Uncovering Hidden Profiles; Managerial Interventions for Discovering Superior Decision Alternatives

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ABSTRACT

A common reason for the use of teams in organizations is the idea that each individual can bring a unique perspective to the decision task; however, research shows that teams often fail to surface and use unique information to evaluate decision alternatives. Under a condition known as the hidden profile, each member uniquely possesses a critical clue needed to uncover the superior solution. Failure to share and adequately evaluate this information will result in poor decision quality. In order to mitigate this team decision-making bias, the present study utilizes experimental research to examine the impact of the devil's advocacy technique on the decision quality of hidden profile teams. Results show that advocacy groups had higher decision qualities than groups under free discussion; however, advocacy teams also had higher levels of anger and lower levels of individual support for their group's decision. As a result, while these teams selected the best solution, the presence of a devil's advocate introduces conditions that may hinder the solution's implementation. Furthermore, similar experiments with advocacy techniques suggest that the positive effect on decision quality found here is reduced in the presence of stronger hidden profiles.

INTRODUCTION

Use of Teams in Organizations

The use of teams in organizational settings has grown dramatically in recent years as companies attempt to deal with a variety of changing competitive pressures (Barley, 1996; Thompson, 2008). They have been used successfully in organizations like Hewlett-Packard to introduce new products and services quickly and efficiently, General Electric to increase cross-functional collaboration, John Deere to reduce manufacturing time, and Xerox to improve product and service quality (Shaw & Schneier, 1995). The ability to capitalize on teamwork is such a relevant topic in business that it was cited as the number one priority for human resource professionals in a survey of Fortune 1000 firms (Roomkin, Rosen, & Dubbs, 1998).

On the surface, reorganizing work around groups of individuals seems like a logical solution to an increasingly competitive business environment. Groups of diverse individuals can pool their unique areas of expertise together to create a broader view of the situation at hand (Katzenbach & Smith, 1993). However, there are many factors at work beneath the surface of teams that erode the quality of decisions and prevent teams from realizing their full potential (see Hackman, 1990, Hackman, 2002, Steiner, 1972, and Thompson, 2008 for an overview). Despite the many stories of success cited in literature, more often than not, teams fail to accomplish their goals or end up implementing inferior solutions. A study by A.T. Kearny revealed that 7 out of 10 teams fail to achieve desired results (The trouble with teams, 1995). When these teams fail to pool and use the information they each possess, the results can be devastating. Not only can team failure lead to an organization's overwhelming loss of profitability or resources, but it can also lead to the tragic loss of human life. One particular example was cited in the official congressional report on the September 11th terrorist attacks. In this report, Senate and House committees claimed that inadequate information sharing due to turf wars between the CIA and FBI played a key role in the isolation of valuable pieces of information. Along with bureaucratic inefficiencies, failure to adequately share and use information led to a significantly reduced likelihood of detecting patterns in terrorist behavior

(National Commission on Terrorist Attacks upon the United States, 2004). Put differently, while the team had the knowledge and ability to detect the patterns, certain faulty group processes created a gap between potential and actual productivity (Steiner, 1972). Given the prevalence of team failure and the dramatic impacts that some failures can lead to, it is natural that a significant amount of research has been conducted to better understand team decision making and to improve the decision making process.

Introduction to Hidden Profiles

Some of the most influential research on team decision making and information sharing was conducted by Garold Stasser and William Titus in 1985. They devised an experiment known as the biased sampling paradigm which challenged the idea that group decisions are more informed than individual decisions. In this experiment, university students were asked to participate in four-person teams and consider three candidates for student senate president. The candidates were represented by a list of traits rated as desirable, undesirable, or neutral as determined by an independent study of students. One hypothetical candidate was given more desirable traits than the other two candidates, and would logically be the best choice. In the experiment's control, the list of candidate traits were given to all members of the group, and after discussion, 83% of the groups chose the superior candidate.

In the experimental groups, the information was divided among group members such that only when the information was completely pooled together through group discussion, could the groups identify the desirable candidate. This hidden profile condition was designed to replicate actual team conditions in which the members of a group rarely enter a meeting with identical information. Pooling of information would perform a corrective function since the group as a whole had complete information and, by exchanging their unique information, they could have ascertained that one candidate was better than the others. Simply put, in the hidden profile condition, a superior decision exists, but its superiority is hidden until all information is shared through group discussion. However, the experiment showed that group discussion actually reduced support for the best alternative. In one experimental condition, 21% of groups supported the superior decision pre-discussion, and 12% supported the superior option after discussion (Stasser & Titus, 1985). The results surprised Stasser and

Titus and spawned a myriad of variations on the biased sampling paradigm design (Stasser & Titus, 2003). The findings of these variations are illustrated next.

Content Based Research

Since detecting the best alternative in a group decision task requires the pooling of information in group discussion, a considerable amount of the research spawned by Stasser and Titus (1985) was conducted on the actual content of group discussion. When Stasser and Titus discovered the hidden profile in 1985, one of the first interpretations of the findings was that the probability of unique information being brought up was lower than shared information. In Stasser and Titus's (1985) words, "The more members there are who are exposed to an item of information, the more likely it is that at least one of them will recall and mention it during discussion" (p. 1477). Stasser and Titus (1987) carried this information sampling theory farther by stating the basic idea that information widely distributed before discussion has a sampling advantage over information available to only a few members. Drawing on previous formal models of group process, such as work by Steiner (1972), they formulated the CIS model. Defining *p(R)* as the probability that an individual will recall and contribute a given item of information to group discussion and *n* as the number of members who can potentially recall the item, the probability of that item being discussed by the group, *p(D)* is given by the following:

$$p(D) = 1 - [1 - p(R)]n.$$

The probability of recalling and contributing an item of information, *p(R)*, is affected by several factors. First of all, a member must first recall the item, then they must have the opportunity to mention it in group discussion, and finally they must decide whether or not to contribute the information once the opportunity arises. These stages are affected by further factors, such as the information load of the discussion, the familiarity with information, the willingness of the member to contribute an item if it goes against the prevailing sentiment of the group, and limits on the amount of discussion time. Thus, if an item of information is already known by all members of the group, there is a higher probability of it being mentioned in discussion (Stasser, Taylor, & Hanna, 1989). In addition to providing empirical

support of Stasser and Titus's (1985) predictions, Stasser, Taylor and Hanna (1989) also discovered an interesting complication in group information sharing. Researchers predicted that once unique information was brought up in discussion, it would be repeated more than shared information because it was novel to all but one member; however, the study showed that approximately a third of the common items were repeated at least once after they were first discussed but only about a fourth of unique items were repeated. Simply put, not only do unique items have a lower probability of being mentioned in group discussions, but they also are likely to be ignored once mentioned (Stasser & Titus, 1987).

