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Group Composition and Decision Making: How Member Familiarity and Information Distribution Affect Process and Performance

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This study examines the role of group composition and information distribution on group process and decision making. Three-person groups performed a decision task that involved solving a murder mystery (Stasser & Stewart, 1992). Groups were composed of (a) three individuals familiar to each other, (b) two familiar individuals and a stranger, or (c) three strangers. Prior to group discussion, evidence bearing on the case was either fully shared (all members possessed identical information) or partially shared (each member possessed several unique clues to which no other member had access). The results indicate that all-stranger groups were most likely to identify the correct suspect when information was fully shared, however, all-familiar and 2 familiar/1 stranger groups were most likely to identify the correct suspect when critical clues remained unshared. Group process analysis reveals that this pattern of results was due to an "aggregation strategy" on the part of strangers and an "information pooling strategy" on the part of groups composed of familiar individuals.

INTRODUCTION

The effectiveness of group decision process has become an increasingly important organizational concern. In response to growing demands for efficiency and flexibility, organizations are implementing teams to do much of the work traditionally accomplished by individuals (Boyett & Conn, 1992; Katzenbach & Smith, 1993). In part, this strategy is based on the assumption that decisions made by groups of employees with diversified expertise will be higher in quality than those made by employees with more homogenous backgrounds, or by any one employee (e.g., a manager) who might have access to the same knowledge but whose single organizational perspective would be more limited (Jackson, 1992).

In practice, unfortunately, these efforts are not always fruitful (Hackman, 1990). In groups that form through natural selection, the most common bases of member attraction are similarity (Ancona & Caldwell, 1992; Newcomb, 1961), proximity (Festinger, Schachter & Bach, 1950), and prior acquaintance (Mannix, Goins, & Carroll, 1996; Tenbrunsel, Wade-Benzoni, Moag, & Bazerman, 1994). These processes, while maximizing relationship potential, often minimize the potential for learning. The knowledge and perspectives of group members from the same social networks may be more redundant than diversified (Granovetter, 1973). Such groups are likely to experience positive affect, smooth interaction, and strong commitment, but they can also lack the diversity on which they were meant to capitalize, undermining their potential problem-solving effectiveness (Jackson, 1992).

A common organizational response to this problem is to design cross-functional teams, combining representatives of different organizational functions to insure diversity in knowledge and perspectives. But these heterogeneous groups exhibit additional prob-

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lems. For one, groups whose members know different facts are often ineffective at integrating their unique insights (Stasser & Titus, 1985). Studies of "information sampling" show that groups are especially ineffective at identifying and pooling the specialized information possessed by individual members (for a review, see Wittenbaum & Stasser, 1996).

In a variety of tasks requiring this type of information sharing, researchers have observed a tendency for groups to overemphasize the common knowledge members share prior to their interaction, and to underemphasize the unique knowledge to which only one member has access. During group discussion, the probability that a given piece of information will be mentioned increases with the number of members who are already aware of it (Hollingshead, 1993; Stasser & Stewart, 1992; Stasser, Taylor, & Hanna, 1989). Furthermore, the influence of an item that is mentioned increases with the number of people who already know about it (Gigone & Hastie, 1993). As a result, group discussions and group judgments are dominated by knowledge that members held in common prior to their meeting, while information of which most members are unaware (i.e., knowledge that is most informative) is discussed less often and has less influence.

Given the current organizational trend toward using groups for the explicit purpose of pooling unshared knowledge and information, the bias against the dissemination of unique information presents a formidable threat to the effectiveness of cross-functional teams, task forces, and other groups whose purpose is to learn through interaction. Yet the extent to which it occurs in such organizational groups has not been previously examined. The vast majority of research on information sampling has been conducted in laboratory experiments using ad hoc groups whose members were previously unacquainted (Wittenbaum & Stasser, 1996). In contrast, naturally occurring groups typically form on the basis of intact relationships that exist prior to and independent of the purpose of any given task (Ancona & Caldwell, 1992; Newcomb, 1961). It is therefore unclear whether groups whose members have prior relationships would fall prey to this particular problem.

In their review of the literature on information sharing in small groups, Wittenbaum and Stasser (in press) speculated that intact groups whose members have had prior interactions might be less susceptible to the problems observed in ad hoc groups because they might have better "meta-knowledge" of members' skills and talents. They reasoned that the presence of interpersonal knowledge among members of intact groups might facilitate the sharing of unique information through several potential mechanisms. These included better coordination of efforts (Stasser, Stewart, & Wittenbaum, 1995), greater willingness to deviate from behavioral norms (Schachter, 1959), and reduced cognitive constraint in response to anxiety (Carver & Scheier, 1981; Sanna & Shotland, 1990).

These considerations suggest that the effectiveness of group decision making can depend on how the group is composed (Argote & McGrath, 1993; Levine & Moreland, 1990; McGrath & Gruenfeld, 1993). Specifically, both the extent to which members know one another and the extent to which they hold common or specialized knowledge can affect how groups process information and make decisions. The study reported here was designed to examine the independent effects of these factors on group decision behavior. Toward this end, three-person groups composed of (a) three familiar members, (b) two familiar members and a stranger, or (c) three strangers performed a problem solving task in which members possessed (a) identical packets of complete information or (b) unique packets of partial information about the problem to be solved.

Theoretical Considerations

Groups composed of members who are familiar with one another are likely to differ from groups of unfamiliar members along several theoretical dimensions: interpersonal knowledge, interpersonal attraction, and member diversity.

Interpersonal knowledge. As noted by Wittenbaum and Stasser (in press), one way in which groups whose members have had prior interactions are likely to differ from groups of strangers is that the former are likely to possess more knowledge about one anothers' skills, perspectives, and interpersonal styles. This superior meta-knowledge can facilitate coordination of effort and improve the use of specialized information because members know where knowledge resides in the group (Stasser, Stewart, & Wittenbaum, 1995; Liang, Moreland & Argote, 1995; Orasanu & Salas, 1993; Wegner, 1986).

Interpersonal knowledge possessed by familiar group members should also reduce conformity, and the suppression of alternative perspectives and judgments (Asch, 1952; Nemeth, 1986; Schachter & Singer, 1962). When unfamiliar group members face an interactive task, they are as likely to be concerned with social acceptance as they are with task performance (Schachter, 1959; Deutsch, 1949) and will therefore be highly sensitized to social cues within the group (Sherif, 1936).

This enhanced sensitivity could affect the tendency to conform through two independent mechanisms. First, unfamiliar group members may experience eval-

uation apprehension and social facilitation (Zajonc, 1965), leading to the cognitive suppression of alternative perspectives and judgments (Carver & Scheier, 1981; Sanna & Shotland, 1990). Second, unfamiliar group members might attempt to behave like other group members, regardless of the nature of their private beliefs (Davis, 1973; Tanford & Penrod, 1984), to avoid social-norm violations that might lead to ostracism. Unfamiliar group members might therefore be reluctant to share or discuss information that is inconsistent with, or irrelevant with regard to, what others have mentioned or seem to believe (Baron, Kerr, & Miller, 1992). If either or both of these factors were operant, discussions in groups characterized by social uncertainty would exhibit a focus on common knowledge.

In contrast, interactions among familiar members are less ambiguous. Group members who have become familiar through training (Liang, Moreland, & Argote, 1995), prior work together (Goodman & Leyden, 1991; Kim, 1995), or through interaction prior to working together (c.f., Levine & Moreland, 1990) experience less uncertainty, and therefore less anxiety, than members of newly formed groups. This reduced anxiety alleviates cognitive constraint, thereby increasing the fluency and flexibility of group members' thoughts (Nemeth, 1986). In addition, familiar group members' knowledge about one another and what is or is not acceptable behavior in the group can innoculate them against the pressure to suppress unique information as a means of avoiding social ostracism. Consistent with this argument, in a longitudinal study of continuing work groups, those with stable membership experienced conflict more frequently than groups for which membership was characterized by instability and change (Arrow & McGrath, 1993). Similarly, Shah and Jehn (1993) found that groups composed of friends exhibited greater task and emotional conflict while working on a decision task than groups of strangers.

