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Article *in* Group Dynamics Theory Research and Practice · March 2009

DOI: 10.1037/a0014344

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2009, Vol. 13, No. 1, 31–45

1089-2699/09/$12.00 DOI: 10.1037/a0014344

Factors Affecting Decision Makers' Preference for Unshared Information

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Two experiments examined solicitation of information in a group structured as a judge–advisor system (JAS) with 1 group member designated as the decision maker and the other 2 members as advisors. The decision maker solicited information from 2 advisors. One advisor's information was shared in common with the decision maker, and the other's information was predominantly unshared. In 2 experiments, decision makers asked for more information from the advisor with unshared information and rated this advisor's information as more important and influential than the advisor with only redundant, shared information. When decision makers were not limited in the amount of information they could ask for, decision makers significantly increased requests for information from the advisor with shared information but not the advisor with unshared information. Experiment 2 found that whether or not an advisor agreed with the decision maker did not affect decision makers' preference for the advisor with unshared information.

Keywords: common information bias, unshared information, judge–advisor system

The judge–advisor system (JAS) is a model used to examine interactive decision making in a group in which members have different roles in the decision process (Savadori, Van Swol, & Sniezek, 2001; Sniezek & Buckley, 1995; Sniezek & Van Swol, 2001; Van Swol & Sniezek, 2005). The judge has the role of decision maker and has the power to make a final decision after receiving advice from one or more advisors. Previous research examining information exchange in JASs has found that JASs have less bias toward discussing and valuing information shared in common with all members than unstructured groups without role differentiation (Savadori et al., 2001; Van Swol & Ludutsky, 2007). This study adds to this previous research by examining how limiting the amount of information the judge is allowed to request from advisors increases the preference for unshared information and by examining whether disagreement among advisors affects how the judge requests information from the advisors.

Research on Information Sampling and Judge–Advisor Systems

Research with groups and dyads has found that members tend to discuss and focus on information that group members all share in common before the group discussion (shared information) more than information that one member may know and hold uniquely before the discussion (unshared information; for review, see Stasser & Titus, 2003; Wittenbaum, Hollingshead, & Botero, 2004). However, most research examining groups' bias toward shared, redundant information has used unstructured groups in which members do not have different roles and there are no differences among them in power or status (for exception, see Henningsen, Henningsen, Jakobsen, & Borton, 2004; Stasser, Stewart, & Wittenbaum, 1995; Stewart & Stasser, 1995; Larson, Christensen, Abbott, & Franz, 1996; Larson, Foster-Fishman, & Franz, 1998). Similar to Wittenbaum et al. (2004), Van Swol and Ludutsky (2007) suggested that the process of information exchange

Special thanks to Matt Hollingshead, Tab Tsai, Suzi Sutton, Oana Eftimie, Josh Ballard, Mike Little, Priyanka Khatri, Amy Christiansen, and Matt Kane for assistance with data collection and coding.

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in groups should be different when group members have different motivations and goals for discussing information. They found that when a decision maker made strategic requests for information from advisors, the decision maker preferred advisors with more unshared information than advisors with more shared information and rated information from advisors with more unshared information as more influential and important.

This preference for advisors with unshared information stands in contrast to research with unstructured groups that has found that group members who mention more shared information are more influential in the group discussion (Kameda, Ohtsubo, & Takezawa, 1997; Sargis & Larson, 2002; Van Swol & Seinfeld, 2006). Past research explaining the mechanisms underlying groups' preference for shared information may help explain why JASs focus more on unshared information. Groups first mention more shared information than unshared information because it is statistically more likely to be mentioned. The probabilistic collective information sampling model proposed by Stasser and Titus (1985, 2003) explains that because each group member holds shared information, while only one member has access to unshared information, shared information is more likely to be contributed to discussion. However, the structure of the JAS can help overcome this sampling advantage of shared information. If one group member has more unshared information, the judge has the power to request more information from that person, enabling more efficient gathering of unshared information. The judge can localize a source of unshared information and has the ability to continually tap that source by requesting information.

In contrast, research on information centrality (Kameda et al., 1997; Sargis & Larson, 2002) also has an information distribution in which one member has predominantly shared or unshared information. However, due to the unconstrained nature of the discussions in previous work on information centrality, the group lacks an efficient mechanism for recognizing and accessing information from the member with more unshared information. Previous research on information centrality (Kameda et al., 1997; Sargis & Larson, 2002) has found that group members who possess more unshared information are less active during the group discussion and are perceived as less influential (for exception, see Larson, Sargis, Elstein, & Schwartz, 2002).

Whereas probabilistic collective information sampling explains why more shared information is mentioned, mutual enhancement explains why shared information is valued and repeated more than unshared information once it has been first mentioned (Wittenbaum, Hubbell, & Zuckerman, 1999). Mutual enhancement is the tendency to give more positive feedback to group members who mention shared information because the shared information can be validated and verified. Group members mentioning shared information are judged as more knowledgeable and competent because the shared information reinforces what others in the group know. Unshared information may be ignored when mentioned and perceived as less valuable because it does not validate group members' preexisting information. Underlying mutual enhancement is the idea that group members respond positively to a group member mentioning shared information (Wittenbaum et al., 1999). However, in a JAS, communication is controlled by the judge and is more centralized, reducing the tendency for members to spontaneously validate information mentioned by others. Also, the validation of shared information helps build common ground and reduces uncertainty in the group (Wittenbaum et al., 2004). However, in a JAS, participants have clear roles and should have less uncertainty. Therefore, there should be less need for the social aspect of shared information toward building common ground. In addition, role assignment may increase the discussion of unshared information in other ways.

