that two other randomly chosen participants in their experimental session had reached the same decision, (b) a *majority condition* in which participants learned that one of these two participants had reached the same decision (so that the participant and this person constituted the majority faction), whereas the other participant had reached a different decision, (c) a *minority condition* in which participants were informed that the two other participants had reached the opposite decision,

and (d) a *control condition* in which participants received no feedback. Within each of these four feedback conditions, participants either were led to expect that they would participate in a group discussion with two other participants or were told that no discussion would take place.

Method

Participants and Design

The sample included 170 students (102 female and 68 male, $M = 24.63$ years, $SD = 4.81$) from the University of Munich who participated in return for course credit or received DM15.00 (about US\$7.00) in exchange for their participation. Participants were randomly assigned to the eight conditions of a 4 (feedback about others' opinions: homogeneous feedback vs. majority feedback vs. minority feedback vs. no feedback) $\times$ 2 (anticipation of group interaction: yes vs. no) between-subjects factorial design.

Procedure and Materials

Up to 10 participants were run in each session. The case study handed out to the participants was identical to one used in other recent experiments on confirmatory information search (e.g., Fischer et al., 2005). It deals with a Mr. Miller who has a 1-year contract to manage a fashion store. The participants' and their bogus partners' role was that of store owner. Participants were informed that Mr. Miller's contract was almost up and negotiations about extending it were due to take place. Participants received information showing that Mr. Miller's success had been mixed.

Participants were asked to make a preliminary decision about whether or not the contract should be extended. To increase their commitment and involvement, the experimenter asked the participants to write down some reasons for their decision. In the meantime, the experimenter collected the questionnaires with the participants' decisions and left the room. Participants were led to believe that the experimenter would photocopy the questionnaires and those of the participants' (bogus) partners. In reality, the experimenter picked up two prepared photocopies of decision questionnaires for each participant. After she returned, she told the participants that they would now be informed about the decisions of two other randomly chosen participants and handed out the prepared photocopies to each participant. In the homogeneous feedback conditions, the two other participants

had made the same decision as the respective participant. In the majority feedback conditions, one of the two other participants had come to the same decision as the participant and the other had made a different decision. In the minority feedback conditions, both of the other participants had come to a different decision. Finally, in the no feedback conditions, participants did not receive any information about the decisions of the other participants.

In addition to the photocopies, the experimenter also handed out a questionnaire. This questionnaire introduced the other experimental factor, anticipation of group interaction. In the conditions with anticipated group interaction, participants were told that after reviewing some more information they would discuss the case with the two participants about whose decisions they had been informed beforehand and that the three of them would then make a final group decision. Thus, participants in the conditions with anticipated group interaction received the same instruction as in the study by Levine and Russo (1995). In the conditions with no anticipated group interaction, participants were told that after reviewing some more information they would be asked to make a final decision about the manager's future individually. Hence, as in the study by Nemeth and Rogers (1996), participants expected no interaction with each other. Subsequently, participants in both conditions were requested to rate how confident they were about the correctness of their preliminary decision.

Thereafter, the information search was introduced. Participants were informed that additional information about the decision case was available. They were led to believe that 12 experts had been asked to develop prognoses about the future performance of the fashion store should Mr. Miller's contract be extended. The experts' statements were said to be about one page in length each. Participants received an overview sheet that characterized each statement by its main thesis. The main thesis contained the central argument of the corresponding statement and left no doubt about whether the expert had voted for or against extending the contract. An example of a main thesis in favor of an extension read, "Mr. Miller was able to gain new customers for the fashion store and this shows that his marketing concepts appeal to new customer sections. This competitive advantage will increasingly pay off in the future. Thus, his contract should be extended." An example for a main thesis against an extension of Mr. Miller's contract read, "The teen fashion line introduced by Mr. Miller is nothing new on the market and his sales strategy is not very innovative. Furthermore, he has not developed any new business concepts. Thus, his contract should not be extended."

There were 6 main theses in favor of and 6 main theses against an extension of the contract. Therefore, irrespective of whether participants had voted for or against extending the contract, one half of the statements supported their decision and the other half conflicted with it. Participants were asked to select exactly 6 statements that they wanted to read. More specifically, for each of the 12 theses, they were instructed to tick *yes* if they wanted to read the corresponding statement or *no* if they did not want to read it (with the restriction that they had to select 6 statements in total). The confirmation bias was computed as the difference between the number of chosen supporting and the number of chosen conflicting statements. Hence, positive numbers indicate a confirmatory bias, whereas negative numbers indicate a disconfirmatory bias.