Thus, groups whose members possess the greatest amount of knowledge about one another should be less likely to exhibit the bias against sharing unique information than groups in which members know less about one another.

Interpersonal attraction. The effects of familiarity in groups are not necessarily positive however, particularly if the existance of important relationships leads members to value group cohesion over the quality of task performance. When relationships form naturally, people choose to have longer and more frequent interactions with people they like than with people they do not like. Furthermore, the more people are exposed to one another, the greater their attraction (Zajonc, 1968; Brockner & Swap, 1976). Groups composed of familiar members are therefore likely to exhibit greater interpersonal attraction and hence greater cohesion than groups of less familiar members (Flowers, 1977).

Janis (1982) argued that excessive cohesion among members was the critical determinant of groupthink, leading to a high frequency of defects in decision-making. In some studies of this phenomenon, dissenters in cohesive groups were more likely to be ostracized than dissenters in noncohesive groups (Cartwright, 1968; Schachter, 1951). Presumably this is because members of cohesive groups often sacrifice rigorous process for harmonious outcomes, which drives them to avoid internal conflict at all costs.

More recently, however, research on interpersonal attraction and decision making effectiveness has demonstrated that sometimes colleagues with positive relationships are actually better at managing conflict than groups of strangers (Valley, Neale, & Mannix, 1995). As noted earlier, Shah and Jehn (1993) found that groups composed of friends exhibited greater task and emotional conflict while working on a decision task than groups of strangers. Because the task required critical inquiry and analysis of assumptions, the conflict gave groups of friends a performance advantage. Similarly, Greenhalgh and Chapman (1993) showed that negotiators involved in cohesive relationships were more likely to share information and less likely to use coercive tactics than less familiar negotiators. This led indirectly to the attainment of integrative outcomes (through increased information exchange) and directly to positive negotiator affect because of an increased expectation about the continuance of the relationship (see also Murnighan & Conlon, 1991).

In sum, the effects of interpersonal attraction on vigilance in group decision making are mixed. When harmonious relations are more important than the quality of task performance, members are likely to suppress conflict and dismiss information that could incite it (Janis, 1982; Valley & Neale, 1993; see also Thompson & DeHarpport, 1990; Schoeninger & Wood, 1969; Fry, Firestone, & Williams, 1983). On the other hand, in task groups where members are friendly and the status of their relationships is not threatened by the process or outcome of the task, cohesion enables group members to surface and deal with conflict effectively.

Since conflict is necessary for diligent and thorough information processing, decisions made by groups in which members are friendly should be less susceptible to the bias against sharing unique information than decisions made by non-cohesive groups, whose members are unacquainted altogether.

Member diversity. Independent of the relative degrees to which familiar and unfamiliar group members

know and or like one another, groups differ in terms of the variance in knowledge and perspectives that members possess. Diversity in groups can be a function of demographics, experience, expertise, values, interpersonal style, and access to information (McGrath, Berdahl, & Arrow, 1994). While some of these factors should facilitate effective information processing, others actually hinder it.

Varied experience and or expertise can be advantageous for group problem solving when the diversity increases the likelihood that one member will be correct (Jackson, 1992). In addition, heterogeneous groups outperform homogeneous groups on tasks requiring creative problem solving and innovation, because the expression of alternative perspectives can lead to novel insights (Nemeth, 1986). However, as noted earlier, groups whose members are unfamiliar and dissimilar also suffer from greater process losses and lower cohesion than homogeneous groups (Goodman & Shah, 1992).

Despite the presence of these important findings, neither the critical dimensions of diversity, nor the mechanisms by which its performance benefits are realized, are fully understood (McGrath, Berdahl, & Arrow, 1994). One common explanation for how diversity enhances problem solving in groups is through the presence of cognitive conflict (Damon, 1991; Levine & Resnick, 1993). In group decision making for example, a devil's advocate can reduce the incidence of groupthink (Janis, 1982) by surfacing faulty assumptions and disconfirming evidence. Similarly, a vocal deviate who proposes unusual and even incorrect solutions during problem solving can lead groups to generate more arguments (Smith, Tindale & Dugoni, 1993), apply more strategies (Nemeth & Wachtler, 1983), detect more novel solutions (Nemeth & Kwan, 1987), use multiple perspectives simultaneously (Gruenfeld, 1995; Peterson & Nemeth, 1996), and generally outperform groups without this type of influence.

Theoretically, these effects depend on the concurrence of two factors: the *presence* of cognitive conflict and its effective *resolution*. Group composition in general, and diversity in particular, can have independent effects on each. Since a critical determinant of attraction is similarity (Ancona & Caldwell, 1992; Newcomb, 1961), group members who have become familiar through natural means are likely to have more knowledge, beliefs, attitudes, values, and background variables in common than group members who have not already established relationships. Hence, groups of strangers are more likely to possess conflicting viewpoints than groups with less compositional diversity.

As noted earlier however, groups of strangers are less proficient at resolving conflicts than groups whose members are familiar (Shah & Jehn, 1993; Greenhalgh & Chapman, 1993). They face greater uncertainty and may therefore be more likely to suppress conflicting facts and viewpoints than groups whose members know one another better (Wittenbaum & Stasser, in press). In addition, groups whose members are unacquainted represent different social networks, and may therefore categorize one another as "outgroup" members. This might make groups of strangers more likely to polarize in the face of conflict than groups whose members have prior social ties (Tajfel, 1982). Groups composed of strangers might also use stereotypes to interpret one anothers' behaviors (Pettigrew, 1979), particularly if they attribute differences in knowledge and expertise to differences in values and preferences. Hence, while the diversity embedded in groups of strangers increases the incidence of latent, cognitive conflicts, it decreases the likelihood that such conflicts will be effectively expressed and resolved.

Thus, the effects of compositional diversity might interact with the effects of information distribution in affecting group information sharing and performance. Specifically, a lack of diversity in social ties should help familiar members introduce and resolve cognitive conflicts when information is distributed among them. However, when familiar members possess redundant information, they may lack the diversity in perspectives to evaluate it thoroughly. In contrast, when groups of strangers with diverse backgrounds and no social ties are burdened by inconsistent facts as well, their shared ability to pool and reconcile the apparent inconsistencies may be overwhelmed by anxiety and discomfort.

Summary. The effects of member familiarity on group process and performance in a task requiring the pooling of unique and common knowledge can be summarized by the following predictions:

H1. Given that member familiarity leads to greater group cohesiveness through interpersonal attraction, members of familiar groups will exhibit more facility and less discomfort with the expression and resolution of conflict than less familiar groups. Specifically, groups with three familiar members should be more comfortable working together and more free to express disagreement than groups with two familiar members, or groups with no familiar members, respectively.

H2a. To the extent that members' prior relationships in this study reflect primarily increased knowledge of one anothers' skills and styles of interaction, familiar groups will outperform less familiar groups because this knowledge should reduce process losses that occur in unfamiliar groups. Specifically, groups with three familiar members should pool information and therefore solve the problem more effectively than groups with two familiar members, or with no familiar members, respectively.

H2b. Alternatively, given that greater diversity in the personal attributes of strangers leads to the presence of alternative perspectives, groups of strangers will outperform less diverse (i.e., more familiar) groups when members possess redundant knowledge. However, when cognitive conflicts exist because the knowledge and facts possessed by members are inconsistent, familiar group members will be better at introducing and reconciling those conflicts than groups of strangers. Specifically, groups with either compositional or informational diversity, but not both (i.e., familiar members with unique information or strangers with common information), will outperform groups with (a) both compositional and informational diversity (i.e., strangers with unique information), or (b) neither compositional nor informational diversity (familiar members with common information).

METHOD

Overview

In the experiment conducted to test these hypotheses, three-person groups performed a decision task that involved solving a murder mystery (Stasser & Stewart, 1992). Groups were composed of (a) three individuals familiar to each other, (b) two familiar individuals and a stranger, or (c) three strangers. Prior to group discussion, evidence bearing on the case was distributed independently to each individual. Each participant was given either "full information" about the case, so that all group members possessed the exact same information, or "partial information," so that each group member possessed several unique clues to which no other member had access. Group members considered their own information packets privately, and reported individual judgments about the identity of the prime suspect. Afterward, they participated in a group discussion and reached a group decision about the suspect's identity.