Preference Based Research

In a second line of research spawned by Stasser and Titus (1985), researchers Gigone and Hastie (1993) proposed that even if groups succeed in sharing enough unshared information, they will fail to discover the superior solution because they will not give significant weight to the information discussed. "When individual group members pooled their information, the groups failed to take advantage of the cues that were unshared" (Gigone & Hasie, 1993, p. 973). Instead, they argued, group members based their decision predominantly on prediscussion preferences. "It was as if the group members exchanged and combined their opinions but paid little attention to anything else" (Gigone & Hasie, 1993, p.973) Since information pooling has no impact on group decision making beyond the impact it has on group member's preferences, what matters more than the actual content of discussion is the number of group members who support a position at the onset of discussion (Gigone & Hasie, 1993). This effect is more pronounced when discussion time is limited (Gigone & Hasie, 1993; Greitemeyer, Schulz-Hardt, Brodbeck, & Frey, 2006).

Recent work by Mojzisch and Schulz-Hardt (2010) provides important contributions to the research of Gigone and Hastie. Not only do they provide strong evidence supporting Gigone and Hastie (1993), but they also offer an explanation for why group members fail to take advantage of the information discussed. They argued that learning the preferences of others in the group prior to the discussion—something that occurs quite often in actual group discussions—reduces the attention given to encoding the information exchanged, ultimately reducing the quality of the group's decision. Simply put, learning others preferences degrades

the quality of decisions because group members end up paying less attention to the exchange of information. In similar research, Toma and Butera (2009) found that competition, compared to cooperation, led group members to withhold unshared information in group discussions. This characteristic was minimal for shared information. In addition, competition made group members more reluctant to disconfirm initial preferences, and decision quality was lower. Like Mojzich and Schulz-Hardt (2010), Toma and Butera (2009) found that this effect was mediated by the disconfirmation of preferences, not by information sharing.

Another important contribution of Mojzisch and Schulz-Hardt builds off of work previously reported in Greitemeyer and Schulz-Hardt (2003). In the 2003 study, Greitemeyer and Schulz-Hardt examined the individual level processes and questioned whether individuals would question their predicussion preferences if all information was pooled during the information exchange. What they found was that individuals would tend to bias the evaluation and interpretation of information in favor of their existing knowledge structure. Simply put, individuals would value information more highly if it supported their initial preferences, and less highly if it went against their preferences. In a hidden profile condition, when members are presented with more information contradicting their prediscussion preference than information supporting it, they will devalue the inconsistent information and adhere to their original preference. As a result, even in the absence of dysfunctional group-level processes, groups in a hidden profile condition will fail to detect the superior decision due to preference consistent evaluation of information. These findings were consistent with Svenson's (1992) differentiation and consolidation theory, which states that individuals who prefer a particular alternative decision will restructure the available information to support their preference. Greitemeyer and Schulz-Hardt (2003) proposed the explanation that their findings were the result of cognitive economy. Information that is inconsistent with an existing preference is tested more intensively and critically than consistent information because either the information or the person's belief is false, and this implies the need for further assessment. Mojzisch and Schulz-Hardt (2010) replicated these findings by showing that less than half of the participants solved the hidden profile despite the fact that all information was pooled. An examination of the groups who failed to solve the hidden profile

revealed that the majority of members in these groups maintained their initial prediscussion preferences.

Dissent as a Facilitator for Decision Quality

One of the most interesting implications of Mojzisch and Schulz-Hardt (2010) comes from its contradiction with previous research. Schulz-Hardt et. al (2006) suggested that groups have better quality decisions when dissent is introduced; however, Mojzisch and Schulz-Hardt (2010) found that learning others' preferences, whether they were supporting or dissenting preferences, actually reduced decision quality. How is it that these studies have contradicting findings? Mojzisch and Schulz-Hardt (2010) offered an explanation that the improvement in decision quality due to dissent was not due to learning the other members' preferences, but rather that dissent requires more intensive discussion than consent does. Since groups who disagree about what alternative should be preferred will need to engage in more intensive information exchange, the likelihood of premature consensus should be reduced (Winquist & Larson, 1998). Specifically, members would be more interested in exchanging their unshared information in order to resolve their positions of dissent.

This assumption is supported by Brodbeck, Kerschreiter, Mojzisch, Frey, & Schulz-Hardt (2002), who demonstrated that increases in the level of information exchanged have occurred simultaneously with increases in prediscussion dissent. Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter and Frey (2005) showed that groups benefit from this dissent even when none of the members initially prefer the superior decision. These groups had higher knowledge gains due to higher discussion intensity and less bias in comparison to groups without prediscussion dissent (Greitemeyer, Brodbeck, Schultz-Hardt, & Frey, 2006). Thus, conflict between members during group discussion should increase the decision quality of hidden profile groups.

To recreate these positions of dissent in experimental groups, we turn to the dialectical techniques created to implement controversial debate independent of group members' actual preferences. One technique, dialectical inquiry (Mason & Mitroff, 1981), was used in a similar experiment by Greitemeyer et al. (2006) to introduce contrived dissent into hidden

profile groups. The other well known technique, devil's advocacy (Herbert & Estes, 1977), has not been researched before. Since dialectical procedures recreate actual diversity of preferences, and preference diversity has been shown to mitigate the dominance of shared information in group discussion (Greitemeyer, Brodbeck, Schultz-Hardt, & Frey, 2006), this experiment's primary purpose was to test whether or not devil's advocacy has the same effect on shared information. While experiments have been conducted in the past regarding the impact of devil's advocacy on decision making quality (see Schweiger, Sandberg, & Ragan, 1986 and Schweiger, Sandberg, & Rechner, 1989), these experiments involved all group members receiving identical information. As a result, the facilitative effect of these experiments may be an individual-level effect (Greitemeyer, Brodbeck, Schultz-Hardt, & Frey, 2006). Put differently, devil's advocacy may improve decision quality because it forces individual decision makers simply to consider their own information from a different point of view. Greitemeyer et al. (2006) states that the hidden profile condition is different from previously tested conditions because each member has their own unique information. As a result, in order for the dialectical techniques to be effective, it must have group-level effects. Put differently, this condition requires group members to solve a problem that would not be possible if members were working individually. As a result, the Greitemeyer et al. (2006) experiment and the experiment reported here differ from past attempts to improve decision quality with advocacy techniques.

EXPERIMENT AIMS AND HYPOTHESIS

We designed the present study to examine the effect of the devil's advocacy technique on the decision quality of hidden profile teams. Theoretically, the devil's advocacy procedure should prevent group members from simply aggregating their prediscussion preferences. It is our belief that these groups will be forced into more intense information exchange than free discussion groups.

> Hypothesis 1: The devil's advocacy technique improves the decision quality of groups under hidden profile conditions

In addition to measuring the effect of the devil's advocacy technique on the decision quality of hidden profile teams, the present study will also measure the impact of devil's advocacy on levels of affective conflict. According to research by Schweiger, Sandberg, & Ragan (1986), the level of anger increased significantly in groups utilizing the devil's advocate technique. We predict the same effect to occur in our study since not all information is shared, and discussion of shared information creates mutual enhancement (Wittenbaum, Hubbell, & Zuckerman, 1999). Theoretically, the presence of unshared information should have the opposite effect and increase affective conflict.