Decision makers may prefer advisors who have a perspective different from themselves. People seek advice to gain alternative views (Budescu & Rantilla, 2000; Heath & Gonzalez, 1995; Valley, White, Neale, & Bazerman, 1992), so decision makers may be more open to nonredundant, unshared information than members in unstructured groups. Research on advice giving has also confirmed that decision makers often prefer to solicit advice from advisors with nonredundant information and see this advice as more valuable than advice redundant with their own information (Goethals & Nelson, 1973; Maines, 1990). For example, Gonzalez (1994) found that decision makers were more influ-

enced by advisors with unshared information than advisors who shared the same information. Other researchers (Burnstein & Vinokur, 1977; Larson et al., 2002) have found that novel arguments in a group discussion can be more persuasive than familiar arguments. However, other researchers have found evidence that decision makers prefer advisors whose information is more correlated and similar to their own (e.g., Kahneman & Tversky, 1973; Luan, Sorkin, & Itzkowitz, 2004; Soll, 1999). Also, because the advisor's role is to provide information to the decision maker, the advisor may be expected to provide new information, and unshared information presented by the advisor may be perceived as more valid than unshared information mentioned by members in unstructured groups as well as more important than shared information provided by advisors.

Van Swol and Ludutsky (2007) did find that decision makers preferred to solicit information from advisors with more unshared information and rated this advisor's information as more important and influential. However, their study had two limitations. First, when the decision maker asked for information from the advisors, the advisor read the information on a card provided by the experimenter and then handed the card to the decision maker. This created an artificial situation in which the information was essentially provided by the experimenter and read by the advisor. In more naturally occurring situations, an advisor is likely to appear as more of the source of the information. Second, the decision makers were limited in the amount of information they were allowed to request from the advisors. However, most previous research examining the preference for shared information has not limited the amount of information that groups can discuss. Therefore, the two studies in this article addressed these limitations, and especially addressed how the limitation of information may increase the preference for more unshared information.

Limiting Information

Previous research has not explored how restricting the amount of information a decision maker can solicit affects the type of advice solicited. However, some research has explored how increasing the costs of communication affects behavior. Isaac and Walker (1991) and Ostrom and Walker (1991) found that "charging" groups for communicating in a social dilemma reduced the amount of communication and their ability to come to a cooperative solution compared with groups that could communicate freely. This suggests that limiting communication may impair group outcomes.

Discussion of shared information in a group often serves a more emotional maintenance function than a decision function. Shared information mutually enhances group members' perception of their knowledge (Wittenbaum et al., 1999), positively reinforces group members, and helps build common ground in the group (Gruenfeld, Mannix, Williams, & Neale, 1996). Discussion of shared information is not useful toward increasing the group's database of information. In the face of limited information exchange, the decision maker may forgo social or emotional maintenance functions of information and solicit more information useful toward problem solving.

Gigerenzer and Selten (2001) suggested that when making decisions under constraints such as information costs, decision makers may use ecological heuristics that allow them to ignore certain information and maximize their capacities. When requests for information are limited, decision makers may use a strategy to seek new information to maximize their limited resources. However, without a limitation on information requests, the decision maker may simply ask for information until he or she reaches a saturation point without a specific strategy guiding the information search. Based on this research, I hypothesized that the decision maker should request a lower ratio of information from the advisor with shared information when the amount of information the decision maker can solicit is limited than when it is not limited (Hypothesis 1).

In addition, I expected to generalize the results from Van Swol and Ludutsky (2007): The decision maker should request more information from the advisor with nonredundant, unshared information than from the advisor with shared information (Hypothesis 2). The decision maker should rate the advisor with more unshared information as more competent, knowledgeable, and having more important and influential information than the advisor with shared information (Hypothesis 3).

Overview of Study

This study used Stasser and Stewart's (1992) murder mystery hidden profile task. In a hidden profile, the majority of unshared information supports a superior alternative and the majority of shared information supports an inferior alternative. To arrive at the best answer, the majority of the unshared information must be discussed. The decision maker met with two advisors from whom he or she could solicit information. The advisors were actually confederates. One advisor gave predominantly unshared information to the decision maker and the other gave only shared information. Experiment 1 examined whether the decision maker requested a higher ratio of unshared information when the decision maker was limited in the number of information requests he or she could make.

Experiment 1

Method

Participants and design. Participants were 39 undergraduates at a private university in the Midwest who completed the experiment for course credit. Participants were randomly assigned to either the limitation ($n = 21$) or nonlimitation condition ($n = 18$). The design was a 2 (information limitation: limitation vs. nonlimitation) $\times$ 2 (type of advisor: advisor with unshared information vs. advisor with shared information) mixed factorial design with repeated measurement on the second factor.

Task. Two different murder mystery packets (Profile 1 or 2) adapted from Stasser and Stewart (1992) were used. Half of the participants received Profile 1 and half received Profile 2. Packets contained 19 pages of information such as investigative interviews, maps, and a list of major characters, and the two packets varied in terms of the interviews and background material contained. In the two packets, interviews contained 18 clues instrumental for solving the murder. Of the 18 total pieces of information, the participant received 12. Six were in both Profiles 1 and 2 and shared by all three members of the JAS (universally shared); 6 (partially shared information) were given only to the decision maker and advisor with shared information (AS); and 6 clues (unshared) were given only to the advisor with unshared information (AU). Therefore, Profile 1 had 6 pieces of information that Profile 2 did not have and vice versa. Whether these additional 6 pieces of information in each profile were unshared or partially shared depended on which profile the participant had received.

