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This article expands the view of groups as information processors into a motivated information processing in groups (MIP-G) model by emphasizing, first, the mixed-motive structure of many group tasks and, second, the idea that individuals engage in more or less deliberate information search and processing. The MIP-G model postulates that social motivation drives the kind of information group members attend to, encode, and retrieve and that epistemic motivation drives the degree to which new information is sought and attended to, encoded, and retrieved. Social motivation and epistemic motivation are expected to influence, alone and in combination, generating problem solutions, disseminating information, and negotiating joint decisions. The MIP-G model integrates the influence of many individual and situational differences and combines insight on human thinking with group-level interaction process and decision making.

Keywords: *group decision making; motivation; information processing; dual-process models; interdependency theory*

Many decisions are made in groups. Political action is the result of decisions made by groups of politicians and advisors, international dispute resolution involves teams of negotiators, and top management teams jointly decide on business strategies affecting the lives of numerous employees and customers. But even many more mundane decisions are the result of group processes. Where families spend their vacation, what marketing strategy a cross-functional product team proposes to upper management, how to allocate charity donations to a series of good causes, and what type of party to organize for a retiring colleague are all examples of several people working together to reach a group decision.

Sometimes these group decisions are of excellent quality and move the group and the larger collective forward. Groups may, for example, reach an understanding or solve a problem that none of their members could have done alone (e.g., Fraidin, 2004; Laughlin, Hatch, Silver, & Boh, 2006). Sometimes group members develop stronger motivation and perform better in the presence of other group members than they would have done in pure isolation (Hertel, Kerr, & Messé, 2000; Michaelsen, Watson, & Black, 1989; Tindale & Larson, 1992). And sometimes groups in organizations develop innovations that supersede the creativity level of individual group members, thereby affecting the profitability and survival chances of entire organizations (e.g., Hambrick & Mason, 1984; West & Anderson, 1996).

Unfortunately, and despite the preceding examples, group decisions are often suboptimal either in the eyes of group members themselves or by some normative standard (Kerr & Tindale, 2003). Examples include the decision-making processes preceding the 1986 Challenger space shuttle disaster (Aldag & Fuller, 1993), the Vietnam war

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(Staw & Ross, 1989), the overspending on prestigious real estate development (Brockner & Rubin, 1985), and the way the Carter Administration dealt with the Iranian hostage crisis (Tetlock, Peterson, McGuire, Chang, & Feld, 1992). Indeed, groups often suffer process losses (Steiner, 1972) and appear to be less creative than individuals (Diehl & Stroebe, 1987), process information in a confirmatory rather than diagnostic manner (Schulz-Hardt, Frey, Luthgens, & Moscovici, 2000), and underestimate their own vulnerability and fallibility (Janis & Mann, 1977).

Psychological models of group judgment and decision making tend to be primarily cognitive or motivational in their orientation. This is well illustrated in the classic explanations for group polarization—the tendency for group members to shift to more extreme positions after group discussion—which either rely on a cognitive perspective using persuasive arguments theory or on a motivational perspective using social comparison theory (Burnstein & Vinokur, 1977; Isenberg, 1986; Sanders & Baron, 1977). Likewise, how predecision preferences combine into a joint decision (e.g., Davis, 1973) and how cognitive heuristics and suboptimal dissemination of information affect the quality of group decisions (Kerr, MacCoun, & Kramer, 1998; Stasser & Titus, 1985) have predominantly (though not exclusively) been studied from a cognitive, information combination perspective (Tindale & Kameda, 2000). In contrast, work on groupthink and defective decision making (Janis & Mann, 1977) has focused on motivational and affective factors, including group members' motivation to (self-)censor and to self-enhance (e.g., Aldag & Fuller, 1993; Johnston, Driskell, & Salas, 1997). Moreover, studies of organizational teams have concentrated on motivational constructs such as team climate (West & Anderson, 1996), group affective tone (George, 1990), or personality variables such as openness to experience and agreeableness (e.g., LePine, Hollenbeck, Ilgen, & Hedlund, 1997).

The tendency to focus on either cognitive or motivational processes underlying group work and group decision making is unfortunate because "without a thorough understanding of motivation, the cognitive approach cannot explain the intricacies of human psychology" (Higgins & Kruglanski, 2000, p. 1). In their review on groups as information processors, Hinsz, Tindale, and Vollrath (1997) noted that they "are unable to discuss a number of issues related to how groups process information (e.g., emotion, motivational influences, and group development . . .). These limitations restrict our ability to consider fully the impact and implications of groups as information processors formulation, so we recommend others examine these issues further" (p. 58). Indeed, various theories concerned with interpersonal and small-group processes accord an important role to motivation (Kelley & Thibaut, 1978;

Rusbult & Van Lange, 2003) and recognize that information processing and strategic decisions are influenced by various social motives, including concern for face and fairness (e.g., Carnevale & De Dreu, 2006). Last but not least, dual-process models of persuasion, of individual judgment, and of human decision making all recognize that information processing is influenced by the epistemic motivation to ensure an understanding of the entity or issue featured in communications (Chaiken & Trope, 1999).

In this article we integrate these cognitive and motivational perspectives and propose that group judgment and decision making is a function of motivated information processing. We argue that a variety of cognitive processes including creative generation, dissemination, and integration of information are driven by two global motivations—epistemic motivation and social motivation. Epistemic motivation refers to the willingness to expend effort to achieve a thorough, rich, and accurate understanding of the world, including the group task or decision problem at hand. Social motivation is defined as the individual preference for outcome distributions between oneself and other group members and can be proself (i.e., the individual is concerned with own outcomes only) or prosocial (i.e., the individual is concerned with joint outcomes and fairness).

Social and epistemic motives capture the influence of a host of personality variables (e.g., agreeableness, need for affiliation, openness to experience, uncertainty orientation, need for cognition) and structure variables (e.g., time pressure, accountability, incentive schemes, cultural values, ambient noise). By bringing all these predictors together under the header of two global motivational forces, we intend to model group judgment and decision making in a parsimonious way and to identify core insights and new areas for research. Most important, we argue that epistemic motivation and social motivation interact to influence individual and group creative performance, the nature of information exchange and integration, and the quality of group judgment and negotiated agreement.

We begin this article with a brief review of the influential view of groups as information processors (Hinsz et al., 1997; Levine & Moreland, 1998; McGrath, 1997; Nijstad & Paulus, 2003; Tindale & Kameda, 2000; D. van Knippenberg & Schippers, 2007) and argue that this view can be extended by inclusion of motivational influences on group information processing, judgment, and decision making. After giving an outline of our motivated information-processing (MIP-G) model, we discuss the role of epistemic motivation in driving the depth of individual-level information processing as well as a host of group-level phenomena and communication processes. Then, we introduce in greater depth the concept of mixed-motive interdependence and the relevance of

considering prosocial versus proself motivation in studying group processes and outcomes. We review studies showing effects of social motives on a variety of group-level information-processing aspects, including the accuracy of and form in which information is communicated, the dissemination of shared versus unshared information, and the extent to which group members engage in persuasive bolstering or collaborative problem solving. We then go into interaction effects and discuss how individual and group information processing is influenced by the combination of epistemic motivation and social motivation. We examine implications for group judgment and decision making, and argue that the eventual effects of epistemic motivation and social motivation on the quality of group judgments and decisions depend on the specific demands of the group task. We conclude with a summary of our main conclusions and some avenues for future research.

GROUPS AS (MOTIVATED) INFORMATION PROCESSORS

Much like individuals, groups process relevant and available information to perform cognitive tasks (Hinsz et al., 1997; Laughlin & Ellis, 1986; Laughlin, VanderStoep, & Hollingshead, 1991; Von Cranach, Ochsenbein, & Valach, 1986). For example, Nijstad and Paulus (2003) argued that individual group members have resources (knowledge, skills, abilities) available to them, which are used to develop ideas, solutions, preferences, judgments, and the like. Group members can contribute these ideas, solutions, and preferences to the group information-processing space (e.g., during discussion; cf. Hinsz et al., 1997). Once contributed, information in principle is available to other group members, and the information is added to the individual group member's knowledge base. The new information can subsequently be processed and can lead to a shift in preferences, new ideas, or a new argument. The information that is shared during group discussion (and was held in common before the discussion) and the way the different contributions are combined affect the group response. The contributions of individuals need to be combined to produce a coherent, feasible, sensible, and, if needed, creative group judgment or decision, reflecting group-level information processing.

This view of groups as information processors extends methodological and theoretical developments in cognitive psychology to research in group judgment and decision making. The processing of information in groups involves activities that occur within as well as among the minds of group members (Ickes & Gonzalez, 1994). Thus, individual information processing is integrated with communication, reflecting group-level information processing (Bales,

1958; Kaplan & Miller, 1987; D. van Knippenberg, De Dreu, & Homan, 2004). Moreover, group members may differ in the information they possess, in the ideas that are most accessible, and in their preferences for certain decision alternatives. An important aspect of group judgment and decision making is how group members combine these various resources and preferences to come up with a decision. Through communication, group members can develop new insights and reach a shared understanding of the task, resolve differences, and come up with a high-quality solution.

Conceptualizing groups as information processors has greatly advanced our understanding of group judgment and decision making. This notwithstanding, the approach can be extended in several ways. First, group decision-making research and theory can be enriched by explicitly considering the fact that people can and will choose among a shallow and heuristic versus a deep and deliberate information search-and-processing strategy. Building on dual-process models (Chaiken & Trope, 1999) and lay epistemic theory (Kruglanski, 1989; Kruglanski & Webster, 1996), we argue that group decision-making theory benefits from closer attention to epistemic motivation because it affects the depth of individual- and group-level information processing. Second, we argue that group decision-making research and theory can be enriched by systematically considering the mixture of cooperative and competitive incentives people have when working in groups. Based on interdependence theory (Kelley & Thibaut, 1978), we argue that group decision-making theory benefits from closer attention to social motivation because it drives the kind of information that is processed at both the individual and the group levels of analysis. Third, and finally, we argue that epistemic motivation interacts with social motivation in predicting the quality of group judgment and decision making.

Within the MIP-G model, social motivation and epistemic motivation are conceptualized as distinct and orthogonal factors. In theory, someone who is unwilling to expend effort to achieve a thorough, rich, and accurate understanding of the group situation (i.e., low epistemic motivation) is equally likely to be primarily concerned with self-interests and to ignore others' needs, interests, and beliefs (i.e., a proself motivation) or to be primarily concerned with collective welfare and joint success (i.e., a prosocial motivation). The same holds in principle for someone with high epistemic motivation—he or she may have a proself or a prosocial motivation and thus be more or less concerned with personal goals or with group goals and harmony. Thus, it is conceptually difficult to maintain that some levels of epistemic motivation necessarily covary with a particular social motive (De Dreu, 2006). Furthermore, some evidence is available that supports the
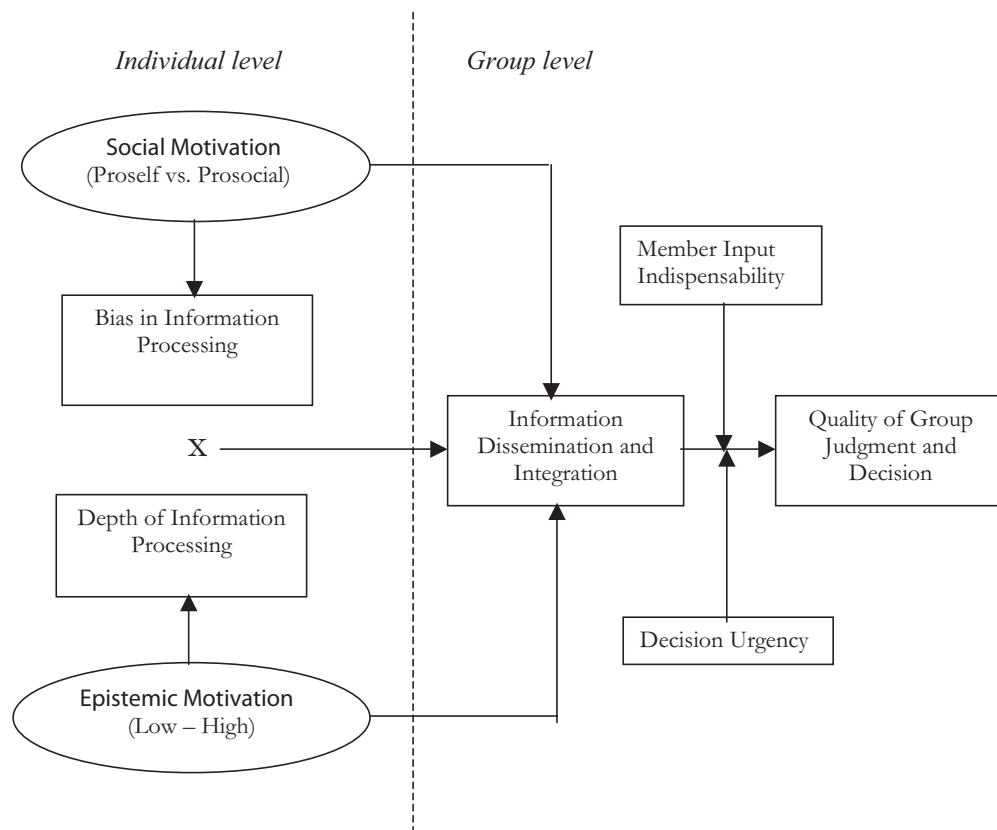
Figure 1   A heuristic overview of the motivated information processing in groups (MIP-G) model.