> Hypothesis 2: The devil's advocacy technique will increase levels of affective conflict of groups under hidden profile conditions.

Finally, the devil's advocacy technique should decrease individual support for the group's decision. Participants in Schweiger, Sandberg, & Ragan (1986) had lower acceptance of their groups' decisions under the advocacy conditions than did subjects in the consensus conditions. We expect this to occur under hidden profile conditions as well.

> Hypothesis 3: The devil's advocacy technique will decrease levels of individual support for the group's decision under hidden profile conditions.

EXPERIMENTAL DESIGN

Subjects

A total of 112 students at Bryant University's College of Business participated in this study. The experiment was conducted in four sessions including a strategy class for MBA students, a senior level management class, a professional business fraternity, and a campus organization for entrepreneurs. Participants were randomly assigned to four person groups.

Decision Task

In replicating Stasser & Stewart (1992), participants read a series of interviews from a homicide investigation. These interviews were combined with supporting materials such as a handwritten note, newspaper article, and a map to create a 27-page booklet. In these interviews, there were 24 clues that were either incriminating or exonerating for each one of the three suspects (B, M, and E). Of these 24 clues, there were six incriminating clues about

each suspect, three clues that exonerated Suspect B, and 3 clues that exonerated Suspect M. As a result, considering the total of 24 clues together ruled out suspects B and M as the possible murderers. In addition, the 24 clues combined led to the conclusion that Suspect E had a motive and opportunity to commit the crime, and had tried to frame Suspect B as the murderer. Put differently, the complete pooling of information supported Suspect E as the guilty party.

Of the 24 clues, three incriminating clues about Suspect E and the six exonerating clues about suspects M and B were critical clues for selecting Suspect E as the murderer. In line with Stasser & Stewart (1992), these nine clues were unshared in order to create a hidden profile in the suspect interviews. In the four-person groups, three members received unshared information and one member received only shared information. The unshared information was divided such that each of the three members received three pieces of the critical clues: one incriminating clue about Suspect E, one exonerating clue about Suspect M, and one exonerating clue about Suspect B. Collectively, these three members had all of the information and would be able to establish that Suspect E was the guilty party. As mentioned earlier, the fourth member received only the shared information and none of the critical clues.

Procedure

MBA and undergraduate students from Bryant University's School of Business were encouraged to participate in this experiment. Participants were randomly assigned to teams of four members, and were given a consent form to read and sign. After signing this form, half of the groups were assigned to the free discussion condition and half the groups were assigned to the devil's advocacy condition. The booklets were randomly dispersed so that three members received booklets containing a combination of unshared and shared information and one member received a booklet containing only shared clues. In the devil's advocacy condition, the member who received only shared information was informed that they would serve as a devil's advocate for their team during group discussion. All participants were then informed that they were responsible for independently reviewing the information before the next session, and that they must refrain from discussing the contents of the booklets with anyone—including fellow group members—until then. To further discourage the sharing of

information prior to the next session, groups were not told that the information varied from booklet to booklet.

In the following session, participants broke up into their groups and were led away to adjacent classrooms. Each group had their own room. Consistent with hidden profile literature, the groups were given a cover letter describing the objective of the study as an examination of effective group decision making. They were informed that, as in the real world, they had not received exactly the same information as their fellow group members; however, all of the information was consistent and true. After this initial introduction, instructions varied depending on the experimental condition.

In the devil's advocacy condition, we used a manipulation modeled after Schweiger, Sandberg, & Ragan (1986). Participants in this condition were informed that the devil's advocacy approach develops a solid argument for a reasonable recommendation and then subjects that recommendation to a formal critique. The devil's advocate questions the assumptions presented by other group members, and attempts to show why the reasonable recommendation should not be adopted. This continues over several repetitions until the mutual acceptance of a recommendation occurs. This technique is believed to improve decision quality because only sound, well supported assumptions and recommendations will survive the criticism of the devil's advocate. The member who was assigned to the devil's advocacy position was then informed that they were responsible for questioning the assumptions and recommendations of the group. In the free discussion condition, groups were not given this information.

Groups in both conditions were then given 45 minutes to discuss the murder mystery and identify the guilty party. Groups in the free discussion condition were not given any guidelines or structure for their discussion. Groups in the devil's advocacy decision were given the following guidelines based on advocacy research by Schweiger, Sandberg, & Ragan (1986):

1. Members not selected to serve as devil's advocate should build an argument identifying one of the suspects as the guilty party, supported by all key

assumptions, facts, and data that underlie this argument. Write the recommendations, assumptions, facts, and data as clearly and thoroughly as you can on the Initial Verdict Form provided for this purpose.

2. Meanwhile, the devil's advocate should prepare for their critique by identifying critical assumptions, data, etc. ascertained through their reading.
3. The non-devil's advocate members present their argument and written assumptions to the devil's advocate. The devil's advocate subjects the argument to a formal critique. The critique attempts to uncover all that is wrong with the argument, assumptions, facts, and data and to expound the reasons why the argument is flawed.
4. Following Step 3, the devil's advocate presents their critique to the group orally and on the Critique Form provided. The non-devil's advocate members then meet separately once again and revise their argument to satisfy the valid criticisms of the devil's advocate.
5. Repeat Steps 3 and 4 until all members can accept the guilty party verdict, assumptions, and data.
6. Write the final verdict, assumptions, facts, and data on the Final Recommendations Form with which you have been provided.

After reaching and reporting their group's decision, participants in both experimental groups were asked to individually fill out a brief questionnaire. In order to test hypotheses two and three, we included the following questions on a Likert scale:

Affective Conflict Questions:

7. How much anger was there among the group over this decision (Amason, 1996)?
8. How much personal friction was there in the group during the decision making process (Amason, 1996)?

Agreement Questions:

9. To what extent do you support the group's decision?

Participants were then thanked for their assistance and the experimenter explained the purpose of the experiment. They were then asked not to discuss the content of the experiment with others and were free to go.

RESULTS

Sample Size

A total of 112 participants engaged in this experiment throughout four sessions. The data from two of these teams was discarded due to their failure to follow instructions. In addition, a third team was omitted from these findings due to their failure to report their decision on the forms provided. As a result, data from 100 participants was used to report the findings of this experiment.