After participants had filled in the information search questionnaire, they completed a suspicion check. Thereafter, participants were thanked and fully debriefed, especially with regard to why no reading of the requested statements was necessary.

Results

Check for Possible Confounds and Manipulation Checks

Data from 13 participants had to be discarded. Of these participants, 4 guessed the correct hypotheses in the suspicion check. In 8 cases, the questionnaires were filled in incompletely or incorrectly. Finally, 1 participant obviously misunderstood the anticipation instruction. Of the remaining 157 participants, 127 voted in favor of and 30 against extending the contract. No significant differences between these two groups were observed in the information search and confidence ratings.

To check for our manipulation of preference feedback, we asked participants at the end of the experimental session to recall the participants' decisions about which they had been informed beforehand. All participants correctly answered this question.

In all of the following analyses, statistical tests were evaluated at $\alpha = .05$

Information Search

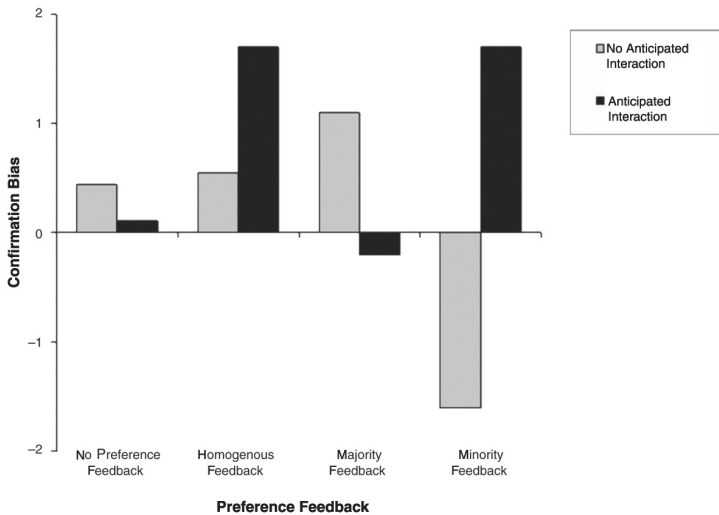
To assess the effect of feedback about others' opinions and anticipation of group interaction on confirmatory information search, we calculated a 4 (feedback about others' opinions: homogeneous feedback vs. majority feedback vs.

minority feedback vs. no feedback) $\times$ 2 (anticipation of group interaction: yes vs. no) between-subjects ANOVA on the confirmation bias. Although the main effects for preference feedback and anticipation of interaction were not significant, $F(3, 149) = 1.16, p = .328, \eta^2 = .020$, and $F(1, 149) = 2.62, p = .107, \eta^2 = .015$, respectively, we observed the expected significant interaction of preference feedback and anticipation of discussion, $F(3, 149) = 5.40, p = .001, \eta^2 = .095$. Follow-up one-way ANOVAs showed that the preference feedback factor had a significant effect on the confirmation bias both for participants anticipating group interaction, $F(3, 75) = 3.56, p = .018, \eta^2 = .125$, and for those not anticipating group interaction, $F(3, 74) = 3.10, p = .032, \eta^2 = .112$. Figure 1 illustrates the interactive effects of knowledge about others' opinions and anticipation of discussion on confirmatory information search.

To examine this interaction more closely, we computed separate post hoc comparisons (least significant difference [LSD] method) for those participants anticipating interaction and for those not anticipating interaction. In the conditions with no anticipated interaction, participants who had received minority feedback ($M = -1.60, SD = 3.35$) significantly differed from participants who had received majority feedback ($M = 1.10, SD = 3.40; p = .006$), homogeneous feedback ($M = 0.55, SD = 2.96; p = .027$), and no feedback ($M = 0.44, SD = 2.01; p = .040$). There were no significant differences among the latter three conditions (all p values $> .50$). Separate t tests against zero revealed a significant *disconfirmation* bias for participants who had received minority feedback, $t(19) = -2.14, p = .046$. By contrast, participants who had received no feedback, homogeneous feedback, or majority feedback did not show a significant confirmation bias (all p values $> .16$).