Subjects

Subjects were 213 Executive MBA students at two Midwestern business schools. The Executive MBA program comprises individuals with at least 10 years of managerial experience who are currently working and attending school part-time. Twenty-five percent of the sample was female; the average age of the subjects was 40 years. There were 71 three-person groups distributed into 6 experimental cells, with 11-14 groups in each of the cells.

Decision Task

Subjects read a series of interviews from a homicide investigation. These interviews were presented in a booklet that included supporting materials such as a list of characters, a map, a handwritten note and a newspaper article (exercise provided by Garold Stasser, see Stasser & Stewart, 1992). These interviews contained 24 clues that were either incriminating or exonerating for each of three suspects ("Suspect 1," "Suspect 2," "Suspect 3"). Specifically, there were 6 incriminating clues about each suspect, but there were also 3 clues that exonerated Suspect 2 and 3 clues that exonerated Suspect 3. Therefore, the set of 24 clues was designed so that Suspects 2 and 3 could be ruled out. In addition, all of the clues considered together supported the conclusion that Suspect 1 had both motive and opportunity to commit the crime. Hence, Suspect 1 was the correct choice.

Procedure

Subjects participated in the task as part of a classroom exercise on group decision making. Participants individually read and reviewed the materials for approximately 30 min. During this time they completed a private, prediscussion questionnaire. On this questionnaire, subjects were asked to ". . . check the name of the one suspect you personally believe murdered" the victim. Subjects were also asked to provide a brief, written rationale for their decision.

Subjects were then divided into three-person groups and were given 40 min to reach agreement on which one of the suspects had committed the murder. They were permitted to refer to the material in their evidence packets during the group discussion. Afterward, participants individually filled out a postdiscussion questionnaire in which they reported the group decision, indicated how well they knew and worked with each of the group members, and answered a variety of questions assessing their group's task performance and management of information.

Experimental Manipulations

Group composition. Groups were composed of either three familiar individuals (the familiar condition), two familiar individuals and one stranger (the mixed condition), or three strangers (the stranger condition). Membership was assigned using data from a network questionnaire that students completed one week prior to the murder mystery task. On the first page of the questionnaire subjects were asked to (1) list up to 10 people in the class whom they were "close to" and (2) circle anyone with whom they socialized outside of school or work. The names of all the students in the course were listed on subsequent pages. Students were asked to indicate how well they knew each person in the class by checking one of four responses: (1) do not

TABLE 1

Prediscussion Suspect Choices as a Function of Information Distribution

	Suspect 1 (Eddie)	Suspect 2 (Billy)	Suspect 3 (Mickey)	Other[a]
Information condition				
Full	54	08	12	37
Partial	33	21	16	32

[a] Most selections in this category reflect the choice of more than one suspect.

know, (2) acquaintance, (3) know well, or (4) know very well.

Familiar individuals were defined as individuals who named each other on the first page and who indicated that they knew each other "very well" on the class list. Strangers were defined as individuals who did not list each other on the first page and who indicted that they "did not know" each other at all on the class list.

Information distribution. Each subject's information booklet contained several pages of evidence, some of which was critical for solving the problem, and some of which was not critical. A total of nine critical clues were necessary to identify Suspect 1 as the guilty party. Three of those clues incriminated Suspect 1, and the other six exonerated Suspects 2 and 3, respectively.

In the full-information condition, each of the three group members had full information, including all nine incriminating and exonerating clues. In the partial-information condition the nine critical clues were distributed among group members so that each member of a three-person group received one-third of the critical evidence: One member of the group received the three exonerating clues for Suspect 2, a second received the three exonerating clues for Suspect 3, and the third received the three incriminating clues for Suspect 1. Thus, the critical clues possessed by each member were completely non-redundant, but all nine clues were distributed within the group.

RESULTS

Prediscussion Choices

After reading the murder mystery task materials and before group discussion, participants indicated their private beliefs as to who had committed the murder. Table 1 shows the prediscussion suspect choices by subjects with full and partial information. Of the 213 subjects, 87 correctly identified Suspect 1, while 126 chose other suspects. Of the 87 correct choices, 54 were in the full-information condition, while 33 were in the partial-information condition, and this difference was statistically significant (χ^2 (1, N = 213) = 5.84, $p < .01$). Before the discussion, subjects were unaware of the group composition; therefore, only information distribution could logically affect prediscussion choices.

Manipulation Checks

Group composition. To confirm the effectiveness of the group composition manipulation, a post-task questionnaire item asked group members how well they knew one another on a scale from 1 (not at all well) to 7 (extremely well). Following Rousseau's (1985) recommendations for cross-level analyses, the level of analysis for all questionnaire items is at the group level. Therefore, to test the effects of group composition (familiar versus mixed versus stranger conditions) on group members' knowledge of one another, the dependent variable is the mean of the group members' responses. An Analysis of Variance (ANOVA) revealed a main effect for group composition, such that groups in the familiar condition perceived that they knew one another better (M = 5.75, SD = 0.84) than mixed groups (M = 4.01, SD = 0.73) and stranger groups (M = 3.32, SD = 0.75) ($F(2, 63) = 58.29$, $p < .001$). Planned comparisons indicate that these effects are significant for familiar versus stranger groups ($F(1, 66) = 108.52$, $p < .001$), familiar versus mixed groups ($F(1, 66) =$ 58.06.95, $p < .001$), and mixed versus stranger groups ($F(1, 66) = 8.95$, $p < .005$).

Information distribution. To confirm that subjects were aware of the similarity or differences in the contents of their evidence packets, subjects were asked to what extent they believed that the information in their packet was the same as that in others' packets. A group-level ANOVA was conducted examining the effects of information distribution and group composition on perceived similarity of the information. The results show a main effect for information distribution only, such that groups in the full-information condition perceived more similarity among their materials (M = 5.36, SD = 1.82) than subjects in the partial information condition (M = 2.90, SD = 1.68) ($F(1, 61) = 30.05$, $p < .001$).

Member Ratings of Group Process

Hypothesis 1 predicted that familiar groups would exhibit greater facility and less discomfort expressing and resolving conflict than less familiar groups. A group-level MANOVA was conducted to examine the effects of group composition and information distribu-

tion on group members' post-task responses to the following questions: (1) To what extent was the group comfortable working together? (2) To what extent did individuals feel free to disagree with one another? and (3) To what extent were group members open to learning from one another? In support of Hypothesis 1, the overall results of the MANOVA reveal a main effect for group composition only ($F(6, 124) = 4.10$, $p < .001$). Univariate tests indicate that familiar groups reported being more comfortable ($M = 6.50$, $SD = 0.49$) than mixed groups ($M = 5.89$, $SD = .80$) and stranger groups ($M = 5.56$, $SD = .76$), ($F(2, 64) = 10.82$, $p < .001$). Planned comparisons indicate that these effects are significant for familiar versus stranger groups ($F(1, 67) = 21.05$, $p < .001$), familiar versus mixed groups ($F(1, 67) = 9.31$, $p < .005$), but not for mixed versus stranger groups ($F(1, 67) = 2.57$, n.s.).

Univariate tests also indicate that group composition had a significant effect on ratings of comfort expressing disagreement ($F(2, 64) = 5.41$, $p < .01$). Familiar groups reported greater comfort expressing disagreement ($M = 6.50$, $SD = 0.58$) than mixed groups ($M = 6.37$, $SD = 0.44$) and stranger groups ($M = 6.00$, $SD = .54$). Planned comparisons indicate that these effects are significant for familiar versus stranger groups ($F(1, 67) = 10.38$, $p < .005$), and mixed versus stranger groups ($F(1, 67) = 5.84$, $p < .05$), but not for familiar versus mixed groups ($F(1, 67) < 1$, n.s.). Univariate tests reveal that the effects of group composition on reported openness to learning did not reach significance ($F(2, 64) = 2.13$, n.s.), although the pattern of means was in the predicted direction.

