



The good, the bad and the ugly thing to do when sharing information: Revealing, concealing and lying depend on social motivation, distribution and importance of information

Wolfgang Steinel^{a,*}, Sonja Utz^b, Lukas Koning^a

^a Social and Organizational Psychology, Leiden University, The Netherlands

^b Department of Communication Science, VU University Amsterdam, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands

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ABSTRACT

Research on information sharing in group decision-making has widely assumed a cooperative context and focused on the exchange of shared or unshared information in the hidden profile paradigm (Stasser & Titus, 1985, 1987), neglecting the role of information importance. We argue that information sharing is a mixed-motive conflict setting that gives rise to motivated strategic behavior. We introduce a research paradigm that combines aspects of the traditional information sampling paradigm with aspects of a public good dilemma: the information pooling game. In three experiments, we show that information sharing is strategic behavior that depends on people's pro-social or pro-self motivation, and that people consider information sharedness and information importance when deciding whether to reveal, withhold, or falsify their private or public information. Pro-social individuals were consistently found to honestly reveal their private and important information, while selfish individuals strategically concealed or even lied about their private and important information.

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Introduction

Information sharing is a crucial process in group decision-making. Organizations favor teams with heterogeneous members, hoping that the knowledge from the different domains and experiences will be pooled and that this will lead to better solutions. However, research has repeatedly shown that groups mainly discuss the information already known (e.g., Scholten, van Knippenberg, Nijstad, & De Dreu, 2007; Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006; Stasser & Stewart, 1992; Stasser, Stewart, & Wittenbaum, 1995; Stasser & Titus, 1985, 1987). This phenomenon has been called information sampling bias and many studies have examined the underlying cognitive processes of biased information processing (see Brodbeck, Kerschreiter, Mojzisch, & Schulz-Hardt, 2007). Motivational processes have largely been neglected, as research on information sharing tended to assume that group decision-making is a cooperative setting (Wittenbaum, Hollingshead, & Botero, 2004). Only recently, theorizing (De Dreu, Nijstad, & van Knippenberg, 2008) and empirical research (Toma & Butera, 2009; Wittenbaum, Bowman, & Hollingshead, 2003) have questioned this assumption and argued that group decision-making is mixed-motive in nature. Besides the cooperative incentive to find a good

(or the correct) solution, it also entails competitive aspects, like defending one's initial preference, showing one's knowledge, or acquiring a superior status in the group. Consequently, members of decision-making groups can be in conflict, which turns information pooling into an arena of motivated, strategic behavior.

Here, a hitherto neglected characteristic of information comes into play: the importance of information. Evidently, not all information is equal. Despite the obvious validity of this claim, group decision-making research has not focused on other aspects of information than sharedness. In this paper, we argue that a piece of information has two characteristics that are especially relevant in the context of strategic information sharing, namely sharedness and importance. These characteristics are not necessarily related in natural group decision-making settings. Sharedness refers to the distribution of information before a group discussion. Unshared pieces of information are possessed by only one member of the group, while shared pieces of information are known to several or all group members. Independent of its distribution, information is also characterized by its importance to the problem at hand. A piece of information can be important for finding a solution (e.g., "Suspect A has an alibi for the time of the murder"), or it can be unimportant (e.g., "Suspect A has an alibi for the day after the murder"). As we outline below, prior studies on information sharing have controlled the sharedness of information, but have not manipulated its importance. It thus remained unclear whether and when people strategically hold back information they knew

* Corresponding author. Address: Leiden University, Social and Organizational Psychology, P.O. Box 9555, 2300 RB Leiden, The Netherlands.

E-mail addresses: wolfgang@steinel.info, wsteinel@fsw.leidenuniv.nl (W. Steinel).

was important for their fellow group members. Furthermore, withholding or giving information is a very limited subset of information-related behavior. To better understand people's behavior in group decision-making situations, it is also necessary to answer questions like: how much information are people willing to provide? Which pieces of information are they willing to reveal and which to conceal? Do they actively falsify information, and if so, which pieces of information do they lie about? Do people pretend to reveal much information, while they strategically try and keep their information advantage? This paper aims to fill this void. We developed a new paradigm that allows studying motivated processes in information pooling. In three experiments we show that selfish individuals deliberately withhold unshared and important information although they know that it is important for others.

Information sharing has predominantly been studied in two domains: mainly field studies examined knowledge sharing in organizational contexts and laboratory studies examined information sharing within the information sampling paradigm. The former line of research has usually focused on technical and managerial solutions of the knowledge sharing problem. Although it has been noted that individuals might be reluctant to share their knowledge (Cabrera & Cabrera, 2002; Cress, Kimmerle, & Hesse, 2006; Kalman, Monge, Fulk, & Heino, 2002), this research largely neglected social motivations and focused on factors like usability of knowledge management systems, the role of organizational culture, commitment, culture, or leadership (e.g., De Vries, Van Den Hooff, & De Ridder, 2006; Fulk, Heino, Flanagan, Monge, & Bar, 2004).

Laboratory research on information sharing is usually conducted within the information sampling paradigm (Stasser & Stewart, 1992; Stasser & Titus, 1985, 1987; Stasser et al., 1995). This paradigm was developed to examine group decision-making in a situation in which the distribution of information among group members is highly controlled. Individuals receive arguments for and sometimes also against several candidates or options before entering a group discussion. Some arguments are given to all members (shared information); some are only given to one or more, but not all members (unshared information). Unshared information can be distributed in such a way that the best decision alternative is hidden from the members prior to discussion and can only be found if unshared information is exchanged – a so-called hidden profile. Ample research shows that groups are bad at solving hidden profiles because they do not pool enough unshared information. This is explained with various biases in information processing (e.g., Brodbeck et al., 2007; Van Swol, Savadori, & Sniezek, 2003): for example, the negotiation bias states that people strive for consensus rather than for the truth (Brodbeck et al., 2007), and the evaluation bias shows that individuals evaluate shared or preference-consistent information as more important and credible than unshared or preference-inconsistent information (e.g., Greitemeyer & Schulz-Hardt, 2003; Mojzisch, Schulz-Hardt, Kerschreiter, Brodbeck, & Frey, 2008). This is a first hint that there are some motivated processes at play; people consider deliberately which information to share. However, withholding information has mainly been treated as biased processing. The information sampling literature has implicitly assumed that group decision-making is a cooperative setting, in which all group members want to help finding the best solution. It was largely neglected that people may be motivated to strategically withhold information that they know to be important for the group.¹

¹ Besides the numerous experiments in the information sampling tradition, we are aware of one study that systematically addresses motivated information pooling in a negotiation paradigm. Deal (2000) found that male negotiators with a competitive motivation were more likely to use information that supported their own position or harmed the position of the negotiation partner as compared to male negotiators with a cooperative motive. However, when asked about their behavior, participants denied that they would strategically use information. This pattern shows that it is not socially desirable to admit strategic withholding of information.

Motivated information pooling

We argue that group decision-making is a mixed-motive setting which triggers strategic behavior. Based on the motivated information processing in groups model (MIP-G; De Dreu et al., 2008), which posits that individual-level and group-level information processing result from motivated processes in a mixed-motive setting, we assume that social motivation plays an important role. Social motivation drives the kind of information that individuals attend to and process: selfish individuals value independence, disregard other's ideas, and try to outperform their fellow group members. Pro-social individuals value group harmony and strive for the cooperative goal of reaching consensus and taking a high-quality group decision. At the group level, pro-self motivation should thus bias information exchange, lead to more deception and spinning of information, and reduce the focus on consensus or integration of perspectives. Initial evidence comes from a study by Toma and Butera (2009). They manipulated individual goals in three-person groups that had to solve a hidden profile task. Participants were told beforehand which information was shared and which was unshared and received a cooperative or a competitive incentive. Results revealed that competitors withheld more unshared information and were more reluctant to disconfirm initial preferences than cooperators. In line with Toma and Butera (2009) and De Dreu et al. (2008), we first predict that social motivation influences the amount of information pooled. Social dilemma research showed that pro-socials contribute more to public goods than pro-selfs do (e.g., De Cremer & Van Vugt, 1999). We thus expected pro-social individuals to accurately reveal more information than pro-self individuals (*Hypothesis 1*).