In the conditions with anticipated interaction, a completely different pattern of results emerged. Participants who had received minority feedback ($M = 1.70, SD = 2.10$) and those who had received homogeneous feedback ($M = 1.70, SD = 2.77$) both differed from each of the other two conditions. Specifically, participants who had received minority feedback ($M = 1.70, SD = 2.10$) significantly differed from participants who had received majority feedback ($M = 0.20, SD = 2.24; p = .014$) and from those who had received no feedback ($M = 0.11, SD = 2.45; p = .041$). Similarly, participants who had received homogeneous feedback ($M = 1.70, SD = 2.77$) significantly differed from participants who had received majority feedback ($M = 0.20, SD = 2.24; p = .014$) and from those who had received no feedback ($M = 0.11, SD = 2.45; p = .041$). All other differences were not significant (all p values $> .65$). Separate t tests against zero revealed a significant confirmation bias for participants who had received minority

Figure 1
Confirmation Bias as a Function of Feedback
About Others' Opinions and Anticipated Discussion



feedback, $t(19) = 3.66, p = .002$, and for those who had received homogeneous feedback, $t(19) = 2.74, p = .013$. By contrast, participants in the other two conditions did not show a significant confirmation bias (both p values $> .69$).

In addition, we also examined the simple effects of anticipated group interaction within each level of preference feedback. Anticipated interaction significantly affected only minority members: As predicted, minority members who anticipated a discussion ($M = 1.70, SD = 2.10$) significantly differed from minority members who did not anticipate a discussion ($M = -1.60, SD = 3.35$), $F(1, 38) = 14.03, p < .001, \eta^2 = .27$. By contrast, in the other three feedback conditions, there was no significant effect of anticipated interaction on confirmation bias (all p values $> .16$).

Confidence

As expected, in the 4×2 ANOVA, a significant main effect for preference feedback emerged, $F(3, 149) = 8.44, p = .001, \eta^2 = .143$. Post hoc comparisons (LSD method) revealed that participants in the minority conditions ($M = 5.50, SD = 2.27$) were less confident about the correctness of

Table 1
Means of Confidence as a Function of Preference
Feedback and Anticipation of Discussion

	Feedback About Others' Opinions							
	No Preference Feedback		Homogeneous Feedback		Majority Feedback		Minority Feedback	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Anticipation of Discussion								
No anticipated discussion	6.33	1.88	7.10	2.17	7.50	1.88	5.45	2.72
Anticipated discussion	6.95	1.87	7.75	1.41	7.25	1.65	5.55	1.76

Note: $n = 20$, except for the conditions with no preference feedback ($n = 18$ for no anticipated discussion, $n = 19$ for anticipated discussion).

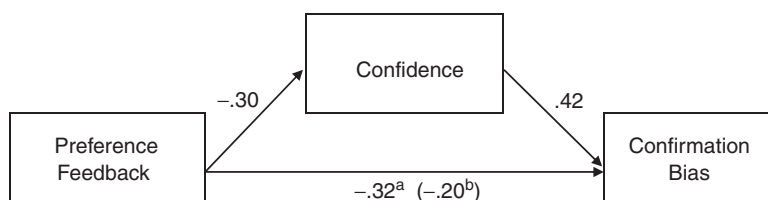
their decision than were participants in the majority conditions ($M = 7.37$, $SD = 1.75$; $p < .001$), the homogeneous conditions ($M = 7.42$, $SD = 1.84$; $p < .001$), and the no feedback conditions ($M = 6.65$, $SD = 1.87$; $p = .011$). There was neither a main effect for anticipation of discussion, $F(1, 149) = 0.80$, $p = .37$, $\eta^2 = .005$, nor an interaction between preference feedback and anticipation of discussion, $F(3, 149) = 0.48$, $p = .70$, $\eta^2 = .008$. Table 1 summarizes the means and standard deviations of the confidence ratings.

Mediation Analyses

The analyses thus far support our hypothesis that the impact of knowledge about others' opinions on confirmatory information search is moderated by anticipated group interaction. Moreover, the results show that the awareness of being in the minority undermines one's confidence about the correctness of the decision. The final stage in the analyses was to test whether the impact of preference feedback on confirmatory information search is mediated by the level of confidence.