Group members were also asked (1) how effectively they worked with each group member and (2) how effectively the group worked as a unit. A group-level ANOVA indicates that groups in the familiar condition perceived that they worked with other group members more effectively ($M = 5.71$, $SD = 0.91$) than mixed groups ($M = 5.28$, $SD = 0.88$) and stranger groups ($M = 4.75$, $SD = 0.71$) ($F(2, 64) = 7.23$, $p < .001$). Planned comparisons indicate that these effects are significant for familiar versus stranger groups ($F(1, 67) = 14.77$, $p < .001$), mixed versus stranger groups ($F(1, 67) = 4.60$, $p < .05$), and marginally significant for familiar versus mixed groups ($F(1, 67) = 3.02$, $p < .09$).

Familiar groups also perceived that they worked as a unit more effectively ($M = 6.11$, $SD = .87$) than mixed groups ($M = 5.69$, $SD = .86$) and stranger groups ($M = 5.39$, $SD = .79$) ($F(2, 62) = 4.10$, $p < .05$). Planned comparisons indicate that these effects are significant for familiar versus stranger groups ($F(1, 65) = 8.24$, $p < .005$), marginally significant for familiar versus mixed groups ($F(1, 65) = 2.85$, $p < .09$), and did not reach significance for mixed versus stranger groups ($F(1, 67) = 1.44$, n.s.).

In sum, these results are consistent with Hypothesis 1. Familiar groups felt significantly more comfortable working together, more comfortable expressing disagreement and more effective than groups of strangers. Familiar groups also scored higher on these items than mixed groups, although the differences were rarely significant.

Group Decision Quality

Hypothesis 2a predicted that groups composed of familiar members would be more likely to reach the correct group decision than groups composed of strangers. Alternatively, Hypothesis 2b predicted that groups with either compositional or informational diversity, but not both would outperform groups with either (a) both compositional and informational diversity or (b) neither compositional nor informational diversity. Table 2 displays the group suspect choices as a function of group composition and information distribution. Of the 71 groups, 37 correctly identified Suspect 1, while 34 chose other suspects. The log-linear analysis reveals a significant three-way interaction between group composition, information distribution and group suspect choice, χ^2 ($df = 5$, $N = 71$) $= 21.03$, $p < .001$). Consistent with Hypothesis 2b, stranger groups chose the correct suspect much more often in the full-information condition ($n = 10$, 90.9%) than in the partial-information condition ($n = 3$, 27.3%). By contrast, familiar groups chose the correct suspect more often in the partial-information condition ($n = 8$, 66.7%) than in the full-information condition ($n = 4$, 33.3%). The mixed groups show a similar pattern of results to the familiar groups; in the full-information condition, mixed groups selected the correct suspect 35.7% of the time ($n = 5$) versus 63.6% of the time in the partial-information condition ($n = 7$).

Post-Hoc Analyses: Group Decision Strategies

The results reported above are consistent with Hypothesis 2b: Stranger groups chose the correct suspect much more often in the full-information condition than in the partial-information condition, whereas familiar and mixed groups chose the correct suspect more often in the partial-information condition than in the full-information condition. To understand this outcome, we performed some exploratory analyses on the group suspect choices.

Effects of prediscussion preferences. First, we examined the pre-discussion suspect choices of the group members and calculated whether there was a predis-

TABLE 2

Postdiscussion Suspect Choices as a Function of Group Composition and Information Distribution

	Suspect 1 (Eddie)	Suspect 2 (Billy)	Suspect 3 (Mickey)	Other[a]
Condition				
All familiars				
Fully shared	4	2	2	4
Hidden profile	8	0	0	4
Mixed (2 Familiar/1 Stranger)				
Fully shared	5	0	3	6
Hidden profile	7	0	2	2
All strangers				
Fully shared	10	0	0	1
Hidden profile	3	2	3	3

[a] Most selections in this category reflect the choice of more than one suspect.

cussion majority preference for any suspect. In 48 of the 71 groups there was a majority preference: Two groups began with a majority for Suspect 3, 5 groups with a majority for Suspect 2, 16 groups with a majority for a joint effort by multiple suspects (Other) and 25 groups with a majority for Suspect 1. The 23 remaining groups had no prediscussion majority preference. Of the 25 groups with a prediscussion majority favoring Suspect 1 (the correct suspect), most (n = 18, 72%) were in the full-information condition; only seven groups (28%) were in the partial-information condition, and this difference was significant (χ^2 (df = 1) = 6.11, $p < .01$).

Table 3 shows the relationship between pre-discussion majority preferences and postdiscussion suspect choices. Groups in which a majority favored the correct suspect (Suspect 1) before discussion were highly likely to choose Suspect 1 as a group, while other groups showed no clear relationship between prediscussion individual choices and post-discussion group choice, χ^2 (df = 12) = 29.08, $p < .005$. This can be seen more clearly by looking at the number of group members who enter the group discussion having identified the correct suspect. Twelve groups started the discussion with zero group members who had individually identified the correct suspect. Of these, five groups (41.7%) ended by correctly identifying Suspect 1 as the killer. Thirty-four groups began with only one group member who had individually identified the correct suspect. Of these, 13 groups (38.2%) correctly identified Suspect 1. Twenty-two groups had two people who were individually correct, and 17 of these groups (77.3%) identified the correct suspect. Finally, three groups began with all group members correctly selecting Suspect 1, and all of these groups (100%) came up with the right suspect. A χ^2 analysis indicates that the number of group members who identified the correct suspect before discussion had a significant influence on whether the group would arrive at the correct answer, χ^2 (df = 3) = 11.47, $p < .01$.

TABLE 3

The Relationship of Prediscussion Majority to Postdiscussion Group Suspect Choice

Prediscussion majority	Suspect 1 (Eddie)	Suspect 2 (Billy)	Suspect 3 (Mickey)	Other[a]
Suspect 1	21	0	2	2
Suspect 2	3	1	1	0
Suspect 3	0	0	1	1
Other	4	1	1	10
None	9	2	5	7

[a] Most selections in this category reflect the choice of more than one suspect.

We next examined the effects of prediscussion majority, group composition and information distribution on the group suspect choice. Although the cell sizes are too small to do conventional statistical tests, suggestive patterns can be discerned. Of the 25 groups that began with a correct pre-discussion majority, 21 (84%) correctly identified Suspect 1 as the killer. Of the four incorrect choices, three occurred under fully-shared information: two in mixed groups and one in a stranger group. One incorrect choice occurred under partially shared information in a mixed group.

The more interesting category to examine is the 46 groups that did not have a correct prediscussion majority. Sixteen of these groups arrived at the correct group suspect: four in the full-information condition and 12 in the partial-information condition; three in stranger groups, five in mixed groups and eight in familiar

groups. An interesting pattern of interactions seems to occur in these groups. In the full-information condition, stranger groups are very likely to arrive at the correct group suspect choice (n = 3/3, 100%), while mixed groups (1/8, 12.5%) and groups of familiars (n = 0/8, 0%) are highly unlikely to do so. By contrast, in the partial-information condition, familiar groups are very likely to arrive at the correct suspect (n = 8/12, 66.6%), while mixed groups (n = 4/7, 57.1%) are less likely to do so, and groups of strangers are never able to identify the correct suspect (0/8, 0%). This result for groups with no correct prediscussion majority parallels the overall result for group decision quality reported above, in which there was a significant three-way interaction among group composition, information distribution, and group suspect choice.

Group decision process. The above examination of the relationship of prediscussion majority preferences to the group suspect choice makes it possible to infer two different group decision processes. In one case, the group chose the suspect (whether correct or incorrect) favored by the majority of individual members prior to discussion. We label this an aggregation process, in which individual preferences were reported and combined using a "majority wins" rule (Gigone & Hastie, 1993). In other groups, however, the final group suspect choice did not reflect a prediscussion majority. In these groups there was either no prediscussion majority, or there was a majority, but the final group choice did not reflect that majority. In these groups it was necessary to go beyond simple aggregation and pool information by sharing and integrating individual knowledge (Stasser & Titus, 1985).