Our further predictions concern the type of information pooled. We expect that strategic behavior is not only related to the initial distribution (i.e., shared vs. unshared), but also to the importance of information. Pro-socials, on the one hand, want to help the group to do well. Therefore, they should accurately reveal information without giving a positive spin on their own or their preferred information. In order to help their group, they will contribute important information. Furthermore, we expect pro-socials to contribute both unshared and shared information: with unshared information, they contribute novel information which helps to reach a high-quality decision. By pooling shared information, they validate each other's information and foster harmony. Pro-selfs, on the other hand, want to do well for themselves, with no regard for the group's outcome. Therefore, they will be reluctant to give away valuable (i.e., important or unshared) information. Nevertheless, they have good reasons to pool information: when they possess insufficient information to solve a problem, they must get information from the other players. One way is to share information in order to stimulate other group members to reciprocally do so too. In traditional social dilemmas, it has been shown that pro-selfs behave cooperatively for strategic reasons, for example when they are confronted with a player who plays tit-for-tat and punishes non-cooperation (McClintock & Liebrand, 1988; Sheldon, 1999). Thus, we expected pro-selfs to make a cooperative impression by pooling information whilst at the same time withholding their important unshared information. In other words, pro-selfs should pool mainly shared and unimportant cues. Taken together, we thus predict that pro-socials pool more unshared information than pro-selfs (*Hypothesis 2*) and that pro-socials pool more important information than pro-selfs (*Hypothesis 3*).

The information pooling game

Initial evidence for motivated processes in group information sharing comes from two studies that both use the hidden profile

paradigm (Scholten et al., 2007; Toma & Butera, 2009). Yet, this paradigm is not ideally suited to test our predictions. First, the importance of each single cue is not manipulated independently from cue sharedness, making it difficult to differentiate between more or less important information. Second, it is problematic to distinguish strategic withholding of information from a bias towards preference-consistent information or from erroneously neglecting unshared information, because players assume (or self-justify their behavior) that this information is less important. Third, participants in an information sampling experiment usually do not know how much information has to be shared to solve the problem or to make a cooperative impression. We argue that people act strategically: they pool enough information to make a cooperative impression, but withhold the really important information. To corroborate this claim, it is necessary to provide participants with information about which kind of behavior is cooperative in this context.

We developed a new paradigm to overcome the limitations mentioned above. Our information pooling game combines aspects of the traditional hidden profile paradigm with procedures from social dilemma research. Similar to the information sampling paradigm, participants are told that they have to make a group decision together with other participants and that each participant would possess a certain number of cues. As in the information sampling paradigm, information is either shared or unshared. However, cue importance is also varied. Thus, not only the quantity of pooled information, but also its quality can be measured. In contrast to the classic information sampling paradigm, respondents know which information is shared (public) and unshared (private), and they know whether a cue is important or unimportant.

Participants are told that in the first phase of the experiment they would not see the actual content of each cue. Instead, they receive a number referring to the cue, and labels about the sharedness and importance of this information (e.g., “information #163, private, important”). Participants are told that those labels would not be visible once a cue is pooled. This allows detecting strategic processes. An individual might share some unimportant private information in order to make a cooperative impression, but withhold important private information in order to outperform the interaction partners later. Moreover, because no actual information is given, biased processing such as preferences for preference-consistent pieces of information can be excluded. Individual who decide to withhold important private information in this paradigm clearly want to withhold it and cannot justify their decision by claiming that they thought the information would not be important.

The basic setting has similarities with a public good dilemma. Participants receive a certain amount of information and decide how many and which pieces of information to contribute to the group. They are also told how much information is needed to solve the problem and can therefore derive a norm for cooperation based on the equality norm (Messick, 1993). Participants do not meet face-to-face, but operate in computerized cubicles. They indicate for each piece of information whether they would reveal it to the group. Participants are told that information which they give to their group would remain in their possession, and that they would get all information which other group members decided to reveal to the group. Participants were further told that after they have pooled information with the other group members, they would see the actual content of the information they possess. Their task would then be to solve the decision making task on the basis of their available information after pooling. Participants expected this second phase, which, however, did not take place. Participants did not actually interact in any of the present studies, as we focus on information provision in the first phase.

The current set of studies

We explored motivated information pooling, using the information pooling game with different cover stories in three experiments. Each experiment tested our prediction that social motive influences the *amount* and the *type* of information that participants are willing to pool. Concerning the amount of information, we expected pro-socials to pool more information than pro-selves. Concerning the type of information, we expected that pro-socials pool more private and important information, while pro-selves pool mainly public and unimportant cues. Furthermore (in Experiments 2 and 3), selfish motivation was expected to give rise to deception, especially with regard to important and private information.

Experiment 1: information pooling by pro-social and selfish individuals

Method

Participants and design

Forty-three students (15 males, 28 females; mean age 20.16 years, $SD = 2.21$) from Leiden University participated and received 3 Euro (approx. 5 US\$). The experiment had a 2 (social motivation: pro-social vs. pro-self) $\times$ 2 (sharedness: public vs. private) $\times$ 2 (importance: important vs. unimportant) design. Social motive² was varied between participants; sharedness and importance of information were varied within participants.

Procedure

Participants read they were paparazzi celebrity photographers. They possessed some information about which celebrity would appear and when. This information was not sufficient to take many pictures, and they could exchange information with two colleagues. Participants further read that prior research has shown that at least eighteen cues had to be exchanged to guarantee a sufficient amount of pictures. According to the equality rule often applied to implicitly coordinate behavior in social dilemmas (Messick, 1993), pooling (at least) six cues would be the cooperative norm. We further told participants that the experiment was a replication of an earlier study, in which we wanted to control for the actual content of the information and would give no actual information (e.g., “Actor George Clooney will be in club Odeon on Saturday night”), but cues which were described in terms of sharedness and importance. Participants received a list of 12 cues and decided which ones they reveal to their group. After that, they filled in a questionnaire, were debriefed, thanked and paid.

Independent variables

We manipulated *information sharedness* by labeling six cues as “public” (i.e., shared information) and six as “private” (i.e., unshared information). Public information came from a news ticker, which means that the other players would possess this information as well. Private information came from personal contacts and was unknown to other photographers. We manipulated *information importance* by labeling cues as either “important” or “unimportant.” Participants were told that the importance of information had been judged in an earlier experiment. Each participant

² Social motivation can be based in individual differences, like social value orientation (McClintock & Liebrand, 1988; Messick & McClintock, 1968) or it can be determined by the situation, for example through reward systems or experimental instructions. A meta-analysis (De Dreu, Weingart, & Kwon, 2000) showed that both operationalizations of social motivation are functionally equivalent for negotiation processes and outcomes. We decided to manipulate social motive, in order to increase experimental control, to obtain equal cell sizes, and to guarantee random assignment to conditions. Nevertheless, we are confident that the same pattern of results would emerge for dispositional social value orientation.

received a list with 12 pieces of information, three in each category (important public; important private; unimportant public; unimportant private).

