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For the degree of Master of Science

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DEVELOPMENT AND TESTING OF AN INTERVENTION TO IMPROVE GROUP
DECISION-MAKING EFFECTIVENESS IN A HIDDEN PROFILE SCENARIO

A Thesis

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of

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ABSTRACT

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Research has repeatedly shown that when groups whose members have varying expertise are combined to make a decision, they tend to discuss common information at a higher rate than unique information, hindering their ability to make the best decision. In response to these findings and the fact that organizations are increasingly using groups rather than individuals to make important decisions, a new intervention was developed based on past research to help groups make better decisions and discuss more unique information. The intervention was developed through three phases to determine which techniques were most powerful. The formal evaluation of the intervention was tested on a total of 228 undergraduate students (44 groups of four and 52 individuals). Groups were randomized into an experimental condition, receiving the intervention, or a control condition. Groups participated in a hidden profile business simulation acting as the top management team of a fictional Hollywood movie studio. Information was distributed so that there was common and unique information for each group. Groups given the intervention made significantly better decisions, shared more unique information, and performed significantly better than individuals. Unique information sharing was positively related to performance and the unique information given to one group member mediated the relationship between the condition and performance. In addition, this study revealed that within the inventory of unique information, different types of information may be more critical in reaching the best possible decision than others. Future research aims and implications are discussed.

CHAPTER 1. INTRODUCTION

In response to increasing competitive challenges and organizational needs of flexibility and adaptation, organizations today are relying more and more on groups and teams rather than individuals to accomplish tasks (Pina, Martinez & Martinez, 2007). In addition, organizations are becoming increasingly global in nature, leading them to have greater access to wider consumer and distribution networks, as well as networks involving internal and external cross-border relationships (Choy, 2007). In this light, teams responsible for making decisions and completing tasks are likely to be diverse in composition, and possess individuals with varying sets of knowledge and expertise (Trimmer, Domino & Blanton, 2002). In many real-world situations, each individual in the group does not possess all of the necessary knowledge needed to reach the optimal decision and both common and unique information must be discussed to reach the best decision possible. Common information refers to information already known collectively by group members before discussion, while unique information refers to information known only to a particular member or subgroup prior to discussion. Unfortunately, research has repeatedly found groups members fail to effectively pool unique information during discussion (Stasser & Titus, 2003).

A hidden profile situation exists when information is distributed among group members so that the information that all group members are aware of supports an inferior alternative, while the sum total of information that the group holds supports a superior alternative (Stasser & Titus, 2003). In this case, members do not favor the superior alternative at the onset of discussion because they only have part of the information, and the superior alternative can be uncovered only by pooling the knowledge held by the individual members (Stasser & Stewart, 1992). Research has shown that the presence of a hidden profile leads to biased information sampling, or the tendency to discuss (or

sample) common information at a higher rate than unique information (Stasser & Titus, 2003). Biased information sampling has been shown to negatively affect group performance and the group's ability to make the correct decision (Stasser, Taylor & Hanna, 1989; Stasser & Stewart, 1992, 2003; Larson, Foster-Fishman & Keys, 1994; Gigone & Hastie, 1993). This phenomenon happens often in decision-making groups in both organizational and educational settings, illustrating the criticality of using discussion to uncover the unique information and discovering new methods to promote the discussion of unique information. Based on this bias and the previous research discussed below, the current study was performed to develop and assess a structured intervention designed to improve performance and unique information sharing in a hidden profile situation.

1.1. Previous Research

Group decision-making effectiveness has been studied since the 1920s but it was not until 1985 that Stasser and Titus uncovered the problem of biased information sampling. In their seminal study, they found that discussion did not augment decision-making effectiveness in groups whose members hold expertise in different areas due to a lack of discussion concerning unique information. In this study, participants were assigned to 4-person groups and given a scenario in which they were to choose the most suitable candidate out of three hypothetical running mates for student body president based on an inventory of information. Within the entire inventory of information, one contained more positive and fewer neutral attributes than the other two and was assumed to be the clear best answer. Three conditions were constructed based on how this inventory of information was distributed prior to discussion. In the shared condition, each group member was given all of the information. In the first unshared condition, named the unshared/consensus condition, positive information about the correct candidate and negative information about one of the incorrect candidates was given to only one person in order to sway the initial decision away from the correct candidate. In the second unshared condition, named the unshared/conflict condition, positive information about the correct candidate and negative information about both of the incorrect candidates was

only given to one person in order to sway initial decisions away from the correct candidate, but not create a strong case for either of the incorrect candidates. It was hypothesized that group members would be able to use discussion time to effectively pool all of their information and identify the optimal candidate.

Group members were told to make a decision individually before and after discussion, and it was found that even after discussion, they tended to make decisions based mostly on common information and information that supported the group's initial decision, and they were able to recall more common than unique information. Groups in the shared condition chose the correct candidate significantly more than those in the unshared conditions (83% correct, 18% correct, respectively). As a result, discussion was dominated by common information and information that supported initial decisions made before discussion. Therefore, discussion did not improve their decisions and caused them to more often support the wrong candidate.

The findings of Stasser and Titus's (1985) seminal study sparked an array of research designed to investigate the problems associated with biased information sampling. Several antecedents of biased information sampling were subsequently studied in attempt to reverse the problem, including group size (Stasser, Taylor & Hanna, 1989), expert labeling (Stewart & Stasser, 1995, Franz & Larson, 2002), the way in which the information is discussed (Stasser & Stewart, 1992; Lavery et al., 1999; Kelly & Karau, 1999; Klocke, 2007), how the information is presented (Stewart & Stewart, 2001), type of task (Stasser & Stewart, 1992), and the introduction of structure to the task (Stasser, Taylor & Hanna, 1987; Larson, Foster-Fishman & Keys, 1994). Motivational aspects of decision making and the influence of cognitive conflict were also taken into account in attempts to solve the bias (Postmes, Spears & Cihangir, 2001; Wittenbaum, Hollingshead & Isabel, 2004; Scholten, Knippenberg, Nijstad, & De Dreu, 2004). Finally, a meta-analysis was performed on information sharing in work groups to consolidate this information (Mesmer-Magnus & DeChurch, 2006).

Stasser, Taylor and Hanna (1989) tested the effect of group size by varying decision-making groups between 3 and 6 members. As expected, larger groups shared more information than smaller groups, however this difference was found to be due to

sharing more common information than unique information. Furthermore, two studies attempted the use of labeling experts to improve unique information sharing (Stewart & Stasser, 1995, Franz & Larson, 2002). Labeling a person as an expert in a particular area in front of other group members led them to mention and maintain more information than nonexperts as well as led to other group members trusting the information given by the labeled experts. Concerning the composition of the group, adding more people to a group may not increase unique information sharing, but choosing experts within the groups and announcing these roles in front of other group members can lead these experts to focus on and mention more of their unique information.

Different aspects of the information itself were also studied to determine their effect on biased information sampling. Stasser and Stewart (1992) first raised the idea that it is not just getting the members of a group to mention a piece of unique information that is important, but group members must also value it and maintain a focus on it. In other words, the group must redirect the focus of discussion away from common to unique information, or turn unique information into common information. Subsequent research lent support to the idea that simply stating unique information does not make a group more likely to uncover a hidden profile (Lavery et al., 1999). For instance, Klocke (2007) found that only groups whose members individually repeated their own and others' unique information were able to uncover the hidden profile. It is not just how much unique information is mentioned, but rather how important this information is perceived to be and whether or not it is taken seriously. Only then can the unique information sway the initial preference (Lavery et al., 1999; Kelly & Karau, 1999).

Stewart and Stewart (2001) tested the impact of giving information in different form by giving information as words or black and white pictures and discovered that making the information more salient in picture form could impact recall of unique information. The picture superiority effect, which asserts that groups would be more likely to recall unique pictures than unique words, gives theoretical framework to this finding. This is an important finding as it shows that increasing the salience of an item of information, such as showing it in picture form, can increase its chances of being recalled and therefore used to make a decision.

Several studies used a task similar to that used by Stasser and Stewart (1985) in their seminal article, leading researchers to investigate the impact of the type of task on information sharing. Stasser and Stewart (1992) compared groups who were given a task that had a discernibly correct answer to groups who were told to make their best judgment. While groups facing a hidden profile had worse group performance as expected, groups outperformed individuals when they were told that the task had a discernibly correct answer (solve set) rather than instructing them to make a judgment (judge set). This finding was probably due to the fact that groups discussed more and focused longer on unique information when they were told that their task had a demonstrably correct answer. These results led to the conclusion that in a hidden profile scenario, type of task can have an impact on the decision-making process and groups may make better decisions when told that the task they are working on has a discernibly correct answer.

To expand upon the impact of the type of task, researchers also studied the way in which the task is performed by introducing structure. Structure in group decision-making can be described as an intervention that provides teams with strategies for sharing and integrating information in order to focus the team's attention on important aspects of the task, stimulate member contribution, and ensure adequate attention to information mentioned in the discussion (Mesmer-Magnus & DeChurch, 2009). Structure was first introduced to a hidden profile task by Stasser, Taylor and Hanna (1987) who compared groups who were given instructions to concentrate on recalling information and to avoid expressing preferences during the early phases of discussion to groups who were just told to reach a conclusion. The hypothesis that structuring the discussion would cause more information to be discussed was supported. However, this was mostly due to an increase in common information. Further, unique information was actually less likely to be repeated once it was mentioned than common information, showing that it is important to get the groups to somehow focus more on unique information.

A structured approach to completing a decision-making task in a hidden profile scenario was also tested by Larson, Foster-Fishman and Keys (1994), who gave half of the groups in one condition a decision-making training, delivered in three parts: 1)

instructions to take five minutes at the beginning of discusses to plan to work to maximize the group's effectiveness, 2) a short review of the three most common barriers to effective group decision training, and 3) a four minute videotape presentation of a three-person group implementing the suggestions in part 2 in a discussion similar to the one that they would be having to choose a candidate for student body president. Groups in the training condition did talk about significantly more common and unique information than those in the non-training group, but the difference was not to the degree expected. Overall, these studies showed promise for implementing structure into group discussion in the presence of a hidden profile, but further research is needed to discover a more effective way to fully leverage the use of this structure.

In a review article of previous research on group decision-making in a hidden profile scenario, Wittenbaum, Hollingshead and Isabel (2004) proposed that there are three assumptions of information sharing that may be hindering researchers' ability to reverse the common information bias. The first assumption is that members are thought to be unbiased communicators and will communicate any piece of information recalled. Second, there is an assumption that groups work cooperatively with one another toward the common goal of reaching the best decision. Finally, there is an assumption that if an item of information is mentioned, that it is mentioned correctly and in a goal-congruent way. The authors proposed that information exchange during discussion is actually a motivated process by which group members choose which pieces of information to share and how to go about discussing these pieces of information in order to satisfy goals. Therefore, these individuals need to be properly motivated for the goals to match those of the party for whom they are making the decision.

Scholten, Knippenberg, Nijstad and De Dreu (2004) used the theories proposed by Wittenbaum, Hollingshed and Isabel (2004) by testing the hypothesis that groups high in what is known as epistemic motivation, or the desire to develop and sustain a correct and deep understanding of issues, including decision problems at hand, would share more information and make better decisions. Participants in the experimental condition were told to gain insight into the process by which they reached their decision because there would be a follow-up interview in which they would be asked to elaborate on the

decision-making process that they used, while groups in the control condition were simply told to complete their task without further instruction or follow-up. Groups given these instructions discussed more unique information, and more frequently chose the optimal decision. Therefore, urging groups to gain a better understanding of the issues and decision problems at hand, (or increasing their epistemic motivation), can ultimately improve their information sharing and decisions.

Another topic that received attention in the hidden profile literature is that of introducing critical thinking to improve unique information sharing. Postmes, Spears and Cihangir (2001) proposed that a group norm of reaching consensus may cause a lack of discussion of alternative solutions, and this problem may be fixed by making different kinds of norms salient using a pre-task to the discussion. Groups were introduced to either a consensus norm in which they were to make communal decisions about putting together a poster of pictures, or a critical thinking condition norm in which they were given a proposal that virtually all students disagreed with and instructed to discuss it prior to the final decision-making task. Groups in the critical-thinking condition considered unique information as equally valuable as common information and made better overall decisions than the consensus condition. Information value was determined using a self-report measure in which each individual rated how valuable they felt each piece of information was during discussion. Therefore, it seems that it would be valuable to teach the groups a process that will help induce critical thought and see the value of unique information rather than just warning them to do so or just having them discuss without any structure.

Overall, the literature on decision-making in a hidden profile scenario has demonstrated that biased information sampling during group discussion is a serious and robust problem. Mesmer-Magnus and DeChurch (2009) examined 72 independent studies (including 4,795 groups) examining information sharing in teams in a meta-analysis in 2009. Their analyses supported the conclusion that the majority of group discussion concentrated on common and non-critical information than on uncovering the unique and critical information. Relationships were reported as correlations corrected for sampling error, measure reliability, and, when necessary, attenuation of observed

correlations due to dichotomization of information sharing, and represented as ρ . As expected, information sharing positively predicted team performance ($\rho = .42$), as well as cohesion ($\rho = .20$), member satisfaction ($\rho = .33$) and knowledge integration ($\rho = .34$). Sharing critical (unique) information had a stronger relationship with decision quality ($\rho = .34$), than sharing of non-critical (common) information ($\rho = .50$ vs. $\rho = .32$).

Moderators of the information sharing-performance relationship were also uncovered. Unique information was more positively related to performance when the task was framed as a solvable problem ($\rho = .53$), and when the discussion was structured ($\rho = .46$).

Overall, the meta-analysis further supports the findings that information sharing is a driver of team performance, and that there are emerging correlates and moderators that have an impact on this relationship. However, even in the presence of these moderators, the relationship between information sharing and team performance remains positive, and unique information has a larger impact on performance than shared information. While it is clear that there are areas that show promise in reducing the shared information bias, the problem has not been solved and better methods for uncovering hidden profiles through group discussion should be sought out since organizations are continuing to rely on diverse groups to discover the optimal direction to take in a decision task that requires the use of varying expertise (Trimmer, Domino, Blanton, 2002). The previous research in this area along with the decision-making interventions discussed below were used to guide the development of the structured intervention developed to deal with the recurring problems of avoiding the common information bias.