Aggregation. As noted above, 48 of the 71 groups studied began with a prediscussion majority. Of these, 29 chose the suspect favored by the majority of individuals prior to discussion. This aggregation process led to identification of the correct suspect (Suspect 1) in 21 groups (72.4% of the time when it was used). Not surprisingly, aggregation occurred more often in the full-information condition (when individuals saw identical information prior to discussion, n = 21, 72.4%) than in the partial-information condition (n = 8, 27.6%). This was true for all three group composition types: stranger groups were more likely to aggregate in the full-information (n = 7, 63.6%) than partial-information condition (n = 4, 36.4%); mixed groups were more likely to aggregate in the full-information (n = 8, 72.7%) than in the partial-information condition (n = 3, 27.3%), and familiar groups were more likely to aggregate in the full-information (n = 6, 85.7%) than partial-information (n = 1, 14.3%) condition. Collapsing across information-distribution conditions, groups of strangers and mixed groups were more likely to use aggregation (n = 11, 37.9% for each condition), than groups of familiar members (n = 7, 24.1%).

Pooling. The remaining 42 groups went beyond a simple aggregation strategy. Twenty-three of these groups began without a pre-discussion majority, eliminating aggregation as a possible strategy. In the 19 remaining groups there was a prediscussion majority; however, the final group choice did not reflect that majority. In these groups it can be said that information was pooled; that is, individual knowledge was shared and integrated systematically, using rules of logic and reasoning (Stasser & Titus, 1985). In some cases this led the group to identify the correct suspect, which we label accurate pooling, and in others an error occurred leading to the choice of an incorrect suspect, which we label inaccurate pooling.

Sixteen of these 42 groups were able to pool information accurately and identify the killer. Accurate pooling was more likely to occur in the partial-information condition (n = 12/37, 32.4%) than in the full-information condition (n = 4/34, 11.8%). This pattern also varied as a function of group composition. Accurate pooling was most common in familiar groups (n = 8/24, 33.3%), followed by mixed groups (n = 5/25, 20.0%), and was least common in stranger groups (n = 3/22, 13.6%). In addition, accurate pooling was more likely to occur in both familiar and mixed groups in the partial-information condition (n = 8/24, 33.3%; n = 4/25, 16.0%, respectively), where the pooling strategy was more likely to have had an impact, than in the full-information condition (n = 0/24, 0%; n = 1/25, 4.0%, respectively). In contrast, stranger groups were less likely to pool accurately in the partial-information condition (n = 0/22, 0%) than they were in the full-information condition (n = 3/22, 13.6%).

Inaccurate pooling (n = 26) occurred more often than accurate pooling (n = 16), and inaccurate pooling was less likely to occur in the full-information condition (n = 12/37, 32.4%) than in the partial-information condition (n = 14/34, 41.2%). Group composition did not affect inaccurate pooling, which occurred at the same rate in stranger groups (n = 8/22, 36.4%), in mixed groups (n = 9/25, 36.0%), and in familiar groups (n = 9/24, 37.5%). However, the impact of information distribution on inaccurate pooling differed depending on group composition. Whereas familiar and mixed groups were more likely to pool inaccurately in the full-information condition, (n = 6/12, 50.0%; n = 5/14, 55.5%, respectively) than in the partial-information condition (n = 3/12, 25.0%; n = 4/11, 36.4%, respectively), stranger groups were more likely to pool inaccu-

rately in the partial-information condition (n = 7/11, 63.6%) than in the full-information condition (n = 1/11, 9%).

Group Evaluations of Outcomes

To assess the extent to which groups were aware of their own process and performance effectiveness, participants were asked: (1) to what extent they were confident that the group had identified the correct suspect and (2) to what extent group members were more concerned with "winning" arguments than identifying the correct suspect. A group-level MANOVA was conducted to examine the effects of group composition and information distribution on both questions. The overall results reveal a marginal interaction between information distribution and group composition ($F(4, 122) = 2.00$, $p < .09$).

The univariate tests reveal a significant group composition × information distribution interaction on confidence ($F(2, 62) = 2.49$, $p < .05$). The pattern of this interaction suggests that groups' perceptions of their own behavior reflected their actual performance. Stranger groups were more confident that they were correct when members had full information ($M = 4.33$, $SD = 1.09$) than when members had partial information ($M = 3.48$, $SD = 1.28$). In contrast, members of familiar groups were more confident when members had only partial information ($M = 4.80$, $SD = .88$) than when all information was shared ($M = 4.12$, $SD = 1.33$). For the mixed-group condition information distribution had little effect on confidence ratings ($M = 4.81$, $SD = 1.18$ vs $M = 4.77$, $SD = .97$). The effects of information condition on confidence ratings are marginally significant for stranger groups ($F(1, 62) = 2.92$, $p < .09$), but do not reach significance for familiar ($F(1, 62) = 2.08$, n.s., or mixed groups ($F(1, 62) > 1$, n.s.). The univariate tests for the "winning" of arguments question did not reach significance, although the pattern of means for the interaction of group composition and information distribution was the same as for confidence.

Finally, subjects were asked to indicate the extent to which they were satisfied with the outcome of the group task. An ANOVA was conducted to examine the effects of group composition and information distribution on satisfaction. The results reveal a main effect for group composition, such that stranger groups were least satisfied ($M = 4.94$, $SD = 1.05$), followed by mixed groups ($M = 5.55$, $SD = .92$) and familiar groups ($M = 5.68$, $SD = 1.03$) ($F(2, 63) = 3.52$, $p < .05$). Planned comparisons indicate that these effects are significant between familiar and stranger groups ($F(1, 66) = 6.13$, $p < .01$), mixed and stranger groups ($F(1, 66) = 4.32$, $p < .05$), but did not reach significance between familiar and mixed groups ($F(1, 66) > 1$, n.s.).

DISCUSSION

The purpose of this study was to examine how member familiarity affects group decision processes under different information distribution conditions. In general, we expected familiar groups to outperform stranger groups when members possessed unique information because of their greater willingness to address conflict and pool unique information, when necessary, to reach high quality outcomes. However, we suspected that when the knowledge members possessed was completely redundant, familiar members might lack the cognitive conflict necessary to engage in thorough information processing, and might therefore do less well than strangers, who would be more likely to bring multiple perspectives to bear on the knowledge they shared in common.

This research question addresses the generalizability of prior conclusions regarding the ineffectiveness of group decision making, which are based primarily on studies using groups of strangers performing unfamiliar tasks (Goodman & Shah, 1992; McGrath, 1991, 1993). These unfamiliar groups have not fared well on the whole, performing only at or slightly above the level of the average member, and rarely reaching the level of the best member, let alone exceeding it (Hill, 1982; Laughlin, 1980; McGrath, 1984; Tindale, 1993). On information sharing tasks, groups of strangers have typically failed to pool unique information effectively, emphasizing common knowledge in discussion instead, and aggregating judgments rather than sharing evidence (Gigone & Hastie, 1993).

The findings reported here help define the scope of, and contingencies underlying, these problems. On the whole, they speak to the importance of group composition as a determinant of group decision process and performance (Levine & Moreland, 1990; McGrath & Gruenfeld, 1993). Although member relationships are a ubiquitous characteristic of work groups in organizational contexts, they are rarely examined in the group decision literature. Usually, members of laboratory groups are randomly assigned to minimize the effects of participants' relationships, including interpersonal knowledge, attraction, and similarity, which are often confounded in the real world. Our study represents a significant departure from this tradition. By controlling for both the existence of members' relationships, and the redundancy of members' knowledge, we were able to distinguish between the independent effects of these factors.

Consistent with previous research, groups of strangers in our study were more likely to aggregate their individual choices and adopt the majority preference than to pool their unique information and discover the

correct choice. In contrast, groups whose members were familiar were more likely to pool their knowledge under partial-information conditions, where it was necessary to solve the mystery, than under full-information conditions, where aggregation should effectively lead to the correct decision.

The fact that these information pooling problems were less evident in familiar groups suggests that familiarity among group members can serve as a buffer against dysfunctional responses to normative influence, at least when members possess different sets of facts. This inference is consistent with our predictions that familiar group members, who have already achieved social acceptance, would be less prone toward conformity than members of stranger groups (Schachter, 1951). Responses to postdiscussion questions support this premise. Familiar group members were more comfortable disagreeing with one another than groups whose members were unacquainted and were, therefore, forming first impressions during the task. The greater the number of familiar members in a group, the more comfortable they were expressing disagreement, the more open they were to learning from one another, the more they enjoyed working together, and the greater their satisfaction with outcomes.