Social motive was manipulated by an incentive. Following earlier research (e.g., Schulz & Pruitt, 1978) participants in the pro-social motive condition were told that the team with the most pictures would be rewarded with an extra prize of 30 Euro (approx. 50 US\$) for each team member, while participants in the pro-self motive condition were told that the individual photographer who took the most pictures would be rewarded with an extra prize of 30 Euro. As participants did not actually take pictures in the course of the experiment, we randomly selected one winner and paid out the 30 Euro after the data collection was completed. We announced this in the debriefing at the end of the experiment, and everyone agreed with this procedure.

Dependent measures

We scored *provision of information* by counting how many cues from each of the four categories were pooled. Each score (the numbers of important public, important private, unimportant public and unimportant private cues) could range from zero to three. As pro-socials are motivated to help their group, the *manipulation-check* item for pro-social manipulation was “I wanted us as a team to take as many pictures as possible.” Pro-selfs are motivated to further their own success. Consequently, the manipulation-check item for pro-self motivation was “I wanted to take as many pictures as possible myself.”

Results

Manipulation checks

A multivariate analysis of variance (MANOVA) with social motivation as independent variable and the two manipulation-check items as dependent variables showed a significant overall effect, $F(2, 40) = 13.28, p < .001, \eta^2 = .40$. Pro-socials wanted more than pro-selfs their team to take many pictures ($M = 5.41, SD = 1.12$ vs. $M = 3.62, SD = 1.39$; $F[1, 41] = 19.92, p < .001, \eta^2 = .33$). Pro-selfs wanted more than pro-socials to take many pictures on their own ($M = 6.08, SD = 0.86$ vs. $M = 4.71, SD = 1.35$; $F[1, 41] = 14.31, p = .001, \eta^2 = .26$).

Descriptive statistics

Table 1 shows the means, standard deviations and intercorrelations of the measured variables and manipulated prosocialness. The strongest positive correlation is found between prosocialness and the provision of important private information.

Table 1
Means, standard deviations and intercorrelations of the dependent measures and independent variable in Experiment 1.

Variable	M	SD	1	2	3	4	5
1. Provision of important public cues	1.84	1.21	–				
2. Provision of unimportant public cues	2.30	1.10	–.05	–			
3. Provision of important private cues	0.47	0.83	.29 ^a	–.18	–		
4. Provision of unimportant private cues	1.95	1.09	–.08	–.03	–.06	–	
5. Prosocialness	0.40	0.49	.22	–.14	.53 ^b	.20	–

Prosocialness is recoded from the experimental manipulation (0 = pro-self, 1 = pro-social).

^a $p < .10$.

^b $p < .001$.

Information pooling

We submitted the numbers of important public, unimportant public, important private and unimportant private cues to a 2 (social motivation: pro-social vs. pro-self) $\times$ 2 (sharedness: public vs. private) $\times$ 2 (importance: important vs. unimportant) MANOVA with repeated measures on the last two factors. Main effects of sharedness, $F(1, 41) = 25.54, p < .001, \eta^2 = .38$, and importance, $F(1, 41) = 24.37, p < .001, \eta^2 = .37$, showed that more public ($M = 4.14, SD = 1.60$) than private ($M = 2.42, SD = 1.33$) and more unimportant ($M = 4.26, SD = 1.53$) than important information ($M = 2.30, SD = 1.66$) was revealed. An interaction, $F(1, 41) = 12.46, p = .001, \eta^2 = .23$, qualified these main effects and showed that participants were most reluctant to reveal important private information ($M = 0.47, SD = 0.83$), while they revealed similar numbers of the other three types of cues ($M = 1.84, SD = 1.21$; $M = 2.30, SD = 1.10$; and $M = 1.95, SD = 1.09$, respectively).

As predicted in Hypothesis 1, a main effect of social motive indicated that pro-socials pooled more cues ($M = 7.53, SD = 1.94$) than pro-selfs ($M = 5.92, SD = 1.94$), $F(1, 41) = 7.06, p = .011, \eta^2 = .15$. Inspection of provision rates showed that 89.2% of the pro-socials and 69.2% of the pro-selfs contributed at least the six cues prescribed by the equality norm. Results revealed two marginally significant interactions (as predicted in Hypotheses 2 and 3), one between social motive and sharedness, $F(1, 41) = 2.97, p = .093, \eta^2 = .07$, and one between social motive and importance, $F(1, 41) = 3.04, p = .089, \eta^2 = .07$. We analyzed these trends in four follow-up *t* tests and found that pro-selfs were more reluctant than pro-socials to reveal their important private information ($M = 0.12, SD = .033$ vs. $M = 1.00, SD = 1.01, t[17.99] = 3.34, p = .004$, Cohen's $d = 1.04$). Pro-selfs and pro-socials did not differ in the provision of other information. They pooled equal amounts of important public ($M = 1.62, SD = 1.27$ vs. $M = 2.18, SD = 1.08$), unimportant public ($M = 2.42, SD = 1.07$ vs. $M = 2.12, SD = 1.17$) and unimportant private information ($M = 1.77, SD = 1.14$ vs. $M = 2.24, SD = 0.97$; all $t[41] < 1.50, ns$).

Discussion

The results of Experiment 1 replicated the typical finding from information sampling studies that individuals pool more shared than unshared information (e.g., Stasser & Titus, 1987; Stasser et al., 1995). In line with our predictions, the results further showed that information pooling is a motivated process. Although the amount of information pooled was close to the amount prescribed by the equality norm, participants withheld the important private information. Thus, they made a cooperative impression by pooling information, but behaved strategically when selecting which information to pool. Overall, they pooled more public than private, and more unimportant than important information.

Social motivation also influenced information pooling. First, and as predicted in Hypothesis 1, pro-socials revealed more cues than pro-selfs. This is in line with findings from public good dilemmas in which pro-socials usually contribute a large part of their endowment (e.g., De Cremer & Van Vugt, 1999). Furthermore, we predicted that social motive would interact with the two information characteristics sharedness and importance. Even though these two interactions failed to reach significance, the two trends suggest that pro-socials pooled more unshared information than pro-selfs (giving initial support to Hypothesis 2), and that they pooled more important cues than pro-selfs (giving initial support to Hypothesis 3). Our paradigm differs from a classical public good dilemma, as people can make high or low quality contributions: contributing shared or unimportant cues is less useful for the group to take a good decision than contributing unshared or important cues. Thus pro-socials do not only contribute

more to the group, their contribution is also *more useful* for the group.

Pro-selfs pooled fewer pieces of information than pro-socials. Nevertheless, the mean contribution of pro-selfs was only slightly below the six pieces of information prescribed by the equality norm. Almost 70% of the pro-selfs contributed six or more pieces of information, which can be seen as cooperative behavior, because it is in line with the prescription of the equality norm. The behavior of pro-selfs appears less cooperative when we take into consideration what information they pooled – predominantly cues that are unimportant or already shared. They thus create a cooperative impression without really contributing useful new information to the group.

A limitation of the cover story is that the task was to make many pictures of various celebrities and not to solve a problem together. Pooling less information resulted in fewer pictures or pictures of less famous celebrities, but the goal was still reached. Problem solving requires information exchange, and finding the best solution requires exchanging important unshared information. Thus, in Experiment 2 we changed the cover story and presented a murder mystery. We again tested the predictions that pro-socials would accurately reveal more cues than pro-selfs (*Hypothesis 1a*), especially unshared (*Hypothesis 2a*) and important ones (*Hypothesis 3a*).

Research in the information sampling tradition has never explicitly studied deliberate deception – that is, lying defined as “a successful or unsuccessful deliberate attempt, without forewarning, to create in another a belief which the communicator considers to be untrue” (Vrij, 2000, p. 6). Experiment 2 extended prior research by adding the option to lie. We expected that pro-selfs would use deception (De Dreu et al., 2008). By lying, they can create a cooperative impression and pretend that they pool many cues, while in fact they distort their information and thus hurt rather than help their fellow group members. Lying about public information is a less useful strategy, as the other group members can easily discover the lie. Lying about important information is especially harmful, as it misleads other members to incorrect conclusions. Individuals can actually harm the chances of their fellow group members by distorting important unshared information. We did not expect pro-socials to lie, as this would be detrimental to the group. We thus predicted that pro-selfs would lie more than pro-socials (*Hypothesis 1b*), and that they would lie about private (*Hypothesis 2b*) and about important information (*Hypothesis 3b*).