Group Decision-Making Interventions

In addition to the attempts made by researchers to diminish biased information sampling in decision-making groups, there are a variety of group decision-making interventions that have been used to improve the quality of decisions made by work groups and teams. These interventions were designed to improve upon the traditional consensus approach, in which groups engage in discussion with the ultimate goal of reaching a common decision without any specific structure. The consensus approach can lead to threat, ingratiation, and lack of participation (Hornsby, Smith & Gupta, 1994).

These interventions can be categorized into conflict inducing (interventions designed to induce strategic conflict and disagreement over alternatives) and conflict reducing (interventions that have been designed to foster conflict-resolving behaviors).

Conflict Reducing

The three most used interventions of this type are the nominal group technique (NGT), the Delphi method, and brainstorming.

The NGT approach is useful in situations where individual decisions must be pooled and there is disagreement about the solution to a problem (Hornsby, Smith & Gupta, 1994). Implementation of this intervention generally involves 5 steps including: (1) silent idea generation, (2) presentation of each group member's idea out loud to the group, (3) discussion and clarification, (4) voting and rank ordering of most important ideas, and (5) final group discussion of the most important areas identified (Evans, Rogers, McGraw, Battle, & Furniss, 2004; Hornsby, Smith & Gupta, 1994). NGT has been found to relate positively to group decision-making effectiveness on its own and when combined with other methodologies (Hornsby, Smith & Gupta, 1994), but the overall literature on this intervention has produced mixed results. It is suggested that NGT is more suitable to fact-finding and idea generation than to idea evaluation or group consensus (Errfmeyer & Lane, 1984), which is often what is desired of work groups in organizations.

In the Delphi technique, a series of questionnaires concerning an issue that requires a decision to be made are created by a small group of subject matter experts and these questionnaires are then sent out to a larger group. After the questionnaires are returned and the answers are reviewed by subject matter experts, a new questionnaire is developed based on the results and sent out to the respondents again. There are generally two rounds of questionnaires and the underlying theory is that consensus will improve with successive rounds of anonymous group judgments (Hornsby, Smith & Gupta, 1994). Research suggests that the Delphi technique can lead to improved decision-making over groups using a consensus approach, but also is fraught with limitations including its time consuming nature and the inability to determine differences in individual interpretation

and can result in negative social facilitation (Hornsby, Smith & Gupta, 1994; Errfmeyer & Lane, 1984). Finally, comparisons between the Delphi Technique and NGT have produced mixed results and the Delphi Technique was found to be most valuable to “almanac” type questions (i.e. how many gas stations are in a given state) (Errfmeyer & Lane, 1984).

Brainstorming was originally proposed in 1957 by Osborn as a means to enhance the quantity and quality of ideas generated in a group discussion. This technique involves participants generating as many ideas as possible by uncritically evaluating their own ideas before expressing them, uncritically evaluating others ideas when they are expressed, and combining and improving upon ideas that have been expressed. In a meta-analysis of 20 studies comparing the productivity of brainstorming groups to productivity of nominal groups presented by Mullen, Johnson and Salas (1991), nominal groups tended to significantly outperform brainstorming groups and productivity loss increased to a great magnitude as groups increased in size, when an experimenter is present, and when they are required to vocalize their contributions.

Overall, these three techniques do show promise for the inclusion of a structured approach to making decisions, but there is no clear evidence of one outperforming another and each has problems that are detrimental to its benefits in improving group decision-making effectiveness. Additionally, these techniques have not been studied in using a hidden profile task, but aspects could potentially lead to improved decision-making in a hidden profile scenario.

Conflict Inducing

Another set of interventions are aimed at inducing conflict, rather than reducing it. These interventions try to stimulate cognitive conflict, rather than affective conflict. Cognitive conflict is defined as multiple perspectives in a group resulting in constructive disagreement over the best way to achieve a group goal or objective. Affective conflict, on the other hand, is interpersonal and refers to conflict directed at others in the group, resulting in tension, frustration, argument, and withdrawal (Jehn, 1995; Devine, 1999). Affective conflict can be detrimental to group discussion and hinder the groups ability to

make the best decisions. However, cognitive conflict can result in increased evaluation of assumptions and alternatives, preventing groups from making decisions without evaluating alternatives (Priem & Price, 1991).

The conflict-inducing methods that have been used the most over the past few decades to improve decision-making effectiveness are Devil's Advocacy (DA) and Dialectic Inquiry (DI). DI is a technique used to increase the otherwise restricted expression of cognitive conflict during decision making by creating a subgroup structure that forces the production of opposing recommendations (Priem, Harrison & Muir, 1995). A prevailing or default plan is identified, an attempt is made to identify the assumptions underlying this plan, and then a counterplan is developed that rests on assumptions opposite those supporting the original plan. After this, advocates for each of the two distinct plans engage in a structured debate to voice their arguments in support of their preferred plan (Schwenk, 1990). DA introduces conflict into group discussion by introducing one set of recommendations and a thorough critique of it (Schweiger & Finger, 1984).

The majority of research on DI and DA has compared these techniques to each other as well as to a third condition in which an expert provided advice on how to make a decision (E). Unfortunately, these studies had a lack of clear hypotheses concerning the nature of the main effects (Schweiger, 1984), and there is no consistent pattern of one intervention being more effective than the next (Schweiger & Finger, 1984). Schwenk (1989) conducted a meta-analysis on five separate studies investigating the comparative effectiveness of DA, DI, and E, revealing that DA and DI have higher effect sizes than E for all studies, and that half of the studies favored DA and half favored DI. Therefore, no strong support was found for either DA or DI as a superior method for introducing conflict, but results show that they are more effective than simply being given the advice of one expert to follow (Schwenk, 1989). Overall, one of the main conclusions of the existing research is that DA and DI can induce conflict and improve decision making if they are effectively managed, but there is a lack of agreement from past research on the best way to manage these techniques and no clear indication of which is more effective (Schwenk, 1989; Priem & Price, 1991; Schwenk & Cosier, 1993).

Little research has been reported on the effects of such interventions on decision making in the hidden profile paradigm. One exception is a study by Devine (1999), who used DI as the experimental condition in comparison to a traditional consensus group. The main conclusions from that study were that conflict has a positive relationship with affective conflict, which leads to frustration and withdrawal. Other attempts to induce cognitive conflict, such as the group training conducted by Larson et al. (1994), have had neutral to positive results, but none have been able to capture the theoretical benefits of cognitive conflict without the consequences of affective conflict. The intervention developed in the current study is aimed at utilizing the benefits of cognitive conflict without suffering the negative results of affective conflict by incorporating components of conflict-reducing techniques as well as carefully implemented conflict-inducing techniques with an explanation of why this conflict is important to the decision-making process.

1.2. Current Study

The current study is aimed at designing a more effective intervention than previous research to get all members of a group to discuss the information that they all hold in common as well as the pertinent information that only certain group members hold.

As discussed in the previous section, the most common techniques used to enhance group decision-making effectiveness have produced mixed results. There are several facets of group decision-making in a hidden profile scenario that must be taken into account and existing techniques may simply be too narrow to touch on all of these components. Therefore, this research is being conducted to develop and test a new intervention aimed reducing the problems associated with biased information sampling that have been introduced in research over the past few decades. The intervention will utilize positive techniques and deal with recurring problems that have been repeatedly found in research since the seminal article by Stasser and Titus in 1985. The main goal of this intervention is to motivate the group members to use their information optimally

to uncover the hidden profile and come to the best decision. For this reason, the intervention is labeled “Motivated Sharing”.

Development of a New Intervention

While there have been mixed results throughout the research in group decision-making in a hidden profile scenario, there have been some positive findings that show promise for the future. Some of the most salient areas of promise are integrated to create the Motivated Sharing intervention, designed to improve information sharing and group decision-making effectiveness. This intervention can be described by breaking it down into three sections: (1) goals of an effective group discussion, (2) principles of an effective group discussion, and (3) implementation. Each of these aspects is presented below along with a rationale.

Goals of an Effective Group Discussion

Information sharing leads to improved group decision-making, and this relationship is stronger for sharing critical information than for sharing non-critical, common information (Mesmer-Magnus & DeChurch, 2009). In addition, critical, unique information must not only be mentioned, but it must be retained and valued by group members in order to be used in the final decision (Stasser and Stewart, 1992). Therefore, in order to bring forth all important information and use the information to come to the best decision, the group discussion must be used to: (1) share unique information, (2) utilize that information in making decisions, and (3) weight that information according to its overall importance.

Principles of an Effective Group Discussion

Based on previous research, four necessary principles for an effective discussion have been identified (with rationales based on previous literature for each discussed below): (1) identification of specific areas of knowledge, (2) labeling of each member’s area of expertise, (3) knowledge of common mistakes made by past decision-making groups, and (4) a structured approach to making decisions.

As was mentioned, unique information may be treated as suspect since it cannot be verified by reference to one's own information or memory, making it seem less reliable than common information that is known by all group members. However, research has shown that labeling group members as experts in a certain area in front of other group members tends to make them mention, discuss and retain more unique information than nonexperts, and members do not question the validity of unique information when it is recalled by a recognized expert (Stasser, Stewart & Wittenbaum, 1995; Franz & Larson, 2002). Also, if other group members are aware of each member's expertise and the type of information that they have, they will be more likely to go to that person with specific questions and listen to their information (Moreland & Myaskovsky, 2006).

Larson et al. (1994) listed the three biggest flaws in group decision making to encourage groups to avoid them in their research. These were implemented into a structured intervention that ultimately improved group performance. These flaws were listed as follows: (1) adopting the first solution proposed without further evaluation, (2) engaging in change without evaluating differences in group opinions, and (3) ignoring important information mentioned by group members. When beginning a group discussion, not all participants are aware of these common mistakes and knowing that they are often made may help to avoid doing the same thing. In addition, these mistakes are related to critical thinking and cognitive conflict in that they aim to make group members strategically use their information by discussing all alternatives and avoiding settling on the first solution proposed, which will likely lead to multiple perspectives and disagreement over the best decision. By stressing the importance of these issues, participants will likely not feel that they are being attacked by other group members and experience less of the negative results of affective conflict.

Finally, introducing structure into a group discussion has been shown to increase information sharing and moderate the relationship between information sharing and group performance (Stasser, Taylor & Hanna, 1989; Larson et al., 1994; Mesmer-Magnus & DeChurch, 2009). Additionally, the conflict-inducing and conflict-reducing approaches discussed indicate that implementing structure to group discussion can lead to better

decisions if they are administered appropriately. Therefore, in this study, a structured approach that stimulates member contribution, focuses the team's attention on unique information, and promotes attention to the information being discussed will be implemented.

Implementation of Intervention

Following the four principles discussed above, the four implementation steps for the intervention will be as follows: (1) give each group member an inventory of the type of information each expert role has, (2) label experts in front of other group members with a name tag, (3) provide groups with a list of the three most common mistakes made by past groups (adopting the first solution without further evaluation, engaging in unconflicted change, and ignoring important information), as well as a real-world example of what can happen if there is a drive for consensus with no structure, (4) assigned one member of the group to be the "note-taker" in front of all group members and supply large flipchart and have the note-taker write down all critical information that is mentioned from each role. The last step instructs groups to decide which pieces of information are critical toward answering the question at hand, and have the note-taker record the most critical pieces of information on a separate sheet of the flip chart. Finally, each group will be informed that they do not all share the same information as the other group members and that it is important to take all information mentioned seriously.

The purpose of this study is to evaluate the performance and unique information sharing of groups given the Motivated Sharing intervention and compare them to groups who do not receive a structured intervention and are given instructions to reach a consensus. The overall objective is to develop an intervention that minimizes the common information bias and improves group decision-making effectiveness in a hidden profile scenario.

1.3. Hypotheses

Researchers have shown that when structure is introduced into a decision-making group, the group members are likely to discuss more information than when there is no structure (Stasser, Taylor & Hanna, 1989; Mesmer-Magnus & DeChurch, 2006). In addition, this intervention is designed to reach the goal of sharing and using unique information.

Hypothesis 1: Groups given the intervention will share more unique information than groups given no structure and instructed to reach consensus.

In a hidden profile task, if group members make a decision based only on the information that they all have in common, then the solution will be suboptimal to one that incorporates the unique information. The experimental condition is tailored to a hidden profile scenario in that it is designed to motivate group members to share and value their unique information. With greater discussion and use of unique information, they should make better overall decisions.

Hypothesis 2: Groups given the intervention will make better overall decisions (have greater decision-making effectiveness) than groups given no structure and instructed to reach consensus.

The way in which information is evaluated during the information sharing discussion will affect how it is used to make the final group decision. Unique information must be valued and recalled in order for it actually to be used in the final decision, and this must happen during the discussion when the information is pooled from various members.

Hypothesis 3: Unique information sharing will partially mediate the relationship between the decision-making intervention and group decision-making effectiveness.

CHAPTER 2. METHOD

2.1. Participants

Participants were recruited from introductory psychology courses at Indiana University Purdue University Indianapolis. A description of the research study was posted on the university's experimetrics website, a web-based scheduling and tracking system which is available to all introductory psychology students at the university. Students had to be at least 18 years of age and currently enrolled in an introductory psychology course at the university in order to participate. A reminder email was sent to participants within two days of their participation date. A total of 360 students (77 groups of four and 52 individuals) completed the task. Participants assigned to groups had an average age of 22 years, were 28% male, 88% white, had completed an average of 37 college credits, and worked an average of 5 years. All students were assigned course credit for their participation, and were notified that the top performing groups would receive a \$25 gift certificate for each group member.

2.2. Task

All groups participated in a decision-making task titled "Tinsel Town: A top management simulation involving distributed expertise," created by Devine, Habig, Bott and Grayson (2003). "Tinsel Town" is a business simulation using groups of four acting as the top management team of a fictional Hollywood movie studio. Participants are each assigned a different formal role within the organization. The four roles are different Vice-Presidents within the Hollywood movie studio. One participant acts as the Vice-President of Script Evaluation (SE), one as the Vice-President of Industry Research (IR), one as the Vice-President of Talent Appraisal (TA), and one as the Vice-President of Marketing (M), and they are instructed to decide which of the eleven potential movies to

produce based on viewer appeal, movie quality, marketing, MPAA rating, and average ticket price. Group members received some common information (a general memo and eleven screenplay profiles), and some unique information (individual staff memos tailored to their role). In order to uncover the best answer possible, unique information from all four of the roles has to be discussed and taken into account for the final decision, as the common information and each individual's unique information does not lead to the best decision. Therefore, Tinsel Town is a hidden profile task (See Appendix B for task materials and information for each role).