The clues either incriminated or exonerated each of the three suspects, but participants' own individual information did not implicate or exonerate one particular suspect. Clues were divided among the decision maker, AS, and AU to create a hidden profile, so that the decision maker needed to use both the shared and unshared information to have enough information to incriminate the correct person, and two of the suspects could be exonerated by the total set of 18 clues. The shared information had 3 clues that seemed to implicate an innocent suspect, 1 clue that exonerated an innocent suspect, 1 clue that could implicate the guilty suspect but only in conjunction with other information, and 1 clue that provided important background information. Of the 6 additional clues in Profile 1, 3 implicated the correct suspect, 2 exonerated an innocent suspect, and 1 helped implicate an innocent suspect. Of the 6 additional clues in Profile 2, 3 implicated the correct suspect and 3 exonerated innocent suspects.

Procedure. Two confederates, blind to the experimental hypotheses, posed as advisors. The table for the experiment was rectangular with one chair on one long side of the table and two chairs on the other side. The participant was directed to sit on the side of the table with one chair, and the advisors sat on the side of the table with two chairs. When the confederates arrived, they were treated as participants, seated at the table, and gave informed consent.

After obtaining the participant's informed consent, everyone was asked to choose one of three cards that were put on the table face down. They were told that the cards would determine their role in the experiment and that two cards had the word *advisor* on them and the third had the words *decision maker*. In reality, all cards had the words *decision maker*. The participant and confederates picked a card. The experimenter collected the cards and asked everyone to state their designated role. Without letting the participant see their cards, the confederates said "advisor."

All participants were then given their profile of information and a sheet to record their initial

decision. The decision maker and AS received the same packet (Profile 1 or 2), and AU received the alternative. Then, the two confederates were escorted out of the room ostensibly to work individually on their task, but the participant was told that he or she would meet with the two advisors again to receive more information about the murder mystery. The participant was given 15–20 min to read through the material and make a decision. Participants picked which of the three suspects they thought was guilty.

After the decision maker finished, the two advisors were brought back. Everyone had a color assigned to them to aid identification for answering the posttask questionnaire. Participants were informed that they would be asked questions about specific group members in a questionnaire after the discussion and that members would be identified by their color. The advisors returned with pieces of notebook paper with information handwritten on them. One advisor was the AU and the other was the AS. The confederates alternated being either AU or AS. The participant was told that the advisors were supposed to have read through the packet and copied information they thought that was important for the decision maker to know. In reality, each confederate was given 12 pieces of information to copy.

In AU's list of information, the unshared information was first, followed by the shared information; however, within the unshared information and within the shared information, the order in which the information was presented was counterbalanced so that in half the conditions the order was reversed. The first 6 pieces of information in AS's list were partially shared, and the remaining pieces were shared with both the decision maker and AU; within this presentation, the order in which the information was presented was counterbalanced. Therefore, both advisors' last 6 pieces of information were universally shared, and if the decision maker asked for more than 6 pieces of information from both advisors, this information would be redundant between the advisors and decision maker. As the decision maker requested information from the advisors, each confederate would go down his or her list, reading one piece of information for each request. The advisors would not necessarily make it through their entire list, but if an advisor read all 12 pieces of information, the advisor was instructed to say that he or she had no further information to offer. The advisors were instructed not to make validating remarks about the other advisor's information.

In the limitation condition, the decision maker had 12 tokens and gave an advisor a token to receive 1 piece of information. The tokens were numbered, so the experimenter could track the order that advisors received requests for information. Thus, the participant was limited to 12 pieces of information, but was instructed that he or she could split the tokens any way he or she wished and that he or she did not have to use all the tokens.

In the nonlimitation condition, the decision maker could ask for as much information as he or she wished from the two advisors. The participant's primary task was to solicit information to help to determine which suspect was guilty. In both conditions, participants were told that the advisors had been instructed not to share their opinion. Also, in both conditions, there was a camera set up facing the group. However, only a few of the experimental sessions in the limitation condition were actually taped to code the behavior of the confederates, whereas all of the experimental sessions in the nonlimitation condition were taped so that the amount and order of the decision maker asking for information could be coded. In all conditions, before the group interaction, the experimenter went to the camera to turn it on or appear to turn it on. Also, the informed consent form told all participants that videotaping would be part of the experiment. Therefore, all participants thought they were being videotaped.

When the group finished, the experimenter passed out a questionnaire that had participants rate the advisors on several characteristics, and then asked the confederates to return to their rooms to fill out the material individually. Participants were then thanked and asked to provide contact information to receive a debriefing in the mail after the experiment was finished. Participants were not immediately debriefed because of the use of confederates.

Coding. In the nonlimitation condition, two coders recorded the amount and order that the participant elicited information from advisors. The coders' lists of information were compared. There were only three differences (about 1% of the information) between them for the infor-

mation elicited in the nonlimitation condition, and these discrepancies were resolved by the author.

Results

Manipulation checks. Participants rated their agreement with two manipulation check questions from 1 (*strongly agree*) to 7 (*strongly disagree*). Participants rated, "On the whole, information given by advisor (S or U) was not information that I originally read about the murder suspects" (reverse coded), and whether each advisor's information was familiar. The mean of the two questions was calculated for a measure of familiarity, and the Cronbach's alpha showed that the items formed an internally consistent composite measure: $\alpha = .62$ for AU and $\alpha = .78$ for AS. A mixed-model analysis of variance (ANOVA) with the repeated measure factor of type of advisor and the between-subjects factor of information limitation tested for differences. Participants rated AS's information as more familiar ($M = 2.46$, $SD = 1.66$) than AU's information ($M = 5.21$, $SD = 1.60$), $F(1, 37) = 31.27$, $\eta^2 = .46$, $p < .0001$. There was no interaction between advisor and the information limitation condition, $F(1, 37) = 0.22$, $\eta^2 = .01$, $p = .65$. Participants were aware that AU had more unshared information.