Experiment 2: secrecy, the truth and strategic lies

Method

Participants and design

A total of 129 students from Leiden University (45 males, 84 females, mean age 20.74 years, $SD = 3.12$) participated and received 3 Euro. The design was the same as in Experiment 1.

Procedure

The experiment resembled Experiment 1, except for some minor changes. Participants were told that they would be in a group with three other participants. They received 12 cues and were told that the other players also have some information about the culprits in a murder investigation. Again, participants could pool or withhold their information. Additionally, the option to *distort the information* was added. In the instructions we avoided the term “lying” in order not to create strong normative beliefs about socially desirable behavior. As an example of a distortion, we explained that someone may say the murderer was left-handed,

while their actual information was that he was right-handed. Participants were told that at least 24 cues needed to be exchanged in order to solve the mystery. Thus, again, a fair share would mean pooling six cues. After participants had indicated which information they had decided to reveal, withhold or distort, they filled in a questionnaire, were debriefed, thanked and paid.

Independent measures

Sharedness and importance of information and social motivation were manipulated as in Experiment 1. In the pro-social condition, participants were told that the groups who solved the murder mystery could win 30 Euro in a lottery. In the pro-self condition, participants were told that the individuals who solved the murder mystery could win the prize of 30 Euro. As in Experiment 1, we randomly selected a winner.

Dependent measures

Provision of information was coded in eight scores ranging from zero to three: for each of the four types of information, we calculated two scores – the *number of truthfully revealed (important/unimportant public/private) cues* and the *number of distorted (important/unimportant public/private) cues*. The *manipulation-check* items for pro-social and pro-self manipulation were “I want someone in my group to solve the murder mystery,” and “I want to solve the murder mystery myself,” respectively.

Results

Manipulation checks

A one-way MANOVA of the two manipulation checks revealed a significant effect, $F(2, 126) = 33.05$, $p < .001$, $\eta^2 = .33$. Pro-socials wanted more than pro-selfs someone in their group to solve the mystery ($M = 6.12$, $SD = 1.53$ vs. $M = 4.47$, $SD = 1.79$; $F(1, 127) = 31.83$, $p < .01$, $\eta^2 = .20$). Pro-selfs wanted more than pro-socials to solve the mystery themselves ($M = 4.47$, $SD = 1.95$ vs. $M = 2.24$, $SD = 1.63$; $F(1, 127) = 50.09$, $p < .001$, $\eta^2 = .28$).

Descriptive statistics

Table 2 shows the means, standard deviations and intercorrelations of the dependent and independent variables. Notably, manipulated prosocialness was most strongly positively correlated with revealing important private information, and strongly negatively correlated with distorting both types of private cues.

Pooling of accurate information

To test Hypotheses 1a, 2a and 3a, we submitted the numbers of truthfully revealed important public, unimportant public, important private and unimportant private information to a 2 (social motivation: pro-social vs. pro-self) $\times 2$ (sharedness: public vs. private) $\times 2$ (importance: important vs. unimportant) MANOVA with repeated measures on the last two factors.³ An interaction between sharedness and importance, $F(1, 127) = 21.48$, $p < .001$, $\eta^2 = .15$, showed that when pooling information that is already shared, participants preferred to pool important cues ($M = 2.00$, $SD = 1.33$) rather than unimportant ones ($M = 1.53$, $SD = 1.43$). When pooling their private information, however, they preferred to pool unimportant cues ($M = 1.79$, $SD = 1.39$) rather than important ones ($M = 2.00$, $SD = 1.24$).

³ An alternative approach to analyze this data would be to include accuracy of information (accurately revealed vs. distorted) as a within participant factor and analyze accurate pooling of information and distorting information in the same 3 (social motive) $\times 2$ (sharedness) $\times 2$ (importance) $\times 2$ (accuracy) ANOVA, with the last three factors being within-participants factors. This analysis yields similar results and identical conclusions.

Table 2
Means, standard deviations and intercorrelations of the dependent measures and independent variable in Experiment 2.

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Revealing important public cues	2.00	1.33	–								
2. Revealing unimportant public cues	1.53	1.43	.24 ^c	–							
3. Revealing important private cues	1.79	1.39	.30 ^c	–.25 ^c	–						
4. Revealing unimportant private cues	2.00	1.24	–.02	.20 ^b	.19 ^b	–					
5. Distorting important public cues	0.09	0.42	–.23 ^b	.17 ^b	–.27 ^c	–.09	–				
6. Distorting unimportant public cues	0.07	0.31	–.08	–.01	–.24 ^c	.00	.08	–			
7. Distorting important private cues	0.25	0.66	–.09	.00	–.44 ^d	–.05	–.05	.07	–		
8. Distorting unimportant private cues	0.24	0.62	–.19 ^b	.14	–.45 ^d	–.43 ^d	.25 ^c	.24 ^c	.22 ^b	–	
9. Prosocialness	0.52	0.50	.03	–.18 ^b	.53 ^d	.26 ^c	–.15 ^a	–.11	–.40 ^d	–.34 ^d	–

Prosocialness is recoded from the experimental manipulation (0 = pro-self, 1 = pro-social).

- ^a $p < .10$.
- ^b $p < .05$.
- ^c $p < .01$.
- ^d $p < .001$.

Social motive influenced strategic information sharing. As predicted in Hypothesis 1a, there was a main effect of social motive, $F(1, 127) = 7.74, p = .006, \eta^2 = .06$. Pro-socials ($M = 8.03, SD = 3.13$) gave more information than pro-selves ($M = 6.55, SD = 2.90$), yet both passed the threshold of six pieces of pooled information prescribed by the equality norm. The interaction between social motive and sharedness predicted in Hypothesis 2a was significant, $F(1, 127) = 32.35, p < .001, \eta^2 = .20$. Pro-socials pooled more private information than pro-selves ($M = 4.76, SD = 1.73$ vs. $M = 2.74, SD = 1.90, t[127] = 6.47, p < .001$, Cohen's $d = 1.15$), but equal numbers of public information ($M = 3.27, SD = 2.40$ vs. $M = 3.81, SD = 1.88, t[123.76] = -1.42, ns$). The interaction between social motive and importance predicted in Hypothesis 3a was significant, $F(1, 127) = 16.67, p = .005, \eta^2 = .06$. Pro-socials pooled more important cues than pro-selves ($M = 4.49, SD = 2.02$ vs. $M = 3.03, SD = 2.14, t[127] = 3.99, p < .001$, Cohen's $d = 0.71$), but did not differ on unimportant information ($M = 3.54, SD = 2.19$ vs. $M = 3.52, SD = 1.95, t[127] = 0.06, ns$).

Distorting information

To test Hypotheses 1b, 2b and 3b, we submitted the numbers of distorted cues in the four categories to the same 3 (social motivation) $\times$ 2 (sharedness) $\times$ 2 (importance) MANOVA. A main effect of sharedness, $F(1, 127) = 17.03, p < .001, \eta^2 = .12$, showed that more private than public information was distorted ($M = 0.49, SD = 1.00$ vs. $M = 0.16, SD = 0.54$). As predicted in Hypothesis 1b, a main effect of social motive, $F(1, 127) = 25.16, p < .001, \eta^2 = .17$, revealed that only pro-selves ($M = 1.16, SD = 1.51$), but not pro-socials ($M = 0.16, SD = 0.59$) distorted information. The interaction between social motive and sharedness predicted in Hypothesis 2b was significant, $F(1, 127) = 21.68, p < .001, \eta^2 = .15$. Pro-selves distorted more private cues than pro-socials ($M = 0.95, SD = 1.27$ vs. $M = 0.06, SD = 0.24, t[64.97] = 5.43, p < .001$, Cohen's $d = 0.96$), while both hardly distorted any public cues ($M = 0.21, SD = 0.58$ vs. $M = 0.10, SD = 0.50, t[120.85] = 1.11, ns$).