Profit was determined by the choices that the group members made given the total inventory of information. Groups were informed that they could not spend more than 150 million dollars, that they could not discuss their decision for more than 25 minutes, and that they were to make choices on which movies to produce and their marketing level. The characteristics of each movie (total cost and marketing value chosen) were put into a formula based on the simulation's rules to determine the movie's total profit, and group performance was set equal to the sum of the profit made on the various movies that a group chose to produce plus the amount of money they did not choose to spend from their maximum allowance of 150 million dollars. (See Appendix B for the scoring sheets used to calculate this final profit).

2.3. Design

Participants were randomly assigned to groups of four, and then each group of four was randomly assigned to the control or experimental condition. Both conditions received the same decision-making task, but only the experimental condition groups received the intervention to improve information sharing and group decision-making effectiveness. When four students did not show up to complete the group, extra students were assigned to an individual condition.

The study was completed in three separate phases. The three phases consisted of the following samples: (1) 10 control and 10 experimental groups, (2) 5 experimental groups, (3) 22 control and 22 experimental groups. Data from each phase was analyzed separately and changes were made to the intervention prior to moving onto the next stage.

Data analysis and changes are discussed below, and Appendix D and E contain full video observations and suggested improvements. Phase 3 data were analyzed using proposed hypotheses and is described in narrative form in the results section.

Videotapes from group discussions in Phase 1 were watched and qualitatively analyzed while Performance and Information Sharing scores were quantitatively analyzed. Themes from discussions were separated into the following seven categories: (1) beginning of discussion, (2) strategy, (3) role recognition, (4) conflict, (5) leaders, (6) decisions, and (7) non-verbals. Discussion content of experimental and control groups were compared using these themes. Overall, experimental groups tended to begin discussion quicker and with more strategy, discuss more alternatives, disagree with each other more often, utilize the information in each other's roles more, and make decisions more objectively than the control group. These findings were reflected in the quantitative results, indicating that experimental groups made better decisions than control groups. Additionally, experimental groups shared more information and used this information toward their final decision more than the control condition.

There were, however, some problems associated with the intervention that led to changes prior to the second phase. First, the name tags used in Phase 1 were simply a piece of paper that would get lost in the Tinsel Town materials. Therefore, smaller nametags that could clip onto the participant's shirt were created for Phase 2. Second, the note taker often did not get up to write during Year 2 of Tinsel Town. Therefore, separate instructions were drafted to remind the note taker to take notes for the group prior to discussion for Year 2. Next, the participant's seemed to rush through the introductions of their roles leading them to use discussion time to reiterate what they said. Therefore, the role introductions page was drafted to include a small example of what the data for each role looks like. Finally, all groups used their note taking board differently. Therefore, new instructions were drafted with more specific aims of combining all of the role's information as well as information from each movie discussed.

Phase 2 consisted of only experimental groups, therefore quantitative comparisons to control condition groups were not made, and only qualitative observations of videotaped discussions were analyzed. The same criteria developed in phase 1 were used

to evaluate the discussions of the groups in Phase 2. Groups continued to begin discussion quickly and strategically, utilize each other's role-specific information, disagree with each other to promote alternatives, and make decisions objectively. Changes from Phase 1 were implemented well with nametags staying visible throughout discussion, less time used describing each other's roles during discussion, and better use of the board to take notes during both Years of discussion. Three further problems were identified with changes made accordingly. First, the note taker assignment sometimes gave the role to a person who did not want it or was unenthusiastic about the task, leading them to pass on the duty to someone else. Therefore, instructions were drafted to allow a volunteer to take notes rather than have a note taker assignment. Second, one group did not obey the rules of using the first 15 minutes to silently review their materials and began discussion early. Therefore, the researcher remained in the room during the first 15 minutes for Phase 3. Finally, there were some recurring technical problems with the video camera, which were fixed for Phase 3.

2.4. Procedure

Participants used a designated user ID and password to log into experimetrix and sign up for the study, which gave a room assignment and a list of 2-hour time slots with various dates to choose from. There were nine seats available for each 2-hour time slot. After signing up, each participant was sent a confirmation email the same day verifying their time slot and a reminder email within two days of their participation date. The reminder email stressed the importance of their attendance and offered further contact information of the researcher that would be present the day of their participation.

Upon arrival, participants were seated around a large table and given an informed consent statement. After reading and agreeing to participate in the study, they were instructed to fill out a demographics form inquiring about their age, sex, education status, ethnicity, and employment status. Upon the distribution of this form, participants were randomly assigned an individual and group ID. Remaining participants assigned to a group were then given a 12-minute cognitive ability test.

Participants were then matched up in groups of four according to their Group ID and taken into separate rooms. Unidentified folders containing general information and information for one role in the Tinsel Town task was distributed to each person. Instructions for the task were then read aloud by the researchers and groups were given 15 minutes to silently read through their materials and take notes on provided scratch paper. After the 15 minute individual review period, groups in the control condition were given a set of instructions reiterating the instructions given in the Tinsel Town task and urging them to strive for consensus in their final decision in allotted time frame. Groups in the experimental conditions were given the following components of the Motivated Sharing intervention: (1) a name tag identifying their role, (2) a description of the type of information held by each vice presidential role, with instructions for each role to read their own information description aloud, (3) a list of the three biggest mistakes made by decision-making groups, read aloud by the researcher, (4) an assigned note taker given instructions on how to make a final decision using a structured note-taking approach. (See Appendix B for Tinsel Town instructions and intervention materials).

Groups then engaged in a 25-minute, videotaped discussion period in which they selected movies to produce and marketing values for each movie produced. They then filled out a Final Recommendation Sheet indicating their movie choices and marketing amount selections (See Appendix B) that was signed by each individual and returned to the researcher. The researcher then used the formula based on the rules of the task to calculate each group's final profit and percentage of maximum possible profit that they attained and returned this sheet to the group for review. Participants ended this phase of decision-making with a 5-minute period to review their results.

Groups then engaged in a second phase of decision-making with the same instructions given to them in the first phase of decisions making but with a different set of eleven movies. The discussion for the second phase of decision making was videotaped for review. After completing their second Final Recommendation Sheet and returning it to the experimenter, groups were given a form to individually assess the amount and usage of perceived information sharing that occurred in their group discussion. After receiving their results for the second decision-making period, they were given a

debriefing form and dismissed. After all data were examined, the groups with the highest decision-making scores were notified by email that they were the recipients of the \$25 gift certificate.

When a multiple of four participants did not show up, one to three participants were assigned to an individual condition. The individuals were chosen by the order in which they arrived, with the last to arrive being placed in the individual condition. Individuals were taken to a separate room prior to the 12-minute Cognitive Ability test, and each was given the full inventory of information in the Tinsel Town task. They were given instructions to choose which movies to produce based on this information, and given 40 minutes to silently and individually make a decision. Final Recommendation Sheets were scored for individuals in the same manner as they were done for groups, and each individual was also given five minutes to review their results before engaging in another 40 minute period of silent and individual decision-making for Year 2. After completion of Year 2, individuals were debriefed and dismissed.

2.5. Measures

Demographic items

Participants were asked to provide the following demographics: (1) age, (2) gender by circling Male or Female (3) race by circling either White/Caucasian, African American, Asian/Pacific Islander, Native America, Hispanic, or Other, and (4) employment status indicating whether or not they were employed for pay, a full or part-time employee, and how many years they had been working for pay.

Performance

The main dependent variable in this study is Performance on the decision-making task. Performance was operationally defined as the final profit determined from the various movies that a group chooses to produce, as is described in the “Task” section. Performance scores were calculated for each Year of Tinsel Town, with a maximum possible profit of \$426.17 for Year 1, achieved by choosing three of the eleven potential

movies, and \$489.17 for Year 2, achieved by choosing two of the eleven potential movies. For analyses, this measure is referred to as Performance and is separated into three separate variables for Year 1, Year 2, and Total Performance (Year 1 + Year 2).

Information Sharing

Information Sharing was measured using two separate methods: (1) a self-report questionnaire given to the participants after the second decision-making period in the Tinsel Town task, (2) observer coding of Year 2 group discussions made by trained raters. The self-report measure was modified after Phase 1 to obtain more variability and better representation of the group information-sharing processes. The measure used for Phases 1 and 2 consisted of two sections. First, a list of all four vice-presidential roles with instructions to place a number from a likert scale indicating how much unique information each person contributed. Scores ranged from 0 = they did not share any information pertaining to their role to 5 = they shared a very large amount of information pertaining to their role. Second, a list of all four vice-presidential roles was given with instructions to place a number from a likert scale indicating how much impact their role-specific information had in the group's final decision. Scores ranged from 0 = their information made no impact on the final decision to 5 = their information made a very large impact on the final decision.

The Self-Report Information Sharing measure used for Phase 3 also consisted of two parts. First, a list of all four vice presidential roles was given with instructions to rank them from 1-4 in terms of who contributed the most information during group discussion. Next, four questions pertaining to the task-related information shared by each vice presidential role with instructions to place a number from a likert scale indicating the amount of role-specific information each participation contributed to discussion. Scores ranged from 1 = basically no information to 4 = a great deal of information throughout discussion. The ranking system was designed in response to lack of variability in the Information Sharing measure for Phase 1 and 2. It was designed to prime their thoughts of differences participants sharing different amounts of information during discussion rather than rating all roles as sharing the same amount of information.

The primary measure of information sharing was ratings of unique information sharing by two trained raters observations of Phase 3 group discussions. The training process is further discussed in section 2.6. The two raters each watched 32 videotapes (10 of these were coded by both raters in order to assess interrater reliability). Coders indicated their information sharing scores on a form containing all of the unique information given to each vice presidential role. This form was created using the tables, values, and decision strategies provided to each vice presidential role in the Tinsel Town task (as seen in Appendix B). Information was separated into three types for the purposes of coding. Absolute information was defined as an exact value shared aloud to the group by a vice president, and was indicated on the form by circling this exact value in the table provided for the vice president who mentioned that information. Relative information was defined as a comparison of one value to another without actually stating the exact number. For example, stating that the appeal of one movie is higher or lower, better or worse, bigger or smaller than another. Relative values were indicated by making a hash mark next to the exact value that was being compared. Strategic information was defined as the strategies provided to each role concerning how their information was presented and the best ways to use it, and included ranges and distribution shapes of Absolute values in sentence form. Strategic information was included in a separate table and indicated with a hash mark if a vice president shared a particular piece of information included in this table.

Scores were calculated separately for Absolute, Relative, and Strategic Information sharing across all four roles and for each vice presidential role to indicate the amount of information shared by that person. An overall variable of information sharing was created as the sum of Absolute, Relative, and Strategic Information Sharing for all four roles in each group. This variable is represented as Total Information Sharing for analyses and specifically represents unique information sharing.

Information Usage

Information Usage, defined as the strategies each group employed to discuss their information and incorporate this information into their final decision, was included as a

second section to the Self-Report Information Sharing Measure. It consisted of 10 questions regarding the groups decision-making process to be answered on a likert scale from 0 = strongly disagree to 4 = strongly agree. These 10 questions pertained to how the information was used throughout discussion rather than how much was shared. An example Information Usage item is as follows: “Our final choices were based on the information provided to us (as opposed to our personal feelings)”. Coefficient alpha on these ten items was .663. Information Usage at the group level is operationally defined as the average of the individual scores in each group.

Cognitive Ability

Cognitive Ability was assessed using the Wonderlic cognitive ability scale. This is to test for the possibility that groups with a higher mean Cognitive Ability score make better decisions, making the scores due to Cognitive Ability and not the intervention. The Wonderlic, developed by Eldon F. Wonderlic in 1937, is a 12-minute, 50-item intelligence exam, with a reliability estimate of .90. Scores are calculated by summing the number of correct responses in a given amount of time, with 20 being the average score. Further information can be found on the website, <http://www.wonderlic.com/>. Cognitive ability at the group level was operationally defined as the mean score of all of the Cognitive Ability tests completed by members of each group.

2.6. Coder Training and Reliability

Coder Training

Two undergraduate psychology students were chosen based on a recommendation from a faculty member and an interview with a researcher to code the videotapes for information sharing. After a researcher interviewed the students, an initial meeting was held to review the study material. After individually reviewing the information, each coder was given a quiz to determine their extent of knowledge on the Tinsel Town task. Coders were given a videotape of a group discussion from Phase 1 to watch independently with instructions to count the number of times each vice president

mentioned a piece of unique information pertaining to their role. This was done to familiarize the coders with each role before presenting them with the Information Sharing Measure.

At the following meeting, the coders watched the same videotape with the researcher while discussing their determination of how much unique information was shared by each role. Coders were then presented with the Information Sharing Measure that they would be using for the Phase 3 tapes, and a videotaped discussion from Phase 1 was watching with the researcher while discussing what counted as unique information sharing for each role and how to fill out the measure. Coders were then given two more videotaped discussions from Phase 1 to code on the Information Sharing measure independently. They were given the same two videos in order to assess how close their scores matched. The follow-up meeting revealed some variability between the coders, resulting in further discussion on how to complete the forms, and discussion of one of the coded videotapes with the researcher while filling out the Information Sharing measure. One final video from Phase 1 was coded independently by each coder. The researcher reviewed these coded forms for reliability and approved the coders to begin their final project as scores had very little variability between the two coders. The researcher then distributed 32 tapes to each coder for the final coding procedure.

Interrater Reliability

In order to determine the usefulness of the Information Sharing measure scored by the trained coders, interrater reliability was assessed for codes pertaining to Absolute, Relative, Strategic and Total Information Sharing for the ten videotapes that were coded by both trained coders. Resulting correlations are shown in Table 1. These correlations indicate very high agreement between the coders concerning the amount of unique information shared during discussion. Therefore, we were confident that the observer coding was reliable and used these ratings as the primary measure of information sharing throughout the hypothesis tests.

Table 1 Correlation of Rater Scores

Information	Correlation
Groups (n = 10)	
Total	.998
Absolute	.994
Relative	.978
Strategic	.973

2.7. Statistical Analyses

All analyses were evaluated as two-tailed tests at the $p < .05$ alpha level for statistical significance, with results at the $p < .10$ alpha level discussed as marginally significant values due to low sample size. All group-level variables assessed using intercorrelations, means, and standard deviations.