The effects of familiarity were not universally positive however, and this result further enriches prior conclusions from research on group information sharing. Gigone and Hastie (1993) argued that information-sharing problems occur not because of ineffective pooling, but rather because group members aggregate their individual responses rather than discussing evidence. They called this tendency the Common Knowledge Effect (CKE). To the extent that this is true, it is most likely to occur in full-information conditions, where the knowledge possessed by group members is completely redundant. In fact, groups of strangers outperformed groups whose members had prior relationships under these conditions. This finding is consistent with research from several paradigms, demonstrating that heterogeneous groups outperform homogeneous groups on creative and intellective problem solving tasks (Hoffman, 1979; Hoffman, Harburg, & Maier, 1962; Hoffman & Maier, 1961; Nemeth, 1986; 1992). Apparently, the personal-attribute diversity embodied by groups of strangers, who represent heterogeneous social networks, increases the probability that members will question one anothers' judgments when information diversity is low. While this heterogeneity appears to hinder the pooling of evidence, it apparently improves the aggregation of judgments.

In sum, these results suggest that discussions of composition and diversity in groups might benefit from a multidimensional approach. The effects of personal-attribute diversity, and the effects of knowledge diversity, appear to have interactive effects. When group members are familiar (i.e., when personal-attribute diversity is low), they are likely to outperform groups of strangers when members possess inconsistent evidence (i.e., when informational diversity is high). In contrast, when group members are unacquainted (i.e., when personal-attribute diversity is high), they are likely to outperform groups of friends when members possess common knowledge (i.e., when informational diversity is low). Groups in previous information sharing studies were diverse in both respects; groups that form through affiliation in organizations are likely to be diverse in neither respect. Our results help explain why the performance of both is often characterized as suboptimal.

Implications for Future Research

In considering the implications of these findings for future research, a number of issues become salient. The fact that relationships among familiar group members are characterized by greater interpersonal knowledge, attraction, and similarity than relationships among unfamiliar group members suggests that the behavior of familiar group members is more predictable than the behavior of strangers. Hence, familiar group members are likely to trust one another more than unfamiliar group members (Davis & Todd, 1985; Pruitt & Kimmel, 1977). Trust depends on one's confidence "that one will find what is desired from another, rather than what is feared" (Deutsch, 1973). It is facilitated by opportunities to communicate (Dawes, McTavish & Shaklee, 1977; Rapaport, 1974) and increases the willingness to accept others' statements at face value (Uzzi, 1996).

When accepting anothers' statements at face value facilitates the exchange and consideration of important information, trust among members should improve the quality of group outcomes. This might occur, for example, when group members possess discrepant facts (i.e., unique information), because, much like the effects of reduced anxiety and diminished pressure to conform discussed earlier, trust among members might facilitate the extent to which these facts are (a) introduced and (b) seriously considered.

Group members may be more likely to consider and treat seriously the unique evidence introduced by a trusted source than they would if the same information were presented by someone less credible. When surprising facts and perspectives are introduced by a stranger, they are likely to be dismissed as aberrant or idiosyncratic behaviors. In contrast, the facts presented by a trusted source are more likely to be ac-

cepted at face value than those presented by a stranger. Such facts will have to be reconciled with what others already know, which may involve reconceptualizing the problem to account for how both could be true. Thus, trust should lead to better performance when information diversity is high in familiar groups, whose personal attribute diversity is relatively low, than in stranger groups, who are less likely to exchange their unique facts effectively.

However, when trust leads to the face-value acceptance of inaccurate or ill-founded judgments, its effects will not be positive. When group members have identical information in addition to similar values and perspectives, there are no discrepant facts to be considered, no conflict to be resolved, and nothing to learn. In these conditions, discussions will focus on judgments, rather than facts (Gigone & Hastie, 1993). Groups whose members accept one anothers' judgments at face value will be less likely to engage in rigorous information processing than groups who trust one another less. Variance in members' judgments will appear to be a matter of opinion, and may therefore be resolved using a simple aggregation rule such as "majority wins." In contrast, group members who are unfamiliar and consequently trust one another less, are more likely to question and challenge one anothers' judgments, increasing the probability that the group will collectively consider all of the pertinent facts to which they have common access. If this were the case, a lack of trust should lead to better performance by groups of strangers than groups of familiar members when information diversity is low and members possess redundant knowledge.

This argument is supported by the finding that familiar groups were more confident about the accuracy of their decision under partial information, when pooling evidence revealed the correct solution, than under common information, when judgments were more likely to have been passively aggregated than actively reconciled. In contrast, stranger groups reported greater confidence in their decision when information was fully shared than when the facts were distributed among them, indicating that they may have engaged in more thorough processing in the former condition. This indirect evidence for the role of trust in group decision making should be supplemented by more direct investigation in future research.

The behaviors of mixed groups in our study also deserve further attention. In most respects, the behavior of mixed groups mirrored that of familiar groups; that is, members of mixed groups seem more similar than diverse. Yet the reason why is unclear. One possibility is that the one stranger conformed to the behavior of the familiar majority. However, since mixed groups outperformed stranger groups under partial information conditions, some form of minority influence may have been occurring in these groups as well. It is also possible that members of mixed groups categorized one another as "in-group" and "out-group" members on the basis of their prior relationships (Kramer, 1991; Tajfel, 1982), but the common fate induced by the information distribution might have diluted any effects. If a lone out-group member is also the sole source of unique information, this might lead to divergent thinking (Nemeth, 1986) and superior performance by mixed groups as a result. On the other hand, coalitions for which boundaries are both social- and knowledge-based might be more susceptible to polarization and an emphasis on winning than collaboration and an emhasis on learning.

These alternatives cannot be distinguished in our data because the information given to majority and minority members was not controlled or assessed. To explore them, it would be interesting to vary the type of information possessed by familiar and unfamiliar majorities and minorities in mixed groups. Does the impact of a critical clue vary depending on whether its source is a majority or a minority member? If unique information is transmitted by a stranger, does the group choose to avoid conflict and aggregate (acting more like stranger groups) or to embrace conflict and pool their information (as the familiar groups in did in the study reported here)? Future research should address these questions.

Finally, it should be emphasized that unlike previous research in this arena, subjects in this study, regardless of information condition, had access to *all* the information within the boundaries of their groups. That is, subjects were allowed to keep their information packets which provided every group-regardless of information condition—with full information (at least at the group level). Even with this conservative approach, we still see marked differences in how groups performed based on their composition *as well as* their initial constellation of information. It would be useful to know whether our findings would replicate under conditions in which group decisions were made using only what subjects could recall as evidence.

Conclusions

Our research suggests that groups whose members are familiar may be more effective at pooling information and integrating alternative perspectives than groups whose members are not familiar. Paradoxically however, the more familiar group members are with one another, the less likely they are to possess unique

knowledge or differing points of view. Thus, while familiar groups may be better equipped psychologically to resolve conflicts effectively, they may be less likely than stranger groups to experience the knowledge asymmetries from which cognitive conflicts arise. On the other hand, groups of strangers are likely to know different facts and have different perspectives, but they may lack the social ties and interpersonal knowledge to tap into the spoils of their diversity. Hence, effective group composition strategies require attention to both the diversity of member perspectives and also to the nature of members' relationships, so that neither is sacrificed through group dynamics for the sake of the other.

REFERENCES

Ancona, D., & Caldwell, D. (1992). Demography and design: Predictors of new product team performance. *Organization Science,* 3(3), 321–341.

Argote, L., & McGrath, J. E. (1993). Group processes in organizations: Continuity and change. In L. L. Cooper & I. T. Robertson (Eds.), *International review of industrial and organizational psychology* (Vol. 8, pp. 333–389). New York: Wiley.

Argote, L., Seabright, M., & Dyer, L. (1986). Individual vs. group use of base rate and individuating information. *Organizational Behavior and Human Decision Processes,* 38, 65–75.