Information. Because there was a restriction in the limitation condition for the amount of information solicited, a full factorial analysis of the amounts of information solicited across conditions was inappropriate because the resulting reduction in variability in the limitation condition was likely to lead to a violation of the assumption of homogeneity of variance. Therefore, data on solicitation of information were analyzed separately across the two conditions. In the limitation condition, all but one decision maker asked for the full 12 pieces of information ($M = 11.95$, $SD = 0.22$). To determine whether participants in the nonlimitation condition asked for significantly more or less information than in the limitation condition, I compared a one-sample *t* test on the total information solicited with the standard test value of 12. Participants in the nonlimitation condition ($M = 13.06$, $SD = 3.89$) did not request significantly more than 12 pieces of information, $t(17) = 1.15$, $p = .27$.

The amount of information that participants solicited from each advisor in the limitation condition is not independent because if a participant solicits eight pieces of information from AU, then he or she can, by definition, solicit only four pieces of information from AS. Directly comparing the solicitation of information from AU and AS in the limitation condition would violate key assumptions of sphericity. Therefore, I examined in a one-sample *t* test whether participants solicited significantly more or less information than the standard test value of 6 from each advisor. A test value of 6 was used because if participants split their requests for information evenly between the two advisors without regard to sharedness of information, they would request six pieces of information from each. In the limitation condition, participants' solicitation of information from AS ($M = 5.00$, $SD = 1.10$) was significantly lower than the test value of 6, $t(20) = -4.18$, $p < .0001$. This supports Hypothesis 2 that the decision maker should request more information from AU than from AS.

Because in the nonlimitation condition soliciting information from one advisor did not limit the amount of information the decision maker could solicit from the other advisor, I compared the amount of information that the participant solicited from each advisor in a paired-samples *t* test. The difference between participants' solicitation of information from AU ($M = 6.89$, $SD = 2.08$) and from AS ($M = 6.17$, $SD = 2.12$) was significantly different from zero, $t(17) = -1.91$, $p = .04$ (one-tailed). This also supports Hypothesis 2.

Because of restriction of range issues, the two conditions could not be directly compared to test for Hypothesis 1. Therefore, solicitation of information from AU and AS was compared with the test value of 6 in the nonlimitation condition to see whether results were similar to those obtained in the limitation condition. In the nonlimitation condition, solicitation of information from AS did not significantly differ from the test value of 6, $t(17) = 0.33$, $p = .74$, and participants' solicitation of information from AU was only marginally greater than the test value of 6, $t(17) = 1.81$, $p = .09$ (two-tailed). Therefore, the decision maker's solicitation from AS was significantly less than the test value in the limitation condition but not in the nonlimitation condition. However, the decision

maker's solicitation from AU was significantly more than the test value in the limitation condition but not in the nonlimitation condition. This supports Hypothesis 1, that is, the decision maker would request more shared information in the nonlimitation than in the limitation condition. Finally, average order in which the information was requested was analyzed in a repeated measures ANOVA. Participants requested information earlier from AS ($M = 6.37$, $SD = 1.54$) than from AU ($M = 6.92$, $SD = 1.44$), $F(1, 37) = 7.26$, $\eta^2 = .16$, $p = .01$. There was no interaction with condition, $F(1, 37) = 7.26$, $\eta^2 = .16$, $p = .01$. Participants were more likely to request information from the advisor with unshared information later in the interaction.

Questionnaire. Participants rated how important and influential each advisor's information was on a scale from 1 (*not important*) to 7 (*very important*). AU's information was rated as more important ($M = 5.82$, $SD = 1.12$) than AS's information ($M = 3.49$, $SD = 1.43$). Participants also rated the competence of each advisor from 1 (*not competent*) to 7 (*very competent*), and AU was rated as more competent ($M = 5.51$, $SD = 1.36$) than AS ($M = 4.82$, $SD = 1.75$). Finally, participants rated how knowledgeable each advisor was from 1 (*not at all knowledgeable*) to 7 (*very knowledgeable*); AU was rated as more knowledgeable ($M = 5.05$, $SD = 1.40$) than AS ($M = 4.51$, $SD = 1.72$). Principal components factor analysis determined whether the three questions represented distinct factors or one factor. Results indicated that the questions represented one factor with an eigenvalue of 2.24 for AU (accounting for 74.62% of the variance) and 1.85 for AS (accounting for 61.54% of the variance). Thus, the mean of the three questions was taken to form a composite rating for each advisor.

In a mixed-model ANOVA with type of advisor as a repeated measures variable and information limitation condition as a between-subjects variable, the mean of the three questions was higher for AU ($M = 5.46$, $SD = 1.12$) than that for AS ($M = 4.27$, $SD = 1.26$), $F(1, 37) = 26.27$, $\eta^2 = .42$, $p < .0001$. There was not a main effect of the information limitation condition, $F(1, 37) = 2.45$, $\eta^2 = .06$, $p = .13$, nor a significant interaction with the information limitation condition, $F(1, 37) = 2.57$, $\eta^2 = .07$, $p = .12$.

I tested whether the amount of unshared information that the advisor provided mediated the decision maker's rating of the advisor. Type of advisor was a significant predictor of the amount of unshared information each advisor provided, $t(76) = -67.20$, $p < .0001$; amount of unshared information each advisor provided was a significant predictor of how the advisors were rated in the mean of the three questions, $t(76) = 4.35$, $p < .0001$. However, the Sobel test (-1.83) for mediation was not significant, $p = .068$, so there was no evidence of mediation.

Decision. Fourteen participants (35.90%) picked the correct guilty suspect in their first decision before meeting with the two advisors, and 16 (41.0%) picked the correct suspect after meeting with the advisors. A nonparametric Friedman test comparing participants' responses before and after found that they did not significantly differ, $\chi^2(38, N = 39) = 0.50$, $p = .48$. Four participants switched to the correct answer after meeting with the advisors and 2 switched to the wrong answer from the correct one. There was no difference between the limitation ($M = 0.14$, $SD = 0.36$) and nonlimitation condition ($M = 0.06$, $SD = 0.24$) for percentage of participants switching to the correct answer, $F(1, 37) = 0.78$, $\eta^2 = .02$, $p = .38$.