For Hypothesis 1, multiple univariate t-tests for independent groups were run to test the hypothesis with each type of information sharing serving as the independent variable (Absolute, Relative, Strategic, Total, Industry Research, Script Evaluation, Marketing and Talent Appraisal) and Condition as the dependent variable for a total of eight tests. For Hypothesis 2, three univariate t tests for independent groups were used to determine if experimental groups made significantly better decisions than control groups. Condition was used as the independent variable with Year 1 Performance, Year 2 Performance, and Total Performance as three separate dependent variables. Effect sizes for Hypotheses 1 and 2 were determined as d-statistics by subtracting the means of the experimental and control groups, and dividing by the total standard deviation. The mediation analysis in Hypothesis 3 was assessed using Baron and Kenny's four-step test of mediation with Condition as the independent variable, Information Sharing as the mediator and Total Performance as the dependent variable. A Sobel Test was run, which involved inputting the unstandardized regression coefficient for the relationship between Condition and Information Sharing, the standard error of this regression coefficient, the unstandardized coefficient for the association between Information Sharing and

Performance, and the standard error of this regression coefficient into an online calculator. This test determined whether the indirect effect of the Condition on the Performance via Information Sharing was significantly different from zero.

Follow-up analyses to determine the effect of individual performance were evaluated using a one-way ANOVA with post-hoc tests to determine differences between group and individual performance, Condition was coded as 0 = Control, 1 = Experimental, and 3 = Individual as the independent variable, analyzed with Year 1, Year 2, and Total Performance as three separate dependent variables. Further investigation of other predictors of performance were assessed using simultaneous and hierarchical regression.

CHAPTER 3. RESULTS

3.1. Preliminary Analyses

Intercorrelations, reliabilities, means, and standard deviations were calculated for all group-level variables and are presented in Table 2. Correlations are bolded and marked with asterisks to denote significance level.

3.2. Hypothesis Tests

Hypothesis 1

Hypothesis 1 predicted that experimental groups would share more unique information than control groups. Due to questionable data quality and little variance in the Self-Report Information Sharing measure, only information sharing data from the trained coders were used in these analyses. Table 3 reports the means and standard deviations for these analyses.

Across the eight tests, Hypothesis 1 was partially supported, with experimental groups sharing significantly more Absolute Information ($t = -2.25, p = .030$) and Marketing Information ($t = -2.64, p = .012$) than the control groups. Generally, experimental groups tended to share more information overall than the control groups, but were less likely to state unique information as comparative to other information, and were more likely to state Absolute values. Effect sizes for Absolute Information Sharing and Marketing Information Sharing were moderate ($d = .66, d = .75$, respectively).

Table 2 Correlations between Group-Level Variables

	CON	PERF1	PERF2	PERF	SRIS	IS	AIS	RIS	SIS	IR	SE	M	TA	IU	CA
n	44	44	44	44	40	43	43	43	43	43	43	43	43	40	35
Mean	1.5	307.27	385.49	692.76	13.24	77.16	35.63	39.51	2.02	23.21	20.40	9.67	23.88	3.41	25.64
(SD)	(.51)	(70.78)	(85.16)	(120.45)	(1.00)	(37.24)	(18.30)	(26.75)	(6.19)	(14.23)	(13.70)	(7.52)	(14.53)	(0.23)	(2.98)
CON	1.00	.351*	.290	.411**	-.019	.169	.331*	-.021	.126	.118	.071	.381*	.053	.197	.006
PERF1		1.00	.186	.719**	.039	.239	.218	.133	.219	-.006	.247	.316*	.223	.341*	.323
PERF2			1.00	.817**	.307	0.225	.087	.240	.057	.043	.016	.257	.385*	.173	-.109
PERF				1.00	.238	.303*	.191	.251	.170	.027	.157	.371*	.409**	.323*	.101
SRIS					1.00	.337*	.200	.294	.191	.212	.269	.285	.283	.028	-.104
IS						.998	.696**	.844**	.309*	.816**	.824**	.472**	.742**	.225	-.052
AIS							.994	.237	.205	.627**	.465**	.254	.599**	.288	.057
RIS								.978	.058	.629**	.758**	.377*	.638**	.166	-.190
SIS									.973	.335*	.308*	.460**	-.066	-.004	.277
IR										1.00	.578**	.177	.475**	.298	.067
SE											1.00	.411**	.390**	.046	.014
M												1.00	.132	.177	.044
TA													1.00	.252	-.215
IU														1.00	.663
CA															1.00

*Correlation is significant at the .05 alpha level (2-tailed) **Correlation is significant at the .01 alpha level (2-tailed)

Key: CON=Condition; PERF1=Year 1 Performance; PERF2=Year 2 Performance, PERF=Total Performance, SRIS= Self Report Information Sharing; IS= Total Information Sharing from Trained Coders; AIS= Absolute Information Sharing; RIS= Relative Information Sharing; SIS= Strategic Information Sharing, IR= Industry Research Information Sharing; SE= Script Evaluation Information Sharing; M= Marketing Information Sharing; TA= Talent Appraisal Information Sharing; IU= Information Usage, CA= Cognitive Ability

Table 3 Means and Standard Deviations for Information Sharing and Condition

	Control (n=22)	Experimental (n=21)
Total	71.09 (45.48)	83.52 (25.63)
<i>Component</i>		
Absolute	29.77 (16.64)	41.76 (18.31)*
Relative	40.05 (40.05)	38.95 (21.36)
Strategic	1.27 (2.30)	2.81 (8.58)
<i>Unique Sources of Expert Information</i>		
Industry research	21.59 (15.48)	24.90 (12.95)
Script evaluation	19.45 (16.89)	21.38 (9.64)
Marketing	6.91 (5.43)	12.57 (8.39)*
Talent appraisal	23.14 (16.83)	24.67 (12.03)

* Difference between control and experimental significant at the $p < .05$ alpha level

Information Sharing on Decision-Making Effectiveness

Though not originally discussed in the hypotheses as it was considered implied, past research indicates that those who share more information will make better decisions. As can be seen in Table 2 where each type of information sharing was correlated with all three measures of Performance, Total Information Sharing was significantly and positively correlated with the Total Performance ($r = .303, p = .049$). This relationship also held true for Marketing and Talent Appraisal Information Sharing ($r = .371, p = .041$; $r = .409, p = .007$, respectively). In other words, those groups who shared more Total Information, as well as more Marketing and Talent Appraisal Information, tended to make better decisions in the Tinsel Town task.

Hypothesis 2

Hypothesis 2 predicted that groups receiving the intervention would perform better than groups given instructions to reach consensus. Hypothesis 2 was partially supported with experimental groups making significantly better decisions in Year 1 ($t = -2.43, p = .020$), and

for Total Performance ($t = -2.92, p = .006$), than control Groups. The superiority of the experimental groups was only marginally significant for Year 2 ($t = -1.96, p = .057$). Overall, groups given the intervention tended to make better decisions in the Tinsel Town task than control groups. Effect sizes were moderate for Year 1 and Year 2 Performance ($d = .69, d = .57$, respectively), and high for Total Performance ($d = .81$).

Table 4 Performance Scores and Standard Deviations by Condition

Measure of Performance	Control (n=22)	Experimental (n=22)
Year 1	282.73 (65.06)	331.80 (69.02)*
Year 2	361.11 (92.79)	409.87 (70.67)
Total	643.84 (107.93)	741.67 (114.21)*

* Difference between control and experimental significant at the $p < .05$ alpha level

Hypothesis 3

Baron and Kenny's four-step test of mediation was used to determine if Information Sharing mediated the relationship between the Condition and Performance. Table 2 was used to determine if steps 1-3 were confirmed. This analysis was first conducted Total Information Sharing as the mediator. Step 1 requires that the independent variable (Condition) be significantly related to the dependent variable (Total Performance). Condition and Total Performance were significantly related ($r = .411, p = .006$). Step 2, which requires that the independent variable (Condition) be significantly related to the mediator (Total Information Sharing), was not fulfilled ($r = .411, NS$). Step 3, requiring that the mediator (Total Information Sharing) be significantly related to the dependent variable (Total Performance), was fulfilled ($r = .303, p = .049$). With step 2 not being fulfilled, the criteria were not met to run a mediation analysis and Hypothesis 3 was not supported for Total Information Sharing. Step 4 of the mediation analysis, a hierarchical regression with Condition in step 1 and Total Information Sharing in step 2, was run to determine the effect of the mediator. Results indicated that the beta weight for

Condition dropped from $\beta = .390, p = .101$ to $\beta = .349, p = .019$ in the presence of Total Information Sharing.

In order to determine if any subtype of Information Sharing mediated the relationship between Condition and Performance, Table 2 was searched for any type of information (Absolute, Relative, Strategic, Industry Research, Script Evaluation, Marketing and Talent Appraisal) that met the requirements for the first three steps of the Baron and Kenny Mediation as discussed above. Only Marketing Information Sharing satisfied all of the criteria to be tested as a mediator between the Condition and Information Sharing. The relationship between Condition and Marketing Information Sharing was statistically significant ($r = .381, p = .021$), as was the relationship between Marketing Information Sharing and Total Performance ($r = .371, p = .014$). Therefore, Hypothesis 3 was tested as a hierarchical multiple regression with Condition as the independent variable in step 1, Marketing Information Sharing as the independent variable in step 2, and Total Performance as the dependent variable. Results indicated that Marketing Information Sharing may mediate the relationship, with the beta dropping from $\beta = .390, p = .010$ to $\beta = .291, p = .063$.

A Sobel Test was run to determine if Marketing Information Sharing significantly carries the influence of the Condition to Performance. The resulting Sobel statistic was 1.84. This value was marginally significant at $p = .067$. These statistics lead to the conclusion that Marketing Information Sharing does mediate the relationship between Condition and Total Performance. In other words, the intervention's positive effect on Performance can be explained by an increase in Marketing Information Sharing.

3.3. Follow-Up Analyses

Further analysis representing variables not present in the three proposed hypotheses were run to achieve a more complete picture of the prediction model of the intervention. These include results on individual Performance, Cognitive Ability, Information Usage, and Self-Report Information Sharing. These analyses were run to address other interesting research questions not examined in the hypotheses. Most notably, they involve looking at other predictors of Performance (i.e., Cognitive Ability

and Information Usage), the reliability of findings involving information sharing when an alternative measure is used (i.e., Self-Report Information Sharing), and analyses of more complete prediction models involving all the predictor variables as a set as well as the incremental validity added by different variables in multi-step models. Additionally, these results determine the differences between group and individual performance.

Individual and Group Comparisons

As was discussed, an individual condition was run in which single participants were given all of the information typically given to a group, and follow-up analyses were run to determine if individuals performed better than groups. Results revealed that there were significant differences between conditions for Year 1 ($F = 3.88, p = .024$), Year 2 ($F = 3.66, p = .030$), and Total ($F = 6.01, p = .004$) Performance between the experimental, control, and individual conditions. Post-hoc tests were performed to determine where the significant differences lie as far as the individual condition compared to experimental and control, and indicated that those in the experimental condition performed significantly better than those in the individual condition for Year 1 Performance, (*Mean difference* = 42.91, $p = .013$), Year 2 Performance (*Mean difference* = 48.76, $p = .009$), and Total Performance (*Mean difference* = 100.53, $p = .001$). There were no significant differences between the control and individual conditions. Overall, these results indicate that when given the intervention, groups were able to significantly outperform individuals, but groups who were not given the intervention were not able to significantly outperform individuals.

Table 5 Individual and Group Performance Scores

Condition	Year 1	Year 2	Total
Individual (n=52)	288.89(66.44)	352.25 (86.51)	641.14(124.21)
Experimental (n=22)	331.80(69.02)	409.87(70.67)	741.67(114.21)
Control (n=22)	282.73(65.06)	361.11(92.79)	643.84(107.93)

Cognitive Ability

Cognitive Ability was examined as part of this study to determine if groups who had a higher mean Cognitive Ability score made better decisions. Table 2 indicates that Cognitive Ability did not have a significant correlation with any other group-level variables. The lack of significant findings may be due to a loss of power from low sample size. Nine groups were missing a mean Cognitive Ability score due to availability of the tests.

Self-Reported Information Sharing

Information Sharing was also measured in the study by asking participants to indicate the amount of information shared during discussion. Self-Report Information Sharing was not used in the analyses due to its low variance ($SD = 1.00$) and poor data quality. Specifically, most group members indicated that all group members shared the same amount of information. However, from watching several of the videotapes and observing ratings from trained coders, there was nearly always one role who shared more information than others and one who shared very little information. The lack of variation may have been due to a desire to leave or fatigue since it was done at the end of the task, or perhaps fear that other members would see that they were rating them low since they were sitting next to each other when filling it out.

However, this measure was still included as a group-level variable in Table 2 to determine its relationship to other group-level variables. Despite the poor data quality, this measure was significantly correlated with one other variable, Total Information Sharing ($r = .337, p = .036$). This relationship indicates that groups who reported sharing more information also tended to be scored higher on information sharing by the trained coders.

Information Usage

To explore the manner in which groups structure their interaction as opposed to simply sharing information, questions were drafted after Phases 1 and 2 in order to better understand how they are using the information and to obtain more variability. Consistent

with the notion that it relates to group decision-making effectiveness, Information Usage was significantly and positively correlated with Year 1 and Total Performance ($r = .341$, $p = .030$; $r = .323$, $p = .042$, respectively). This indicates that those who used their information more effectively tended to make better decisions in Year 1 and overall in the Tinsel Town task.

Impact of Additional Variables on the Hypothesized Model

Further analyses were performed using the complete set of predictor variables to determine their overall effect on the outcome variable. A simultaneous regression was run including all follow-up variables and variables having a significant relationship with Performance. Two variables were found to explain a significant amount of variance in this regression were Condition ($\beta = .582$, $p = .002$), and Talent Appraisal Information Sharing ($\beta = .573$, $p = .032$), and Total Information Sharing explained a marginally significant amount of variance in the predictor model ($\beta = -.483$, $p = .098$).

A hierarchical regression was run to determine if the variables discussed in the follow-up analyses (Cognitive Ability, Information Usage, and Self-Report Information Sharing) explained any incremental variance in Performance above and beyond the variables found to have significant relationships for the hypothesis tests (Condition, Total Information Sharing, Marketing Information Sharing). Results indicated that these follow-up variables did not provide any incremental variance above and beyond the variables used in the hypothesis tests.