Group Decision Quality

Figure 1 shows the decision quality for teams employing the devil's advocacy technique versus teams engaged in unstructured free discussion. The presence of a devil's advocate in hidden profile groups had a marginally significant impact on decision quality, $x2(1, N = 100) = 3.15$, $p = .076$. In the control condition, 58% of the teams selected Suspect E, the superior decision, as their final selection. In contrast, 75% of teams in the devil's advocacy condition successfully solved the hidden profile. While this finding was only marginally significant, an examination of the data shows that in one of the rotations of this experiment, all teams solved the hidden profile regardless of whether or not they were in the control condition or the devil's advocacy condition. This suggests that something occurred during this rotation that may have influenced the data. Since this rotation was conducted in a management class dedicated to team building and conflict resolution, it is possible that the control condition participants in this rotation used lessons from their classes and implemented their own techniques to improve decision quality, despite not receiving special instructions from experimenters to do so. One possible explanation brought to our attention was the class's exposure to a concept known as the "challenger role." Several weeks before the experiment, the class participated in a survey designed to identify the role each student played in a team environment. Students identified as challengers tend to question the assumptions of the team in order to improve decision quality. This concept is remarkably similar to the devil's advocacy procedure which submits group assumptions to a formal critique. We believe members played this challenger role; however, since the content of the discussions was not recorded, there is no way that we can know for sure exactly what occurred in these groups.

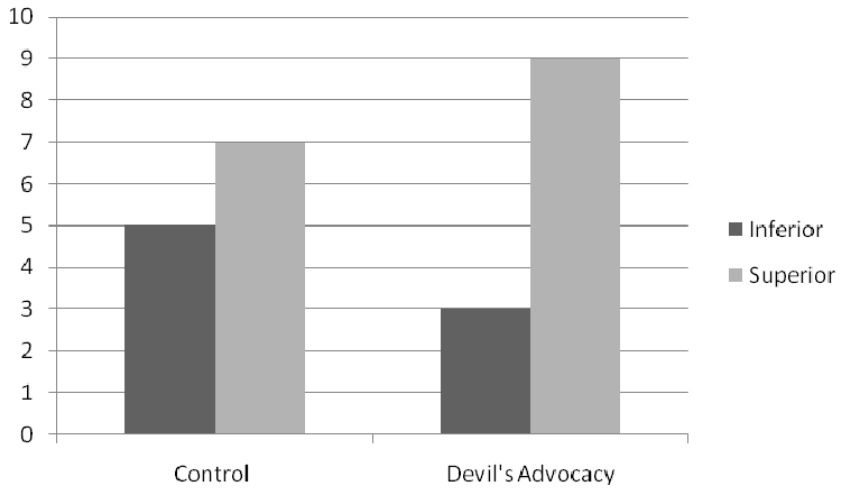

Figure 1 indicates decision quality for teams in the control and devil's advocacy conditions (includes rotation with possible response bias)

As a result of this finding, we were curious what the data would look like if this rotation was omitted from our analysis. Data from this rotation was removed and a second univariate analysis was conducted. Our findings were significant $x^2(1, N = 70) = 7.34$, $p = .009$. When omitting the second rotation from analysis, the devil's advocacy technique significantly improved the quality of decision making in hidden profile situations to a degree that rejects the null hypothesis (see Figure 2). Of the teams in the free discussion condition, 38% of the teams selected the superior decision. In contrast, groups employing the devil's advocacy technique solved the hidden profile paradigm 68% of the time (see Figure 3). The 30% improvement is noteworthy in comparison to other hidden profile experiments. Specifically, dialectical inquiry, a second advocacy technique, failed to have any significant impact on decision quality in an experiment conducted by Greitemeyer et al. (2006).

Conditions	Sample Size	P-value	Accurate Control Groups	Accurate Devil's Advocacy Groups	Improvement
All Rotations	100	0.076	58%	75%	17%
Omitting Rotation 2	70	0.009	38%	68%	30%

Figure 2 illustrates the impact of the possible response bias on statistical significance

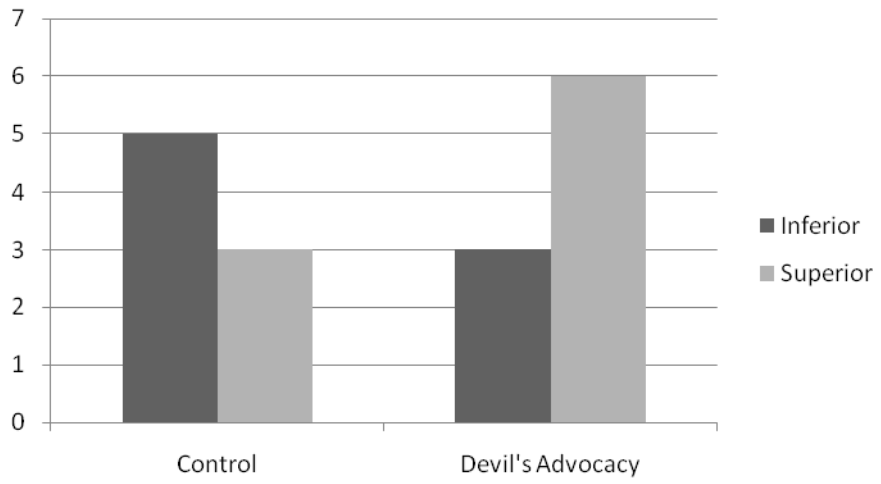

Figure 3 indicates decision quality for teams in the control and devil's advocacy conditions (omits rotation with possible response bias)

While this is a significant finding, one reservation regarding this data is the small sample size. It is important to point out that the omission of the second rotation significantly reduced the sample size of this experiment by 30 participants. It is our opinion that the finding is still noteworthy; however, future research should attempt to replicate this finding with a larger sample size.

Affective Conflict

In addition to measuring the final decision quality of the groups, we also individually surveyed the participants in the study. The questions were designed to measure the level of cognitive and affective conflict, individual agreement with group decision, difficulty in the decision task, and the degree members felt that they needed their teammates to successfully pool information. Of these measures, an affective conflict question modeled after Amason (1996) resulted in the most significant finding. The question was designed to measure the level of affective conflict in groups, which according to Amason (1996), has a negative effect on team harmony, implementation, and the likelihood that the team will work together in the future.

Consistent with our second hypothesis, the presence of a devil's advocate had a significant effect on the level of anger in the group, $t(95) = -2.89$, $p = .04$, with the devil's advocacy

groups receiving higher anger scores than the control group. When asked to rate the level of anger experienced during group discussion from one to three (one equaling low, three equaling high), the anger score for the free discussion groups was 1.00. In contrast, the devil's advocacy groups had a score of 1.08.

Agreement with Group Decision

In addition to questions regarding affective conflict, group members were asked to rate their level of agreement with their group's decision. Responses were measured on a five point Likert scale (one equaling completely disagree, five equaling completely agree). A 2 x 4 ANOVA was conducted on the data measuring the level of agreement per experimental condition within each of the four rotations. We found a significant effect, $F(3, 92) = 5.12$, $p = .003$.