independence assumption: In three large student samples, De Dreu, Koole, and Oldersma (1999) found small and nonsignificant correlations between people's social motivation (i.e., inclination to cooperate) and their epistemic motivation (i.e., need for closure, need for cognition; see also the following discussion).[1]

The way epistemic motivation and social motivation alone and in combination affect group judgment and decision making is shown in Figure 1, which makes a distinction between individual-level and group-level information processing. As can be seen, the individual's epistemic motivation influences the extent to which new information is searched and generated and how deep and deliberately this information is processed. Second, the individual's proself versus prosocial motivation biases the type of information that someone looks for, generates, and processes. This notion suggests that individuals with a prosocial motivation are more likely to search, encode, and retrieve information consistent with and conducive to group rather than personal goals, and with preserving harmony. Individuals with a proself motivation are more likely to search, encode, and retrieve information conducive to personal goals.

At the individual level of analysis, the preceding discussion suggests that the biasing effect of social motivation is amplified by epistemic motivation in that higher levels of epistemic motivation lead to a more thorough and deliberate processing of the set of information that is inherently biased because of the individual's proself or prosocial motivation. Furthermore, and consistent with the general view of groups as information processors, Figure 1 shows that the resulting information is contributed to the group information-processing space where it is disseminated, exchanged, and integrated. Thus, because of the interaction between social motivation and epistemic motivation, the information individual group members contribute to the group information-processing space is inherently biased (because of member's social motivation), and the consequences of this bias for judgment and decision making may be more or less severe (because of member's epistemic motivation).

Our MIP-G model assumes that, at the group level of analysis, epistemic motivation influences the depth and thoroughness with which information is disseminated and combined. Our model also proposes that group-level information processing is influenced by

social motivation. In the following sections, we review evidence that groups with prosocially motivated members are more likely to exchange accurate information about task-relevant options and decision alternatives. Proself-motivated group members are, in contrast, more likely to promote personal goals and preferences through deception, strategic withholding of information, and "spinning" of information conducive to personal preferences. On the other hand, prosocial motivation may lead to a bias in information processing as well, when groups focus on maintaining harmony and consensus rather than focus on reaching a high-quality decision.

Whether and how information dissemination and integration affect the quality of a group judgment or decision depends, to a large extent, on the nature of two critical features of the group task—decision urgency and member input indispensability. Sometimes groups face emergency situations that require fast decision making (e.g., what surgery is needed in an emergency operating room, how to counter a surprise attack in a war situation). In such cases, high epistemic motivation with its concomitant deep, deliberate, and extensive processing and dissemination of information may not be conducive to quality decision making. However, as we argue later, in urgency situations prosocial motivation is actually conducive because it tends to foster task cohesion and smooth coordination (cf. Tschan et al., 2006; Zacarro, Gualtieri, & Minionis, 1995). Also, in some group decisions individual members' inputs are more indispensable than in other situations—when the task is not algorithmic and when decisions are relatively nonroutine and well-learned principles and heuristics cannot be applied. When member input indispensability is high, deep and deliberate processing of all members' inputs, ideas, and suggestions may be more relevant to high-quality decision making than when member input is relatively dispensable (cf. Vroom & Jago, 1978). In short, whether and when social motivation and epistemic motivation increase the quality of group judgment and decision making depends on urgency and member indispensability, and this issue is discussed further toward the end of this article.

In four sections, we develop the MIP-G model in more detail. We do so by reviewing individual-level and group-level phenomena related to information processing, group judgment, and group decision making. We begin with epistemic motivation and review work on group reliance on decision heuristics, group centeredness, creative ideation, and information dissemination. We then deal with social motivation and review work on individual-level biases in information search and processing, group-level information dissemination (including advocacy, mutual enhancement, lying and deception, and spinning of information), and creative ideation. In the third section we integrate insights from the sections on epistemic motivation and social motivation to highlight possible interaction effects, and in the fourth section we discuss in greater detail the moderating influences of two critical task features—decision urgency and member input indispensability.

THE DEPTH OF INFORMATION PROCESSING: THE ROLE OF EPISTEMIC MOTIVATION

Although not explicitly recognized in the original conceptualization of groups as information processors, individuals and groups may differ in the depth with which information is searched and processed. Consistent with dual-process models of human thinking and decision making (Chaiken & Trope, 1999; E. R. Smith & DeCoster, 2000), our MIP-G model assumes that individuals may solve logical problems, evaluate new information, and make judgments through a quick, effortless, and heuristic processing of information that rests on well-learned prior associations. Alternatively, individuals may engage in more effortful, deliberate, and systematic processing that involves rule-based inferences (Chaiken, 1987; Petty & Cacioppo, 1986). Whereas the use of decision heuristics may help groups make satisfactory and relatively quick decisions most of the time, relying on generalized and simplified strategies may produce disastrous decisions some of the time. Deep and deliberate information search and processing may help groups prevent this from happening and may lead to high-quality decision making (De Dreu & Carnevale, 2003; Janis & Mann, 1977).[2]

Heuristic processing is more likely with low levels of epistemic motivation, whereas deep and deliberate processing is more likely with high levels of epistemic motivation (cf. Figure 1). Earlier we defined epistemic motivation as the willingness to expend effort to develop and hold accurate and well-informed conclusions about the world. In terms of dual-process models, epistemic motivation depends on the perceived sufficiency of the information that is already available to the decision maker, that is, the sufficiency principle (Chaiken, Liberman, & Eagly, 1989; see also Chaiken & Trope, 1999). The more decision makers perceive their current state of knowledge and information as insufficient to make a decision of satisfactory quality (i.e., actual confidence [AC] < sufficiency threshold [ST]), the more they are motivated to engage in systematic processing of decision-relevant information. When, in contrast, decision makers feel they already have the information they need to make a decision (i.e., $AC \geq ST$), epistemic needs are satisfied and there will be no additional search for and processing of new information.

In terms of lay epistemic theory (Kruglanski, 1989; Kruglanski & Webster, 1996), epistemic motivation is nondirectional in that what is looked for is a rich and

TABLE 1:   Examples of Person and Situation Antecedents to Epistemic Motivation and to Social Motivation

	Epistemic Motivation	*Social Motivation*
Person based	Need for cognition (+)	Prosocial value orientation (+)
	Need for cognitive closure (–)	Agreeableness (+)
	Openness to experience (+)	Disposition to trust (+)
		Cultural collectivism (+)
Situation based	Accountability to process (+)	Cooperative reward system (+)
	Time pressure/decision urgency (–)	Third-party instructions to cooperate (+)
	Power preponderance (–)	Prosocial norms, climate (+)
	Environmental noise (–)	Collective identity (+)
	External threat (–)	Anticipated future interaction (+)
	Preference diversity (+)	Past cooperation (+)
	Strong minorities (+)	
	Autocratic leadership (–)	

NOTE: (+), (–) higher levels produce more or less of that particular motivation, respectively; the lists are nonexhaustive and reflect empirically well-established antecedents.

accurate understanding of the world rather than a specific type of knowledge or conclusion. As such, epistemic motivation is inversely related to an individual's need for nonspecific closure, which leads to a tendency to "seize and freeze": coming to quick (rather than rich, well-developed, and accurate) conclusions and, once closure is reached, sticking to them (Kruglanski & Webster, 1996). Although the need for nonspecific closure initially implies that one is open to new ideas and information, this information will be processed relatively shallow to speed up the process. Furthermore, once a conclusion is reached (after it has "crystallized") no further information is processed. Thus, a high need for nonspecific cognitive closure is similar to low epistemic motivation, particularly after an initial opinion or conclusion has been reached.[3]

Epistemic motivation is not only (inversely) related to need for closure. The left-hand column of Table 1 gives an overview of the person and situation factors that create a negative discrepancy between AC and ST and thus trigger epistemic motivation. As can be seen, epistemic motivation is likely to be higher for those with high need for cognition (Petty & Cacioppo, 1986) and high openness to experience (McCrae & Costa, 1997). Furthermore, situational cues may influence epistemic motivation. Research suggests that epistemic motivation increases when the stakes are raised (Mayseless & Kruglanski, 1987) or when there is process accountability (Tetlock, 1992). Under process accountability, individuals expect to be observed and evaluated by others with unknown views about the process of judgment and decision making (Lerner & Tetlock, 1999; Tetlock, 1992). This leads to more information processing "to the extent that (a) suboptimal performance resulted from lack of self-critical attention to the judgmental process and (b) improvement required no special training in formal decision rules, only greater attention to the information provided" (Lerner & Tetlock,

1999, p. 263). Finally, sometimes the context lowers epistemic motivation. For example, epistemic motivation is reduced when there is a high level of ambient noise or when individuals become fatigued (for a review, see Kruglanski & Webster, 1996). Also, in outlining our MIP-G model (Figure 1) we noted that decision urgency may be a critical moderator of the way group information processing feeds into group judgments and decisions. Although we develop this possibility later, here it is important to note that decision urgency and the felt time pressures it engenders by itself may lower epistemic motivation and drive group members to rely on well-learned principles and routines (cf. De Dreu, 2003; De Grada, Kruglanski, Mannetti, & Pierro, 1999; Kruglanski & Freund, 1983).

The preceding factors reside predominantly at the individual level. However, group-level factors may also affect epistemic motivation. In particular, preference homogeneity within groups has been shown to lead to higher levels of confidence of group members in the correctness of their judgments and ideas (e.g., Schulz-Hardt, Jochims, & Frey, 2002). Groups with high agreement among their members will therefore often feel sufficiently confident in their judgments (i.e., have a high AC), which undermines epistemic motivation. On the other hand, preference heterogeneity (i.e., group members hold, a priori, different rather than the same preferences) may decrease the confidence of individual members and therefore increase epistemic motivation (Baker & Petty, 1994; Schulz-Hardt et al., 2002).

Although majority factions often prevail in group decision making (e.g., Davis, 1973; Levine, 1999), sometimes minority factions succeed in convincing a majority (e.g., Brodbeck, Kerschreiter, Mojzisch, Frey, & Schulz-Hardt, 2002; Stewart & Stasser, 1995). Even if they do not succeed in actually converting the majority to adopt their position, minority dissent has been found to stimulate divergent thinking and innovation (e.g., De Dreu & West,

2001; Gruenfeld, Thomas-Hunt, & Kim, 1998; Nemeth, 1986), reduce confirmatory information search (Schulz-Hardt et al., 2000), reduce group polarization (Isenberg, 1986), prevent groupthink (C. M. Smith, Tindale, & Dugoni, 1996), and reduce conformity (Asch, 1956). We suggest that minority dissent can have these effects because it raises epistemic motivation and therefore causes group members to abandon low-effort decision heuristics (such as "consensus implies correctness") and instead switch to elaborate and deep information processing (see also De Dreu & De Vries, 1996; Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006).