Next, a hierarchical regression was run to determine if the indirect effect (Condition) explained increment variance above and beyond the direct effects (Information Usage, Cognitive Ability, Self-Report Information Sharing, and Total Information Sharing). Direct effects were entered in step 1, and Condition in step 2, with Total Performance as the dependent variable. Results indicated that Condition did explain significant variance above and beyond other variables. These results are represented in Table 6.

Table 6 Multiple Regression for all Predictors Variables on Total Performance

Variable	<i>B</i>	<i>P</i>	ΔR^2 (<i>p</i>)
<i>Step 1</i>			
Total IS	.260	.252	
Cognitive Ability	.062	.324	
Information Usage	.113	.633	
Self-Report IS	.062	.532	
<i>Step 2</i>			
Condition	.585	.002	.283 (.002)

Overall, these results indicate that Condition explains more variance in Total Performance of all predictor variables. The results support the use of the variables used in the hypothesis tests, as those included in the follow-up analyses (Cognitive Ability, Information Usage, and Self-Report Information Sharing) did not account for a significant amount of the variance in Total Performance, while Condition, Total Information Sharing, and Talent Appraisal Information Sharing, which were used in the hypothesis tests, explained at least a marginally significant amount of variance in Total Performance.

CHAPTER 4. DISCUSSION

As organizations continue to use group and teams more to make decisions, there is a need for more effective methods of improving their quality of decisions by decreasing their focus on common information. This study evaluates the use of a newly developed intervention on the decisions made and unique information shared by groups with varying expertises. By comparing groups given this intervention to control groups, results indicated an improvement in the decisions made by those who received the intervention above those who did not. Results reflect findings from past literature concerning decision-making in a hidden profile scenario, as well as lead to new ideas to improve upon this research while guiding future directions in the area of hidden profile research.

The following primary results were found in this study: (1) experimental groups tended to outperform control groups, (2) experimental groups tended to outperform individuals given the total inventory of task information, but control groups did not outperform these individuals, (3) experimental groups tended to share more Absolute value information, more information from the marketing role, and more unique information overall, (4) across both experimental and control groups, those who shared more unique information tended to make better overall decisions, (5) Marketing Information Sharing mediated the relationship between Condition and Total Performance. In addition, further analyses suggested that the intervention explained the most variance in Total Performance.

Several of these findings are consistent with results from past literature, specifically the finding that groups given the intervention outperformed groups given instructions to reach consensus. This was expected given that the elements of the intervention were drawn from results of past research. First of all, introducing structure

to the decision-making task was found by several researchers to have a positive impact on performance (Stasser, Taylor & Hanna, 1987; Larson, Foster-Fishman & Keys, 1994), and structuring team discussions was found to have the strongest impact in enhancing information sharing in the only known meta-analysis on information sharing in work groups (Mesmer-Magnus & DeChurch, 2009). Structure in group decision-making can be described as an intervention that provides teams with strategies for sharing and integrating information in order to focus the team's attention on important aspects of the task, stimulate member contribution, and ensure adequate attention to information mentioned in the discussion (Mesmer-Magnus & DeChurch, 2009). Similarly, the structured intervention in this study tended to increase Absolute and role-specific information sharing, which ultimately tended to improved Performance.

Labeling experts in front of other group members as was done in this intervention was also developed due to positive findings of past research (Stewart & Stasser, 1995, Franz & Larson, 2002), and consequently found to have positive results in the present study as well. Past studies using expert role assignment found that labeling a person as an expert in a particular area in front of other group members can increase unique information sharing and lead other members to have more trust in the information given from these roles (Stewart & Stasser, 1995, Franz & Larson, 2002). In the intervention used in this study, experts were given name tags and instructed to announce the important unique information from their role, and results showed that those given the intervention discussed more role-specific information, and role-specific information had a positive relationship with group performance. These findings are also consistent with the meta-analysis, which found that sharing critical (unique) information had a stronger relationship with decision quality, than sharing of non-critical (common) information (Mesmer-Magnus & DeChurch, 2009).

Finally, one element of the intervention was developed to help groups think critically and avoid reaching consensus without exploring alternatives and practicing cognitive conflict. Past research has found that introducing critical thinking norms to a group result in better overall performance and lessen the chances of groupthink taking place (Postmes, Spears & Cihangir, 2001). Similarly, this intervention introduced critical

thinking and cognitive conflict by specifically listing the biggest decision-making flaws of work groups, which included not thinking critically and failing to explore all alternatives. Those given these instructions shared more unique information and made significantly better decisions than those in the control condition.

The findings of this study also extend past research, lending new insights to the study of information sharing and group decision-making in a hidden profile scenario. This study showed that the combination of elements proposed has promise for improving unique information sharing and group decision-making performance. The fact that groups given the intervention were able to outperform individuals but those given instructions to reach consensus were not shows that this intervention is promising in the workforce for decisions that were once made by individuals rather than just putting individuals together and instructing them to make decisions. As discussed in the introduction, the traditional consensus approach can lead to threat, ingratiation, and lack of participation (Hornsby, Smith & Gupta, 1994), which could have played a role in the control groups' inability to significantly outperform individuals.

Beyond the fact that groups given the intervention outperformed individuals and control groups, this study also offered a new measure of information sharing resulting in new insight into understanding the criticality of unique information sharing. Past studies either used a self-report measure of information sharing or watched videotapes to code unique information sharing based on mentioning unique information. For this study, we used both of these procedures but took extra steps to understand unique information sharing by splitting up the information into several dimensions within the measure. Previous research has shown that unique information is more critical than common information (Mesmer-Magnus & DeChurch, 2009), but has not determined if all unique information is equally critical. By decomposing the sharing of unique Absolute values, unique Relative information, unique Strategic information, and information shared by each role in the task separately, this study uncovered the idea that some types of unique information are in fact more critical than others and can be differentially affected by the methods used in the structured interventions.

While those in the experimental condition were found to share more role-specific and overall information, it was only for Absolute and Marketing Information Sharing that this result was significant. In addition, Marketing Information Sharing mediated the relationship between Condition and Total Performance, leading to the idea that those groups given the intervention were more likely to realize which pieces of information were more critical for the overall decision, and were thus more likely to share more information from more critical roles. The fact that Marketing Information Sharing was the only type of role-specific information to satisfy all four steps of Baron and Kenny's test of mediation lends to the idea that in this type of task, not all unique information is equally critical. Interestingly, Talent Appraisal had the strongest positive relationship with Total Performance, but only had a weak positive relationship with Condition, so while those given the intervention were able to recognize the importance of Marketing Information, they were not as likely to recognize the importance of sharing Talent Appraisal Information.

Several explanations for these differences are possible. The increase in discussion of Absolute Information Sharing may be due to the fact that the intervention made experts more salient and increased critical thought, making these groups feel more confident in stating Absolute values rather than just comparing their information to other information. The role-specific differences may be due to the specificity of the task. Given the unique information known only by the Marketing and Talent Appraisal roles, these two arguably have the most important information in coming to the best decision. The fact that Marketing Information Sharing was the only role to significantly related to condition could also be due to the fact that Marketing was the most recognizable role to the undergraduate students, who have likely been exposed to marketing positions in organizations, but not a Talent Appraisal position, which may sound more abstract to them. Even in the case of this finding being due to the task, these differences in criticality are likely existent in the unique information known by members of most decision-making groups. Therefore, emphasis should be placed not only on getting groups to talk more about unique information, but also to realize what unique information holds the most value.

Another interesting finding is that groups given the intervention made significantly better decisions during Year 1 of the task, but the superiority of the intervention was not as strong during Year 2 of the task. Past studies typically only had participants go through one phase of decision making for a single task, not allowing them to accrue learning effects as groups would in the real world. These results may be due to a learning effect that the groups given the intervention did not need as much time as control groups during the first Year to develop a strategy and understand the task. It was noted in watching videotapes of experimental and control groups in Phase 1 that experimental groups went into the task with more strategy and structured discussion than those in the control group. Perhaps the control groups used this first Year to develop their strategy, structure, and norms while the groups given the intervention already had this instilled in their group dynamic. Though only marginally significant, the superiority of the experimental groups in Year 2 also lends support to the idea that the elements of the intervention give groups a better strategy, structure, and norms than they would develop on their own with only instructions to reach consensus. Additionally, though not significant, experimental groups also shared more information than control groups, lending support to the idea that the elements of the intervention may lead groups to discuss their unique information more often, helping them uncover the hidden profile.

Finally, the follow-up analyses showed that the intervention was explaining a significant amount of incremental variance above the other predictors of performance. This may indicate that there is something other than unique information sharing that is not being captured in the current study but explaining why the intervention was successful in increasing group performance. There are both psychological and structural factors that could account for this missing variance. Self or collective efficacy, motivation, and cognitive conflict were not directly measured in this task, but could ultimately play a role in the successfulness of the intervention. Groups given the structured intervention may have felt more confident in their ability to complete the task, more motivated to do so, and had a better grasp on the use of cognitive conflict without the detrimental effects of affective conflict in completing the task. Structurally, there could have been differences in how they pictorially recorded their information on the dry-

erase board for all members to see that ultimately guided their decisions. Overall, interpretations of these results can give insight into future research aimed at uncovering exactly what aspects of this intervention are causing it to improve group performance.

In summary, by integrating effective methods of previous research to develop an intervention to improve unique information sharing and decision-making effectiveness, this study gave additional support to positive findings of past research as well as introduced a new, easy-to-implement intervention that can aid decision-making teams. This study also introduced a new measure of information sharing and revealed that not all unique information is equal in improving the decision-making process. Additionally, these findings open up several avenues for future research in this area.

4.1. Limitations

While it led to several promising results, this study, like any, has its limitations. The first limitation concerned the sample size. As this was a thesis conducted with limited resources in a university setting, a larger sample was not attainable. A larger sample would lead to more power in the analyses and thus less chance of a Type II error. In addition, there were several analyses that came out marginally significant, and were interpreted as possibly having a significant effect, but with a larger sample size it would be more likely that these results would have gone in the direction of significant or non-significant.

The next limitation concerned the fact that a student sample was used. Since this study was conducted in a university setting that offers credits for participation in research, this type of sample was most feasible. By offering students credits for their participation in the study, they were able to learn more about Psychological research and earn points toward course credit. However, the use of this type of sample can hinder the generalizability of results as they are intended for the working population. A sample of employees from an organization may perceive this task as more applicable to their lives and may have different motivation since they work to make decisions in the context of a paid job.

Following with the fact that a student sample was used, there may have been a lack of motivation to perform well on the task. Students had the option of participating in a research study or writing a paper to receive their research credits for their course, so many may have viewed their participation as a way to get out of writing a paper. In order to improve motivation, participants were informed that the top performing groups would receive a reward in the form of a \$25 gift certificate. This was intended to increase their chances of taking the task seriously and make it more generalizable to the working population. Work groups are generally working for pay and improve their performance in hopes of a raise or bonus. By offering the students a reward, or performance bonus, for excellent performance, they were expected to exhibit the same type of motivate experienced by individuals in work groups working for pay. Fortunately, videotape observations indicated that most groups remained highly engaged throughout the task.

Another limitation is that a specific type of task was used and this type of intervention may only improve decisions in this type of task. While the task was generalizable to the working population in that it was a business simulation aiming toward the highest possible profit, tasks can vary quite a bit in organizations. This intervention may be more or less effective when there are more or less roles, or when the ultimate goal is not to increase profit.

Finally, the experimenter that administered the study to participants was aware of the hypotheses. This could have resulting in a subconscious change in mood, inflection of words, or emotions when describing the task to an experimental group versus a control group. Having a verbatim set of instructions that was given across all experimental and control groups was intended to diminish this possibility.

4.2. Future Aims

This study lends promising results to future research aimed at diminishing the common information bias in work groups. Therefore future aims at utilizing this research for future studies are presented.

First, as the target population for the study is work groups working for an organization, a field study using adults currently employed at an organization that work

together in groups would be appropriate. By assembling groups already getting paid to make these types of decisions, a more accurate picture of how this intervention would work in an organizational can be revealed. Testing a sample of adults who are not currently enrolled in college courses may also provide additional insight into the effectiveness of the intervention on a different sample. In addition, the intervention can be tested on work groups who are working together for the first time to those who have been making decisions together for some time. Whether in a field setting or repeated in a University setting, a larger sample size would also improve quality of results.

Second, this intervention should be tested using different tasks. By decomposing the unique information shared by different roles, it was uncovered that not all information affected performance equally, and the intervention did not improve all types of unique information sharing. Therefore, different tasks that have varying sets of information can be used to determine if this trend continues across task types.

Next, this intervention has several components and it is not possible to say which exact components led to the increase in performance. Future research can decompose these components by having several conditions which build upon each other with the different components and compare them to determine which affects performance the most, or if it may be the combination of methods that together leads to better performance.

Additionally, the varying types used in the information sharing measure revealed the differences in criticality and effectiveness of these types of unique information sharing. Future research should look further into the idea of not all unique information being equally important and continue to assess information sharing objectively and with varying dimensions and roles.

Finally, Information Usage had a relationship with Performance, leading to the idea that it may be a useful measure to study in future research. However, the items in this measure only reached a coefficient alpha of .663, leading that the measure could be improved for future studies. By writing items that more accurately depict the information usage process and how exactly the information was used after it was mentioned, a better picture of how this usage affects overall performance can be revealed.

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APPENDICES

Appendix A: Proposal Introduction

Introduction

In response to increasing competitive challenges and organizational needs of flexibility and adaptation, many organizations today are relying more and more on teams rather than individuals to accomplish tasks (Pina, Martinez & Martinez, 2007). In addition to this, organizations are becoming increasingly global in nature (Choy, 2007). As Choy, 2007 points out, with increasing globalization, corporations have greater access to wider consumer and distribution networks, as well as networks involving internal and external cross-border relationships. In this light, teams responsible for making decisions and completing tasks are likely to be diverse in composition (i.e. age, gender, race/ethnicity, attributes, values), and possess varying sets of knowledge and expertise (Trimmer, Domino & Blanton, 2002). One reason for putting these employees together is because the overall knowledge possessed by groups should be greater than that of a single individual. However, in many real-world situations, each individual in the group does not possess all of the necessary knowledge needed reach the optimal decision. *Common information*, or information known to all group members before discussion, as well as *unique information*, information known only to a particular member or subgroup prior to discussion must be pooled and discussed by all members of the team. Unfortunately, research has repeatedly found that this is not the case (Stasser & Titus, 2003).