Discussion

In summary, Experiment 1 replicated the findings of Van Swol and Ludutsky (2007). Participants asked for more information from AU and rated this advisor as more knowledgeable and competent and this advisor's information as more important and influential. In the nonlimitation condition, in which solicitation of information was not limited, participants asked for more information from AS than they did in the limitation condition, but they did not increase the amount of information they asked for from AU. Thus, in support of Hypothesis 1, when the amount of information that the decision maker could solicit was not restricted, the decision maker solicited more shared information. Despite asking for more information from AU, participants' decision accuracy did not significantly improve after meeting with the advisors.

Experiment 1 controlled for advisors' preference by not having the advisors express an

opinion to the decision maker. This allowed a clear focus on how the advisors' type of information affects decision maker's solicitation of information. However, Sniezek and Buckley (1995) found that when two advisors disagreed, decision makers were more likely to accept advice from the advisor in agreement with the decision maker. Indeed, much research has found that people prefer information and opinions that are consistent with their own decision (for review, see Tavris & Aronson, 2007). Thus, I expected that decision makers would prefer to solicit information from advisors in agreement with them than from advisors in disagreement (Hypothesis 4).

A further question was how disagreement or agreement with the decision maker would affect how much the decision maker prefers to solicit information from an advisor with shared or unshared information. Although decision makers unaware of the advisors' opinion may prefer advisors with unshared information, the type of information an advisor has may not be important when the decision maker knows the advisor's opinion. Thus, one effect of letting the decision maker know if an advisor agrees or disagrees with the decision maker's opinion is that the type of information an advisor has will have no effect on whether or not a decision maker solicits information from that advisor. Alternatively, the decision maker may prefer to solicit the most information from an advisor with unshared information who agrees with the decision maker and the least from an advisor with shared information who disagrees. Thus, a research question explored in Experiment 2 was how agreement with the decision maker interacts with type of information that an advisor has. Experiment 2 was run identically to Experiment 1 except that one advisor was in agreement with the decision maker and one was in disagreement.

Experiment 2

Method

Participants. Participants were 68 undergraduates at a private university in the Midwest who completed the experiment for course credit.

Design and procedure. The task and procedure were identical to Experiment 1 with one difference: Confederate advisors were instructed to share an opinion with the decision maker. One confederate agreed with the decision maker and one disagreed. The design was a 2 (information limitation condition) $\times$ 2 (agreement/disagreement of advisor) $\times$ 2 (type of advisor) mixed factorial design with repeated measurement on the last factor. Therefore, in each experimental session, there was one advisor who agreed with the decision maker and one who disagreed. Across participants, type of advisor (AU or AS) was crossed with agreement and disagreement. It was counterbalanced whether the disagreeing confederate chose the correct or incorrect answer. However, if the participant chose the correct answer in his or her prediscussion decision, then the disagreeing confederate always chose the incorrect answer. Most decision makers asked for the advisors' opinion at the beginning of the discussion. If not asked, the confederates were instructed to state their opinion before offering the first piece of information.

From videos that recorded the experimental sessions in the nonlimitation condition, two coders recorded the amount and order that the participant elicited information from the advisors, and their lists were compared. They agreed on 90% of the information. The author resolved any discrepancies.

Results

Manipulation checks. As in Experiment 1, participants were asked whether they had originally read the information of each advisor and whether each advisor's information was familiar. The mean of the two questions was calculated for a measure of familiarity, and the Cronbach's alpha showed that the items formed an internally consistent composite measure: $\alpha = .71$ for AU and $\alpha = .79$ for AS. A mixed-model ANOVA was run with the repeated measures factor of rating of the shared or unshared advisor and the between-subjects factors of information limitation condition and which advisor agreed with the participant. Participants rated AU's information as less familiar than AS's information, $F(1, 64) = 141.03$, $\eta^2 = .69$, $p < .0001$. There was no interaction between advisor and agreement with advisor, $F(1, 64) = 0.45$, $\eta^2 = .01$, $p = .51$. However, there was an interaction between advisor and the information

limitation condition, $F(1, 64) = 5.78$, $\eta^2 = .08$, $p = .02$. Participants rated AU's information as less familiar in the limitation than in the nonlimitation condition, $F(1, 66) = 6.50$, $\eta^2 = .09$, $p = .01$. However, there were no differences between the information limitation condition in the rating of AS, $F(1, 66) = 2.59$, $\eta^2 = .04$, $p = .11$. Therefore, participants were aware that they were less familiar with AU's information, especially in the limitation condition. For means, see Tables 1 and 2.

Information. All participants in the limitation condition asked for the full 12 pieces of information. In a one-sample *t* test, participants in the nonlimitation condition asked for significantly more information ($M = 14.61$, $SD = 4.98$) than the test value of 12, $t(37) = 3.22$, $p < .005$. There was no difference in sequential order in which information was requested between AS and AU, $F(1, 64) = 2.76$, $\eta^2 = .04$, $p = .10$. There was also no interaction with sequential order and the information limitation condition, $F(1, 64) = 3.03$, $\eta^2 = .05$, $p = .09$, or the agreement condition, $F(1, 64) = 2.35$, $\eta^2 = .04$, $p = .13$.

In the limitation condition, participants' solicitation of information from AS ($M = 4.60$, $SD = 0.93$) was significantly lower than the test value of 6, $t(29) = -8.23$, $p < .0001$. This supports Hypothesis 2, that is, the decision maker would request more information from AU than from AS.