Finally, a group-level factor that may influence group members' epistemic motivation is the approach taken by the group leader. Specifically, some studies suggest that transformational leadership—leadership through an inspiring vision and intellectual stimulation of followers (Bass, 1985)—enhances group creativity (Sosik, Kahai, & Avolio, 1998) and stimulates group members to contribute ideas to the group (B. van Knippenberg & van Knippenberg, 2005). Other research suggests that autocratic and highly directive leadership approaches undermine the degree to which followers think independently and deliberately about their tasks (cf. Yukl, 2002). Although systematic research is lacking, it seems reasonable to assume that specific approaches by the group leader affect group-level epistemic motivation.

Group-Level Information Processing as a Function of Epistemic Motivation

Under high epistemic motivation, individuals suspend judgment, engage in more extensive information search, and generate multiple interpretations for known facts until their AC no longer falls below their ST, or until time and energy is depleted. Individuals with low epistemic motivation may be more likely to use cognitive heuristics in making judgments and decisions (Kruglanski, 1989; Kruglanski & Webster, 1996; Webster & Kruglanski, 1994). Epistemic motivation and concomitant tendencies to engage in more or less deep and deliberate information processing have been shown to affect person perception (Fiske, Lin, & Neuberg, 1999), attitude change (Chaiken, 1987; Petty & Cacioppo, 1986), and individual judgment and decision making (E. R. Smith & de Coster, 2000).

Group Reliance on Decision Heuristics

Growing evidence suggests that groups, like individuals, engage in more or less deep and deliberate information processing. Stasser and Birchmeier (2003) distinguished between preference-driven and information-driven group interactions (see also Hastie, Penrod, & Pennington, 1983). In preference-driven groups, members take stock of extant preferences and form a group judgment by aggregating these preferences. Preference-driven groups may

reach consensus through normative influence—the tendency to accept influence from others because of the desire to belong to and affiliate with these others (Deutsch & Gerard, 1955; Kaplan & Miller, 1987). In addition, these groups rely on heuristics such as a consensus-implies-correctness heuristic and yield to the majority perspective regardless of the true validity of that perspective (De Dreu & De Vries, 1996). Information-driven groups, on the other hand, are characterized by the communication and integration of relevant information and thus by systematic information processing (cf. Larson & Christensen, 1993).

In groups, it has been shown that individuals with low epistemic motivation are more likely to base their concession making on heuristic cues including irrelevant anchor information or stereotypic cues about their counterpart (De Dreu et al., 1999). Other studies showed that group members under process accountability revise inaccurate pre-existing cognitive structures to a greater extent during negotiation, and they do so because of more intense processing of information that becomes available during negotiation (De Dreu, Koole, & Steinel, 2000). In contrast, individuals under time pressure are less likely to revise inaccurate pre-existing cognitive structures during negotiation (De Dreu, 2003), and group members pay less attention to and are less influenced by fellow emotional expressions when they have low rather than high epistemic motivation (Van Kleef, De Dreu, & Manstead, 2004).

Group Centeredness

Extending work on individual need for cognitive closure to group processes, Kruglanski, Pierro, Mannetti, and De Grada (2006) invoked the concept of group centeredness—the behavioral syndrome of group members to pressure themselves and others to opinion uniformity, toward stability of knowledge and perspective, and to enhance the value and validity of group features and characteristics. The authors further argued that lower need for cognitive closure should come hand in hand with lower group centeredness. Individuals with low rather than high need for closure have a relatively weak desire for firm and ready-made knowledge, and thus they rely less on what other group members think to acquire (social) validation of one's views, beliefs, and perspectives (see also Pierro, Cicero, Bonaiuto, van Knippenberg, & Kruglanski, 2005; Wittenbaum & Bowman, 2004).

Group centeredness manifests itself in a variety a group processes, including the way group members communicate, organize information exchange, and respond to discrepant insights and deviant opinions. For example, De Grada et al. (1999) showed less conformity pressures and more egalitarian participation in groups composed of members with low need for closure. Likewise, group members with low need for closure

tend to be more tolerant of opinion deviates (Kruglanski & Webster, 1991; Kruglanski, Webster, & Klem, 1993) and less likely to endorse autocratic leadership (Pierro, Mannetti, De Grada, Livi, & Kruglanski, 2003).

Earlier we argued that individuals with low need for closure are more likely to have higher epistemic motivation than those with high need for closure (cf. Table 1). Accordingly, we expect that groups with higher levels of epistemic motivation (cf. low need for closure) are less likely to fall prey to group centeredness, more tolerant of opinion deviates, less likely to endorse autocratic leadership, and less susceptible to normative influences and group conformity pressures. However, because this expectation rests on the assumption that findings for need for closure transfer comfortably to epistemic motivation as conceptualized presently, future work is needed to examine the specific relationships between group-level epistemic motivation and particular manifestations of group centeredness.

Generating Creative Ideas and Problem Solutions

Many everyday decision problems are ill defined because they do not have, a priori, known decision alternatives or outcomes. When a problem does not have a fixed set of decision alternatives, creativity is required to generate these alternatives, and the generation of new ideas and problem solutions is therefore often a critical aspect of group judgment and decision making.

Epistemic motivation influences creativity, albeit in a complex way. Stressful conditions likely to lower epistemic motivation (e.g., time pressure, conflict-related threat) reduce creative problem solving (Schulz & Searleman, 1998), lower cognitive complexity and flexibility (Carnevale & Probst, 1998; Van Hiel & Mervielde, 2003), and result in less creative task performance (Baer & Oldham, 2006). In contrast, trait-based openness to experience correlates positively with a variety of indicators of creativity (Wolfradt & Pretz, 2001). These findings indicate that high levels of epistemic motivation are associated with higher creativity. However, task relevance, which arguably associates with higher epistemic motivation, actually inhibits creative ideation: Fewer ideas and fewer creative ideas are generated with a relevant task than with an irrelevant task (Harari & Graham, 1975). Furthermore, Rietzschel, De Dreu, and Nijstad (2007) studied the effects of need for structure and fear of invalidity, two personality factors that are closely associated with epistemic motivation. They found that high need for structure, which is typically seen as reflecting low epistemic motivation (Neuberg, Judice, & West, 1997; Neuberg & Newsom, 1993), was especially detrimental to creativity when coupled with high fear of invalidity, a factor typically seen as reflecting high epistemic motivation. We suspect that task relevance and fear of invalidity leads to a focus on reality constraints and

to self-censoring of original ideas that do not seem to fit these constraints. More work is needed, but it appears that epistemic motivation enhances individual creativity as long as it does not come from, or pairs with, high fear of making invalid judgments and decisions.

At the group level, research findings are more straightforward and suggest that high levels of epistemic motivation are conducive to group creativity. Thus, creative groups score higher on tolerance of ambiguity than do noncreative groups (Maini, 1973) and have members with lower scores on need for cognitive closure (Chirumbolo, Livi, Mannetti, Pierro, & Kruglanski, 2004, Experiment 2). Furthermore, Chirumbolo et al. (2004) found that inducing time pressure leads to lower levels of group creativity (Experiment 1) and that the effect of need for closure on group creativity was mediated by conformity pressure (Experiment 3). Thus, it seems that high levels of epistemic motivation foster group creativity both because it stimulates individual-level creativity and because it prevents pressure on deviates. Pressure on deviates, like fear of invalidity, seems to inhibit creative performance.

The notion of group centeredness reviewed earlier has implications for the way epistemic motivation in groups affects group creativity. As noted, higher group centeredness implies less tolerance of opinion deviants, less acceptance of divergent thinking, and less egalitarian and participative decision making. However, group creativity benefits from opinion deviates and minority dissent (Nemeth, 1986), especially when groups engage in participative decision making (De Dreu & West, 2001). In addition, group creativity benefits from egalitarian participation and open exposure to others' ideas (Nijstad, Stroebe, & Lodewijkx, 2002). Finally, group creativity benefits from a climate that tolerates divergent thinking (Shalley, Zhou, & Oldham, 2004). In other words, group creativity benefits from lower group centeredness, and as discussed in the previous section, lower group centeredness is expected when group members have high rather than low epistemic motivation (cf. Chirumbolo et al., 2004).

Taken together, (self-)criticism most likely inhibits creativity, but other than that, epistemic motivation seems to stimulate cognitive flexibility, divergent thinking, and thus creative ideas and novel problem solutions. In addition, epistemic motivation is expected to lower group centeredness, a critical barrier to group creativity.

Dissemination of Shared Versus Unshared Information

The importance of information-driven processing and interaction is most clearly seen in so-called hidden-profile situations where group members need to decide among a series of options (e.g., job candidates) and in which each member has part of the information available about each

option. Whereas some information is known to all group members (shared information), other pieces of information are known to only some group members (unshared information). Based on the shared information available to all group members, a suboptimal decision alternative (e.g., job candidate A) appears to be the best. However, when shared and unshared information is pooled, an alternative option (e.g., job candidate B) emerges as a superior decision alternative. Thus, by disseminating and processing unshared information, groups make decisions of superior quality (Stasser & Birchmeier, 2003).

It is interesting that hidden-profile decision-making research suggests that group members tend to talk primarily about shared information and ignore unshared information (e.g., Larson, Foster-Fishman, & Keys, 1994; Stasser & Titus, 1985, 1987). Furthermore, recent work indicates that at least as important is whether group members actively and systematically process the information that is exchanged. For example, Greitemeyer and Schulz-Hardt (2003) had participants read incomplete information sets and state an initial decision preference. Next, they received written protocols of a fictitious discussion that contained all of the information pertaining to the decision to be made. The quality of their final decisions was lower than that of participants who had had access to the full set of information from the start. Decisions generally reflected participants' initial preferences—even when information dissemination was optimal, preference-consistent evaluation of information kept decision quality low (see also Gigone & Hastie, 1993; Winquist & Larson, 1998).

Whether group members engage in effortful, deep processing of information should, according to the present thesis, depend on the factors that raise or lower group members' ST and concomitant epistemic motivation. Indeed, Postmes, Spears, and Cihangir (2001) had some groups first perform a task in which they had to be critical, whereas other groups performed another task. This induced a criticality group norm in half the groups. Next, the groups performed a hidden-profile task. In groups with a criticality norm, a more evenhanded consideration of unshared information took place, and these groups more often made high-quality decisions. Also, work by Kelly and colleagues showed that higher time pressure resulted in reduced information exchange and consequently lowered performance (Kelly & Karau, 1999; Kelly & Loving, 2003; see also Bowman & Wittenbaum, 2004). Finally, Galinsky and Kray (2004) showed that the activation of a counterfactual mindset increased the discussion of unshared information and helped groups identify the correct decision alternative.

Whereas time pressure reduced epistemic motivation, so that groups switch to heuristic, preference-driven processes, criticality norms and the activation of counterfactual mindset may increase the ST and concomitant epistemic motivation, leading to systematic processing of information and thus superior decisions. This possibility was tested directly by Scholten, van Knippenberg, Nijstad, and De Dreu (2007). These authors predicted that groups with high epistemic motivation have higher STs, engage in more information-driven and less preference-driven interaction, and achieve better decisions. An experiment manipulating process accountability showed that groups under process accountability reported higher STs before group discussion, reported higher motivation to engage in deep and systematic information processing, repeated unshared information more often during group discussion, and chose the correct decision alternative more often. Mediation analysis established that epistemic motivation produced high-quality decisions because it stimulated systematic rather than heuristic information processing.