The most significant change was in group three where the introduction of the devil's advocacy technique reduced individual support for the group decision from 4.8 to 3.3. Interestingly, rotation two, the rotation with a possible response bias, was the only rotation where devil's advocacy improved the support of individual members for their group's decision. All other rotations had either negative effects or no effects—a finding that is consistent with the advocacy research of Schweiger, Sandberg, & Ragan (1986). This supports our third hypothesis and shows that devil's advocacy has a negative effect on individual level support for the group decision under hidden profile conditions. While we predicted that this would occur based on past research by Schweiger, Sandberg, & Ragan (1986), to the best of our knowledge, this finding was new to the hidden profile line of research. In addition, it raised serious concerns regarding the implementation of a solution for groups that managed to solve the hidden profile.

DISCUSSION

Decision Quality

This study examined the idea that the devil's advocacy technique improves the decision quality of groups under hidden profile conditions. When members are forced to argue independently of their prediscussion preferences, they may engage in intense discussion that

should increase the likelihood of uncovering a hidden profile. Contrived dissent should increase the quantity of information discussed, and members may place higher value on the unshared information in order to resolve their positions of dissent. This should mitigate the problems faced with prediscussion preferences and improve the decision quality of teams under these conditions.

The data from this experiment seems to support this conclusion. Teams in the advocacy condition had a significant improvement in decision quality at the 90% level. In the experimental condition, 75% of groups uncovered the hidden profile. This is a notable improvement over control conditions that solved the murder mystery only 58% of the time. The omission of the rotation with the possible response bias improves the significance of the study, $x^2(1, N = 70) = 7.34$, $p = .009$, with 38% of control groups and 67% of experimental groups solving the hidden profile.

In a similar study, Greitemeyer et al. (2006), researchers recorded the actual content of group discussion and found that teams using a dialectical technique actually discussed more shared and unshared information; however, they noted no change in the actual sampling bias of groups. Put differently, while teams surfaced more information, unshared information was still at a sampling disadvantage to shared information. As a result, the experimental groups in the Greitemeyer et al. study did not experience the same increase in decision quality as the present study (2006).

If both experiments utilized an advocacy technique in order to introduce contrived dissent into group discussion, how is it that the present study experienced improvements in decision quality while the other did not? It is possible that this difference is caused by the strength of the hidden profile used in the study by Greitemeyer et al. (2006). In the experimental procedures used here, we replicated the hidden profile used in the original murder mystery experiment by Stasser and Stewart (1992). This hidden profile dispersed information such that all information was shared except for nine pieces of critical information that led to the conclusion that Suspect E committed the murder and attempted to frame Suspect B (see Figure 4). In contrast, a particularly strong hidden profile was used in the study by

Greitemeyer et al. (2006). In the 2006 study all positive information about the correct alternative and all negative information about the worst alternative was unshared. All negative information about the correct alternative and all positive information about the worst alternative was shared (see Figure 5). As a result, the experimenters in that study created a strong preference for the incorrect solution. Put differently, there was a significantly high hurdle for group members to overcome in that study.

In the present study, the information distribution led group members to initially favor either Suspect B or Suspect M. Only through information exchange and integration could they see that Suspect E was the superior decision. In contrast, the strong hidden profile condition used by Greitemeyer et al. (2006) creates a strong preference for the inferior candidate and a strong rejection of the superior candidate. Put differently, group members would hold a strong, consensual preference for the wrong candidate. As a result, strong hidden profiles create high obstacles for information exchange and integration to overcome.

Information type and valence for critical clues			
	Alternative		
	E	B	M
Shared information			
Positive	0	0	0
Negative	3	6	6
Unshared information			
Positive	0	3	3
Negative	3	0	0

Figure 4 illustrates the weak hidden profile condition used in this study. Note that E is the superior candidate and B and M are equally inferior candidates.

Information type and valence			
	Alternative		
	A	B	C
Shared information			
Positive	0	6	3
Neutral	3	0	0
Negative	3	0	3
Unshared information			
Positive	9	0	3
Neutral	0	3	6
Negative	0	6	0

Figure 5 illustrates the strong hidden profile of the Greitemeyer et al (2006) study. Note that A is the superior candidate and B is the inferior candidate.

In a separate study conducted by Winquist and Larson (1998), experimenters created a weak hidden profile in which each member held an equal amount of positive information for each alternative. They found similar results showing an increase in both unshared and shared information; however, the groups had more accurate decisions as a result of the increase in unshared information. In the words of Greitemeyer et al. (2006), "when group members hold strong and almost consensual preferences, group discussion has a high hurdle to leap to correct these suboptimal preferences. However, when group member preferences are weak and inconsistent across group members, discussion can overcome the effects of member preferences on group decisions."

It is possible that the present study experienced the same increase in unshared and shared information, but due to the weaker hidden profile, teams were able to correct their suboptimal preferences and chose the correct solution. This suggests that in weaker hidden profile conditions, the devil's advocacy technique increases the quantity of information discussed and causes group members to value unshared information more highly. Put differently, members are more likely to use their unshared information in order to resolve their positions of dissent. It would be interesting to record group discussion in a future replication of this experiment in order to measure the sampling bias of groups under weaker hidden profile conditions.

While these findings suggest that advocacy techniques can successfully remedy decision making biases in weak hidden profile conditions, they also suggest that advocacy techniques are ineffective in strong hidden profile conditions. This is an alarming finding because the situations in which individuals hold such strong suboptimal preferences are the situations in which teams are needed most to correct the biases. Put differently, the corrective potential of information pooling is greatest in groups with strong hidden profiles; however, groups are least likely to realize the gains of group discussion under these conditions.

Mental Models

As illustrated by the Greitemeyer et al. (2006) experiment, simply pooling more information will not result in improved decision quality. Groups under hidden profile conditions must both pool and use the information in order to uncover the superior decision; however, the literature on hidden profiles is clear that teams often fail to use the information they surface. In a team decision-making simulation by Edmondson and Roberto (2007), teams are tasked with a simulated climb of Mount Everest in which they face a series of complex hidden profile challenges. In order to summit the mountain successfully, they must not only share their unique pieces of information, but they must integrate the knowledge into their decisions through mathematical calculations on tactical concerns like health, weather risks, and oxygen canister levels. Without a high level of integration, the simple pooling of unshared information does not uncover the hidden profile and the group's summit of the mountain is jeopardized. Researchers Gigone and Hastie (1993) suggested that teams often fail to use the information they surface. In their 1993 experiment, they proposed that even if groups succeed in sharing enough unshared information, they will fail to discover the superior solution because they will not give significant weight to the information discussed. "When individual group members pooled their information, the groups failed to take advantage of the cues that were unshared" (Gigone & Hasie, 1993, p. 973). Gigone and Hastie (1993) argued that prediscussion preferences prevented groups from realizing the gains of improved information pooling. This suggests that the devil's advocacy technique used in this study enabled teams to organize and evaluate information independent of these prediscussion preferences.