In the limitation condition, a one-way ANOVA found that the participant asked for less information from AU when AU disagreed ($M = 6.94$, $SD = 0.93$) with the participant than when AU agreed ($M = 7.93$, $SD = 0.62$), $F(1, 29) = 11.49$, $\eta^2 = .29$, $p = .002$, and also asked for less information from AS when AS disagreed ($M = 4.07$, $SD = 0.62$) than when AS agreed with the participant ($M = 5.06$, $SD = 0.93$). This supports Hypothesis 4, that is, the decision makers would prefer to solicit information from advisors in agreement with them than from advisors in disagreement.

Within the limitation condition, when AS agreed with the participant and AU disagreed, participants' solicitation of information from AS ($M = 5.06$, $SD = 0.93$) was significantly lower than the test value of 6, $t(15) = -4.04$, $p < .001$, and participants' solicitation of information from AU ($M = 6.94$, $SD = 0.93$) was significantly higher than the test value of 6, $t(15) = 4.04$, $p < .001$. When AU agreed with the participant, participants' solicitation of information from AS ($M = 4.07$, $SD = 0.62$) was significantly lower than the test value of 6, $t(13) = -11.72$, $p < .0001$, and participants' solicitation of information from AU ($M = 7.93$, $SD = 0.62$) was significantly higher than the test value of 6, $t(13) = 11.72$, $p < .0001$. Thus, in the limitation condition participants preferred to solicit more information from AU regardless of whether AU agreed or disagreed with the participant.

In the nonlimitation condition in a mixed-model ANOVA with type of advisor as a repeated measures variable and agreement with the advisor as a between-subjects variable, it was found that participants asked for more information from AU than from AS, $F(1, 36) = 5.90$, $\eta^2 = .14$, $p = .02$. This supports

Table 1
Means for the Shared Advisor Between Conditions in Experiment 2

	Rating of shared advisor							
	Agree with shared advisor				Agree with unshared advisor			
	Limitation		Nonlimitation		Limitation		Nonlimitation	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Read advisor's information	5.72	1.41	5.55	1.76	5.93	1.73	6.31	0.95
Advisor information familiar	2.17	1.30	2.80	2.07	1.86	1.41	2.00	0.89
Important/influential	3.67	1.68	4.20	2.09	5.36	0.93	5.63	1.20
Competence	4.67	1.61	5.45	1.15	5.57	0.76	6.06	1.00
Knowledge	4.28	1.49	5.30	0.87	5.43	1.16	6.25	0.93
Amount elicited information	5.06	0.93	7.20	2.90	4.07	0.62	6.50	2.38
Sequential order of information solicitation	7.46	2.58	8.03	2.93	6.23	1.13	5.64	0.79

Table 2
Means for the Unshared Advisor Between Conditions in Experiment 2

	Rating of unshared advisor							
	Agree with shared advisor				Agree with unshared advisor			
	Limitation		Nonlimitation		Limitation		Nonlimitation	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Read advisor's information	2.78	1.83	3.20	1.99	2.21	0.80	2.25	0.58
Advisor information familiar	5.00	1.33	4.75	1.94	5.71	0.83	5.56	0.51
Important/influential	5.11	1.57	5.45	1.19	5.71	1.90	5.75	1.07
Competence	4.94	1.35	5.50	1.50	6.21	0.80	5.54	0.81
Knowledge	4.78	1.17	5.15	1.14	6.36	0.93	5.56	0.81
Amount elicited information	6.94	0.93	8.20	2.73	7.93	0.62	7.22	2.82
Sequential order of information solicitation	7.18	2.96	8.27	2.77	6.58	0.51	7.06	0.62

Hypothesis 2. There was not a main effect of agreement with advisor, $F(1, 36) = 1.08$, $\eta^2 = .03$, $p = .31$, nor was there a significant interaction between agreement with advisor and solicitation of information from each advisor, $F(1, 36) = 0.15$, $\eta^2 = .00$, $p = .70$. This fails to support Hypothesis 4.

To help compare the limitation with the nonlimitation condition, I examined participants' solicitation of information from the advisors to the test value of 6 in the nonlimitation condition. Information solicited from AS ($M = 6.87$, $SD = 2.65$) was significantly higher than the test value of 6, $t(37) = 2.02$, $p = .05$, and participants' solicitation of information from AU ($M = 7.74$, $SD = 2.78$) was significantly higher than the test value of 6, $t(37) = 3.86$, $p < .0001$. In support of Hypothesis 1, in the nonlimitation condition, requests for information from AS were significantly above the test value of 6. Requests for information from AU were not much higher in the nonlimitation condition (7.93) compared with the limitation condition (7.40). However, requests for information from AS were much higher in the nonlimitation condition (6.87) than in the limitation condition (4.60). This suggests that participants significantly increased their requests for information from AS in the nonlimitation condition compared with the limitation condition, but they did not significantly increase requests to AU. Unfortunately, because of restriction of range issues, direct tests between the conditions were not appropriate.

Questionnaire. As in Experiment 1, participants rated how important and influential each advisor's information was and rated each advisor for competence and knowledge (for means, see Table 1). Principal components factor analysis determined that the three questions represented one factor with an eigenvalue of 1.78 for AU (accounting for 59.33% of the variance) and 2.81 for AS (72.75% of the variance). The mean of the three questions was taken to form a composite measure for each advisor.