A *hidden profile* situation occurs when information is distributed among group members so that the information that all group members are aware of supports an inferior alternative, while the sum total of information that the group holds supports a superior alternative (Stasser & Titus, 2003). This can be the case when organizations put together a group of people with various expertises as described above. In this case, members do not favor the superior alternative at the onset of discussion because they only have part of the information, and the superior alternative can be uncovered only by pooling the knowledge held by the individual members (Stasser & Stewart, 1992). Research has shown that the presence of a hidden profile leads to *biased information sampling*, which is when group members tend to discuss, or in other words *sample*, common information

at a higher rate than unique information. Biased information sampling has been shown to adversely and negatively affect group performance and the group's ability to make the correct decision (Stasser, Taylor & Hanna, 1989; Stasser & Stewart, 1992, 2003; Larson, Foster-Fishman & Keys, 1994; Gigone & Hastie, 1993). This phenomenon happens often in decision-making teams, illustrating the criticality of using discussion to uncover the information the unique information. Researchers have set out to find ways to improve upon groups' inability to uncover hidden profiles.

Previous Research

Group decision-making effectiveness has been studied since the 1920's but it was not until the 1980's that Stasser and Titus revealed some very alarming results pertaining to group decision-making. Rather than groups that hold various expertises coming to a better decision than one individual with limited knowledge, they discovered that group discussion in this case did not augment decision-making effectiveness due to biased information sampling.

The Collective Information Sharing (CIS) Model

The seminal study in this line of research, which proposed that group members fail to effectively pool their information because of the tendency for discussion to be dominated by common information and information that supports existing preferences, was done by Stasser and Titus in 1985. Participants were assigned to 3-person groups and given a scenario in which they were to choose the most suitable candidate out of three hypothetical running mates for student body president based on an inventory of information. Participants were assigned to an all shared condition, in which all information about each candidate was given to all members, or one of two unshared conditions, in which some of the information that the participants had was common to all group members, but they also each held some unique pieces of information. In the unshared conditions, the information that they were given in common supported one particular candidate, who was in reality not the best suited for the job. However, if the information that each group member uniquely held was pooled, they would have been

able to make the optimal decision. In other words, there was a hidden profile. It was hypothesized that group members would be able to use discussion time to effectively pool all of their information and identify the optimal candidate even in a hidden profile situation. Group members were told to individually make a decision before and after discussion, and it was found that even after discussion, they tended to make decisions based mostly on common information and information that supported the group's initial decision. Unique information had little effect on member's preferences during group discussion, and after discussion they were able to recall more information that supported the decision made based on common information (the inferior decision), rather than recall unique information that would have led them to the right decision. Groups in the shared condition made significantly better decisions (83% of groups chose the correct candidate) than those in the unshared conditions (18% of groups chose the correct candidate). As a result, discussion, which resulted in biased information sampling, did not improve their decision-making performance and caused them to more often support the wrong candidate. This surprising finding sparked an array of research.

To formally describe the problem found in the seminal article, Stasser and Titus (1987) developed the Collective Information Sharing (CIS) model to explain the tendency of discussing common over unique information in an equation. This equation is: $p(D) = 1 - [1 - p(M)]^n$ where $p(M)$ is the probability that an individual will both recall and contribute a given item of information to discussion, and $p(D)$ is the probability that the group will discuss a piece of information and is contingent upon the number of group members aware of the information (n) and $p(M)$ (Stasser & Titus, 1987). It is important to note that in order for the whole group to discuss an item, it must be brought up by an individual, and the individual bringing it up is contingent upon their recall, opportunity, and motivation to mention it (Stasser, Taylor, & Hanna, 1989). Mentioning an item of information to the other members of the group during discussion is what is meant by *sharing*.

The CIS model can be illustrated using a 4-person group where 45% of the information is common among all group members. The CIS model predicts that the probability of mentioning an item of common information is $p(D_s) = 1 - [1 - .45]^4 = .91$.

When considering the probability of unique information being mentioned, $n=1$ (since only one person has this piece of information) and the equation predicts this probability to be $p(D_u) = 1 - [1 - .45]^1 = .45$. In general, the formula predicts common information to have a sizeable advantage over unique information, thus leading to biased information sampling.

Subsequent Research

The CIS model sparked an array of research designed to investigate the problems associated with biased information sampling. In 1989, Stasser, Taylor and Hanna directly tested the model proposed by Stasser and Titus in 1987. Three- and six-person groups participated in a political caucus simulation similar to the one used by Stasser and Titus in 1985. Participants read descriptions of three hypothetical candidates for student body president, with manipulations set to vary the amount of information common to all group members prior to discussion (33%, 66%, or 100%), the structure of the discussion set (*structured*, in which they were given instructions on how to go about the discussion, and *unstructured*, in which they were just told to reach a conclusion), and the group size (three or six people). The authors hypothesized that discussion would be dominated by common information, that this bias toward shared information would be stronger in larger groups, and that interventions, such as structuring the discussion by giving instructions on how to go about the discussion, would increase the proportion of unique information discussed. The hypotheses that more common than unique information was discussed, more information was discussed in the larger groups (mostly common information), and structuring the discussion caused more information to be discussed were supported. However, this was mostly due to an increase in common information. Further, unique information was actually less likely to be repeated once it was mentioned than common information, showing that it is important to get the groups to somehow focus more on unique information.

Stasser and Stewart (1992) explored the possibility that the type of task may influence the way in which information is shared. The authors proposed that groups would be less prone to focus on common information if their task has a demonstrably

correct answer that can be defended by a logical argument, or the idea that it may be the task itself that affects the extent to which unique information is discussed. In the previous studies, the tasks used were of a judgmental nature rather than having a direct, solvable right or wrong answer. To test the hypothesis that groups would focus less on common information if their task is solvable, participants were assigned to groups of three or six, given a solve or judge task set, and the prediscussion distribution of information was either all common (they were not in the presence of a hidden profile) or critical clues were unique (they were in the presence of a hidden profile). Participants read a series of interviews from a homicide investigation and used clues from the interviews to determine which of three suspects was guilty. They were then either told to decide which was most likely to have committed the crime (judge set), or they were told that only one of the suspects could have committed the crime (solve set). Although groups facing a hidden profile had worse group performance as hypothesized, groups outperformed individuals when they were told that the task had a discernibly correct answer (solve set) rather than instructing them to make a judgment (judge set). This finding was probably due to the fact that they discussed more and focused longer on unique information when they were told that their task had a demonstrably correct answer. Overall, these results led to the conclusion that the type of task does have an effect on the group discussion content. Therefore, in any decision-making group, the type of task should be taken into account.

Stasser and Stewart (1992) also raised the idea that it is not just getting a group to mention a piece of unique information that is important, but they must also value it and maintain a focus on it. In other words, the group must redirect the focus of discussion away from common to unique information, or turn unique information into common information. Subsequent research lent support to the idea that simply *stating* unique information does not make a group more likely to uncover a hidden profile (Lavery et al., 1999). Klocke (2007) showed the importance of valuing information using three-person groups performing the task of selecting an airline pilot from a list of four potential candidates. Two pre-tasks were given before the main decision making task, in which group members solved a jigsaw puzzle followed by an analogy of how solving the

jigsaw puzzle relates to group decision-making was read aloud, and these were compared to a control condition in which they just solved the puzzle with no analogy. The main decision-making task was videotaped and watched by researchers who determined how much unique information was discussed and repeated. The pre-tasks effectively caused the groups to discuss more information, but the only groups whose members individually repeated their own and others' unique information were able to uncover the hidden profile. It is not simply how much unique information is mentioned, but rather how important this information is perceived to be and whether or not it is taken seriously. Only then can the unique information sway the initial preference, which seems to be a very important factor in the group's decision after discussion (Lavery et al., 1999; Kelly & Karau, 1999).

Gigone and Hastie (1993) tested the hypothesis that the influence of unique information on a group decision is directly related to the number of group members who hold that information in common before group discussion. The authors used three-person groups and had them make judgments about the grades received by 32 students in an introductory psychology course. Information on these students included high school grade point average, Scholastic Achievement Test scores, self-rated enjoyment of the class, and self-rated workload in other classes. Some of this information was common to all group members, and some was unique to individuals in the group. Participants were to first make a judgment on each student individually, and then come to a consensus on the student in a group with members holding unique information on the student in question. As hypothesized, the authors found that group judgments were no more accurate than the judgments of their constituent members in a judgmental task and there was a bias toward common information during discussion, further lending support to the common information bias and pointing out that it is a consistent problem in group decision-making.

Larson, Foster-Fishman and Keys (1994) tested the hypothesis that groups would make better decisions as the importance of the task increased and that training the groups to make decisions in a structured way would improve decision making by introducing a task importance manipulation and group decision training. Three-person groups decided

which of three hypothetical faculty candidates would be the best person to teach an introductory psychology course. Task importance was manipulated by telling half of the groups that the Department of Psychology was very interested in the decisions the groups were about to make and that this was the first time the department had tried to determine what characteristics undergraduate students prefer in an introductory psychology instructor. Also, about half of the groups in each of the task-importance conditions were given decision-making training, delivered in three parts: 1) instructions to take five minutes at the beginning of discusses to plan to work to maximize the group's effectiveness, 2) a short review of the three most common barriers to effective group decision training (adopting the first solution proposed without further evaluation, engaging in unconflicted change, and ignoring important information), and 3) a four minute videotape presentation of a three-person group implementing the suggestions in part 2 in a discussion similar to the one that they would be having to choose a candidate for student body president. Manipulating the importance of the task and the group decision-making training were hypothesized to increase the probability that a group member would mention a piece of unique information, but contrary to hypotheses, only the training did so, and not to the degree that was expected. Groups in the training condition did talk about significantly more common and unique information than those in the non-training group, but the difference was not to the degree expected. Overall, this study showed promise for the use of implementing structure into group discussion, but further research is needed to discover a more effective way of implementation to fully leverage the use of this structure.

In 1995, Stewart and Stasser took a new approach to improving group decision-making in a hidden profile scenario and found that labeling a person as an "expert" in a particular field made them more likely to mention and retain their unique information. Three-person groups participated in a decision-making task in which they were to choose the best of three hypothetical candidates. For each potential candidate, 18 pieces of information ranging from unfavorable to favorable were divided into three subsets of 6 items of information, with each set having about the same average rating of favorableness as the entire set of information for the candidate. For every group, two subsets of

information were given to all group members, and one subset of information was only given to one group member. In an expert-assigned condition, each group member was told that they were an expert on the particular candidate for whom they were given unique information and that they had extra information about that candidate that the other group members did not receive. Members were also reminded of their expertise out loud in front of the other group members so that they were mutually informed of each others expertise. The performance of these groups was compared to a group in which no indication of expertise was given. Groups in the expert assigned condition discussed more unique information and were able to recall more unique information than those in the non-expert assigned condition. Further research supported this finding when Franz and Larson (2002) tested and confirmed the hypothesis that experts would mention more task-relevant information than nonexperts. Participants performed a task in which they were to select one of two college running backs to play on a National Football League team. Before this task, they took a test that assessed their knowledge about football to determine who would be assigned an expert. This test consisted of 28 multiple choice items and was developed and validated in two pilot studies prior to the study. Groups were either assigned no expert, one identified expert (an expert that was announced in front of the other group members to be the member of the group who scored in the top 25% on the football test), or one unidentified expert (the group was informed that someone in the group was an expert on football who scored in the top 25% on the football test without indication of which specific member held the expertise). It was found that identified experts did indeed mention more task-relevant information than non-experts. This further supported the idea that when a person is labeled an expert, they are more likely to use their knowledge and abilities by putting forth more information than nonexperts during group discussions.

After 1995, researchers continued to find evidence that groups are more likely to discuss common than unique information, that common information tends to be mentioned earlier than unique information, and that group discussion rarely leads to the discovery of a hidden profile (Larson, Foster-Fishman, & Franz, 1998; Larson et. al, 1996; Winqvist & Larson, 1998; Devine, 1999). For instance, Kelly and Karau (1999)

demonstrated the importance of influencing the group's initial decision in 1999. Three-person groups participated in a management simulation in which they had to decide which of two cholesterol-reducing drugs to market given a database of information with positive, neutral, and negative facts about each drug. Some of the information was common among all group members, some was unique to individuals. Time pressure was manipulated by telling some groups to imagine that they had a deadline where they had to report their final decision at a surprise meeting, and another group was told to take as much time as they needed to come to a decision that they were comfortable with. In addition, the strength of the initial preference was also manipulated by varying the amount of common information that was given to the groups to either strongly or weakly support the correct or incorrect decision. Even under time pressure, discussions were biased in favor of initial preferences, and ultimate decisions were largely congruent with initial preferences. Overall, the initial preference was what guided the discussion and unique information was not taken into account enough to sway these initial preferences, further showing the importance of not only mentioning unique information but weighing it as important and using it to make a final decision.

Another topic that was explored in the 1990's was the induction of critical thought versus consensus. Postmes, Spears and Cihangir (2001) proposed that it may be a group norm of reaching consensus that causes a lack of discussion of alternative solutions, and that this problem may be fixed by making different kinds of norms salient using a pre-task to the discussion. A norm is a standard or rule that is accepted by the members of the group about what is and is not appropriate thought and behavior. In line with the idea that a drive for consensus can restrict information sharing, the authors found that critical thinking norms improved the quality of decisions, and consensus norms did not. This effect was shown to be mediated by the perceived value of common and unique information. The authors demonstrated this by having participants take part in a pre-task that either created a consensus norm or a critical thinking norm. Groups in the consensus condition were to make communal decisions about putting together a poster of pictures. Groups in the critical thinking condition were given a proposal that virtually all students disagreed with and discuss it. This proposal was aimed at inducing cognitive conflict in

which the members would have multiple perspectives on a controversial issue and would have to strategically use their independent thought to come to a final decision. Groups in the critical-thinking condition considered unique information as equally valuable as common information and made better overall decisions than the consensus condition, with 22% of the consensus groups choosing the right candidate after discussion, and 67% of the critical thinking groups choosing the right candidate after discussion. Therefore, it seems that it would be valuable to teach the groups a process that will help induce cognitive conflict and critical thought and see the value of unique information rather than just warning them to do so or just having them discuss without any structure.