As Greitemeyer et al. (2006) discussed in their study, it is possible that prediscussion preferences enable teams to mentally arrange information into two categories: (a) preference justifications and (b) doubts and reservations. Since the devil's advocacy technique used in the present study required certain team members to argue independently of their prediscussion preferences, it is possible that new mental models were formed enabling members to organize and evaluate their information differently (Greitemeyer, Brodbeck, Schultz-Hardt, & Frey, 2006). Perhaps under these new models, it requires more cognitive resources to continue preference negotiating than to evaluate unshared information. If this is true, preference negotiation would become less practical and cognitive economy would force team members to approach the decision task differently. The fact that our devil's advocacy teams had better decision quality suggests that these teams chose to value the unshared information more highly than the free discussion groups. This is partially supported by Schweiger, Sandberg, & Ragan (1986) who found that advocacy techniques lead to a higher level of critical evaluation of personal assumptions by group members in comparison to free discussion groups.

While this scenario should occur under weak hidden profile conditions, in strong hidden profile conditions preference negotiation still occurs (Greitemeyer, Brodbeck, Schultz-Hardt, & Frey, 2006). Perhaps the strong hidden profile conditions create such high hurdles for the evaluation of unshared information that preference negotiation still seems practical. For example, consistent with findings in Schweiger, Sandberg, & Ragan (1986), the survey used in the present study showed an increase in anger for groups employing the devil's advocacy technique, $t(95) = -2.89$, $p = .04$. Since strong hidden profile conditions distribute information to create strong preferences for the incorrect solution, the advocacy technique may cause higher levels of anger in the strong hidden profile condition. This may increase the resources needed to evaluate the unshared information, and make preference negotiation and entrenchment the logical approach to the decision task. While these speculations would need to be tested in future experiments, they would explain why our advocacy groups were able to increase unshared information and use it to improve decision quality while groups in similar experiments were unable to capitalize on the increase in information pooling.

Individual Support and Affective Conflict

Participants in Schweiger, Sandberg, & Ragan (1986) had lower acceptance of their groups' decisions under the advocacy conditions than did subjects in the consensus conditions. In the present study, a 2 x 4 ANOVA was conducted on the data measuring the level of agreement per experimental condition within each of the four rotations. We found a significant interaction, $F(3, 92) = 5.12$, $p = .003$. Consistent with Schweiger, Sandberg, & Ragan (1986), the level of support for the group decision significantly decreased in groups with a devil's advocate.

This is a disturbing finding because while groups who implement the devil's advocacy technique may have a higher decision quality, they are less satisfied with the performance of their team. Combined with our finding on the increased levels of anger in advocacy groups, we can draw the conclusion that the harmony of the team is disrupted by this technique (Amason, 1996). This may cause problems for the implementation of the team's decision. While the decision is of higher quality, the increased conflict and decreased individual support for the group's decision may decrease the likelihood that the final decision is actually implemented. Schweiger, Sandberg, and Ragan (1986) suggested that these conditions are not due to the existence of conflict per se, but rather, that the groups failed to manage this conflict properly. According to Amason (1996), Brodwin & Bourgeois (1984) and Sussman & Herden (1982), a team needs strong norms that encourage the constructive type of conflict. Constructive conflict helps to build decision commitment, and therefore facilitates implementation (Roberto, 2005).

Priming the Mind

The findings of this study suggest that devil's advocacy facilitates an increase in the quantity of unshared information mentioned during discussion, and that in some weak hidden profile conditions, this advocacy technique forces group members into valuing unshared information more highly than shared information. However, the findings also suggest that the presence of a devil's advocate creates conditions in which groups may find, but not implement their superior decisions. This is evident through the higher anger scores and lower support scores found in advocacy groups. Furthermore, similar experiments suggest that while advocacy

techniques may increase the quantity of unshared information in group discussion, strong hidden profiles prevent groups from realizing these gains.

These conclusions suggest that an additional factor is needed to facilitate these gains. Put differently, perhaps devil's advocacy can be paired with something else in order to improve the likelihood that groups will discover a hidden profile and implement the superior solution. Since devil's advocacy can successfully increase the quantity of unshared information mentioned in group discussion, the factor must accomplish two objectives. First of all, the factor must mitigate the problems caused by increased affective conflict and ensure solution implementation. Second of all, the factor must cause groups to value the unshared information more highly regardless of the strength of the hidden profile. Research suggests that priming groups with the appropriate norms will accomplish both of these objectives.

As mentioned in previous sections, group norms that foster constructive conflict enable members to build the decision commitment that facilitates implementation (Roberto, 2005). Put differently, groups primed with this norm are able to manage the conflict created by the devil's advocacy technique. Therefore, priming devil's advocacy groups with a norm of constructive conflict should ensure that the groups implement the superior decisions they make.

In addition to improving the management of conflict in advocacy groups, research shows that norms can also ensure groups will value unshared information regardless of hidden profile strength. Postmes et al. (2001) tested to see if a group norm induced through a prior task would have an effect on a subsequent group task. They primed some of the groups with a consensus norm by engaging the members in "getting along" task and stimulating communal decision making. In this task, group members were asked to make a group poster in which all members had to participate. Other groups were primed with a critical thinking norm and engaged in a task that required them to evaluate a policy proposal through group discussion. Following the norm priming, both the consensus and critical thinking groups engaged in the hidden profile distribution experiment presented in Stasser and Titus (1985). The experiment was changed slightly so that after reading the partial information descriptions and making

initial private decisions, they were then given complete information with the previously unavailable information highlighted. Despite revealing the hidden profile to the groups, only 22% percent of the consensus primed groups chose the superior decision alternative. In contrast, 67% of the critical thinking primed groups selected the best option. Groups that were primed to think critically saw a 45% increase in the identification of the superior decision alternative. Interestingly, group cohesiveness was equal between the critical thinking and consensus groups. Postmes et al. (2001) concluded that the content of the norm determined the group's success, and not the strength of the member's ties. While cohesiveness does strengthen the grip of group norms, the group is able to influence its members in several ways. Not only can cohesiveness push members unquestioningly towards a collective decision, but it can also inspire the critical evaluation of choices. Postmes et al. (2001) reasoned that cohesion could actually help solve hidden profiles under the right norms.

Galinksy and Kray (2002) performed a similar experiment by priming groups with a counterfactual mind-set. Prior to engaging in a decision task, some of the groups considered a "What if" scenario in which groups had to imagine alternative outcomes to a story presented. Other groups considered a similar story but were not asked to identify counterfactual possibilities. Following this priming, all groups engaged in a decision task modeled after Stasser and Stewart (1992). Of the groups who were not exposed to a counterfactual prime, only 23% discovered the hidden profile. The counterfactual prime was much more successful and 67% of the groups selected the superior decision. Liljenquist, Galinsky, & Kray (2004) took these findings further when they determined that mind-sets created by the group will induce collective, analytical focus on the task and may increase the repetition of and receptivity towards another member's insights. In their words "one person's 'if' becomes the antecedent to another group member's 'then'" (Liljenquist, Galinsky, & Kray, 2004, p.267); however, the prime must be given at the group level. If group members are primed individually with the counterfactual mindset, individual performance on decision tasks will improve, but group judgment accuracy will suffer. Therefore, group decision tasks require group level primes—especially in hidden profile conditions when the success of the group depends on the sharing of information. Furthermore, Liljenquist, Galinksy, and Kray (2004)

and Postmes et al. (2001) illustrate how even minimal alterations in group norms can cause sizable effects on group processes. This is a significant extension of Stasser and Stewart (1992), which showed that simply framing a task as a problem to be solved rather than a decision to be made could radically alter the way groups are influenced by information.