Discussion

The results of Experiment 2 supported our predictions about the provision of accurate information (i.e., Hypotheses 1a, 2a and 3a). Replicating the findings of Experiment 1, pro-socials revealed more cues than pro-selves. Two significant interactions between social motive and sharedness and between social motive and importance replicated the patterns that failed to reach statistical significance in Experiment 1: pro-socials pooled more unshared information and more important information than pro-selves. Results further showed that the deception is a motivated behavior as well. Pro-selves lied more than pro-socials (supporting Hypothesis 1b), especially about

private information (supporting Hypothesis 2b). Thus, if a problem solving context is given, strategic information sharing occurs depending on the social motive of the individual. Pro-socials are cooperative and pool important and unshared information. Pro-selves want to solve the murder mystery by themselves and withhold the important information. They also try to set the others on the wrong track by lying about their private information. Hypothesis 3b was not supported: pro-selves lied both about important and unimportant information.

We did not expect that people would lie about public information at all, because this should make other people suspicious of one's honesty and integrity. Surprisingly, we found that some selfish participants nevertheless incidentally did so. One may speculate that people might want to devalue other member's information by raising doubt about the validity of shared info, or they might want to create confusion. Note, however, that this was a rather infrequent observation: on average, only one out of six participants distorted one public cue. Importantly, and as expected, a significantly larger part of all lies was about private information.

A puzzling finding of Experiment 2 is that more unshared than shared information was pooled. This finding is different from the predominance of shared information that is usually observed in information sampling studies. The high number of pooled unshared information is to a large extent caused by pro-socials, who on average accurately revealed almost five of their six pieces of unshared information. Some participants stated after the experiment that their most important target was to detect the murderer and bring him or her to justice. They considered this to be far more important than the reward structure for finding the correct solution. To avoid this normative moral concern, we used a treasure hunt instead of a murder mystery in Experiment 3.

One may wonder how realistic it is to read on a label whether a cue is important or unimportant. To address this issue of external validity, we modified the paradigm in Experiment 3. In order to operationalize importance in a realistic way, we used cues that excluded either many or few potential solutions. Participants could draw their own conclusions about the importance of each cue. Furthermore, we increased the realism of the information sharing situation by giving actual information instead of labels.

In Experiments 1 and 2, we contrasted pro-social with pro-self motives. Within a pro-self motivation, however, two orientations can be distinguished: individualistic and competitive ones (Messick & McClintock, 1968). While both share a positive value for own outcomes, they differ in the outcome weight assigned to other people's outcomes: no value in the case of individualists, and a negative value in the case of competitors, who want to increase relative gain. In Experiment 3, we investigated strategic information

sharing by pro-socials, individualists and competitors and test the same set of hypotheses as in Experiment 2. We expected to replicate the findings for pro-socials. Our former predictions concerning pro-selfs hold for both individualists and competitors, as both need to make a cooperative impression in order to get information from their fellow group members. Both should be motivated to keep their information advantage, and are expected to pool mainly shared and unimportant cues. Competitors should be motivated to sabotage their fellow group members in order to outperform them and are thus expected to lie. Again, we expected that unshared and important information would be distorted.

Our paradigm focuses on the motivational processes underlying information sharing and not on the actual decision making. However, it would be interesting and important to know how motivated information pooling can affect the quality of group decisions. Therefore, we simulated group decisions by forming all possible three-person groups within each experimental condition, and counted for each group how many different pieces of information each group member would get, and how many groups would have pooled sufficient information in order to solve the task.

Experiment 3: comparing pro-social, selfish and competitive motivations

Method

Participants and design

Seventy-one students (31 males, 40 females, mean age 21.24 years, $SD = 5.60$) from the VU University Amsterdam participated and received 3 Euro. In a 3 (social motivation: pro-social, individualistic, competitive) $\times 2$ (sharedness: public vs. private) $\times 2$ (importance: important vs. unimportant) design, social motivation was again varied between, and sharedness and importance within participants.

Procedure

The experimental task resembled the one used in Experiment 2, except that participants allegedly played in three-person groups and that we used a different cover story. Participants read that, centuries ago, an old monk hid a treasure in the graveyard of his monastery. To guard the information in which grave the treasure is hidden, he wrote four letters, distributing more or less important cues in each one. For example, the cue “The grave is not in the north-western part of the cemetery” excludes one quarter of all graves and is therefore more important than the cue “The monk in whose grave the treasure is hidden did not die in 1674,” which excludes only four graves. In order to find the grave it would be necessary to combine information from those letters. The story went on that the monastery was recently bought by an investment company, and that one such letter was found in the library. The investment company published this letter (i.e., the information from this letter became public), and asked people who possessed the remaining letters to come together and find the treasure. Participants read that they had bought such a letter at a flea market, and would meet the owners of the remaining two unpublished letters. They indicated which information they had decided to reveal, withhold or distort, answered some questions, were debriefed, thanked and paid.

Independent measures

We manipulated sharedness by the source of the information: public information came, according to the cover story, from the published letter, and private information came from the participant's own letter. Importance of the information was manipulated by indicating how many graves each cue excludes. This number

was four for unimportant information, or 64 for important information. Again, there were three cues in every category. Following earlier research (e.g., O'Connor & Carnevale, 1997), social motivation was manipulated via instructions related to the cover story. In the *pro-social* condition, participants read that the investment company would give a reward of 10,000 Euro to each group member if anyone in the group found the treasure. In the *competitive* condition, participants read that only the first group member who found the treasure would get the reward. In the *individualistic* condition, participants read that everyone who found the treasure would get the reward, no matter whether they were the first in their group or not.

Dependent measures

Provision of information was scored as in Experiment 2. Participants answered three *manipulation-check* items for social motivation: “I want someone in my group to find the treasure” (pro-social motivation), “I want to find the treasure myself” (individualistic motivation) and “I wanted to be the first one to find the treasure” (competitive motivation). In order to check the manipulation of importance, we randomly selected one cue out of every category and asked how important it was (1 = *completely unimportant*; 7 = *very important*).

Results

Manipulation checks

A MANOVA of the three manipulation-check items for social motivation revealed a significant effect, $F(6, 134) = 8.66$, $p < .001$, $\eta^2 = .28$. Pro-socials wanted more that someone in their group found the treasure ($M = 6.37$, $SD = 1.25$) than did individualists ($M = 4.12$, $SD = 1.51$) or competitors ($M = 4.26$, $SD = 1.91$; the latter two did not differ according to Duncan test), $F(2, 68) = 15.31$, $p < .001$, $\eta^2 = .31$. Pro-socials were further less motivated to find the treasure themselves ($M = 4.96$, $SD = 1.81$) than individualists ($M = 6.58$, $SD = 0.83$) or competitors ($M = 6.48$, $SD = 0.73$; the latter two did not differ according to Duncan test), $F(2, 68) = 13.09$, $p < .001$, $\eta^2 = .28$. Finally, pro-socials also agreed less with the competitive statement ($M = 4.54$, $SD = 2.02$) than did individualists ($M = 5.58$, $SD = 1.87$) or competitors ($M = 6.52$, $SD = 0.59$), $F(2, 68) = 8.55$, $p < .001$, $\eta^2 = .20$. Importantly, a follow-up t test showed that competitors agreed more with the competitive statement than did individualists, $t(27.68) = 2.32$, $p = .028$, Cohen's $d = 0.69$. Both individualists and competitors assign positive weight to their own outcomes, they only differ in the weight they assign to the outcome of the interaction partner. Individualists do not care about the other, while competitors assign a negative weight to the other's outcome. Thus, the manipulation of social motive was successful.