Arrow, H., & McGrath, J. E. (1993). Membership matters: How member change and continuity affect small group structure, process and performance. *Small Group Research,* 24(3), 334–361.

Asch, S. E. (1952). *Social psychology.* Englewood Cliffs, NJ: Prentice–Hall.

Baron, R. S., Kerr, N. L., & Miller, N. (1992). *Group process, group decision, group action.* Pacific Cove, CA: Brooks/Cole Publishing.

Boje, D. M., & Murnighan, J. K. (1982). Group confidence pressures in nominal and Delphi groups. *Management Science,* 28, 1187–1196.

Boyett, J. H., & Conn, H. P. (1991). *Workplace 2000: The revolution reshaping American business.* New York: Dutton.

Brockner, J., & Swap, C. W. (1976). Effects of repeated exposure and attitudinal similarity on self-disclosure and interpersonal attraction. *Journal of Personality and Social Psychology,* 33, 531–540.

Burt, R. S. (1992). *Structural holes: The social structure of competition.* Cambridge, MA: Harvard Univ. Press.

Carver, C., & Scheier, M. (1981). The self-attention-induced feedback loop and social facilitation. *Journal of Experimental Social Psychology,* 17, 545–568.

Cartwright, D. (1968). The nature of group cohesiveness. In D. Cartwright and A. Zander (Eds.), *Group dynamics: Research and theory* (3rd ed.). New York: Harper & Row.

Damon, W. (1991). Problems of direction in socially shared cognition. In L. B. Resnick, J. M. Levine, and S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 384–397). Washington, DC: American Psychological Association.

Davis, J. H. (1973). Group decision and social interaction: A theory of social decision schemes. *Psychological Review,* 80, 97–125.

Davis, K. E., & Todd, M. J. (1985). Assessing friendsh: Prototypes, paradigm cases and relationship description. In S. Duck & D. Perlman (Eds.), *Understanding personal relationships: An interdisciplinary approach.* Beverly Hills, CA: Sage.

Dawes, R. M., McTavish, J., & Shaklee, H. (1977). Behavior, communication, and assumptions about other people's behavior in a commons dilemma situation. *Journal of Personality and Social Psychology,* 35, 1–11.

Deutsch, M. (1949). An experimental study of the effects of cooperation and competition upon group process. *Human Relations,* 2, 129–152.

Deutsch, M. (1973). The resolution of conflict: *Constructive and deconstructive processes.* New Haven: Yale Univ. Press.

Festinger, L., Schachter, S., & Back, K. (1950). *Social pressure in informal groups.* New York: Harper and Brothers.

Flowers, M. L. (1977). A laboratory test of some implications of Janis' groupthink hypothesis. *Journal of Personality and Social Psychology,* 35, 888–896.

Fry, W., Firestone, I., & Williams, D. (1983). Negotiation process and outcome of stranger dyads and dating couples: Do lovers lose? *Basic and Applied Social Psychology,* 4, 1, 1–16.

Gigone, D., & Hastie, R. (1993). The common knowledge effect: Information sharing and group judgment. *Journal of Personality and Social Psychology,* 65, 959–974.

Goodman, P. S., & Leyden, D. P. (1991). Familiarity and group productivity. *Journal of Applied Psychology,* 76, 578–586.

Goodman, P. S., & Shah, S. (1992). Familiarity and work group outcomes. In S. Worchel, W. Wood, & J. Simpson (Eds.), *Group process and productivity* (pp. 276–298). London: Sage Publications.

Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology,* 78, 1360–1379.

Greenhalgh, L., & Chapman, D. I. (1993). *The influence of relationships on the process and outcomes of negotiations.* Paper presented at Cornell University, April 7, 1993.

Gruenfeld, D. H. (1995). Status, ideology, and integrative complexity on the U. S. Supreme Court: Rethinking the politics of political decision making. *Journal of Personality and Social Psychology,* 68, 5–20.

Hackman, J. R. (Ed.) (1990). *Groups that work (and those that don't): Creating conditions for effective teamwork.* San Francisco: Jossey-Bass.

Hackman, J. R. (1992). Group influences on individuals in organizations. In M. D. Dunnett & Hough (Eds.), *Handbook of industrial and organizational psychology* (Vol. 3, pp. 199–267). Chicago: Rand McNally.

Halpern, J. (1992). *The effect of friendship on decisions: An experimental study of personal transactions.* Best Papers Proceedings, Academy of Management, Las Vegas, Nevada.

Hill, G. W. (1982). Group versus individual performance: Are N + 1 heads better than one? *Psychological Bulletin,* 91, 517–539.

Hoffman, L. R. (1959). Homogeneity of member personality and its effects on group problem-solving. *Journal of Abnormal and Social Psychology,* 58, 27–32.

Hoffman, L. R. (1979). Applying experimental research on group problem solving to organizations. *Journal of Applied Behavioral Science,* 15, 375–391.

Hoffman, L. R., Harburg, E., & Maier, N. R. F. (1962). Differences and disagreement as factors in creative group problem solving. *Journal of Abnormal and Social Psychology,* 64, 206–214.

Hoffman, L. R., & Maier, N. R. F. (1961). Quality and acceptance of

problem solutions by members of homogeneous and heterogeneous groups. *Journal of Abnormal and Social Psychology,* 62, 401–407.

Hollingshead, A. B. (1993). *Information, influence, and technology in group decision making.* Doctoral dissertation, University of Illinois at Urbana Champaign. Dissertation Abstracts International, 54 (05), B2809.

Jackson, S. (1992). Team composition in organizations. In S. Worchel, W. Wood, & J. Simpson (Eds.), *Group process and productivity* (pp. 138–176). London: Sage.

Janis, I. L. (1982). *Victims of groupthink* (2nd ed.). Boston: Houghton-Mifflin.

Katezenbach, J. R., & Smith, D. K. (1993). *The wisdom of teams.* Cambridge, MA: Harvard Business School Press.

Kim, P. H. (1996). *Dynamic influences on the common knowledge effect.* Unpublished manuscript, Dispute Resolution Research Center, Kellogg Graduate School of Management, Northwestern University.

Kramer, R. (1991). Intergroup relations and organizational dilemmas: The role of categorization processes. In L. Cummings & B. Staw (Eds.), *Research in Organizational Behavior* (Vol. 13, pp. 191–227). Greenwich, CT: JAI Press.

Kruglanski, A. W., and Mackie, D. M. (1990). Majority and minority influence: A judgmental process analysis. *European Review of Social Psychology,* 1, 229–261.

Lamm, H., and Myers, D. G. (1978). Group-induced polarization of attitudes and behavior. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 11, pp. 145–195). New York: Academic Press.

Latane, B., & Wolf, S. (1981). The social impact of majorities and minorities. *Psychological Review,* 88, 438–453.

Laughlin, P. R. (1980). Social combination processes of cooperative problem solving groups on verbal intellective tanks. In M. Fishbein (Ed.), *Progress in social psychology.* Hillsdale, NJ: Erlbaum.

Laughlin, P. R., VanderStoep, S. W., & Hollingshead, A. B. (1991). Collective versus individual induction: Recognition of truth, rejection of error, and collective information processing. *Journal of Personality and Social Psychology,* 61(1), 50–67.

Levine, J. M., & Moreland, R. (1990). Progress in small group research. *Annual Review of Psychology,* 41, 585–634.

Levine, J. M., & Resnick, L. B. (1993). Social foundations of cognition. *Annual Review of Psychology,* 44, 585–612.

Liang, D. W., Moreland, R., and Argote, L. (1995). Group versus individual training and group performance: The mediating role of transactive memory. *Personality and Social Psychology Bulletin,* 21(4), 384–393.

Mannix, E. A., Goins, S., & Carroll, S. (1996). *Starting at the beginning: Linking team performance to process and performance.* Working paper, Columbia University, New York.

McGrath, J. E. (1984). *Groups: Interaction and performance.* Englewood Cliffs, NJ: Prentice–Hall.

McGrath, J. E. (1991). Time, interaction and performance (TIP): A theory of small groups. *Small Group Research* 22, 147–174.