Taken together, this work on preference-driven versus information-driven interactions and the dissemination of shared versus unshared information during group discussion provides a straightforward extension of the dual-process model's notion of heuristic versus systematic processing. Both at the individual and group levels, it appears that high levels of epistemic motivation lead to more systematic, deliberate, and thorough search for and processing and dissemination of information.

Synthesis

Based on dual-process models (Chaiken & Trope, 1999) and lay epistemic theory (Kruglanski & Webster, 1996), we have argued that group members may have high or low epistemic motivation and are therefore inclined to engage in more or less deep and deliberate information processing. Ample evidence supports this claim and reveals that group members think in a more divergent and flexible way when they have high rather than low epistemic motivation. Thus, a first conclusion is that groups with high levels of epistemic motivation engage in more creative ways of thinking, are information rather than preference driven in their interaction, and are unlikely to be influenced by inaccurate decision heuristics and reasoning errors.

Work on need for cognitive closure and group centeredness suggested that groups with high levels of epistemic motivation have greater tolerance for deviants, are more open to minority dissent, develop more egalitarian and participative interaction patterns, and are less likely to seek and endorse autocratic leaders. We argued, therefore, that epistemic motivation in groups stimulates creative ideation and the dissemination of unshared information. In other words, both directly and via reduced group centeredness, high epistemic motivation in groups leads to creative ideas and problem solutions and better and more thorough dissemination of information held by individual members of the group.

Figure 2 summarizes our review and analysis thus far in a path diagram. Person variables and context raise or
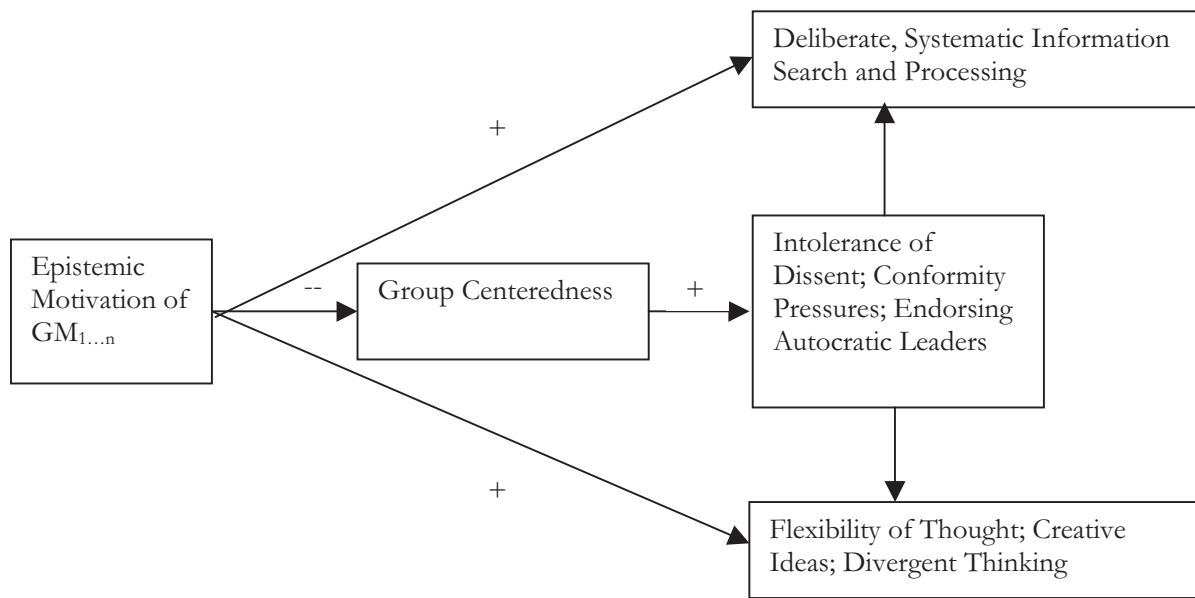
Figure 2   Effects of epistemic motivation on group centeredness and individual-level and group-level information processing.

lower group members' ST and concomitant epistemic motivation (cf. Table 1), and this has three interrelated effects. First, higher levels of epistemic motivation lead to more systematic and deliberate search for and processing of information. Second, higher epistemic motivation leads to lower levels of group centeredness and thereby reduces the intolerance of deviance, the pressure toward conformity, and the longing for autocratic, hierarchical decision making. Third, higher levels of epistemic motivation lead to more divergent thinking, undermine rigidity of thought, and stimulate creative ideation. Finally, the effects of epistemic motivation on information processing and divergent thinking may also be partly mediated by group centeredness (i.e., conformity pressure, autocratic leadership).

Figure 2 does not explicitly show how epistemic motivation affects group judgment and the quality of group decisions. Most of the work we reviewed showed that more systematic, deliberate, and thorough search for and processing and dissemination of information lead to calibrated group judgments and superior group decisions. However, as mentioned earlier (cf. Figure 1), this effect may be limited to group tasks where urgency is relatively low and group members' inputs are relatively indispensable. Indeed, the studies showing that epistemic motivation promoted high-quality group decisions used group tasks in which urgency was low and input indispensability was high. For example, in studies using the hidden-profile paradigm, group members have unique information, and all information is needed to

come to a high-quality decision, making group members indispensable. We return to this issue in a later section.

Second, the research showing that epistemic motivation promoted high-quality group decisions implicitly provided group members with the prosocial goal of reaching a joint decision, and relatively few (if any) competitive incentives to outdo fellow group members were present. Thus, it may be that the preceding effects of epistemic motivation on the quality of group decision making are limited to situations in which group members have a prosocial rather than proself motivation. We turn to this issue in the next section where we discuss the roles of social motives.

MIXED-MOTIVE INTERDEPENDENCE AND THE ROLE OF SOCIAL MOTIVES

Several lines of work within the groups as information processors perspective proceed on the basis of the implicit or explicit assumption that group members share the cooperative goal of reaching consensus on a high-quality decision and that no other goals, including the competitive goal of outperforming one's fellow group members, exist (e.g., Hollingshead, 2001). Indeed, work on epistemic motivation and information dissemination reviewed in the previous section focused on groups whose members had the shared goal of reaching a joint decision. However, the reality of most decision-making groups is different. Although some groups have members whose only goal is

to reach consensus on high-quality decisions, often members have other incentives as well. Individuals within groups may be driven by personal motives, including the desire to attain and maintain a high-status position within the group, to impress others by taking credit for group successes and ideas (Stroebe, Diehl, & Abakoumkin, 1992), to avoid being exploited by free-riding fellow group members (e.g., Camacho & Paulus, 1995; Kerr, 1983; Paulus & Dzindolet, 1993), or to prevail in a conflict. Put differently, individuals in decision-making groups face a mixture of cooperative incentives to reach high-quality group decisions and competitive incentives to do well personally (Davis, Laughlin, & Komorita, 1976). Obviously, group decision-making situations may differ in terms of the relative weight cooperative versus competitive incentives carry, with some settings being primarily cooperative and others being primarily competitive. The important point here is that the vast majority of past work on group decision making has not taken into account the fact that competitive incentives are present (Stasson, Kameda, & Davis, 1997; Wittenbaum, Hollingshead, & Botero, 2004). Accordingly, much of our knowledge about group creativity, about the pooling of preferences, and about information dissemination may not generalize comfortably to group decision-making settings where competitive incentives are present or given more weight.

That much of the work on group decision making implicitly assumes a purely cooperative incentive system with no competitive incentives being present is at odds with work on coalition formation in small groups (e.g., Komorita & Parks, 1995; Murnighan, 1978). This work, which has clear relevance to group decision making, has largely proceeded on the basis of the reverse assumption—that individual group members are primarily motivated to maximize their personal gain and ignore what others get (Van Beest, Van Dijk, De Dreu, & Wilke, 2005). It is also difficult to reconcile with decades of research on small-group negotiation, which is based on the premise that group members have a cooperative incentive to reach agreement and a competitive incentive to develop an agreement that serves their personal interests well (Pruitt, 1998; Schelling, 1960). Thus, not only is it difficult to maintain that group decision making is dominated by cooperative or by competitive incentives, relaxing such assumptions allows one to integrate three currently separate traditions of research on information dissemination in groups, on coalition formation, and on group negotiation.

To understand the influence of mixed-motive interdependence within group decision making, interdependence theory (Kelley & Thibaut, 1978; Rusbult & Van Lange, 1996) provides a good starting point. In essence, interdependence theory proposes that people "transform" the objective (given) interdependence structure into a subjective (effective) interdependence situation, and this subjective situation forms the basis for further action. Although two people may face the exact same mixture of cooperative and competitive incentives, one may emphasize the cooperative incentives and act in the interests of the group and the other may emphasize the competitive incentives and pursue his or her self-interest.

How people transform a given situation into an effective situation depends on their social motivation—the individual's preference for a particular outcome distribution between self and others. A variety of social motives can be distinguished, including altruistic, competitive, individualistic, and cooperative (McClintock, 1972, 1977). Many studies on social dilemmas, conflict, and negotiation have, however, relied on the more global distinction between proself and prosocial motivation (e.g., Beersma & De Dreu, 2002; Carnevale & Lawler, 1986; De Dreu & Van Lange, 1995; Giebels, De Dreu, & Van de Vliert, 2000; Van Lange & Kuhlman, 1994; Weingart, Bennett, & Brett, 1993; we return to this in the Conclusions). Proself motivation comprises both competitive and purely individualistic goals, and prosocial motivation comprises both cooperative and purely altruistic goals. In the case of proself motivation, individuals try to maximize their own outcomes and they have no (or negative) regard for the outcomes obtained by other group members. Individuals with a proself motive tend to see the decision-making process as a competitive game in which power and personal success are key. Individuals with a prosocial motive try to establish a decision that values and incorporates both own and other's interests and ideas; they see the decision-making process as a collaborative game in which fairness, harmony, and joint welfare are key.[4]

Social motives are related to individual differences in social value orientation (e.g., McClintock, 1977; Van Lange & Kuhlman, 1994), need for affiliation (McClelland, Koestner, & Weinberger, 1989), and agreeableness (Hofstee, De Raad, & Goldberg, 1992; e.g., see Graziano, Jensen-Campbell, & Hair, 1996). There is some evidence that collectivist culture makes prosocial motivation more chronically accessible than individualistic culture (e.g., Hulbert, Correa da Silva, & Adegboyega, 2001; Probst, Carnevale, & Triandis, 1999; Wong & Hong, 2005). In addition, prosocial versus proself motivation may be cued by providing group or individual incentives for performance (e.g., Deutsch, 1949), by referring in instructions to others as partner versus opponent (Burnham, McCabe, & Smith, 2000) or by subliminal priming of "I" versus "we" (Utz, 2004; see also Smeesters, Warlop, Van Avermaet, Corneille, & Yzerbyt, 2003). More indirect ways to manipulate social motives are to have individuals anticipate future

interaction or not (Ben-Yoav & Pruitt, 1984) or to emphasize shared versus different group membership (Kramer, Pommerenke, & Newton, 1993). The right-hand column of Table 1 summarizes these antecedents of social motivation.

Social motives have been studied in the context of social dilemmas, intimate relations, and bargaining and negotiation, and these lines of research mostly considered attitudinal and behavioral effects. The general conclusion from these studies is that individuals with a prosocial motive have a stronger tendency to trust others, to value harmony and joint welfare, and to make decisions that foster collective goals. Individuals with a proself motive, in contrast, tend to distrust others, value power and personal achievement, and make decisions that foster personal goals (for reviews, see Caporael, Dawes, Orbell, & Van der Kragt, 1989; De Dreu & Carnevale, 2003; Pruitt, 1998; Weber, Kopelman, & Messick, 2004). A meta-analysis of the effects of social motivation on negotiation strategies and outcomes, for instance, showed that prosocial negotiators engage in less persuasive bolstering and more problem solving, and reach agreements of higher joint gain than proself negotiators (De Dreu, Weingart, & Kwon, 2000).