In 2001, Stewart and Stewart hypothesized that it may be something about the information itself and how it is presented that affects recall of unique information. The authors based their study on the picture-superiority effect, or the finding that individuals tend to recall pictures better than words, to test if participants would recall information in the form of pictures better than in the form of words in a hidden profile scenario. Participants studied not only common and unique information in the form of words, but also in the form of black and white line drawings. Results supported the picture superiority effect in that groups were more likely to recall unique pictures than unique words. This is an important finding as it shows that increasing the salience of an item of information, such as showing it in picture form, can increase its chances of being recalled and therefore used to make a decision.

In a review article of previous research on group decision-making in a hidden profile scenario, Wittenbaum, Hollingshead and Isabel (2004) proposed that information sharing is a subjective, motivated process rather than an objective, unbiased process as was previously assumed. In a review and critique of the previous literature on the topic, the authors pointed out that in the original CIS model, there was an assumption that members are unbiased communicators and will communicate any piece of information recalled. Another assumption identified was that groups are assumed to work cooperatively with one another toward the common goal of reaching the best decision. Finally, the authors pointed out that there is an assumption in the original CIS model that if an item of information is mentioned, that it is mentioned correctly and in a goal-

congruent way. The authors proposed that information exchange during discussion is actually a motivated process by which group members choose which pieces of information to share and how to go about discussing these pieces of information in order to satisfy goals.

To use the idea of information sharing as a motivated process in an empirical study, Scholten, Knippenberg, Nijstad and De Dreu (2004) tested the hypothesis that groups high in what is known as epistemic motivation, or the desire to develop and sustain a correct and deep understanding of issues, including decision problems at hand, would engage in more information-driven interaction, thus leading to better decision-making. They manipulated process accountability by telling participants in the experimental condition to gain insight into the process by which they reached their decision because there would be a follow-up interview in which they would be asked to elaborate on the decision-making process that they used. This was expected to increase epistemic motivation since it was aimed at getting the groups to gain an understanding of the issues and decision-problems used to come to their final decision. Groups under process accountability repeated unique information more often, and more frequently chose the optimal decision. This shows the importance of instilling motivation to understand the decision process in the group to achieve the best answer.

Conclusions on Information Sharing Literature

The literature on this topic has demonstrated that biased information sampling during group discussion is a serious and robust problem. Researchers have been attempting to discover ways to ameliorate the effects of this bias with mixed results since the seminal article was published by Stasser and Titus in 1985. Indeed, there is now enough research to perform a meta-analysis and this was done by Mesmer-Magnus and DeChurch in 2006. These authors conducted a meta-analysis on information sharing in work teams to bring together and summarize the research conducted over the years. Their analyses supported the conclusion that the majority of group discussion concentrated on common and non-critical information than on uncovering the unique and critical information. Relationships were reported as reliability corrected correlations, or

ρ . As expected information sharing and group decision-making performance were positively related ($\rho = .21$), and sharing critical (unique) information had a stronger relationship with decision quality ($\rho = .34$), than sharing of non-critical (common) information ($\rho = .15$). In addition, teams that actively shared any type of information reported higher levels of team cohesion ($\rho = .21$), decision satisfaction ($\rho = .41$), and decision-relevant knowledge ($\rho = .19$) after discussion than teams where less information was shared. Effect sizes varied quite a bit among different antecedents that have been explored, but structuring team discussions ($r = .43$), framing the decision-making task as a solvable problem ($r = .25$), and using virtual rather than face-to-face formats had the strongest results in enhancing information sharing ($r = .24$), thus showing the most promise for future research in this area. While these are areas that show promise in lessening the shared information bias, the problem has not been solved and better methods for uncovering hidden profiles through group discussion should be sought out since organizations are continuing to rely on diverse groups to discover the optimal direction to take in a decision task that requires the use of varying expertise (Trimmer, Domino, Blanton, 2002).

Group Decision-Making Interventions

In addition to the attempts made by researchers to diminish biased information sampling in decision-making groups, there are a variety of existing group decision-making interventions that have been used to improve the quality of decisions made by work groups and teams. These interventions were developed to improve upon the traditional consensus approach, in which groups engage in discussion without any specific structure. The traditional consensus approach can lead to threat, ingratiation, and lack of participation (Hornsby, Smith & Gupta, 1994). These interventions can be categorized into conflict inducing (interventions designed to induce strategic conflict and disagreement over alternatives) and conflict reducing (interventions that have been designed to foster conflict-resolving behaviors).

Conflict reducing

The three most popular interventions of this type are the nominal group technique (NGT), the Delphi method, and brainstorming.

The NGT approach is useful in situations where individual decisions must be pooled and there is disagreement about the solution to a problem (Hornsby, Smith & Gupta, 1994). Implementation of this intervention generally involves 4-5 steps including: (1) silent idea generation in writing by each participant, (2) presentation of each group members idea out loud to the group, (3) discussion and clarification of ideas by the entire group, (4) voting and rank ordering of most important ideas to identify priority areas, (5) final group discussion of the most important areas identified (Evans, Rogers, McGraw, Battle & Furniss, 2004; Hornsby, Smith & Gupta, 1994).

NGT has been found to positively impact group decision-making effectiveness on its own and when combined with other methodologies (Hornsby, Smith & Gupta, 1994), but the overall literature on this intervention has been mixed. It is suggested that NGT is more suitable to fact-finding and idea generation than to idea evaluation or group consensus (Errfmeyer & Lane, 1984), which is often what is desired of work groups in organizations.

The Delphi technique relies on the judgments of subject matter experts (SMEs). In this approach, a series of questionnaires are created by a small group and these questionnaires are then sent out to a larger group. After the questionnaires are returned and the answers are reviewed, a new questionnaire is developed based on the results and sent out to the respondents again. There are generally two rounds of questionnaires and the underlying theory is that consensus will improve with successive rounds of anonymous group judgments (Hornsby, Smith & Gupta, 1994).

Research suggests that the Delphi technique can lead to improved decision-making, but also is fraught with limitations. First of all, it is time consuming to run multiple iterations and may not be feasible in an organizational setting. Negative findings in research have been attributed to poor experimental manipulation of the technique. In addition, the Delphi technique does not allow to determine differences in

individual interpretation and can result in negative social facilitation (Hornsby, Smith & Gupta, 1994; Errfmeyer & Lane, 1984). Finally, comparisons between the Delphi Technique and NGT have had mixed findings and the Delphi Technique was found to be most valuable to “almanac” type questions (i.e. how many gas stations are in a given state) (Errfmeyer & Lane, 1984).

Brainstorming was originally proposed in 1957 by Osborn as a means to enhance the quantity and quality of ideas generated in a group discussion. This technique involves participants generating as many ideas as possible by uncritically evaluating their own ideas before expressing them, uncritically evaluating others ideas when they are expressed, and combining and improving upon ideas that have been expressed. In a meta-analysis presented by Mullen, Johnson and Salas (1991), results further supported that nominal groups tend to significantly outperform brainstorming groups and that productivity loss increases as groups increase in size, when an experimenter is present, and when they are required to vocalize their contributions. In addition, this productivity loss was of significant magnitude, and it appears to be difficult to justify brainstorming techniques in terms of any performance outcome. This can be quite problematic considering that the majority of groups required to make important decisions work vocally rather than making decisions through writing.

Overall, these techniques do show promise for the inclusion of a structured approach to making decisions, however there is no clear evidence of one outperforming another and each has problems that are detrimental to its benefits in improving group decision-making effectiveness.

Conflict Inducing

Manipulations aimed at inducing conflict into group decision making have been designed to increase cognitive conflict, rather than *affective conflict*. Cognitive conflict is strategic in nature and deals with multiple perspectives in a group and disagreement over the best way to achieve a group goal or objective, while affective conflict is interpersonal and refers to conflict directed at others in the group, resulting in tension, frustration, argument, and withdrawal (Jehn, 1995; Devine, 1999). This is an important distinction

because it has been shown that cognitive conflict can lead to affective conflict or they can occur together, causing an interaction where pooling of unique information is lower when affective conflict is higher and pooling of unique information is higher when affective conflict is lower (Devine, 1999). However, cognitive conflict can result in increased evaluation of assumptions and alternatives, preventing groups from making decisions without further evaluating alternatives and coming to a hasty decision that has not been critiqued for flaws (Priem & Price, 1991).

The most widely known conflict-inducing methods that have been used over the past few decades to improve decision-making effectiveness are *Devil's Advocacy (DA)* and *Dialectic Inquiry (DI)*. DI is a technique used to increase the otherwise restricted expression of cognitive conflict during decision making by creating a subgroup structure that forces the production of opposing recommendations (Priem, Harrison & Muir, 1995). A prevailing or default plan is identified, an attempt is made to identify the assumptions underlying this plan, then a counterplan is developed that rests on assumptions opposite those supporting the original plan. After this, advocates for each of the two distinct plans engage in a structured debate to voice their arguments in support of their preferred plan (Schwenk, 1990). DA introduces conflict into group discussion by introducing one set of recommendations and a critique of it (Schweiger & Finger, 1984).

There has been little research on the effectiveness of DA and DI. The majority of research has compared these techniques to each other as well as to a third condition in which a simple expert report provided one set of advice on how to make a decision (E). In this research, most comparisons were made using a research paradigm known as the Multiple-Cue Probability Learning Paradigm (MCPLP), which required subjects to predict values of a criterion variable after they have been given information about the values of three variables which served as cues that were correlated with the criterion variable (Schwenk, 1989). A financial prediction task was used in which subjects had to predict a firm's earnings given three financial cues. To compare the effectiveness of DA, DI, and E, groups in the DA condition were given the advice of an expert along with a critique of the recommendation, groups in the DI condition were given a written recommendation from one expert supporting a certain assumption, and recommendations

from another expert supporting an opposing assumption, and groups in the E condition were simply given a written recommendation of only one expert (Schweiger, 1984). Unfortunately, these studies display a lack of clear hypotheses concerning the nature of the main effects (Schweiger, 1984), and there does not seem to be any consistent pattern of one intervention being more effective than the next (Schweiger & Finger, 1984).

Schwenk (1989) conducted a meta-analysis on the comparative effectiveness of DA and DI. The superiority of these two methods over one another has been an area of debate. Schwenk evaluated the differences between DA, DI and an E condition in past papers that looked at the differences between these interventions. First, cumulated effect sizes for the differences in performance between DA, DI, and E revealed that DA and DI have higher effect sizes than E for all studies, and that half of the studies favored DA and half favored DI in terms of effect sizes. Therefore, no strong support was found for either DA or DI as a superior method for introducing conflict, but results show that they are more effective than simply being given the advice of one expert to follow (Schwenk, 1989). Overall, one of the main conclusions of the existing research is that DA and DI can induce conflict and improve decision making if they are effectively managed (Schwenk, 1989; Priem & Price, 1991; Schwenk & Cosier, 1993).

These interventions have been used very sparsely in a hidden profile scenario in research. Devine (1999), was the only available published study in which DI was used as a manipulation. Details and results of this study are discussed earlier, and the main conclusions show that cognitive conflict has a positive relationship with affective conflict, which leads to frustration and withdrawal. Other attempts to induce cognitive conflict, such as the group training conducted by Larson et al. (1994), have had neutral to positive results, but none have been able to capture the theoretical benefits of cognitive conflict without the consequences of affective conflict.

Current Study

The current study is aimed at finding a better method than previous research to get all members of a group to discuss the information that they all hold in common as well as the pertinent information that only certain group members hold.

As was discussed in the previous section, the most common techniques used to enhance group decision-making effectiveness have produced mixed results. Other interventions that have attempted to induce cognitive conflict have either not worked to the degree expected, or also induced affective conflict, which is detrimental to decision-making effectiveness (Jehn, 1995; Devine, 1999). Interventions aimed at decreasing conflict have had mixed results and have been applied very little to a group in a hidden profile scenario. There are several facets of group decision-making in a hidden profile scenario that must be taken into account and existing techniques may simply be too narrow to touch on all of these components. Therefore, this research is being conducted to develop and test a new intervention aimed reducing the problems associated with biased information sampling that have been introduced in research over the past few decades. The intervention will deal with recurring problems that have been repeatedly found in research since the seminal article by Stasser and Titus in 1985. The main goal of this intervention is to motivate the group members to use their information optimally to uncover the hidden profile and come to the best decision. For this reason, the training will be labeled “*Motivated Sharing*” throughout the remainder of this paper.

Development of a New Intervention

While there have been mixed results throughout the research in group decision-making in a hidden profile scenario, there have been some positive findings that show promise for the future. Some of the most salient areas of promise are integrated to create a new intervention, labeled Motivated Sharing or MS, designed to improve group decision-making effectiveness. This intervention can be described by breaking it down into three sections: (1) goals of an effective group discussion, (2) principles of an effective group discussion, and (3) implementation. Each of these aspects are presented below along with a rationale.

Goals of an Effective Group Discussion

As was found in the meta-analysis by Mesmer-Magnus and DeChurch, information sharing leads to improved group decision-making, and this relationship is

stronger for sharing critical information than for sharing non-critical, common information. In addition, this critical, unique information must not only be mentioned, but must be retained and valued by group members in order to be used in the final decision (Stasser and Stewart, 1992). Therefore, in order to bring forth all important information and use the information to come to the best decision, the group discussion must be used to: (1) share unique information, (2) utilize that information in making decisions, and (3) weight that information according to its overall importance.

As was mentioned, each piece of information that is brought forth must not just be mentioned, but must be retained and turned into common information (Stasser and Stewart, 1992). As Larson, Foster-Fishman, and Keys (1994) point out, when a piece of unique information is mentioned once, it is not as easy to recall as a piece of common information since members have already had two exposures to the common information. In addition, the authors argued the point that unique information is more likely to be treated as suspect since it cannot be verified by reference to one's own information or memory, making it seem less reliable. Therefore, it will likely take longer for other group members to accept the new piece of information and may require them to hear it more than once or hear a longer, detailed explanation of why it is important to the problem at hand. It is apparent that existing interventions can get a group to talk about more information, but this information must be recalled in order for it to sway the final decision, and the critical pieces of information must be weighted as so in making the final decision (Stasser and Stewart, 1992; Lavery et al., 1999).