In a mixed-model ANOVA with type of advisor as a repeated measures variable and the information limitation condition and which advisor agreed with the participant as between-subjects variables, the mean of the three questions was higher for AU ($M = 5.46$, $SD = 1.06$) than that for AS ($M = 5.11$, $SD = 1.23$), $F(1, 64) = 3.92$, $\eta^2 = .06$, $p = .05$. There was not a main effect of the information limitation condition, $F(1, 64) = 1.89$, $\eta^2 = .02$, $p = .18$, nor was there a significant interaction between type of advisor and the information limitation condition, $F(1, 64) = 1.61$, $\eta^2 = .02$, $p = .21$. There was not a main effect of whether the advisor agreed with the participant, $F(1, 64) = 2.72$, $\eta^2 = .04$, $p = .10$. However, there was a significant interaction between type of advisor and agreement with advisor, $F(1, 64) = 4.06$, $\eta^2 = .06$, $p < .05$. When AU agreed with the participant, AU was rated as significantly higher on the mean of the three questions ($M = 5.45$, $SD = 1.26$) than AS ($M = 4.75$, $SD = 1.29$), $F(1, 31) = 7.44$, $\eta^2 = .19$, $p < .01$. However, when AS agreed with the participant, AS was not rated higher ($M = 5.43$, $SD = 1.08$) than AU ($M = 5.46$, $SD = 0.88$), $F(1, 35) = 0.03$, $\eta^2 = .00$, $p = .88$.

Using the Preacher and Hayes (2004) bootstrap approach to obtain confidence intervals, I tested whether the amount of unshared information that the advisor provided (M) mediated the relationship between the independent variable of type of advisor (X) and the dependent variable of the decision makers' rating of the advisor (Y). The total effect of the independent variable of type of advisor on the dependent variable of decision makers' rating of the advisor was significant: $b(\mathrm{YX}) = -0.85$, $SE = 0.28$, $t(134) = -3.10$, $p = .002$. The effect of the independent variable of type of advisor on the proposed mediator of amount of unshared information was also significant: $b(\mathrm{MX}) = -5.69$, $SE = 0.10$, $t(134) = -58.91$, $p = .000$. The effect of the mediator on the dependent variable of decision makers' ratings, controlling for the independent variable of type of advisor, was significant: $b(\mathrm{YM.X}) = 0.47$, $SE = 0.241$, $t(134) = 1.95$, $p = .05$. Therefore, advisors who provided more unshared information were rated higher by the decision makers, even after controlling for type of advisor. Finally, the direct effect of the independent variable of type of advisor on the dependent variable of decision makers' ratings, controlling for the mediator of amount of unshared information provided, was not significant; $b(\mathrm{YX.M}) = 1.85$, $SE = 1.41$, $t(134) = 1.31$, $p = .19$. This indicates that there was no relationship between type of advisor and decision makers' rating of advisors after controlling for amount of unshared information provided by the advisor. Thus, all of Baron and Kenny's (1986) criteria for mediation were established, and the evidence was that amount of unshared information provided completely mediated the effect of type of advisor on decision makers' ratings. Furthermore, a 95% bias corrected bootstrap confidence interval (CI) obtained using Preacher and Hayes' (2004) method did not contain zero (95% CI = −5.06, −0.08), indicating that the indirect effect was significant and that mediation occurred.

Decision. Twenty-one participants (30.9%) picked the correct guilty suspect in their first decision before meeting with the two advisors, and 31 (45.6%) picked the correct suspect after meeting with them. A nonparametric Friedman test comparing participants' responses before and after found that they significantly differed, $\chi^2(67, N = 68) = 9.00$, $p = .003$. Fifteen (22.0%) participants switched to the correct answer after meeting with the advisors, 5 (7.0%) switched to the wrong answer from the correct one, and 16 (24.0%) stayed with the correct answer. The percentage of participants switching to the correct answer was higher in the limitation condition ($M = 0.37$, $SD = 0.49$) than in the nonlimitation condition ($M = 0.11$, $SD = 0.31$), $F(1, 64) = 8.33$, $\eta^2 = .12$, $p = .005$. However, this was qualified by a significant interaction between the information limitation condition and advisor agreement with the participant, $F(1, 64) = 5.58$, $\eta^2 = .08$, $p = .02$. When AS agreed with the participant, participants were equally likely to switch to the correct answer in the limitation ($M = 0.25$, $SD = 0.45$) and nonlimitation conditions ($M = 0.20$, $SD = 0.41$), $F(1, 34) = 0.12$, $\eta^2 = .00$, $p = .73$. However, when AU agreed with the participant, participants were more likely to switch to the correct answer in the limitation ($M = 0.50$, $SD = 0.52$) than the nonlimitation condition ($M = 0.00$, $SD = 0.00$), $F(1, 30) = 16.88$, $\eta^2 = .36$, $p < .0001$. In conclusion, participants were significantly more likely to switch to the correct answer in the limitation condition when AU agreed with them.

Discussion

In summary, in support of Hypothesis 2, participants solicited more information from AU than from AS in both conditions. In support of Hypothesis 1, when not limited in the amount of information they could ask for from the advisors, the participants significantly increased their requests for information from AS but not from AU. In both conditions, participants solicited more information from AU whether or not this advisor agreed with them. Therefore, knowledge of the advisor's opinion did not eliminate the preference for AU. Finally, Hypothesis 4 received support only in the limitation condition. In this condition, participants solicited more information from advisors who agreed with them than from disagreeing advisors.

In support of Hypothesis 3, AU was rated as having more important and influential information and as more knowledgeable and competent. Amount of unshared information provided mediated this effect; thus, when the advisor provided more unshared information, their informa-

tion was rated as more important and influential and they were rated as more knowledgeable and competent.

Unlike Experiment 1, participants were more likely to pick the correct answer after meeting with the advisors, despite the fact that the advisors disagreed. Participants were most likely to switch to the correct answer in the limitation condition when AU agreed with them. In the limitation condition, participants received a higher ratio of unshared information than in the nonlimitation condition, and the manipulation check found that participants were more aware of the unshared information in the limitation condition. Implications of both experiments are discussed next.