Although research evidence is lacking as far as we know, it is intuitively plausible that proself individuals are less concerned with egalitarian participation and less disturbed by dissenting points of view than prosocial individuals who focus more on consensus and the need to make fair decisions. Indeed, prosocial individuals have been found to be more accepting of a leader who makes decisions for them if the group itself appeared unable to do so (e.g., Van Vugt & De Cremer, 1999). Also, proself individuals tend to focus on "what works" whereas prosocial individuals interpret behavior in terms of its moral implications (i.e., might vs. morality; Liebrand, Jansen, Rijken, & Suhre, 1986). These are all plausible and interesting possibilities because they may affect group interaction and (partially) mediate the effects of social motivation on information processing in group judgment and decision making.

Information Processing as a Function of Social Motivation

When we reviewed work on epistemic motivation, we concluded that higher levels of epistemic motivation produce a greater tendency to engage in deliberate and systematic rather than shallow and heuristic information processing. With regard to social motivation, research seems to point to a different direction. Instead of influencing the depth of information processing, social motivation appears to influence the type of information searched, encoded, retrieved, and shared. Thus, social

motivation gives a direction to and leads to a bias in information processing (see Figure 1).[5]

Several lines of research show that social motivation biases individual information processing. First, individuals with prosocial motivation search information that is consistent with, and corroborates, their initial belief that others can be trusted and that cooperation is beneficial to all. Individuals with a proself orientation, on the other hand, assume others to be proself and seek to confirm others' competitive intentions. For example, Van Kleef and De Dreu (2002) classified individuals as prosocial or as proself and prepared them for a negotiation with another individual. Participants also read a personality test allegedly filled out by the counterpart, suggesting that the counterpart was a prosocial or proself person. In a control condition, no personality information was provided. Subsequently, participants were given the opportunity to write questions for their counterpart. Analysis of these questions showed evidence for confirmatory information search—people asked about cooperation more when the counterpart had a prosocial personality and about competition when the counterpart had a proself personality. It is important to note that participants in the control condition, who did not receive information about their counterpart's personality, asked about cooperation when they themselves were prosocial or about competition when they themselves were proself. In other words, social motivation drives information search so that prosocial individuals look for confirmation of their "cooperative" beliefs, whereas proself individuals look for confirmation of their "competitive" beliefs.

Second, there is evidence that social motivation makes people selective in encoding and retrieving information. Individuals with a prosocial value orientation recall better possibilities for joint gain from Prisoner Dilemma types of games, whereas individuals with a proself value orientation recall better possibilities for own or relative gain (Camac, 1992). De Dreu and Boles (1998; De Dreu & Carnevale, 2003) found that prosocial negotiators recalled more cooperative and less competitive tactics presented to them earlier, whereas proself negotiators did the reverse. These findings suggest that individuals better encode and retrieve cooperative information when they have a prosocial motivation and competitive information better when they have a proself motivation.

Taken together, growing evidence suggests that social motivation not only affects the strategic choices people make, and the individual and collective gains they achieve, but also the more fundamental information search and processing activities they engage in. Specifically, it appears that prosocial group members search and process information that confirms their initial belief that others are cooperative, trustworthy, and concerned with fairness and

collective goods. Proself group members, in contrast, search and process information that confirms their initial belief that others are self-interested and concerned with power and personal gain.

Information Dissemination

Advocacy. Social motivation may result in a bias in the information that is shared during a group discussion. Group members often have a tendency to argue for their position and consequently only mention information that is consistent with that position (advocacy; Schulz-Hardt et al., 2000; Stasser & Titus, 1985). This evidently leads to a bias in the information they share. This bias is particularly likely to occur when group members have a proself rather than prosocial motivation. For example, when group members have a (selfish) interest in a group decision and want a certain alternative to be chosen, they may only share positive information about that alternative or negative information about other alternatives, even though they also possess negative information about their preferred and positive information about their nonpreferred alternatives.

Lying and deception. Social decision-making studies show high levels of accurate information exchange about preferences and priorities under prosocial motivation and high levels of (strategic) misrepresentation under proself motivation. For example, deception increases when parties know their counterpart lacks information (Boles, Croson, & Murnighan, 2000) or when the stakes are high (Tenbrunsel, 1998). Also, misrepresentation is more likely when individuals have experience with the task at hand (Murnighan, Babcock, Thompson, & Pillutla, 1999), when they face a stranger rather than a friend (Schweitzer & Croson, 1999), and when they aim to maximize personal rather than joint gains (O'Connor & Carnevale, 1997; Steinel & De Dreu, 2004). In short, group members with a prosocial motive are more likely to communicate accurate information, whereas group members with a proself motive engage in more lying, deception, and misrepresentation, especially when there is opportunity to do so and doing so may result in personal gains.

Spinning preference-consistent information. Our analysis also makes predictions about the way information is disseminated. Growing evidence indicates that people instantly and automatically develop ownership of their ideas, arguments, and preferences because they have spent considerable energy in developing them (Abelson, 1986), have been exposed to their own ideas and positions relatively often (Zajonc, 1980), or seek to avoid the costs of being inconsistent, or because these ideas and preferences have become part of their (extended) self-concept (Beggan, 1992; De Dreu & van Knippenberg, 2005). This ownership has two consequences. First, people feel hurt and react

defensively when their ideas and preferences are questioned, derogated, disputed, or even refuted on the basis of facts and new evidence (De Dreu & van Knippenberg, 2005; see also Baumeister, Smart, & Boden, 1996). Second, people self-enhance the attractiveness, validity, and correctness of their arguments, ideas, and preferences, and this may lead them to vehemently argue for their own perspective and against new counterevidence provided by other group members. In short, during group discussion participants tend to push their own preferences and ideas, make them seem even bigger and more beautiful than they are, and ignore or derogate information that counters the validity of their own perspective, idea, or position.

One consequence is that group members put a positive spin on the information they have and endorse, and a negative spin on available or anticipated counterevidence (Scholten, 2007; Wittenbaum, Bowman, & Hollingshead, 2003). For example, they exaggerate the importance of information that endorses their preference and downplay information that is inconsistent with their preference. Wittenbaum et al. (2003) tested these ideas in an experiment in which three group members were each given a different preference before discussion and were told that the more group members would endorse their personally preferred candidate after group discussion, the more lottery tickets they would earn. Group members thus had a strong incentive to convince others and to be not convinced by new information (cf. proself motivation). Analyses of group discussions showed that members were more likely to mention positive aspects of their preferred alternative and negative aspects of the alternatives preferred by others, and this tendency was stronger for information that was unshared rather than shared. Also, group members were more likely to put an upward spin on information supporting their preferred alternative and a downward spin on information supporting alternatives preferred by others.

The study by Wittenbaum et al. (2003) provided group members with a proself motivation and did not include a prosocial motivation condition. Our MIP-G model suggests that compared with proself motivation, in groups with prosocially motivated members two things will change. First, because prosocially motivated individuals value harmony and inclusiveness to a greater degree, downward spinning of alternatives preferred by others is less likely to occur. Second, prosocially motivated individuals may be less sensitive to ownership issues; they may be less inclined to construe entitlement at the individual level and instead develop feelings of group ownership (cf. Carnevale, 1995). If true, this would mean that prosocially motivated group members have less inclination to spin upward their own preferences and are less likely to react with hostility when their own preferences are counterargued by others (De Dreu & van Knippenberg, 2005).

Self-censorship and mutual enhancement. Sometimes a prosocial orientation may also lead to a bias in information sharing. Group members with a prosocial motivation value group harmony and consensus, and they may therefore refrain from sharing information that is contrary to the group's current opinion. Such self-censoring may lead to a tendency not to share unique (unshared) information that runs counter to the group's preference and may as such contribute to the failure to share unique information. Furthermore, if information that runs counter to the group's consensus is shared, it might be downplayed. In these situations, a high prosocial motivation thus may also lead to spinning; however, not the individually preferred but rather the group-preferred alternative is spun.

Moreover, Wittenbaum, Hubbell, and Zuckerman (1999) have argued that shared information has the property that it can be validated by other group members (also Wittenbaum & Bowman, 2004). As a consequence, group members who mention shared information are perceived to be more knowledgeable and competent than those who mention unshared information, and group members who possess much shared information are more influential. We argue that mutual enhancement will be more prevalent in groups with a prosocial motive and that prosocially motivated group members are more likely to acknowledge the competence of others. As a consequence, this might lead to a bias in information processing. If shared information is seen as more valid than unshared information, unshared information may have little influence on the group's decision, even though it might be relevant (also see Gigone & Hastie, 1993). Thus, self-censoring and mutual enhancement may be more likely in prosocial than in proself groups and bias information provision and exchange toward shared rather than unshared information.

Generating Ideas and Problem Solutions

Earlier we argued that preference diversity and minority dissent raise the level of epistemic motivation of group members because it reduces group members' confidence in their initial preference. However, we did not go into the issue of what causes someone to take a different position from others in the first place. Here we argue, first, that a proself motivation rather than a prosocial motivation is related to independent thinking and a higher likelihood of taking a minority position and, second, that this will be especially beneficial for divergent and creative tasks.

There is some work showing that when group members stand up for their own interests and ideas and seek competition rather than cooperation, this benefits group creative performance in the long run. For example, research

by Nemeth and colleagues (Nemeth & Kwan, 1985, 1987) suggests that a certain level of disagreement and conflict may be functional for groups in that it stimulates creativity and innovation. Furthermore, individuals in brainstorming groups perform better and generate more creative ideas when competition and winning are rewarded (Munkes & Diehl, 2003) and when upward comparisons dominate (Paulus, Dugosh, Dzindolet, Coskun, & Putman, 2002). Thus, when individual group members are attempting to "win" and strive to outperform each other by coming up with better ideas, this will serve the long-term needs of the group and benefit collective creative performance. If group members focus on their own input and performances, rather than on achieving consensus and maintaining harmony, the group is more creative and has the potential to reach more innovative decisions. When, however, the task is convergent rather than divergent, independence and dissent might hurt rather than help performance. Indeed, Peterson and Nemeth (1996) showed that minority dissent helped task performance on a divergent task and lowered performance on a convergent task.

Initial support that proself motivation stimulates creative ideation in groups comes from a study by Goncalo and Staw (2006), who showed that groups where members had predominantly individualistic values were more creative than collectivist groups. Beersma and De Dreu (2005) directly tested the hypothesis that a prosocial orientation leads to better performance on a convergent task, whereas a proself orientation leads to better performance on a divergent task. They engaged three-person groups in a negotiation task and thereafter had them perform a creative idea generation task. Before the negotiation, group members were given a prosocial motivation or a proself motivation. After 20 min of negotiation, in which prosocial groups achieved a more constructive process and higher joint outcomes, group members were asked to engage together in a new task—creating advertisement slogans for a new marketplace. Results showed that proself groups generated less feasible but more original ideas (Experiment 1) and, when performing a creativity task (Experiment 2), showed greater dedication, functioned more effectively, and performed better than prosocial groups. Prosocial groups, on the other hand, performed better when a convergent task (a planning task) followed the negotiation.