We first performed the mediation analysis for those participants who did not anticipate a discussion. Consistent with the effect of preference feedback on confirmatory information search reported above, we dummy coded the preference feedback factor such that the minority condition was contrasted with the three other preference feedback conditions. As predicted, preference feedback had a significant effect on both the confirmation bias (i.e., the dependent variable; $\beta = -.32$, $p = .004$) and the confidence (i.e., the mediator; $\beta = -.30$, $p = .008$). When both preference feedback and confidence were

Figure 2
Mediation Analysis for the Condition Without Anticipated Group Interaction With Preference Feedback as the Independent Variable, Confidence as the Mediator, and Confirmation Bias as the Dependent Variable



Note: Path coefficients are standardized beta coefficients.

a. Beta weight for preference feedback without controlling for confidence (simple linear regression).

b. Beta weight for preference feedback when confidence is controlled for (multiple linear regression).

simultaneously entered into the regression, confidence turned out to be a significant predictor of the confirmation bias ($\beta = .42, p < .001$), whereas preference feedback was no longer a significant predictor ($\beta = -.20, p = .06$). According to a Sobel (1982) test of mediation, the difference in regression weights was significant ($z = -2.24, p < .05$). The results of this mediation analysis are summarized in Figure 2.

For participants anticipating group interaction, it is quite obvious that no such mediation is possible because the pattern of results for the confirmation bias does not correspond to the pattern of results for confidence. To further illustrate this, in a simple regression analysis, confidence was not significantly associated with the confirmation bias ($\beta = .08, p = .46$). For a more detailed analysis, we examined the relation between confidence and confirmation bias in each of the four preference feedback conditions. For participants who received homogeneous feedback, a significant *positive* correlation between confidence and confirmation bias emerged ($\beta = .57, p = .008$). Conversely, for participants who received minority feedback, the results revealed a significant *negative* correlation between confidence and confirmation bias ($\beta = -.56, p = .011$). In the other two feedback conditions, the correlation between confirmation bias and confidence was not significant (all p values $> .19$).

Discussion

The main purpose of the present experiment was to clarify the contradictory results that had been obtained in previous studies on the impact of knowledge about others' opinions on confirmatory information search. Although Levine and Russo (1995) observed that minority members were particularly biased in favor of supporting information, Nemeth and Rogers (1996) obtained the opposite result, that is, minority members showed a preference for conflicting information. We hypothesized that these incompatible results could be accounted for by the fact that participants in the first study anticipated a group discussion, whereas participants in the second study were merely informed about the opinions of other participants. By building on the multiple-motive HSM (Chaiken et al., 1996; Chen & Chaiken, 1999), we proposed that these two experimental settings are linked to different motivations. The mere awareness of being in the minority (in the absence of anticipated group interaction) should induce a motivation to find out whether the majority position is correct or not. Hence, people who are exposed to majority dissent, but who do not anticipate a discussion, should search for information consistent with the majority position on the basis of *accuracy concerns*. By contrast, if minority members anticipate a discussion, they should be motivated to bolster and justify their position by searching for supporting information on the basis of *self-presentation concerns*.

Our results provide clear-cut evidence for this hypothesis. In the conditions with no anticipated group interaction, minority members, but not majority members, showed a pronounced preference for conflicting information (as observed by Nemeth & Rogers, 1996). By contrast, minority members anticipating a group interaction showed a substantially higher confirmation bias than did majority members anticipating a group interaction (as observed by Levine & Russo, 1995).

A second goal of the present study was to shed light on the processes underlying the effect of knowledge about others' opinions on confirmatory information search. We proposed that the mere awareness of being in the minority undermines one's level of confidence about the correctness of one's decision. This decrease in confidence, in turn, was predicted to result in a decreased confirmation bias based on a motivation to test whether the majority is correct or not. The results of a mediation analysis support this prediction. For participants in the conditions without anticipated group interaction, confidence ratings mediated the effect of being in a minority on confirmatory information search.