General Discussion

Soll (1999) asked, "How do people choose what information sources to consult?" (p. 319). The studies in this article sought to examine how sharedness of information, limitation on information requests, and disagreement with an advisor affect who a decision maker consults for information. First, with regard to sharedness of information, this study replicated the results of Van Swol and Ludutsky (2007) and found that participants solicited more information from the advisor with unshared information and rated this advisor as more competent and knowledgeable and their information as more influential and important.

Limitation of Information

Both experiments found that limiting the amount of information the participant could solicit resulted in fewer requests from the advisor with shared information. The less perceived information that is available to the decision maker, the more strategic the decision maker may have been in the solicitation of information. In this way, "less is more" (Gigerenzer, 2001), as the decision maker makes better decisions and uses a better strategy when operating under constraints.

In the limitation condition, participants were more selective and reduced their requests to the shared advisor. Results from Experiment 2 show that participants made better decisions in the limitation condition, at least when the unshared advisor agreed with them. The decision maker received a higher ratio of unshared information in the limitation condition, helping him or her make a better decision. When the participant could solicit as much information as he or she wished, the participant increased requests to the advisor with shared information but not the advisor with unshared information. Shared information often serves more social and emotional purposes in a group by helping build common ground or validate members' knowledge. When not limited in information, the decision maker may have been more willing to fulfill other purposes in the group besides soliciting information that could help toward making the best decision. However, this study did not measure socioemotional measures, so future research should explore participants' motives more directly to examine how limitation of information influences salience of difference motives.

Agreement

In Experiment 2, the effects of agreement versus disagreement with the decision maker on the solicitation of information were examined. The decision maker solicited more information from the agreeing advisor in the limitation but not in the nonlimitation condition. Again, the decision maker may have been more strategic when making requests for information in this condition. Given the limit on the amount of information, the decision maker may have sought advice from the advisor who confirmed his or her opinion. However, with no limitation on information requests, the decision maker may have simply requested information from both advisors without a strategy to prefer one over the other. Also, decision makers preferred to receive advice from the advisor with unshared information, whether or not this advisor agreed or disagreed with the decision maker. This suggests that the preference for receiving unshared information was robust and not undone when the unshared advisor disagreed with the participant.

There was a significant interaction between type of advisor and agreement from advisors in terms of how the participant rated the advisors. When the advisor with unshared information agreed with the participant, he or she was rated significantly higher than the advisor with shared information, but when the advisor with shared

information agreed, he or she was not rated as significantly higher. It is possible that when the advisor with all shared information agreed with the participant, this agreement was not very affirming because their shared conclusion was based on the same root information. Harkins and Petty (1987) found that participants prefer viewpoints from sources that are more independently based than viewpoints from sources that seem heavily influenced by one another. The conclusion from their three studies was that the power of sources of information to influence participants lies in their "perceived informational independence" (p. 260). Therefore, agreement from the advisor may have been more significant to decision makers when they knew that the agreeing opinion came from an independent pool of information.

Decision

Although the decision makers solicited more information from the unshared advisor, the decision makers' final decision did not significantly improve in Experiment 1, and they were not more likely to uncover the hidden profile. However, in Experiment 2, participants did significantly improve their decision making after meeting with the advisors in the limitation condition when the unshared advisor agreed with the participant. In the limitation condition, participants had a larger ratio of unshared information, which supported the correct alternative, and they may have been more likely to pay attention to the unshared advisor's information when this advisor also agreed with them. Again, agreement from the advisor with unshared information may have been more important to the participant because this agreement seemed to stem from independent, nonredundant sources of information. Thus, the unshared advisor's information may have been given more weight when this advisor agreed with the decision maker.

Also, the disagreement among the confederate advisors in Experiment 2 created cognitive conflict (Sniezek & Buckley, 1995). Cognitive conflict has been associated with process gains in groups (Sniezek & Buckley, 1995) and may be related to greater information processing because the participant has to reconcile two opposing viewpoints. For example, Eisenhardt (1989) reported that cognitive conflict can help teams produce more thorough and well-thought-out decisions. Research on minority influence has found that the presence of a conflicting minority opinion facilitates deeper and more divergent thinking about a decision (Nemeth & Wachtler, 1983) and can increase the discussion of unshared information and improve decision making (Brodbeck, Kerschreiter, Mojzisch, Frey, & Schulz-Hardt, 2002). Disagreement among the advisors may have spurred more integrative complexity in the decision maker. Therefore, in an attempt to integrate the advisors' differing viewpoints, the participant may have paid more attention to the information and improved decision making, especially when the advisor with more unshared information agreed with them. Future research may want to compare JASs with cognitive conflict to JASs in which all members agree to determine the effects of cognitive conflict on the decision maker's solicitation of information. Furthermore, future research should examine whether the effects of cognitive conflict on decision making are more pronounced when information is limited.

Future Research and Conclusion

The results suggest several other areas for future research. First, future research may want to study solicitation of information from natural advisors. These experiments used confederates in the role of advisors. However, future studies should examine how advisors in JASs behave naturally. Advisors may offer more validating comments and initiate more conversation with the decision maker. Also, future research should examine whether unstructured groups focus more on unshared information when the amount of information they can discuss is limited. Previous research examining information exchange and the bias for shared information in unstructured groups has not limited the amount of information groups can discuss, but it would be interesting to examine whether limiting the amount of information discussed in unstructured groups would also reduce the focus on shared information.

Information is seldom unlimited. This study found that putting limitations on the amount of information one could solicit increased the preference for information from advisors with unshared information and advisors in agreement

with the decision maker. Overall, this study extends a line of research examining the reduced preference for shared information in JASs. This study also helps extend research examining decision makers' preference for nonredundant information over redundant information (Soll, 1999).

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Received February 28, 2007
Revision received September 12, 2008
Accepted October 6, 2008 ■