Together these studies indicate that proself, individualistic motivation leads group members to be more creative than prosocial, collectivist groups in the ideas they generate and select. However, there may be a potential downside to proself motives in the context of group creativity. That downside is that a proself orientation and a focus on winning may lead group members to disregard others' ideas or even derogate them. Research has shown that attention to others' ideas is generally beneficial to
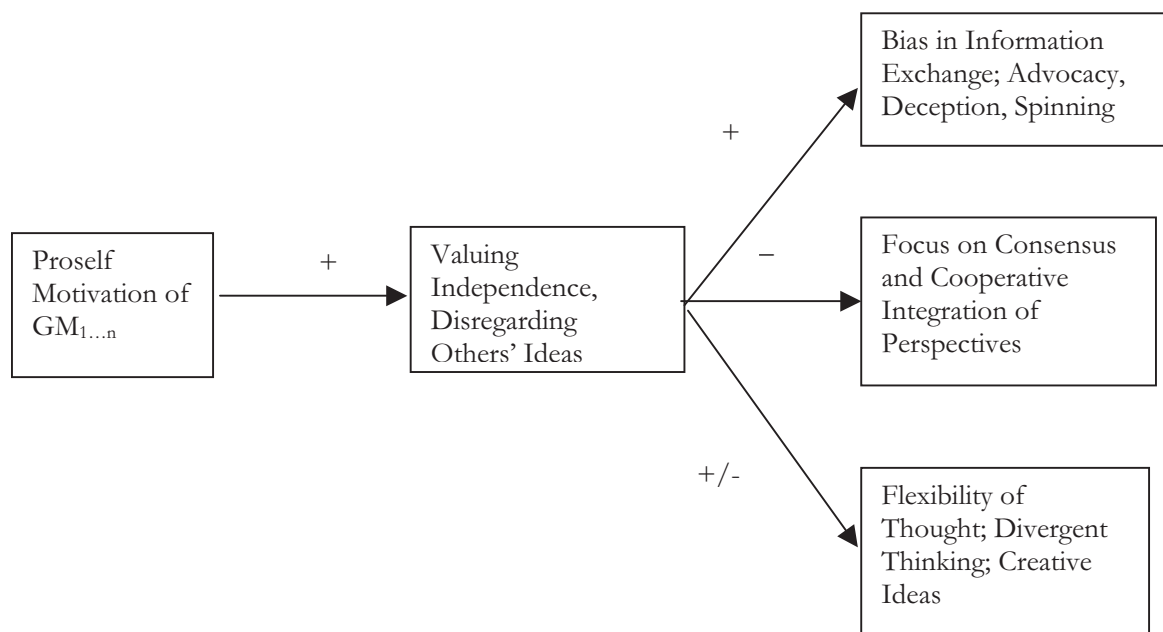
Figure 3   Effects of social motivation on individual-level and group-level information processing.

creative group performance (Dugosh, Paulus, Roland, & Yang, 2000; Nijstad et al., 2002) because it helps group members build on these ideas. Furthermore, expectations of negative evaluation may reduce creativity (e.g., Diehl & Stroebe, 1987), especially for group members who are high in social anxiety (Camacho & Paulus, 1995).

Synthesis

We have argued that group decision making takes place in the context of mixed-motive interdependence and that social motivation determines whether mixed-motive situations are transformed into a collaborative game in which harmony and joint success are valued or into a competitive game in which power and personal success are key. Social motives are rooted in individual differences including social value orientations, need for affiliation, and agreeableness, and may be cued by instructions and incentives, past and future interactions, and the like. Past work on social motives has shown that prosocial individuals tend to trust others and are inclined to act in the interest of the group, whereas proself individuals tend to act in their personal interests.

The few studies on information processing suggest that social motives steer toward goal-consistent information processing, both at the individual level (encoding and retrieval) and at the group level (information exchange): Prosocial individuals seek, encode, and retrieve cooperative

information more and exchange this type of information more, whereas proself individuals seek, encode, and retrieve competitive information more and exchange this type of information more. In proself groups, this may lead to advocacy (i.e., only mentioning information that is consistent with one's preference), lying and deception, and spinning of information. Furthermore, because of their stronger focus on coordination and harmony, prosocial groups may self-censor more and value shared information more than proself groups. Furthermore, a proself orientation leads to independent thought, which results in higher levels of group creativity. However, it may also reduce attention to others' ideas and lead to derogation and criticism of these ideas, which may undermine creativity.

Figure 3 summarizes our synthesis with regard to social motivation in group judgment and decision making. The figure shows that the more members have or adopt a proself motivation, the less likely it is that the group focuses on consensus and integration of perspectives, emphasizes the value of shared information, and tolerates dissent and independence. This may promote divergent thinking and the exchange of unique, unshared information. However, the more members have a proself motivation, the less likely it is that others' ideas and viewpoints are considered and integrated into one's own thinking and idea production. It can thus be inferred that groups with prosocially motivated members may be better at reaching agreements that integrate all parties' aspirations but may be worse at designing truly novel and creative group decisions.

Groups with prosocially motivated members may seek high-quality decisions because this fosters collective goals and welfare and to the extent that this search process does not compromise harmony and more or less fragile consensus. Prosocial groups thus need to overcome their tendency toward self-censoring and overvaluing shared information. Much in line with our earlier argument that epistemic motivation may or may not lead to high-quality decisions depending on members' social motivation and task requirements, we propose here that whether social motivation leads to high-quality decisions depends on member epistemic motivation and specific features of the group task. This complex interaction is further developed in the next section.

INTERACTIONS BETWEEN SOCIAL MOTIVATION AND EPISTEMIC MOTIVATION ON GROUP INFORMATION PROCESSING

From the work on social motivation, it follows that prosocial individuals consider cooperative information more, whereas proself individuals consider competitive information more. This work thus supports that at both the individual level and the group level, social motivation biases information search: encoding and retrieval at the individual level and information dissemination and integration at the group level (cf. Figure 1). This work also suggests that social motivation has little influence at the individual level on how deeply and systematically information is processed. However, we are unaware of systematic research into this issue; therefore, conclusions regarding the impact of social motivation on the depth of information processing have to be taken with caution.

From the work on epistemic motivation, it follows that epistemic motivation drives the amount and depth of information processing at the individual level, such that individuals with high epistemic motivation engage in more deliberate and deep processing of information, are less influenced by heuristic cues, and develop a more accurate understanding of the decision problem (cf. Figure 1). It is interesting that there is no evidence that epistemic motivation makes group members more cooperative or competitive in their strategic choices, but again, systematic research into this issue is lacking and more work is needed. At the group level, higher levels of epistemic motivation were argued and found to be associated with lower group centeredness and more open-minded and full-blown idea generation, information dissemination, and integration.

Taken together, the work we have reviewed indicates that social motivation drives individuals and groups to consider goal-consistent information more than goal-inconsistent information, and epistemic motivation seems to drive individuals and groups to process information in a deep and systematic fashion. Before moving on, however, it is important to note that the bias set forth by social motivation may include a focus on harmony and pleasant interaction among prosocial group members more than among proself group members. Our notion that epistemic motivation amplifies bias induced by social motivation does not necessarily apply to this focus on harmony and pleasant interaction for two reasons. First, epistemic motivation is primarily about information search and processing and not, or is less so, about affective and behavioral tendencies, including harmony-preserving actions. Second, epistemic motivation is all about a rich and accurate understanding and thus leads to information processing that helps one move the current AC beyond the ST. As such, we expect epistemic motivation to leave unaffected tendencies to value and preserve harmony and to undermine self-censorship.

In the following, we review the evidence for the interaction between social motivation and epistemic motivation on, first, individual-level information processing and, second, group-level information processing (cf. Figure 1).

Individual-Level Information Processing

We have suggested that the bias set forth by social motivation will be amplified by individual group members' epistemic motivation so that prosocial members search, process, and generate goal-consistent information more, and more deliberately, when epistemic motivation is high rather than low, and proself members search, process, and generate goal-consistent information more, and more deliberately, when epistemic motivation is high rather than low.

Recent evidence supports this proposition. De Dreu, Beersma, Stroebe, and Euwema (2006, Experiment 1) conducted an experiment in which they crossed social motivation and epistemic motivation in an orthogonal design. Participants were given role instructions for an upcoming negotiation between themselves and one counterpart. Social motivation was manipulated through instructions (i.e., the counterpart was referred to as opponent or partner in the proself vs. prosocial motivation condition). Epistemic motivation was manipulated by holding individuals (not) accountable for the decision-making process. Before the negotiation task (which actually did not take place), participants were given a list of tactics and strategies, some of which were cooperative (e.g., "share and share alike") and some of which were competitive (e.g., "winner takes all"). After participants read the list and completed several filler tasks, they were asked to recall as many tactics and strategies as possible. Results for recall showed that when epistemic motivation was high rather than low, prosocial relative to proself negotiators recalled more cooperative than competitive information; when epistemic

motivation was low, no significant differences in recall between prosocial and proself individuals were found. Thus, epistemic motivation amplified the (recall) bias set forth by the individual's prosocial or proself motivation.

Group-Level Information Processing

Our MIP-G model indicates that at the group level, information dissemination, integration, and generation are a function of the interaction between social motivation and epistemic motivation. More specifically, compared with proself group members, prosocial group members are more likely to input information conducive to group goals and collective functioning, they are more likely to disseminate information in an accurate way, and they are less likely to spin information conducive to personal goals and preferences, to strategically withhold information, and to engage in lying and deception. These tendencies should, according to our theory, amplify when epistemic motivation among group members is high rather than low. This is because, first, higher levels of epistemic motivation engender a stronger tendency to deliberately and systematically process the information that is or becomes available during group discussion. Second, higher levels of epistemic motivation reduce tendencies toward group centeredness and concomitant preference for autocratic leadership and reduced participative decision making.

Four lines of inquiry lend support for the idea that group-level information processing is a function of social motivation and epistemic motivation. First, work on epistemic motivation in so-called hidden-profile situations showed that higher levels of epistemic motivation led to more evenhanded exchange of both shared and unshared information and to more systematic processing of this information (e.g., Galinsky & Kray, 2004; Kelly & Karau, 1999; Kelly & Loving, 2003; Postmes et al., 2001; Scholten et al., 2007). As noted, group members in these experiments were induced to have the cooperative goal of reaching consensus on a joint decision and thus were most likely to have prosocial rather than proself motivation. A contrasting condition in which group members were given competitive goals and concomitant proself motivation was not included, however, so the evidence is indicative at best.

More direct evidence for the interactive effects of social motivation and epistemic motivation has been provided by De Dreu and colleagues. De Dreu et al. (2006, Experiments 2 and 3) gave participants role instructions for an upcoming negotiation between themselves and one counterpart. Social motivation was manipulated through instructions (i.e., the counterpart was referred to as opponent or partner in the proself vs. prosocial motivation condition). Epistemic motivation was manipulated by holding

individuals (not) accountable for the decision-making process. In Experiments 2 and 3, face-to-face interaction took place and the quality of negotiated agreement was assessed, along with perceived cooperativeness and trust and strategic choices. Results showed that when epistemic motivation was high rather than low, prosocial relative to proself negotiators had more trust and reached higher joint outcomes (Experiment 2). Experiment 3 showed that under high epistemic motivation, negotiators who received cooperative rather than competitive tactics reached higher joint outcomes because they engaged in more problem solving. Under low epistemic motivation, negotiators made more concessions and reached low joint outcomes. Together, these experiments yield strong support for the idea that depending on the level of epistemic motivation, prosocial motivation may direct groups toward thorough information processing and high-quality decisions, or toward shallow information processing and mediocre decisions. In other words, when group members have prosocial motivation they "satisfice" under low levels of epistemic motivation and "optimize" under high epistemic motivation.

Testing the same ideas in a different setting, De Dreu (2007) conducted a field study involving 46 teams from various organizations. Team supervisors provided ratings of their team's effectiveness, and team members rated the extent to which they perceived own and other members' goals to be cooperatively interdependent (cf. prosocial motivation) and the extent to which there was task reflexivity—whether the team reflected on their goals and strategies, processed performance progress, and so on (cf. epistemic motivation). The more team members perceived cooperative interdependence, the better they shared information and the more they learned from each other, but only when task reflexivity was high. When task reflexivity was low, no relationship between cooperative interdependence and information sharing and learning was found.