Therefore, the research suggests that devil's advocacy groups primed with a critical thinking or counterfactual norm should perform well in hidden profile situations regardless of the profile's strength. Furthermore, the critical thinking norm should foster constructive conflict that mitigates the affective conflict of advocacy groups and increases the likelihood of implementation. While future research is needed in this area to confirm this conclusion, the research as a whole suggests that devil's advocacy can improve the decision quality of teams in hidden profile conditions when paired with a critical thinking norm.

LIMITATIONS AND FUTURE RESEARCH

Limitations of Findings

While the results of this study are significant, there are several limitations to the experiment's findings. First of all, the omission of the rotation with the possible response bias decreased the sample size from 100 participants to 70 participants. Ideally, a larger sample size should be utilized. In addition to the sample size, the experiment was conducted over a series of four rotations. While every effort was made to randomly assign members to groups, the fact that all group members were in the same class or academic club may have introduced uncontrolled factors to the experiment. A third limitation would be the academic background of the subjects. While the MBA candidates did have professional backgrounds, during the experiments all participants were serving in an academic capacity. The experiences of professionals solving actual business problems may be different from students in a controlled environment. As a result, there may be limitations of these findings in real-world applications. Finally, since we did not record and code the actual content of group discussion, we cannot say with absolute certainty whether or not groups followed the instructions perfectly. All indications show that they did; however, there is always the possibility that groups deviated from instructions when the researchers were not present and supervising.

Future Research

As mentioned periodically throughout this study, this experiment uncovered several interesting areas for future research. There are four primary areas that we are particularly interested in exploring further. First of all, this experiment should be repeated with a larger sample size. We would like to see if the effects we found in the present study can be replicated in a larger experiment with more participants. Second of all, we did not have the resources needed to record and monitor all of the group discussions. It would be interesting to see if groups in the devil's advocacy conditions had the increase in shared and unshared information pooling that we suspected. In addition, the recording would enable researchers to see exactly how the devil's advocacy groups integrated and used their pooled information. These recordings should be done in both a weak hidden profile condition similar to the one used here and the strong hidden profile condition used in the Greitemeyer et al. (2006) study. This would lend empirical support to our suspicions that the strength of the hidden profile prevents groups from realizing the gains of the devil's advocacy technique under extreme conditions. A third area for research would task groups with not only solving hidden profiles, but also implementing them. To our knowledge, the research on hidden profiles has only tested the group's decision-making quality. As this study shows, superior decision-making does not always lead to positive solutions. The groups must also be willing to implement their solutions once the decision is made. Finally, an examination of both our findings and research on team norms suggests that critical thinking norms paired with the devil's advocacy technique may mitigate the challenges found here. We are interested in seeing a study that pairs these techniques together in a hidden profile situation. As we discussed earlier, the literature leads us to believe that there would be interaction between these two variables.

IMPLICATIONS FOR MANAGEMENT

Early attempts at solving hidden profiles, such as requiring groups to rank decision alternatives rather than choosing the best option (Hollingshead, 1996), telling members to avoid indicating their preference prior to group discussion (Houlette, Muzzy, & Sawyer, 2000), and creating expert role assignments (Stasser, Vaughan, & Stewart, 2000), increased the likelihood of discovering hidden profiles, but only by a modest amount. For example,

Stasser et al. (2000) found that role assignment increased the percentage of unique items discussed from 29% to 34% in comparison to 58% of common items discussed. As these results indicate, the majority of interventions targeted at addressing the content of discussion and the preferences of group members—while grounded solidly in research on discussion content and member preferences—only improved the likelihood of hidden profile discovery by modest amounts (Stasser & Titus, 2003). Despite these discouraging results, there were some interventions that had significant impacts on hidden profiles.

The findings of this particular experiment are quite significant in comparison. By encouraging work teams to use the devil's advocacy technique in group meetings, managers are able to not only improve decision quality in strategic decisions, but also improve decision quality under hidden profile conditions. Since the devil's advocacy technique may seem unnatural at first, managers should only encourage teams with the right critical thinking norms and appropriate training to use the technique. Practice and experience will not only familiarize teams with this process, but it will also enable them to handle conflict more effectively. Managers should communicate that conflict is not only a part of group decision-making, but also a helpful tool when it is used constructively (Amason, 1996). As this critical thinking norm develops, the devil's advocacy technique should have a lower likelihood of inducing affective conflict. In addition, critical thinking norms paired with the devil's advocacy technique may improve the chances of solution implementation.

While this technique is effective in experienced teams with critical thinking norms, managers are warned not to impose this technique on teams that are inexperienced or have poor norms. As the results of the present study show, doing so may actually hurt team harmony, introduce negative conflict into the workplace and lower the likelihood of solution implementation.

CONCLUSION

While the devil's advocacy technique improved the decision quality of teams under hidden profile conditions, two particular findings were alarming. First of all, the results of this study differ significantly from those of Greitemeyer et al. (2006) who used the dialectical inquiry

technique to introduce advocacy in a strong hidden profile condition. Greitemeyer et al. (2006) noted this anomaly and attributed it to the strength of the hidden profile they used in their experiment. Similar research supports this conclusion. This finding is very alarming because it suggests that teams who can benefit most from the unshared information often fail to do so. It also suggests that the devil's advocacy technique that was so successful in this experiment has limitations under more challenging conditions.

A second alarming finding in this study was an increase in the level of anger and decrease in the level of individual support for the group decision in teams utilizing the advocacy technique. Since these factors are known to decrease the likelihood of solution implementation, it is possible that teams who discover the superior solution will encounter significant difficulty in implementing it.

If this finding is due to constructive conflict, it may be possible to counteract these effects by introducing a group critical thinking norm. Groups primed with a critical thinking norm have not only performed exceptionally well under hidden profile conditions, but they also used conflict more constructively than control groups. As a result, the pairing of devil's advocacy and critical thinking norms may improve both decision quality and the likelihood of implementation. In addition, this critical thinking norm may work independently of the hidden profile's strength, resulting in improved decision quality in situations like Greitemeyer et al. (2006) where the hidden profile was particularly strong. These conclusions offer encouraging results for hidden profile researchers and present an interesting opportunity for future research.

APPENDICES

Appendix A – Consent Form

Consent Form

You are invited to participate in a study on team performance. We hope to learn whether or not certain techniques improve the quality of group decision making. You were selected as a possible participant in this study because of your experience in academic courses that often require the use of teams to solve a problem or make a judgment.