In order to check the manipulation of importance, we computed one-sample t tests to find out whether the four importance ratings differed from the scale midpoint. Both cues that excluded 64 graves were rated significantly higher than 4.00 ($M = 6.16$, $SD = 0.88$, $t[73] = 21.23$, $p < .001$, Cohen's $d = 4.97$, and $M = 5.92$, $SD = 1.11$, $t[73] = 14.91$, $p < .001$, Cohen's $d = 3.49$). Both cues that excluded four graves were rated significantly below 4.00 ($M = 2.95$, $SD = 1.59$, $t[73] = -5.72$, $p < .001$, Cohen's $d = -1.34$, and $M = 3.16$, $SD = 1.78$, $t[73] = -4.04$, $p < .001$, Cohen's $d = -0.95$).

Descriptive statistics

Table 3 shows the means, standard deviations and intercorrelations of the measured variables and the manipulation of social motive. Like in Experiment 2, prosocialness (i.e., the contrast between pro-socials on the one hand and individualist and competitors on the other hand) was most strongly positively correlated with revealing important private information. Competitiveness (i.e.,

Table 3
Means, standard deviations and intercorrelations of the dependent measures and the (dummy-coded) independent variable in Experiment 3.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Revealing important public cues	1.96	1.35	–									
2. Revealing unimportant public cues	2.38	1.03	.21 ^a	–								
3. Revealing important private cues	1.01	1.18	.36 ^c	–.26 ^b	–							
4. Revealing unimportant private cues	1.83	1.17	.05	.57 ^d	–.03	–						
5. Distorting important public cues	0.25	0.58	–.56 ^d	.08	–.30 ^b	.17	–					
6. Distorting unimportant public cues	0.17	0.51	–.37 ^c	–.40 ^c	–.05	–.22 ^a	.05	–				
7. Distorting important private cues	0.62	0.78	–.06	.09	–.41 ^d	.07	.25 ^b	–.02	–			
8. Distorting unimportant private cues	0.44	0.75	–.25 ^b	–.13	–.24 ^b	–.45 ^d	.04	.48 ^d	–.15	–		
9. Prosocialness	0.34	0.48	.25 ^b	–.26 ^b	.50 ^d	.01	–.27 ^b	–.00	–.18	–.26 ^b	–	
10. Competitiveness	0.32	0.47	–.13	.32 ^c	–.39 ^c	.04	.05	–.09	.02	.18	–.50 ^d	–

Prosocialness is recoded from the manipulation (1 = pro-social; the other two conditions are coded as 0). Competitiveness is similarly recoded (1 = competitive; the other two conditions are coded as 0).

- ^a $p < .10$.
- ^b $p < .05$.
- ^c $p < .01$.
- ^d $p < .001$.

the contrast between competitors and the other two groups) was most strongly negatively correlated with revealing important private information.

Pooling of accurate information

We submitted the numbers of accurately pooled important public, unimportant public, important private and unimportant private cues to a 3 (social motivation: pro-social, individualistic, competitive) $\times$ 2 (sharedness: public vs. private) $\times$ 2 (importance: important vs. unimportant) MANOVA with repeated measures on the last two factors. A main effect of sharedness, $F(1, 68) = 43.58$, $p < .001$, $\eta^2 = .39$, showed that more public than private information was pooled ($M = 4.34$, $SD = 1.86$ vs. $M = 2.85$, $SD = 1.64$). A main effect of importance, $F(1, 68) = 17.52$, $p < .001$, $\eta^2 = .21$, showed that participants pooled more unimportant than important cues ($M = 4.21$, $SD = 1.96$ vs. $M = 2.97$, $SD = 2.08$). An interaction between sharedness and importance, $F(1, 68) = 5.07$, $p = .028$, $\eta^2 = .07$, suggested that when pooling public information, participants contributed more important cues ($M = 2.38$, $SD = 1.03$) than unimportant ones ($M = 1.96$, $SD = 1.53$). When pooling their private information, however, they contributed more unimportant cues ($M = 1.83$, $SD = 1.17$) than important ones ($M = 1.01$, $SD = 1.18$). Pro-socials gave more information ($M = 8.05$, $SD = 3.25$) than individualists ($M = 6.71$, $SD = 3.09$) and competitors ($M = 6.78$, $SD = 1.95$), but the effect of social motive was not significant, $F(2, 68) = 1.67$, $p = .20$, $\eta^2 = .05$. Note that in all conditions, participants pooled on average more than the six cues prescribed by the equality norm. Social motive interacted with information characteristics. As predicted in Hypothesis 2a, an interaction between social motive and sharedness, $F(2, 68) = 4.74$, $p = .012$, $\eta^2 = .12$, showed that pro-socials gave more private information than individualists or competitors ($M = 3.71$, $SD = 1.83$ vs. $M = 2.58$, $SD = 1.50$ and $M = 2.22$, $SD = 1.17$), while they did not differ in the provision of shared information ($M = 4.33$, $SD = 2.12$, $M = 4.13$, $SD = 1.90$ and $M = 4.57$, $SD = 1.56$). As predicted in Hypothesis 3a, an interaction between social motive and importance, $F(2, 68) = 4.74$, $p = .012$, $\eta^2 = .12$, showed that pro-socials gave more important cues than individualists or competitors ($M = 4.29$, $SD = 1.81$ vs. $M = 2.58$, $SD = 1.50$ and $M = 2.00$, $SD = 1.48$), while they did not differ in the provision of unimportant cues ($M = 3.75$, $SD = 2.36$, $M = 4.13$, $SD = 1.99$ and $M = 4.78$, $SD = 1.28$).

Distorting information

We submitted the numbers of distorted cues in the four categories to the same 3 (social motivation) $\times$ 2 (sharedness) $\times$ 2 (importance) MANOVA. A main effect of sharedness, $F(1, 68) = 28.97$, $p < .001$, $\eta^2 = .30$, showed that more private than public informa-

tion was distorted ($M = 1.06$, $SD = 1.00$ vs. $M = 0.42$, $SD = 0.79$). As predicted in Hypothesis 1b, a main effect of social motive, $F(2, 68) = 3.53$, $p = .035$, $\eta^2 = .09$, showed that pro-socials differed from individualists. They distorted fewer pieces of information ($M = 0.88$, $SD = 1.36$) than individualists ($M = 1.96$, $SD = 1.71$). Competitors ($M = 1.61$, $SD = 1.20$) did not differ from the other groups. Social motive did not interact with information characteristics.

Information possession in simulated groups

In order to investigate how motivated information pooling can affect the distribution of information, we artificially formed all possible three-person groups within the three experimental conditions. The 24 participants in the pro-social condition can be combined into 2024 different three-person groups; the 24 participants in the individualistic condition can also form 2024 groups; and the 23 participants in the competitive condition can form 1771 different groups. We counted within each possible group how many cues each member would possess after all group members have pooled their cues. Remember that members were told that they would play in three-person groups, and that 18 cues were necessary to find the treasure. Initially, each member possesses six unshared cues and six shared cues. We counted each unshared cue that was accurately pooled as one contribution to the group's pool of information. Each unshared cues that was distorted was counted as a contribution of minus one to the group's pool of information. Each lie therefore diminished the number of information available to the other group members by one, while the distorted cue was counted as one valuable piece of information for the group member who has distorted it (in other words: lies only harm the other group members, not the liar). We did not count shared cues, because this information is known to each group member no matter whether it is pooled or not. Within each possible group, we computed the amount of information that each group member possesses as the sum of information that was pooled by all members, plus this particular group member's private information that was not pooled, plus the six shared cues.