Finally, recent unpublished work by Bechtoldt, De Dreu, and Nijstad (2007) examined implications of the interaction between social motivation and epistemic motivation for group creativity. In a first study, three-person groups composed of individuals either all high or all low in agreeableness (indicative of a prosocial motivation; cf. Table 1) worked under high or low time pressure (indicative of low vs. high epistemic motivation; cf. Table 1). Results showed that low-time-pressure groups produced more creative ideas, especially when agreeableness was high rather than low. In a follow-up study, prosocial motivation was induced through an incentive scheme (individual vs. team bonus for performance), and epistemic motivation was induced through process accountability. Again, results showed more creativity in

TABLE 2: Summary of Expected Effects Resulting From the Different Combinations of Social and Epistemic Motivation

| | Social Motivation | |
Epistemic Motivation	Proself	Prosocial
Low	Social loafing, inaction	Maintaining harmony, collective bolstering, mutual enhancement
	Inflexible forcing, vetoing	Group centeredness, directive leadership, pressure on deviants
	Stalemates, indecision Ignoring others' ideas	Lazy compromising, preference pooling
High	Flexible forcing, arguing and counterarguing	Problem solving
	Advocacy, deception, spinning	Information pooling, collaborative reasoning
	Willingness to disagree, independence, disregard for others' ideas	Attention to others' ideas

high–epistemic motivation groups, but especially when there was a prosocial rather than proself motivation.

Synthesis

Table 2 gives an overview of our expectations regarding the interaction between social motivation and epistemic motivation for group-level information processing. The table distinguishes among the four combinations of social motivation and epistemic motivation. Of course, the reader should keep in mind that the two dimensions are continuous rather then dichotomous. For example, a situation may have both competitive and cooperative features. Furthermore, epistemic motivation may be higher and lower, depending on several factors (see also Table 1). The four quadrants of the table should thus be considered idealized situations. Let us consider the four quadrants in turn.

Low epistemic motivation, proself. In this situation, group members are unwilling to invest much cognitive effort and are motivated by personal interests. This may lead to inaction and a tendency to withhold effort. Group members will be unmotivated and may free ride on the efforts of others or engage in social loafing. When group members hold different opinions, they may be unwilling to give in and understand the others' positions; they may instead engage in inflexible forcing and vetoing. This may lead to stalemates and indecision. Indeed, Nijstad and Kaps (2006) have recently shown that preference diversity leads to indecision when the group interaction is preference driven rather than information driven and when group members vetoed the decision.

High epistemic motivation, proself. In this situation, group members are motivated by selfish goals and are willing to exert cognitive effort to gain a better understanding of the situation. Group members are likely to forcefully argue their point and use flexible ways to get their way. They will argue and counterargue. Furthermore, they are

likely to engage in advocacy, lying and deception, and spinning of information. As these strategies require some amount of thought and understanding of the situation, they are more likely to be used under high rather than low levels of epistemic motivation. At the same time, group members may not shy away from taking a minority position and are relatively independent in their thinking. To the extent that they do not disregard or downplay others' ideas, group creativity may benefit from a combination of selfish motivation and high epistemic needs.

Low epistemic motivation, prosocial. In this situation, group members value their own as well as other group members' outcomes. However, they are unwilling to invest much effort to attain a good understanding of the situation. Group members place high value on maintaining group harmony and consensus. This may lead to collective bolstering, self-censoring, and mutual enhancement. Group members may reinforce the sharing of commonly held, shared information. The behavioral syndrome of group centeredness may emerge, with autocratic leadership and pressure on deviants. Finally, group interactions are likely to be characterized by the pooling of preferences rather than of information, and groups may satisfice by accepting "lazy," middle-of-the-road compromises.

High epistemic motivation, prosocial. Group members have prosocial goals and are willing to invest effort to reach a better understanding of the situation and the group task. In service of this, self-censorship will be reduced and preferences for accuracy and harmony will drive the group toward solving the problem in a way that satisfies all group members' needs. The interaction is likely to be information driven rather than preference driven. Group members pay attention to one another's ideas, try to build on them, and may reach high levels of creativity. In short, this situation is most likely to lead to constructive group processes.

FROM INFORMATION PROCESSING TO GROUP JUDGMENT AND DECISION MAKING

Much of the preceding work not only showed that groups with prosocial motivation and high levels of epistemic motivation engage in more evenhanded processing and dissemination of task-relevant information, they also reached judgments and decisions of better quality. Thus, in the case of a presumed prosocial motivation, higher levels of epistemic motivation result in higher quality decisions (e.g., Galinsky & Kray, 2004; Kelly & Karau, 1999; Kelly & Loving, 2003; Postmes et al., 2001; Scholten et al., 2007), more integrative agreements (De Dreu, 2006), and greater team effectiveness (De Dreu, 2007).

Whereas these works all suggest that group decision making benefits from high epistemic motivation when members have a prosocial rather than proself motive, it is important to note that all this evidence pertains to group tasks that were characterized by relatively low urgency and high member input indispensability. Groups did not face emergency situations that required them to trade off accuracy for speediness, and in the hidden-profile paradigm, in integrative negotiation, and in organizational teamwork group members generally need each others' input to perform well. Earlier we touched on the possibility that when member indispensability is low or decision urgency is high, social motivation and epistemic motivation may function differently in affecting the quality of group judgment and group decision making (see Figure 1). In short, the effects of epistemic motivation and social motivation on the quality of group judgments and decisions depend critically on task demands (cf. Steiner, 1972).

Decision Urgency

When decision urgency is high rather than low, a full-blown and deliberate search for and processing of information are both difficult and undesirable. A medical team preparing for an emergency surgery neither can nor wants to explore in depth the latest developments in medical sciences, to systematically weigh the pros and cons of alternative anesthesia drugs, or to consult outside experts from an adjacent academic hospital. Instead, and because time is critical, this medical team needs action readiness, smooth coordination, and fast decision making. Reliance on well-learned rules and proven procedures that facilitate swift action may be preferred to thorough, deliberate, and in-depth search for and dissemination and integration of available and new information. The same holds for military teams facing an enemy attack, for example.

Decision making often involves a trade-off between effort and accuracy: The strategies that more often lead to the correct choice most of the time also require more effort and time (Payne, Bettman, & Johnson, 1988; see also Gagne & Lydon, 2004). One benefit of using simplifying strategies and "quick and dirty" heuristics is that these are quick methods for arriving at a choice. We thus argue that it is not necessarily better to engage in deep processing. Rather, when decision time is limited and an urgent decision is needed, deep, deliberate, and thorough information processing may not be a wise thing to do. Consistent with this, Vroom and colleagues (Vroom & Jago, 1978; Vroom & Yetton, 1973) have persuasively argued and shown that when decision urgency is high, directive rather than participative leadership is the optimal strategy to decision making.

Although under urgency conditions epistemic motivation may hinder rather than help, evidence suggests that in such situations prosocial motivation helps rather than hinders in reaching group judgments and quality decisions. Zaccaro et al. (1995) showed that low-task-cohesive groups performed particularly poorly when decision urgency was high, and high-task-cohesive groups performed better and equally well in high- and low-urgency situations, respectively. Tschan et al. (2006) showed that medical emergency teams functioned better when directive leadership was applied and teams were cooperatively motivated to coordinate smoothly.

Together, these arguments and emerging pieces of evidence suggest that when decision urgency is high, group judgment and decisions are a function of the interaction between social motivation and epistemic motivation, but this interaction has a different shape than situations where decision urgency is low. When decision urgency is low, group judgments and decisions benefit from prosocial motivation paired with high levels of epistemic motivation. However, when decision urgency is high, group judgments and decisions benefit from prosocial motivation paired with low levels of epistemic motivation.

Although there may be situations of high decision urgency where group members have high epistemic motivation, it may well be that the mere fact that because time is critical, and action readiness, smooth coordination, and fast decision making are needed, group members adapt by reducing their epistemic needs. Earlier (cf. Table 1) we noted that felt time pressure lowers epistemic motivation and that directive leadership may emerge especially under low levels of epistemic motivation coupled with a prosocial orientation (cf. Table 2). Research could further examine the possibility that decision urgency in and by itself lowers group members' epistemic motivation and adapts the group to its decision requirements.

Member Input Indispensability

Most of the work we reviewed implicitly or explicitly focused on situations in which group judgments and

decisions benefit from disseminating, combining, and integrating the unique inputs from different group members. In some cases this may be pushed to the extreme, where group members contribute ideas and insights that trigger others to generate new insights and problem solutions. Thus, member input indispensability is high when groups face hidden-profile tasks, when they can and need to negotiate integrative agreements, and when new ideas and problem solutions help the group move toward high-quality judgments and decisions (see also Stasser & Birchmeier, 2003).

As argued and shown previously, our MIP-G model proposes that in these situations, groups benefit from prosocial motivation paired with high levels of epistemic motivation. However, in situations where member input is not indispensable, the situation may be different. When member inputs are not needed or are less critical to reach a high-quality decision, information dissemination and integration are also less critical—individual group members can rely on well-learned routines and their own, individually available information to make accurate judgments and decisions. In such task environments, prosocial motivation may be better than proself motivation because it prevents group members from working against each other (Beersma et al., 2003). However, when member indispensability is low, high levels of epistemic motivation are not required to reach good judgments and decisions.

Initial evidence for the idea that member input indispensability moderates the effect of epistemic motivation on group decision making comes from a study by Beersma, De Dreu, Dalenberg, and Vogelaar (2007). In a four-person dynamic decision-making task, they manipulated task ambiguity so that in one condition group members needed each others' knowledge and insight to design individual strategies, whereas in another condition group members needed each other far less and could rely on well-established routines. Results showed that groups with members scoring high rather than low on personal need for structure performed relatively well in the unambiguous task condition but relatively poorly in the ambiguous task condition. Because need for structure has been argued to associate with lower epistemic motivation (cf. Table 1), it follows that high epistemic motivation in groups helps (hurts) performance when tasks are (un)ambiguous and member input indispensability is high (low).

Synthesis

Across the board, prosocial rather than proself motivation helps groups reach high-quality judgments and decisions. When group tasks are ambiguous and of low urgency, high levels of epistemic motivation are key to harvesting the potential benefit of prosocial motivation.

When decision urgency is high or member input indispensability is low, however, high levels of epistemic motivation may be detrimental and groups reach better judgments and decisions when prosocial motivation is paired with low epistemic motivation.

CONCLUSIONS AND AVENUES FOR FUTURE RESEARCH

In their ground-breaking review on groups as information processors, Hinsz et al. (1997) noted that they did not consider motivational influences and recommended that others should examine these issues further. In the present article, we took this advice to heart and examined the influence of two global and distinct types of motivation—social motivation and epistemic motivation—on individual-level and group-level information processing, group judgment, and group decision making. The resulting approach shows that individual-level generating of creative ideas, individual-level information processing, group-level information dissemination, pooling and weighting of information, and group-level information integration in collective judgment and agreement are all a function of social motivation, epistemic motivation, and their interaction. The MIP-G model thus reveals that these two classes of motivation are critical both in isolation from each other (see Figures 2 and 3) and in combination (see Figure 1 and Table 2). Also, our review and reinterpretation of the existing research literatures revealed that high levels of epistemic motivation combined with a prosocial orientation may foster accurate information dissemination, creative ideation, and cooperative negotiation, provided the task has low decision urgency and member input indispensability is high. In the remainder of this section, we discuss group composition effects, address the place of affect and emotions in the emerging model, and discuss the possibility that different antecedents of epistemic motivation and social motivation may have different effects at times.

Group Composition Effects

Group members may differ in the level of epistemic motivation they bring to the table. Group members differ, a priori, in their openness to experience (Colquitt, Hollenbeck, Ilgen, LePine, & Sheppard, 2002), their uncertainty orientation (Hodson & Sorrentino, 1997), their need for cognitive closure (Kruglanski et al., 1993), or their need for cognition (Shestowsky, Wegener, & Fabrigar, 1998). In addition, group members may experience different time pressures (Baer & Oldham, 2006), differ in the extent to which they are held accountable for the decision-making process (Tetlock, 2000), or differentially perceive the task to be important

and interesting. Likewise, group members may have or adopt different social motives, with some having a prosocial motivation and others having a proself motivation. In short, because of temperament, socialization, or differences in environmental pressures, some group members may have high and others a low epistemic motivation, and some may have a proself and others a prosocial motivation.