McGrath, J. E. (1993). The JEMCO workshop: Description of a longitudinal study. *Small Group Research,* 24(3), 285–306.

McGrath, J. E., Berdahl, J. L., & Arrow, H. (1994). *No one has it but all groups: Diversity as a collective, complex, dynamic property of groups.* Paper presented at the NSF/APA/CCL Conference, Greensboro, NC.

McGrath, J. E., & Gruenfeld, D. H. (1993). Toward a dynamic and systematic theory of groups: An integration of six temporally enriched perspectives. In M. M. Chemers & R. Ayman (Eds.), *The future of leadership research: Promise and perspective* (pp. 217–244). Orlando, FL: Academic Press.

Moreland, R. L., & Levine, J. M. (1989). Newcomers and oldtimers in small groups. In P. Paulus (Ed.), *Psychology of group influence* (2nd ed., pp. 143–186). Hillsdale, NJ: Erlbaum.

Murnighan, J. K., & Conlon, D. J. (1991). The dynamics of intense group work: A study of British string quartets. *Administrative Science Quarterly,* 36, 165–186.

Neale, M. A., & Bazerman, M. (1991). *Cognition and rationality in negotiation.* New York: Free Press.

Neale, M. A., Northcraft, G. B., Bazerman, M. H., & Alperson, C. (1986, March). "Choice shift" effects in group decisions: A decision bias perspective. *International Journal of Small Group Research,* pp. 33–42.

Nemeth, C. J. (1986). Differential contributions of majority and minority influence. *Psychological Review,* 93, 23–32.

Nemeth, C. J. (1992). Minority dissent as a stimulant to group performance. In S. Worchel, W. Wood, & J. Simpson (Eds.), *Group process and productivity* (pp. 95–111). London: Sage.

Nemeth, C. J., & Kwan, J. L. (1987). Minority influence, divergent thinking and detection of correct solutions. *Journal of Applied Social Psychology,* 17, 788–799.

Nemeth, C. J., & Wachtler, J. (1983). Creative problem solving as a result of majority vs. minority influence. *European Journal of Social Psychology,* 13, 45–55.

Newcomb, T. M. (1961). *The acquaintance process.* New York: Holt, Rinehart & Winston.

Northcraft, G. B., & Neale, M. A. (1993). Negotiating successful research collaboration. In J. K. Murnighan (Ed.), *Social psychology in organizations: Advances in theory and research* (pp. 204–224). Englewood Cliffs, NJ: Prentice–Hall.

Orasanu, J., & Salas, E. (1993). Team decision making in complex environments. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsambok (Eds.), *Decision making in action: Models and methods* (pp. 327–345). Norwood, NJ: Ablex Publishing Corp.

Perret-Clemont, A., Perret, J., & Bell, N. (1991). The social construction of meaning and cognitive activity in elementary school children. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 41–62). Washington, DC: American Psychological Association.

Pettigrew, T. F. (1979). The ultimate attribution error: Extending Allport's cognitive analysis of prejudice. *Personality and Social Psychology Bulletin,* 5, 461–476.

Peterson, R. S., & Nemeth, C. J. (1996). Focus versus flexibility: Majority and minority influence can both improve performance. *Personality and Social Psychology Bulletin,* 22, 14–23.

Pruitt, D. G., & Kimmel, M. J. (1977). Twenty years of experimental gaming: Critique, synthesis, and suggestions for the future. *Annual Review of Psychology,* 28, 363–392.

Rapaport, An. (1974). Prisoners dilemma: Recollections and observations. In An. Rapaport (Ed.), *Game theory as a theory of conflict resolution.* Dordrect, Holland: Reidel.

Rousseau, D. (1985). Issues of level in organization research: Multilevel and cross-level perspectives. In L. L. Cummings & B. Staw (Eds.), *Research in Organizational Behavior* (Vol 7, pp. 1–37). Greenwich, CT: JAI Press.

Sanna, L. J., & Shotland, R. L. (1990). Valence of anticipated evaluation and social facilitation. *Journal of Experimental Social Psychology,* 26, 82–92.

Schachter, S. (1951). Deviation, rejection and communication. *Journal of Abnormal and Social Psychology,* 46, 190–207.

Schachter, S. (1959). *The psychology of affiliation.* Stanford, California: Stanford Univ. Press.

Schachter, S., & Singer, J. (1962). Cognitive, social and physiological determinants of emotional state. *Psychological Review,* 69, 379–399.

Schoeninger, D., & Wood, W. (1969). Comparison of married and ad hoc mixed-sex dyads negotiating the division of a reward. *Journal of Experimental Social Psychology,* 5, 483–499.

Shah, P. P., and Jehn, K. A. (1993). Do friends perform better than acquaintances: The interaction of friendship, conflict, and task. *Group Decision and Negotiation,* 2(2), 149–166.

Sherif, M. (1936). *The psychology of social norms.* New York: Harper & Brothers.

Smith, C. M., Tindale, R. S., & Dugoni, B. L. (1993). Minority and majority influence in freely interacting groups: Qualitative versus quantitative differences. *British Journal of Social Psychology.*

Stasser, G., & Stewart, D. (1992). Discovery of hidden profiles by decision-making groups: Solving a problem versus making a judgment. *Journal of Personality and Social Psychology,* 63, 426–434.

Stasser, G., Stewart, D., & Wittenbaum, G. M. (1995). Expert roles and information exchange during discussion: The importance of knowing who knows what. *Journal of Experimental Social Psychology,* 31, 244–265.

Stasser, G., Taylor, L. A., & Hanna, C. (1989). Information sampling in structured and unstructured discussion of three- and six-person groups. *Journal of Personality and Social Psychology,* 57, 67–78.

Stasser, G., & Titus, W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality and Social Psychology,* 48, 1467–1478.

Steiner, I. D. (1972). *Group process and productivity.* New York: Academic Press.

Tajfel, H. (1982). The social psychology of intergroup relations. *Annual Review of Psychology,* 33, 1–39.

Tanford, S., & Penrod, S. (1984). Social influence model: A formal integration of research on majority and minority influence. *Psychological Bulletin,* 95, 189–225.

Tenbrunsel, A. E., Wade-Benzoni, K. A., Moag, J., & Bazerman, M. H. (1994). *The costs of friendship: The effects of strong ties on matching efficiency, individual effectiveness and barriers to learning.* Unpublished manuscript, Kellogg Graduate School of Management (DRRC), Northwestern University.

Thompson, L. L., & DeHarpport, T. (1990) *Negotiation in long-term relationships.* Paper presented at the International Association for Conflict Management, Vancouver, Canada.

Tindale, R. S. (1989). Group vs. individual information processing: The effects of outcome feedback on decision making. *Organizational Behavior and Human Decision Processes,* 44, 454–473.

Tindale, R. S. (1993). Decision errors made by individuals and groups. In N. J. Castellan, Jr. (Ed.), *Individual and group decision making: Current issues* (pp. 109–124). Hillsdale, NJ: Erlbaum.

Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological Review,* August.

Valley, K. L., & Neale, M. A. (1993). *Intimacy and integrativeness: The role of relationships in negotiations.* Working paper, Cornell University, Ithaca, NY.

Valley, K. L., Neale, M. A., & Mannix, E. A. (1995). Friends, lovers, colleagues, strangers: The effects of relationships on the process and outcome of dyadic negotiations. *Research on Negotiations in Organizations,* 5, 65–93.

Wegner, D. M. (1986). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. Grelchals (Eds.), *Theories of group behavior* (pp. 185–208). New York: Springer-Verlag.

Wittenbaum, G. M., & Stasser, G. (1996). Management of information in small groups. In J. L. Nye & A. M. Brower (Eds.), *What's social about social cognition? Social cognition research in small groups.* (pp. 3–28). Thousand Oaks, CA: Sage.

Wood, W., Lundgren, S., Ouellette, J. A., Busceme, S., & Blackstone, T. (1994). Minority influence: A meta-analytic review of social influence processes. *Psychological Bulletin.*

Zajonc, R. B. (1965). Social facilitation. *Science,* 149, 269–274.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology Monograph,* 9, 1–28.

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