If you decide to participate, we will conduct an experiment involving the following procedures: Individually reading a case study, discussing the case as a group, reaching a group-level decision, and independently answering a brief survey. During this experiment, group members will likely have conflicting viewpoints and opinions regarding the group's final decision. As a result, disagreements between members may occur. The total estimated time for the experiment is one (1) hour of both independent and group work.

Any information obtained in connection with this study will remain confidential and will not be disclosed to the general public in a way that can be traced to you. In any written reports or publications, no participant other than the researchers will be identified, and only anonymous data will be presented

This consent form, with your signature, will be stored separately and independently from the data collected so that your responses will not be identifiable.

Your participation is totally voluntary, and your decision whether or not to participate will not affect your future relations with Bryant University or its employees in any way. If you decide to participate, you are also free to discontinue participation at any time without affecting such relationships. However, it is requested that you notify the investigator of this. If you have any questions, please contact Brian Waddell at BWaddell@Bryant.edu. If you have any additional questions later, we will be happy to answer them. You can have a copy of this form to keep.

Please sign below if you have decided to participate. Your signature indicates only that you are at least 18 years of age and have read the information provided above. Your signature does not obligate you to participate, and you may withdraw from the study at any time without consequences.

Signature of Participant Date

Signature of Principal Investigator Date

Appendix B – Group Instructions

Honors Program Experiment

This study is an examination of effective group decision making. As in the real world, members will not receive exactly the same information as other group members; however, all of the information is consistent and true.

You are tasked with solving a murder mystery. The police have conducted a series of interviews and have assembled your team to assist in the investigation. They have narrowed the suspect list to one of three (3) individuals: Mickey Malone, Billy Prentice, and Eddie Sullivan. The guilty party must be one individual from this list.

To assist you in this process, we ask that you follow the following guidelines and instructions. Please read through the instructions in their entirety before beginning the experiment. You will have a total of one (1) hour to complete the experiment unless otherwise directed by the experiment facilitators.

Part 1

1. Each member of your team is responsible for reviewing the consent form provided in this packet. A signature is required to participate in the experiment. Your participation is voluntary. Should you decide not to participate in this study, please notify one of the facilitators immediately.

Part 2

2. Included in this packet are four case study booklets. The booklets are labeled as Case Study A, B, C, and D. Please divide these amongst group members so that each member has one of the four booklets. Each member should independently read their assigned booklet. Please do not discuss your assigned case with other members.
3. Two (2) maps and one letter have been included in this packet. Group members should independently review these pieces of information.
4. You are welcome to take notes on all information in this section.
5. Please spend no more than 20 minutes on Part 2.

Part 3

6. You are welcome to use your notes, the two (2) maps, and the letter in this section; however, the case study booklets labeled A, B, C, and D must remain closed and cannot be opened to review information.
7. Please spend 40 minutes discussing the information as a group. You must come to a consensus on which one of the 3 suspects committed the murder.
8. Please turn to your Part 3 section. Some teams have received a document labeled "Special Instructions." If your team has these special instructions, we ask that you follow them. If your team has not received this section, please proceed normally with group discussion.
9. Please spend no more than 35 minutes on Part 3.

Part 4

10. Once your team has come to consensus over who committed the murder, please independently fill out the brief questionnaire included in this section.
11. Write the name of the suspect that your team has selected as the murderer on the top of each questionnaire.
12. Return to all forms to the facilitator.

Appendix C – Devil's Advocacy Manipulation of Groups

Special Instructions

The devil's advocacy approach develops a solid argument for a reasonable recommendation and then subjects that recommendation to a formal critique. The devil's advocate questions the assumptions presented by other group members, and attempts to show why the reasonable recommendation should not be adopted. This continues over several repetitions until the mutual acceptance of a recommendation occurs.

This technique is believed to improve decision quality because only sound, well supported assumptions and recommendations will survive the criticism of the devil's advocate. We ask that your group use this technique during your group discussion. The individual with **Case Study 'D'** has been randomly assigned to this position.

We have included the following recommendations to guide you in this process:

1. Members not selected to serve as devil's advocate should build an argument identifying one of the suspects as the guilty party, supported by all key assumptions, *facts, and data that* underlie this argument. Write the recommendations, assumptions, facts, and data as clearly and thoroughly as you can on the Initial Verdict Form provided for this purpose.
2. Meanwhile, the devil's advocate should prepare for their critique by identifying critical assumptions, data, etc. ascertained through their reading.
3. The non-devil's advocate members present their argument and written assumptions to the devil's advocate. The devil's advocate subjects the argument to a formal critique. The critique attempts to uncover all that is wrong with the argument, assumptions, facts, and data and to expound the reasons why the argument is flawed.
4. Following Step 3, the devil's advocate presents their critique to the group orally. The non-devil's advocate members then meet separately once again and revise their argument to satisfy the valid criticisms of the devil's advocate.
5. Repeat Steps 3 and 4 until all members can accept the guilty party verdict, assumptions, and data.
6. Write the final verdict, assumptions, facts, and data on the Final Recommendations form with which you have been provided.

You have 40 minutes to discuss and reach a consensus on who committed the murder.

Appendix D – Independent Post Discussion Survey

Individual Survey

Please answer the following questions:

How many disagreements were there over different ideas about this decision?

Not Sure	*No Disagreements*	*A Few Disagreements*	*Many Disagreements*
[ ]	[ ]	[ ]	[ ]

How many differences about the content of this decision did the group have to work through?

Not Sure	*No Differences*	*A Few Differences*	*Many Differences*
[ ]	[ ]	[ ]	[ ]

How much anger was there among the group over this decision?

Not Sure	*No Anger*	*A Little Anger*	*A lot of Anger*
[ ]	[ ]	[ ]	[ ]

How much personal friction was there in the group during the decision making process?

Not Sure	*No Personal Friction*	*A Little Personal Friction*	*A lot of Personal Friction*
[ ]	[ ]	[ ]	[ ]

Please rate the accuracy of the following statements:

I support the group's decision.

Completely Disagree	*Somewhat Disagree*	*Neutral*	*Somewhat Agree*	*Completely Agree*
[ ]	[ ]	[ ]	[ ]	[ ]

This team's purposes are not especially challenging--achieving them is well within reach.

Completely Disagree	*Somewhat Disagree*	*Neutral*	*Somewhat Agree*	*Completely Agree*
[ ]	[ ]	[ ]	[ ]	[ ]

Each member of this team brings a unique perspective to group discussion.

Completely Disagree	*Somewhat Disagree*	*Neutral*	*Somewhat Agree*	*Completely Agree*
[ ]	[ ]	[ ]	[ ]	[ ]

Generating the outcome of this team requires a great deal of communication and coordination among members.

Completely Disagree	*Somewhat Disagree*	*Neutral*	*Somewhat Agree*	*Completely Agree*
[ ]	[ ]	[ ]	[ ]	[ ]

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