In the conditions with anticipated group interaction a more complex pattern emerged: For both participants in the homogeneous feedback condition and participants in the minority feedback condition, a strong confirmation bias was found. The information search behavior in these two feedback conditions, however, seems to be born of different motivations. For participants in the homogeneous condition, there was a significant *positive* correlation between confidence and confirmation bias. In other words, the more confident these participants became as a consequence of learning that the other group members in the forthcoming discussion held the same opinion as they did, the less interested they were in reading contradicting information. This result is in line with previous studies showing that the strong confirmation bias of homogenous groups is based on overconfidence and closed-mindedness (e.g., Schulz-Hardt et al., 2000). By contrast, the strong confirmation bias of minority members who anticipated a group interaction seems to be based on a motivation to seek all the ammunition they can get to persuade the majority. This idea is corroborated by the finding that for minority members who anticipated a group interaction, a significant *negative* correlation emerged between confidence and confirmation bias. The less confident minority members were about the correctness of their decision, the more they searched for confirming information—presumably because of the fact that this information might compensate for their lack of confidence in the forthcoming discussion with the majority. The results hence suggest that different motivational processes may lead to the same observable information search behavior.

The third goal of the present experiment was to extend previous research on biased information search by including a homogeneous feedback condition. The results revealed that for participants without anticipated interaction, there were no significant information search differences among homogeneous feedback, majority feedback, or no feedback. By contrast, in the anticipated interaction condition, participants who received homogeneous feedback exhibited a substantially higher confirmation bias than did participants who received majority feedback or no feedback. One explanation for this finding could be that social consensus per se does not result in closed-mindedness unless individuals expect to interact with the agreeing others. Thus, individuals who receive homogeneous feedback but who do not anticipate a discussion may still focus on finding out whether their decision is right or wrong (based on accuracy concerns). By contrast, if individuals anticipate a discussion with others who all have the same opinion, they anticipate that hardly anyone in the group will be interested in counterarguments, and their cognitive focus may shift toward reaching consensus on

the alternative they all prefer. Consequently, these individuals may exhibit a strong confirmation bias not only because they are overconfident but also because searching for conflicting information would be dysfunctional with regard to the emerging group consensus.

More generally, the present results demonstrate the value of investigating the cognitive and motivational consequences of anticipated interaction with majorities or minorities. During the past decades, a great deal of research has compared influence processes exerted by minorities versus majorities (Moscovici, 1994; Wood, Lundgren, Ouellette, Busceme, & Blackstone, 1994). This research has led to several widely accepted conclusions, such as, for example, that minorities stimulate divergent thinking (cf. Nemeth, 1986). Notwithstanding the value of this research, it should be stressed that large parts of it have been carried out within a social influence paradigm in which participants neither anticipated interacting nor actually interacted with others who disagreed. The present study goes beyond this research by highlighting the impact of anticipated group interaction. In this regard, it is important to note that only in the condition with no anticipated group interaction are our findings consistent with Nemeth's (1986) minority influence model, according to which individuals exposed to minority dissent (i.e., majority members) are stimulated to consider multiple sides of an issue, whereas individuals exposed to majority dissent (i.e., minority members) focus on the viewpoint held by the majority and search for information supporting the majority view. Thus, our finding that minority members who anticipated a group discussion were particularly biased toward information supporting their own opinion is at odds with Nemeth's model.

Limitations and Future Research

One limitation of the present study should be taken into account: To explore the processes underlying the information search effects, we measured the participants' level of confidence and examined the relationship between confidence ratings and confirmation bias. As such, the evidence that the information search effects were born of different motives is rather indirect. Notwithstanding this limitation, it is important to note that our results nicely tie in with recent work showing the importance of interpersonal goals in information search (Jonas et al., 2005; Lundgren & Prisin, 1998). Clearly, an important avenue for future research is to take a closer look at the motivational processes underlying information search in such interpersonal situations.

Future studies may also examine whether the effect of learning other persons' opinions on biased information search is moderated by framing the additional information available as coming from experts (as in the present study) or from other participants. Although previous research found that framing the information as coming from experts as compared to coming from other participants has no reliable effect on biased information search (cf. Frey, 1986), the results may look different if participants are led to believe that the articles available had been written by those participants about whose opinions they have been informed.