To get an indication of how successful groups would share information, we first counted in each possible group how much information the most well-informed group member would have after information pooling. It appeared that the best-informed member of pro-social groups possessed more information ($M = 20.11$, $SD = 3.01$) than the best-informed member of individualistic groups ($M = 16.55$, $SD = 2.49$), who, in turn, possessed more information than the best-informed member of competitive groups ($M = 15.70$, $SD = 2.14$). Secondly, we counted how many group members would possess at least the eighteen cues that we had indicated as a threshold to solve the task in the instructions. [Table 4](#)

displays how many group members would possess sufficient information. The most striking result is that in the vast majority of individualistic groups (64.6%) and of competitive groups (79.4%) not a single group member would succeed, while this occurred in less than every fifth pro-social group (19.3%).

Discussion

The results of Experiment 3 again showed that information pooling is a motivated process. Concerning the provision of accurate information, we again found support for our prediction that social motive interacts with information sharedness (Hypotheses 2a) and importance (Hypothesis 3a): Pro-social participants pooled much of their unshared and important information, while individualists and competitors pooled predominantly shared and unimportant information. Like in Experiment 2, the moderating effects of social motive – which were only marginally significant in Experiment 1 – became more pronounced. With the option to lie being present, pro-selfs distorted some information and contributed mainly shared and unimportant information, while pro-socials revealed even more accurate information in Experiments 2 and 3 than in Experiment 1.

In contrast to the first two experiments, the main effect of social motive on accurate information pooling failed to reach statistical significance in Experiment 3. Nevertheless, the pattern of means was in the expected direction.

Social motive did influence deceptive behavior in Experiment 3 (thus supporting Hypothesis 1b): pro-socials distorted fewer cues than individualists. Interestingly, both individualists and competitors distorted unshared information and thus misled their fellow group members. Also, they did not differ from each other in this respect. Furthermore, they distorted important and unimportant information. Two explanations come to mind. First, the overall level of lying was low, making it difficult to detect differences between conditions. Second, in hindsight it is not astonishing that pro-selfs distorted both important and unimportant cues, as both serves to confuse the fellow players: a distorted unimportant cue can look like an important cue – imagine that an unimportant cue like “The monk was born *before* 1750” could be distorted to “The monk was born *in* 1750.”

Unlike in Experiments 1 and 2, where we labeled each cue as either important or unimportant, in Experiment 3, we operationalized importance as the number of solutions that a cue excluded. Participants found cues which exclude few options less important than cues that exclude many options. This increases our confidence in the results related to the role of importance: pro-selfs conceal or distort cues that would help the group to find the correct solution.

General discussion

In three experiments, we have demonstrated strategic aspects of information pooling. Although information is not lost when pooled, people do not give away all the information they have.

Table 4
Numbers of group members with sufficient information depending on social motive.

Number of group members with sufficient information	Social motive					
	Pro-social		Individualistic		Competitive	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
0	390	19.3	1307	64.6	1406	79.4
1	150	7.4	490	24.2	312	17.6
2	840	41.5	159	7.9	30	1.7
3	644	31.8	68	3.4	23	1.3
Total	2024	100.0	2024	100.0	1771	100.0

As in classical public good dilemmas, most people adhered to the implicit equality norm induced by the threshold and pooled an appropriate amount of information (e.g., [Messick, 1993](#)). However, a closer look shows that they kept the important unshared information to themselves.

Consistent results across three experiments provided evidence that social motivation influences strategic information sharing. As predicted, social motivation did not only affect how much information was pooled, but also what kind of information people accurately gave to the group (Experiments 1–3), and what kind of information they lied about (Experiments 2 and 3). We found that participants consider information sharedness as well as importance. Selfish people withhold unshared information (see also [Toma & Butera, 2009](#)) and pool mainly unimportant information. Our findings furthermore show that they even go “one step further” and deliberately distort information. Nevertheless, they tried to make a cooperative impression by pooling (almost) enough information to pass the threshold induced by the equality norm. Pro-social people pooled private and important information.

Theoretical and practical implications

The current findings have interesting implications for the literature on social dilemmas as well as for research on group information sharing. As to the former, the finding that pro-selfs gave more information than the equality norm prescribed shows that pro-selfs can be induced to adhere to a cooperative group norm when it is in their interest. This is similar to the case of tit-for-tat strategies, in which pro-selfs can also be induced to cooperate, but only for the strategic reason of increasing their personal outcome through cooperation. Furthermore, our results reveal pro-selfs as strategic impression managers: of all the behaviors which would make a cooperative impression (like contributing all important or all unshared information), they selected the behavior that is actually the least cooperative (contributing predominantly shared and unimportant information). In Experiments 1 and 2, pro-socials accurately pooled more information than pro-selfs did, replicating a common finding in social dilemmas: pro-socials care for the group's outcome, thus they give more coins to the group instead of their private endowment ([Kollock, 1998](#); [Utz, Ouwkerk, & Van Lange, 2004](#)). It is interesting that this effect also emerges in the present setting, in which cues are not lost, but remain in an individual's possession once pooled.

In information sharing settings, groups usually pool mainly shared information ([Stasser & Titus, 1987](#); [Stasser et al., 1995](#)), especially when competitive incentives are present ([Toma & Butera, 2009](#)). As participants do not know beforehand which information is shared the sampling bias can simply be explained by a statistical model. The present research shows that people pool shared cues even if they know that they are known to everybody. Pooling shared information can nevertheless be functional, even in hidden profile situations: by doing so, group members can confirming the validity of each other's information, which in turn promotes trust in one another's inputs and fosters relationships and information exchange ([Mesmer-Magnus & DeChurch, 2009](#)). Thereby, pooling shared information indirectly benefits group decision-making.

The finding that social motivation influences information sharing provides empirical support for the MIP-G model ([De Dreu et al., 2008](#)). Strategic withholding of unshared information and the sharing of unimportant rather than important information occurred more often under a pro-self than under a pro-social motivation. This is an important contribution to the group decision-making literature, as it shows that pro-selfs deliberately withhold information they know would be important to their group, while pro-selfs pool shared information in order to appear cooperative. Thus, pro-selfs “abuse” the socio-emotional function of pooling shared information.

Besides the role of social motivation, the MIP-G model (De Dreu et al., 2008) also describes the role of epistemic motivation in group information processing. Epistemic motivation refers to the depth of information processing. We did not provide our respondents with actual information, and examined only the individual level processes of strategic information pooling. Therefore, we did not focus on epistemic motivation. Epistemic motivation plays a crucial role once individuals in groups have to integrate information into a decision and once arguments have to be processed. Future research into the role of epistemic motivation in group decision-making may make use of an adapted version of our information pooling game – for example, players may get the chance to contribute information in multiple rounds. Epistemic motivation should then determine whether a player is satisfied with the information obtained from other players in the first round, or wants to exchange more cues in a successive round.

Earlier studies on group decision-making have not explicitly focused on deception. The present study is therefore the first one that investigates the motives for lying in group information sharing. Empirical deception research has largely focused on dyadic interactions and has applied game theoretic approaches (e.g., Boles, Croson, & Murnighan, 2000; Koning, Van Dijk, Van Beest, & Steinel, 2010; Moran & Schweitzer, 2008; Steinel & De Dreu, 2004; Tenbrunsel, 1998) or a negotiation paradigm (e.g., O'Connor & Carnevale, 1997; Olekalns & Smith, 2009; Schweitzer & Croson, 1999). A common finding is that the goal of liars is to appear honest or fair, while at the same time, lying helps them to actually increase their outcomes at the expense of their counterpart. The current study extends this research into the field of group decision-making, and reveals the same tendency in a multiparty setting. This is interesting, as we may assume that the social pressure to appear fair is stronger in multiparty settings than in dyadic interactions.