To understand how group diversity in epistemic motivation affects information processing, and concomitant group judgment and decision making, it is useful to invoke the ST discussed earlier. Group members with higher STs will be less likely to accept shallow judgment and will lead the group toward more deliberate and systematic information processing. A handful of studies provide support for this idea. In dyadic decision making, members with high need for cognition are viewed by their discussion partners as being more effective persuaders and as generating more valid arguments than their counterparts with a low need for cognition (Shestowsky et al., 1998). Schei, Rognes, and Mykland (1996) studied negotiated agreement as a function of homogeneous versus heterogeneous need for cognition. Their results revealed that negotiation pairs in which the seller was high rather than low in epistemic motivation achieved higher joint outcomes; the epistemic motivation of the buyer did not affect joint outcome. Similar results were obtained by Ten Velden, Beersma, and De Dreu (2007b, Experiment 2). These authors manipulated process accountability so that both, one, or no member of the negotiation pair had high epistemic motivation. Results showed more information exchange and higher joint gain when at least one member had high epistemic motivation. Thus, these findings map onto the general idea that one group member with high epistemic motivation may elevate the information-processing activity in the group.

The evidence thus far has concerned dyadic decision making and it cannot be excluded that different patterns emerge in larger groups. In larger groups, members with high epistemic motivation may find themselves in a minority position, in which case they face the challenging task of persuading a majority to continue information processing. Or these members may have relatively low status within the group, which undermines the extent to which others attend to their messages. Group leaders are important in the management of information sharing. In particular, leaders ask more questions and repeat information more often than other group members (e.g., Larson, Christensen, Abbott, & Franz, 1996). It is possible that leaders stimulate information processing in groups because they raise the level of epistemic motivation (cf. van Ginkel & van Knippenberg, 2006). Clearly, research is needed to understand group composition effects of epistemic motivation.

With regard to group composition of social motivation, social dilemma research provides a solid basis for thinking. Kelley and Stahelski (1970) have argued and shown that a prosocial individual facing a prosocial counterpart maintains his or her cooperative stance, whereas a prosocial individual facing a proself counterpart switches to a noncooperation stance, too. Proself individuals do not seem to display this behavioral flexibility, and they maintain a noncooperative attitude regardless of whether their counterpart is prosocial or proself (for some refinements and elaborations, see Miller & Holmes, 1975). This behavioral asymmetry may be understood in functional terms. Proself individuals defend themselves against proself counterparts with noncooperative behavior and maximize personal gain by exploiting prosocial counterparts. Prosocial individuals, in contrast, seek to maximize joint gain by cooperating with prosocial counterparts, yet they defend themselves against exploitation by proself individuals by adopting a noncooperative stance themselves. This behavioral asymmetry has been identified in several settings, including two-person Prisoner Dilemma games (Kelley & Stahelski, 1970), *n*-person social dilemmas (Van Lange, 1992), information provision dilemmas (Steinel & De Dreu, 2004), and small-group negotiation (Ten Velden, Beersma, & De Dreu, 2007a).

Although not directly testing implications of group composition on individual- or group-level information processing, the preceding discussion strongly suggests that groups in which at least some members have a proself motive move toward a homogeneous proself-motivated group during group interaction. The implication is that, on average, groups develop a predominantly proself motivation despite the fact that at the outset more prosocial than proself members enter the group. It also means that competitive information will have higher salience and subjective value than cooperative information and that competitive information more easily crowds out cooperative information than vice versa. This fundamental asymmetry, which resonates with a general tendency to weigh negative, threatening information more than positive information (Kahneman & Tversky, 1979), may in fact represent one of the core hurdles for high-quality group decision making.

The preceding hypothesis regarding social motivation composition is largely based on studies examining interactions of fairly short duration. Consistent with work showing that opinion minorities who are consistent across time may change majority opinions, recent social dilemma research indicates that consistent cooperators serve as a model for other group members who, over time, tend to cooperate more also (Weber & Murnighan, 2006). Put differently, a particular behavioral or attitudinal stance adopted by a prosocial minority within the

group may block or reverse the tendency of heterogeneous groups to develop into predominantly proself motivation.

The Role of Affect

An important second area for future research concerns the relation among affect and emotions, motivation, and group information processing and decision making. Indeed, researchers have begun to address the effects of affect on group processes and outcomes (e.g., Barsade, Ward, Turner, & Sonnenfeld, 2000; Forgas & George, 2001; George, 1990; D. van Knippenberg, van Knippenberg, Van Kleef, & Damen, in press). It is interesting that some of the mood-related effects resonate with current conclusions about the roles of social motivation and epistemic motivation. For example, it has been argued that negative affect typically motivates more thorough processing of information and greater openness to new information than positive affect (Forgas & George, 2001; Schwartz, 1990), which may suggest that affect influences epistemic motivation and concomitant information processing in groups. Indeed, groups higher in negative affect engage in more group-level information processing and reach higher quality group decisions (Kooij-de Bode & van Knippenberg, 2006). Groups whose members were manipulated into a positive mood when compared with a neutral control condition were less likely to engage in deep and systematic information processing, exchanged more shared and less unshared information, and reached lower quality decisions (Kelly, 2006).

There is also some evidence that positive affect elicits prosocial motivation and cooperative behavior, whereas negative affect elicits more proself motivation and competitive behavior. Forgas and George (2001), Barsade et al. (2000), and George (1990), for instance, found more prosocial and cooperative behavior as a function of group members' level of positive affect. The available evidence thus supports the conclusion that affect and emotions, either dispositional or situationally determined, may influence both social motivation and epistemic motivation in groups. More research is needed, however, to substantiate this role of affect in group information processing and performance.

Are All Motives Equally Created?

The MIP-G model rests on the fundamental assumption that many different personality and situation variables feed into epistemic motivation and social motivation. Whereas the simple dichotomy in prosocial versus proself motivation has strong heuristic value and captures much of the past research we built on, future work may consider refinements of prosocial motivation and proself motivation. Throughout our analysis, we noted that proself motivation

may manifest itself in independent thinking and a focus on the self, but it sometimes also manifests itself in competition and explicit derogation of information and positions provided by other group members (cf. Table 2). We noted, for example, that a proself motive may be conducive to creative ideation as long as it does not give rise to derogation of others' inputs. In this instance, at least, it may be fruitful to decompose proself motivation into strictly individualistic orientations and strictly competitive orientations.

Related to this is whether the specific antecedents of social motivation have more or less identical effects. A meta-analysis of social motivation in negotiation suggested that many different antecedents of social motivation, including anticipated cooperative future interaction, reward structures, and third-party instructions had effects on the negotiation process and outcomes that were highly similar (De Dreu, Weingart, et al., 2000). However, it may be that regarding other group processes different antecedents of proself versus prosocial motivation exert qualitatively different effects, and this issue requires research. For example, culturally scripted mental sets may give rise to a proself (cf. individualistic cultural background) versus prosocial (cf. collectivistic cultural background) motivational orientation, as much as an individual versus collective reward system may do. However, culturally scripted social motivation may influence behavior in a more automatic and habituated manner than do temporarily induced reward systems. Also, there is evidence that collectivistic values drive toward prosocial motivation vis-à-vis in-group members but competitive motivation vis-à-vis out-group members, something a temporarily activated reward structure does not necessarily do. When it comes to searching and processing information provided out-group members, these different antecedents of social motivation may thus have qualitatively different effects. In general, we maintain that the broad distinction between proself and prosocial motivation accounts for and relates to a great variety of group processes and outcomes. However, when it comes to specific antecedents and specific dependent variables, qualifications and refinements of the MIP-G model will be expected.

A similar comment applies to the concept of epistemic motivation. We distinguished between high versus low epistemic motivation to capture the influence of a host of personality and situation variables known to influence the motivation to systematically and deliberately process available and new information. Kruglanski and Webster (1996) elaborated on specific forms of epistemic motivation and distinguished between nonspecific and specific need for closure (cf. Endnotes 3 and 5). As noted, our conception of epistemic motivation closely matches their notion of nondirectional motivation, and again, this proved to have strong heuristic value. However, future work may develop how our notion of epistemic motivation relates to the

freezing and seizing processes prominent in lay epistemic theory. Doing so will not only allow for further integration but will also permit a more dynamic perspective on the process of information processing in groups: When do group members stop searching and processing information? When do they (un)freeze? When and how does this affect group judgment and decision making?

Finally, it is important to note that although epistemic motivation and social motivation are independent forces, some antecedent conditions may influence both of them. Earlier we gave the example of political orientation that may give rise to particular combinations of epistemic motivation and social motivation (Jost et al., in press; see Endnote 1). But situations may have similar effects. For example, an emerging threat to the group's existence (e.g., a surprise attack by enemy forces) may reduce epistemic motivation and simultaneously increase prosocial motivation to coordinate and care for each other. Likewise, anticipating future interaction (vs. not) may increase both prosocial motivation and epistemic motivation. Thus, future work may identify antecedent conditions that affect both types of motivation simultaneously.

Conclusion

Social motivation and epistemic motivation were invoked to integrate and combine the separate and joint influences of a host of predictors of group judgment and decision making. Our MIP-G model enables us to understand in a parsimonious way the impact of personality variables such as social value orientation, agreeableness, openness to experience, need for cognition, and need for cognitive closure. In addition, our approach pulls together the possible influences of features of the situation under which groups operate, including competitive incentive systems, expectations of future interaction (process) accountability, time pressure and decision urgency, ambient noise, and preference diversity. Furthermore, the MIP-G model addresses several group-level processes, including group centeredness, information exchange, and group-level creative ideation. It indicates how these, alone and in combination, influence the quality of group judgment and choice given decisions of high or low urgency, and high or low member input indispensability. Finally, the model provides new explanations for existing phenomena and opens up new areas for research. As such, the MIP-G model integrates currently isolated theories on human information processing, social interdependency and negotiation, group-level information processing, and group decision making. This provides new insights into the interfaces between individual information processing and social interaction processes, and its effects on group judgment and decision making.

NOTES

1. The independence assumption does not exclude the possibility that situational or personality variables produce specific combinations of epistemic motivation and social motivation. For example, work by Jost et al. (in press) suggests that liberal political orientation is associated with high epistemic motivation and a prosocial value orientation, whereas a conservative stance is associated with lower epistemic motivation and more proself values. We return to this in the Conclusion.

2. In contrast to dual-process models that argue that people switch between heuristic and systematic information-processing modes, Kruglanski and colleagues (Kruglanski, Pierro, Mannetti, Erb, & Chun, in press; Kruglanski, Thompson, & Spiegel, 1999) have argued that the process is continuous, with more or less reliance on heuristic cues and on deliberate and systematic information processing. Here it is important that both approaches agree with the current position that individuals (and groups) may differ in how deliberate and systematically versus shallow and heuristically information is processed.

3. According to lay epistemic theory, it is also possible to have a need for specific cognitive closure, in which case the person seeks a specific (rather than an unspecific) answer. For reasons of brevity, we refer to the need for nonspecific cognitive closure as the need for closure.

4. The term *social motivation* is used in the game-theoretic sense, which essentially started with social psychological analyses of cooperation and competition by Deutsch (1949) and Messick and McClintock (1968). As such, it needs to be distinguished from the use of the same term in, for example, attribution theory (e.g., Weiner, 1995), interpersonal theories relating to self-related processes (e.g., Leary, Twenge, & Quinlivan, 2006), or work on inclusion and exclusion (Levine & Kerr, 2007).

5. In that respect, social motivation is related to the need for specific cognitive closure—the need to arrive at a specific answer (e.g., Kruglanski, 1989; see also Endnote 1). However, social motivation here refers to preferences for certain distributions of outcomes between oneself and others. Although this, as we argue, influences information processing, the concept is not tied to information processing or epistemic needs alone but is much broader. Also, our concept of social motivation is not tied to a sense of urgency (or lack thereof), whereas the need for specific closure motivates people to reach quick and permanent specific answers.

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