Another line of research worth pursuing involves investigating whether the combined effect of discussion anticipation and knowledge about others' opinions varies as a function of the anticipated group task. For example, Wittenbaum, Merry, and Stasser (1996) showed that the kind of information that group members attended to in anticipation of discussion depended on whether the anticipated group task was decision making or collective recall. In the domain of biased information search, Kerschreiter et al. (in press) found that homogeneous groups displayed a strong confirmation bias when anticipating having to give reasons for their decision but a balanced information search or even a disconfirmation bias when anticipating having to invalidate counterarguments (at least when the groups' confidence in the correctness of their decision did not exceed moderate levels). In the present study, participants anticipated group decision making. Because minority members anticipating a collective recall task (compared to group decision making) may not feel a need to bolster their position, it is conceivable that they search for information in a balanced or even self-critical way. Therefore, testing whether the anticipated group task moderates the information search of minority members is an important area for future research.

Furthermore, it is interesting to compare our findings with those obtained in studies in which information search was measured at the group level (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002). As we have already outlined in the introduction, homogeneous groups (i.e., groups in which all members favor the same decision alternative) show a clear confirmation bias, whereas heterogeneous groups (consisting of a majority and a minority faction) search for information in a relatively balanced way. This finding is not simply because of aggregated individual confirmation biases. Thus, heterogeneous groups were even less biased than one would expect on the basis of their members' individual information requests prior to discussion. Now, if all group members have a preference for information supporting their position (as shown in the individual baseline measurement), the debiasing effect of preference heterogeneity is possible only if the confirmation

bias of minority members becomes substantially higher than that of majority members in the group situation (because in heterogeneous groups the bias of minority members runs counter to the majority bias). Note that this is exactly what we found in the condition with anticipated group interaction: Participants who anticipated being minority members in a group discussion showed a substantially higher confirmation bias than did participants who anticipated being majority members. Furthermore, we found that participants who anticipated a discussion and received homogeneous feedback showed a substantially higher confirmation bias than did participants in the no feedback condition who received no preference feedback—a result that is again congruent with the findings obtained in studies in which confirmation bias was measured at the group level (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002). It is thus possible that the tendency of homogeneous groups to be closed-minded (Tjosvold, Johnson, & Lerner, 1981), to be overconfident (Sniezek, 1992), and to prefer supporting to conflicting information (Schulz-Hardt et al., 2000; Schulz-Hardt et al., 2002) may reflect not influence processes during discussion but rather individual processes instigated by anticipated interaction with agreeing others. Testing this possibility by comparing the differences between anticipated group interaction and actual group interaction represents an interesting topic for further research.

Finally, future research is called for to examine information-seeking activities *during* discussion. Unfortunately, studies of simultaneous majority and minority influence in interacting groups are far less frequent in the literature than are studies on individual-level effects of majority and minority influence. Although it would be tempting to transfer the data from the present study to information seeking during discussion, caution is warranted. For example, in a study on group information pooling, Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, and Frey (2006) also compared the information exchange behavior of majority as compared to minority members. It was surprising that there were no differences, neither with regard to the bias favoring shared information nor with regard to the bias favoring preference-consistent information (i.e., information supporting the group members' prediscussion preferences). Therefore, findings from the individual-level context do not necessarily generalize to freely interacting groups.

In summary, further research is called for to fully understand the cognitive and motivational consequences of knowledge about others' opinions. Our results suggest that new insights can be gained by investigating the differences between (a) the mere awareness that others hold a similar or a different position, (b) the anticipated interaction with others who agree or disagree, and (c) the actual interaction with these others.

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Andreas Mojzisch is assistant professor in the Industrial, Economic and Social Psychology Unit at the Georg-August-University, Goettingen. He received his PhD in 2003 from Ludwig-Maximilians-University, Munich. His research interests include group decision making, biased information processing in groups, and social cognitive neuroscience.

Stefan Schulz-Hardt is chair in Industrial, Economic, and Social Psychology and head of the Economic and Social Psychology Unit at the Georg-August-University, Goettingen. He received his PhD from University of Kiel. Current research interests are group decision making, social information processing, and financial psychology.

Rudolf Kerschreiter is assistant professor in the Social Psychology Unit at the Psychology Department of Ludwig-Maximilians-University, Munich. He received his PhD in 2003 from Ludwig-Maximilians-University, Munich. His research interests include group decision making, biased information processing in groups, personal and social identity, and leadership.

Dieter Frey is full professor in social psychology at the department of psychology at Ludwig-Maximilians-University, Munich. He received his PhD in 1973 from the University of Mannheim. His research interest includes decision making, testing social psychological theories, and applied research in the field of organizational psychology.