Another contribution to deception research is the focus on content aspects of deception: the topics of deception in prior studies were typically the exchange value of chips in ultimatum games, the value of outside options, or the preferences within negotiated issues. The current study paints a more fine-grained picture of the strategic use of deception, because it shows that selfish individuals strategically select *which* information to lie about: pro-selfs withheld or lied about important and private information although they knew of the relevance of this information to the group. Interestingly, this behavior was found not only under competitive, but also under individualistic motivation. People thus showed these counterproductive behaviors irrespective of whether they solely tried to further their own outcomes, or whether they wanted to hurt other people's outcomes. These findings have important practical implications, as they can explain why so many knowledge management initiatives in organizations fail. Selfish motivations in group decision-making make people reluctant to pool all their information. When motivated to keep their information advantage, people withhold their private and important information in particular.

It should be noted that lying levels were rather low. This is an interesting result in itself. It is plausible that people prefer to withhold information rather than to lie about information also in ongoing group interactions in organizational contexts. Being identified as a liar has more negative consequences for the future career than “forgetting” to mention a piece of information.

Our results also address the role of reward structures in group decision-making tasks. We have manipulated social motive through a group-based (i.e., pro-social) or individual-based (i.e., pro-self) reward system (see Footnote 2). We explored in Experiment 3 how these reward systems and, ensuing from them, participants' willingness to reveal, withhold or distort different pieces of information may relate to outcomes. To reach the goal of finding

one correct solution in a problem solving task, like in our example of a hidden treasure, at least one group member needs to acquire enough information. It should thus depend on the most well-informed group member whether the correct solution is found or not. Notably, our exploratory analysis suggests that under a group-based reward system, the number of cues that the most well-informed group member possessed was on average more than one standard deviation higher than the respective number in individualistic groups, and almost two standard deviations higher than in competitive groups.

We counted in how many groups at least one member would possess more information than the threshold allegedly needed to solve the task. Again, the group-based reward system leads to a much higher success rate. Less than one out of five cooperative three-person groups would fail to pool sufficient information for at least one member to find the correct solution. Under an individual or a competitive reward system, however, in the vast majority of groups not a single member would possess enough information. The results of these simulated groups should be interpreted with caution: we did not differentiate between important and unimportant cues, and arbitrarily assigned distorted information a score of –1. Nevertheless, this exploratory analysis indicates that reward structure might play an important role in real group discussions.

A new paradigm: the information pooling game

The present research contributes to the domain of information sampling by introducing a new paradigm that allows studying motivated information sharing. In the traditional information sampling paradigm, it is difficult to disentangle biased processing from deliberately withholding information. In our information pooling game, withholding important information can only be caused by a selfish motivation, but not by cognitive biases. By contrasting the quality and quantity of information pooled, the paradigm can differentiate between actual cooperation and making a cooperative impression. The paradigm can easily be adapted to different contexts by changing the cover story or the group size. The distribution of information can also be varied to examine information sharing behavior in asymmetric settings, i.e. with players initially possessing more or less critical information. Criticality or perceived self-efficacy are important predictors of cooperation in social dilemmas (Chen, Au, & Komorita, 1996; De Cremer & Van Dijk, 2009; Kerr, 1992; Rapoport, 1988) and could also play a role in information sharing. Future research might further use the information pooling game to investigate the effects of a broad scope of variables on motivated information pooling, like for example status, power, norms, or emotions.

For decision-making in natural groups, information importance matters, not sharedness

Classical information sampling studies used hidden profile situations. These are exceptional situations, in which unshared information hints at a correct solution, while shared information misleads the group to assume that a different solution is correct. The question remains how valid these artificial hidden profile situations are for decision-making in natural groups. In our paradigm, it does not matter whether the information is distributed as a hidden profile or not. More importantly, the new paradigm does not only focus on sharedness, but also on the importance of information. Importance is the crucial aspect of information in group discussions: after all, it does not matter whether natural decision-making groups discuss shared or unshared information, as long as the *important* information is pooled and discussed. Prior studies in the information sharing paradigm did not investigate the role of cue importance.

Furthermore, the process of information exchange may influence people's estimation of cue importance: shared information is more frequently discussed and socially validated, and may thus be perceived as more accurate and valuable. Ample research has shown that repetition increases confidence that information is true and valuable (e.g., Hertwig, Gigerenzer, & Hoffrage, 1997). Studying the role of cue importance in real group discussions is thus difficult. The new paradigm, which focuses only on information pooling and not on the actual discussion, avoids these problems, as cue importance is manipulated independent of its content. It thus contributes to group decision-making research by showing the strategic effects of revealing, withholding or falsifying information based on its importance.

Strengths and limitations

Strength of the current set of studies is that we find consistent results across three experiments. Although the amount of information sharing varies depending on the cover story, the basic pattern that selfish individuals withhold their important unshared information remained stable across all three studies, strengthening the generalizability of the current findings.

The information pooling game allowed us to investigate which kind of information people accurately pool, withhold or falsify. This highly controlled setting is obviously a more artificial setting than most real life group decision-making situations. We therefore get a clear picture how social motive and information characteristics affect people's willingness to reveal different pieces of information at the onset of a group discussion. Of course we do not exclude the possibility that people would reveal more information during the course of a group interaction than at the onset of a discussion. The ecological validity of our results for real group discussions might therefore be limited. However, our aim was to study the motivational processes underlying information sharing and not so much actual information sharing in an ongoing discussion. Moreover, more and more team decisions are made in virtual teams, and information sharing via a group decision support system bears some similarities with the current paradigm. Future research should focus on the question how the motivation to strategically share information affects actual group interaction. Our results show clearly that motivation influences the willingness to initially share information.

The request to indicate whether an item would be distorted made lying very easy, and might also have placed a demand on participants to do so. Therefore, we do not know whether pro-social and pro-self participants would differ in their voluntary use of deception. Furthermore, we do not know when group members choose to lie about their information without being asked whether they wish to do so, and how they would do this in a more naturalistic setting.

The use of student samples may be seen as a limitation of the current set of experiments. However, studies within the traditional information sampling paradigm did not find consistent differences between student groups and groups of professionals (e.g., Larson, Christensen, Franz, & Abbott, 1998). Although they may differ on some factors, we thus do not expect that this would affect the influence of social motivation on information sharing in a highly controlled experimental paradigm – we would rather expect that these effects would only be amplified in real groups working on important problems as compared to our experimental setting.

Conclusions

Information sharing in groups has long been seen as a cooperative process. Nevertheless, groups regularly fail to pool enough unshared information. In line with recent theorizing (De Dreu et al.,

2008), we argue that information sharing is a mixed-motive conflict setting. Depending on social motivation, people strategically decide whether to do the good, the bad or the ugly thing with their information. On the one hand, pro-social motives trigger good behavior: pro-socials reveal their unshared information, and contribute important information to the group decision. Selfish motives, on the other hand, instigate bad (concealing) and ugly (lying) behavior. Pro-selves withhold or distort their private information. Additionally, they deliberately withhold or falsify information that would be important for the group to know.

Rather than giving practical advice, the purpose of the present set of experiments was to develop and test a theory of how social motivation influences the strategic disclosure, withholding, or falsification of important and unimportant, shared and unshared information. Nevertheless, our findings yield a clear advice to decision-making groups: in order to get the important information “on the table,” stress cooperative aspects of the task, and eliminate selfish motives as much as possible!

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