Principles of an Effective Group Discussion

Based on previous research, four necessary and sufficient principles for an effective discussion have been identified (with rationales for each discussed below): (1) identification of specific areas of knowledge, (2) labeling of each member's area of expertise, (3) knowledge of common mistakes made by past decision-making groups, and (4) a structured approach to making decisions.

As was mentioned, unique information may be treated as suspect since it cannot be verified by reference to one's own information or memory, making it seem less

reliable than common information. However, research has shown that labeling group members as experts in a certain area in front of other group members tends to make them mention more common and unique information than nonexperts (Franz & Larson, 2002). In addition, labeling a person as an expert in the field associated with their unique information makes them more likely to discuss and retain that information, and members do not question the validity of unique information when it is recalled by a recognized expert (Stasser, Stewart & Wittenbaum, 1995; Franz & Larson, 2002). Also, if other group members are aware of each member's expertise and the type of information that they have, they will be more likely to go to that person with specific questions and listen to their information (Moreland & Myaskovsky, 2006).

Larson et al. (1994) introduced the three biggest flaws in group decision making: (1) adopting the first solution proposed without further evaluation, (2) engaging in change without evaluating differences in group opinions, and (3) ignoring important information mentioned by group members. When beginning a group discussion, not all participants are aware of these common mistakes and knowing that they are often made may help to avoid doing the same thing.

Finally, introducing structure into a group discussion has been shown to increase information sharing (Stasser, Taylor & Hanna, 1989; Larson et al., 1994). In fact, it was found to have the largest effect on information sharing in a hidden profile scenario of all attempted interventions in a meta-analysis (Mesmer-Magnus & DeChurch, 2006). Structure in group decision-making can be described as it was in the meta-analysis as intervention that provides teams with strategies for sharing and integrating information in order to focus the team's attention on important aspects of the task, stimulate member contribution, and ensure adequate attention to information mentioned in the discussion. Therefore, it is important to include the implementation of this type of structure into the group discussion.

Implementation

Following the four principles discussed above, the four implementation steps for the new intervention will be as follows: (1) provide groups an inventory of the type of

information each expert role has, (2) label experts in front of other group members with a name tag, (3) provide groups with a list of the three most common mistakes made by past groups and a real-world example of what can happen if there is a drive for consensus with no structure, (4) assign one person to be the “note-taker”. Information in all four steps will be provided after information on the main decision-making task is distributed to the groups, but before the groups begin discussion. The group will be supplied with a large flipchart and the note-taker will write down the critical information that is brought up by all group members. The note-taker will be instructed to write down the process not the conclusions, or in other words to keep notes just on the information presented by each group member rather than any final decisions or conclusions, which will be done on the final decision sheet. The effectiveness of note-taking in information recall has been supported by research (Hartley, 2002). With all of the information written down at their disposal, the group will have an easier time critiquing each piece of information so only relevant information is kept in making the final decision. In addition, making the information more salient has been shown to increase its chances of being remembered and thus used in the final decision (Stewart & Stewart, 2001).

Finally, each group will be informed that they do not have the same information as the other group members. This has been done in many studies in the past (Kelly & Karau, 1999; Gigone & Hastie, 1993; Stasser, Taylor & Hanna, 1989), but did not have a strong impact on the results, possibly because they were not actually taught a process or given a structured training for discussion and did not know how to effectively use this information.

In order to test the effectiveness of this intervention, it will be compared to groups who are instructed to reach consensus given time and money constraints with the available information. This will be referred to as the consensus, or CON condition.

Hypotheses

The goal of this study is to develop an intervention that will help groups perform better than they would without a strategy for sharing and integrating information. Researchers have shown that when structure of this kind is introduced into a decision-

making group, the group members are likely to discuss more information than when there is no structure (Stasser, Taylor & Hanna, 1989; Mesmer-Magnus & DeChurch, 2006). In addition, this intervention is designed to reach the goal of sharing and using unique information. Therefore:

Hypothesis 1. Groups given in the MS intervention will share more unique information than groups in the CON condition

In a hidden profile task, if group members make a decision based only on the information that they all have in common, then the solution will be suboptimal to one that incorporates the unique information. The MS condition is tailored to a hidden profile scenario in that it is designed to motivate group members to share and value their unique information. With greater discussion and use of unique information, they should make better overall decisions. Thus:

Hypothesis 2. Groups given the MS intervention will make better overall decisions (have higher group decision-making effectiveness) than groups in the CON condition.

The way in which information is evaluated during the information sharing discussion will affect how it is used to make the final group decision. Unique information must be valued and recalled in order for it actually to be used in the final decision, and this must happen during the discussion when the information is pooled from various members. Therefore:

Hypothesis 3. Unique information sharing will partially mediate the relationship between the decision-making intervention and group decision-making effectiveness.

Appendix B: Task Materials

General Memo

To: Vice-President, Script Evaluation
 Vice-President, Industry Research
 Vice-President, Talent Appraisal
 Vice-President, Marketing

From: Stan Friedman, CEO

RE: Choosing films for production next year

Thanks for agreeing to meet on such short notice! As usual, the task in front of you is one of picking the movies that we will produce and release in the upcoming year. The earnings of our studio are riding on the decisions you make. Pick the best movies and we (as well as our stockholders) will be swimming in profit; pick the wrong ones and we may go belly up.

Profit from the movies we make is determined by taking the revenue earned by each film and subtracting its cost:

$$\text{Movie Profit} = \text{Movie Revenue} - \text{Movie Cost}$$

Movie cost is estimated by adding the production cost (which is fixed) to the marketing cost (which is under our control):

$$\text{Movie Cost} = \text{Production Cost} + \text{Marketing Cost}$$

Movie revenue is estimated by multiplying the number of viewers by the average ticket price for a particular film:

$$\text{Movie Revenue} = \# \text{ of Viewers} * \text{Average Ticket Price}$$

As you are well aware, the number of viewers for any given film depends on five main factors:

1. **Viewer Appeal:** a function of popular interest in the film's content (i.e., setting, plot, special effects), as well as the popularity of the talent involved (i.e., director and actors/actresses).
2. **Movie Quality:** a function of the script quality, director's skill, and actor/actress' skill. All of these things interact with one another, and each one is important. If a movie has a good script and good actors/actresses but a terrible director, the movie will not be very good. Similarly, if a movie has a good director and good

stars but a poor script, it will also be bad. It probably goes without saying that a movie that is poor in all three categories will just plain stink.

3. Marketing: increases public awareness of our movie.
4. MPAA rating: constrains the size of our audience base.
5. Average Ticket Price: reflects the age of the average viewer and, to a certain extent, the time of day that the typical viewer goes to see the movie. Movies with the highest average ticket prices draw mostly adults who go to see the movie in the evening; movies with lower average ticket prices attract younger viewers and people who go when matinee prices are in effect.

****The point here is that all five factors must be considered when estimating how much revenue a film will bring in.****

Our spending allowance for this year is \$150 million. It's hard to tell from a brief summary how much a film is going to cost because it depends on many factors, including star salaries, shooting location and duration, and special effects. However, our screenplay reviewers are pretty good and the estimates they provide should be very close.

I would like you to examine the information at your disposal and figure out how to spend our \$150 million to maximize total profit for the year. As usual, I don't care if you spend the \$150 million on one blockbuster or divvy it up over 10 little art-house projects – just figure out the ones that will bring in the most profit. While a film's total revenue is important, keep in mind that it's return on investment that is critical. In other words, the most important value to estimate is a potential film's profit divided by its cost (i.e., profit/cost, or profit ratio). Profit ratio reflects the number of dollars of profit we get for every dollar we spend. A good film will end up making about twice as much as it cost (including marketing), and a great film may end up making three to four times as much. And don't bother trying to save any money – it's there to be spent, so use as much as you can!

I know that picking movies isn't an easy task, but do the best you can. Your staffs have provided you with a good deal of useful information, and I think our screening team has identified a good set of potential choices for you. Feel free to use your personal experiences and gut feelings, but let the hard numbers provided by our research team have the final say. I look forward to seeing your recommendations on my desk next week. Good luck!

Stan Friedman, CEO

Industry Research Memo

To: Vice-President, Industry Research

From: Industry Research Staff

RE: Viewer Appeal ratings

Here is the market research that you requested on potential movies for next year. We pulled together 10 focus groups to get this data. Each focus group was led by someone on our staff and involved a roundtable discussion of the movie's premise and cast, plus formal ratings of content and star appeal by each member of the focus group. We gave the focus groups the same movie capsules that your committee is using to make your decisions. See Table 1 for a summary of the findings from the focus group research.

Table 1 contains two separate estimates of a film's appeal based on its content and stars. We asked people in the focus group to discuss (and rate) Content Appeal and Star Appeal separately.

- Content Appeal concerns a movie's premise, plot, character development, and special effects; the film's genre and emergent themes play a role as well.
- Star Appeal has to do with the popularity of the actors/actresses as well as the director.

Industry research suggests that content is roughly twice as important as stars in determining who goes to see a movie, so we scaled Content Appeal values from 0-200, and Star Appeal values from 0-100. Basically, a Content Appeal score of 200 means that the movie should have a very broad demographic appeal and the focus group participants were dying to see the screenplay get turned into a movie. In contrast, a Content Appeal score of 0 means that no one was interested in seeing the movie get made based solely on its subject matter. A Star Appeal score of 100 means that basically every role in the film has A-List stars that people want to see; a score of 0 means that the cast is essentially unknown to the audience. Star Appeal is based on physical attractiveness, charisma, and the success of recent films and has little to do with talent – it only reflects “popular demand.”

Films with unusual situations and big-name stars tend to have more appeal to viewers. In particular, action/adventure, war, science-fiction, and suspense films tend to interest people more than dramas or comedies. Animated films almost always do well with families and often become blockbusters – they have a built-in audience if based on a book or story familiar to the audience. Horror movies do well with males (especially younger ones) and some pull in women as well. Comedies do well if the situation is right and the casting is good. Dramas are the most variable; they tend to draw discriminating viewers from all groups, but usually have much lower content appeal because their situations are more ordinary. More importantly, movies with lots of special effects are very attractive regardless of their genre – in part because of extensive repeat viewing.

To summarize, the Content Appeal and Star Appeal values quantify the appeal of a film based on its subject matter and cast, respectively. A good overall index of the “buzz” surrounding a potential movie is to add up its Content Appeal and Star Appeal.

Table B.1 Year 1 Focus Group Research on Viewer Appeal of Potential Movies

Movie Title	Content Appeal	Star Appeal	Staff Comments
Rikki-Tikki-Tavi	200.00	75.00	Families will eat this stuff up; the famous mongoose is loved by all. Focus groups liked the voices.
Light Years	185.00	30.00	Offbeat science fiction story from an A-list director. Story is intriguing, and will have great special effects.
Chosin Reservoir	150.00	50.00	Older viewers were intrigued by the history; younger viewers liked the realistic battle scenes.
Degeneration	130.00	55.00	Everyone loves a good zombie pic. Should provide nice mix of humor and special effects.
Renegade	130.00	80.00	A modern update of <i>Invasion of the Body Snatchers</i> . The huge <i>X-Files</i> fan base will love it, especially with Jessica Alba.
Rio	110.00	45.00	Mystery involving sex, murder, corruption – and the President. Should appeal to older viewers.
Sex Ed	80.00	40.00	Sex in the schools is a perfect target, and focus groups responded well. No headliners, but good cast.
Southern Accents	75.00	30.00	Gritty realism – story appealed more to women, but men really liked Eliza Dushku.
Fast Food	70.00	70.00	Spoof of typical fast food joint scored about average on content; perfect casting in this one.
A Lifetime of Anger	65.00	45.00	A biting tragedy; this may be the tear-jerker of the year. No major female roles hurts appeal some.
On Campus	50.00	0.00	Documentary-style exploration of college life. Viewer appeal will be somewhat limited to older teens and young adults.

Table B.2 Year 2 Focus Group Research on Viewer Appeal of Potential Movies

Movie Title	Content Appeal	Star Appeal	Staff Comments
The Reactor	190.00	95.00	This looks like a can't-miss summer blockbuster – great special effects and all-star cast.
We, The People	180.00	80.00	The war on terrorism takes an Orwellian turn after a U.S. city is nuked. Popular cast and knock-out special effects. Very timely.
Oil & Water	170.00	70.00	There is a huge market out there for this kind of film. A 21 st century take on <i>The Parent Trap</i> .
Air Cav	160.00	55.00	Sort of <i>Black Hawk Down</i> set in Vietnam – above average cast; very realistic.
Welcome to My Room	150.00	50.00	Spoof of suburbia and documentaries seen through the eyes of a kid. Nice supporting cast.
Line of Duty	140.00	100.00	An action flick with a twist – focus groups were drooling over the cast.
Extrapolation	115.00	35.00	Hot topic due to popularity of “Diablo” computer game. Should bring out the teens.
The Devil Made Me Do It	115.00	25.00	Chilling mystery that had focus groups intrigued; no-name cast, though.
The Wolf's Lair	100.00	65.00	Interesting mix of war, suspense and character study with solid casting, but some viewers will know the outcome.
Hoover	95.00	85.00	Most people don't know who J. Edgar Hoover is, but an outstanding cast.
A Good Day to Die	60.00	85.00	Sounds like a real downer, but Ang Lee, Tom Hanks, and Jennifer Connelly will bring in a lot of viewers.

Marketing Memo

To: Vice-President, Marketing
From: Marketing Staff

RE: *Impact of Marketing Strategy, MPAA Rating, and Expected Ticket Prices*

Table B.3 Marketing Strategy Information

Strategy	Cost (in millions)	Impact on Viewer Appeal
Word-of-Mouth	\$0	+0%
Print + Outdoor	\$5	+30%
Pre-Release TV	\$10	+55%
Saturation TV	\$20	+75%

As shown in Table 1, there are four feasible marketing strategies we can employ, each with a given cost and impact. Note that, as our marketing strategy gets more sophisticated, the costs and the positive change in viewers go up. Basically, the more expensive the strategy, the more effective it is. It is important to note, however, that marketing is most effective when there is a movie with high Viewer Appeal – marketing doesn't help much if the content of the film isn't all that intriguing or if there are no big-name stars. If we're going to produce any "small" high-quality films, it's probably better to just rely on word-of-mouth to spread the news. Overall, a good strategy is to spend money marketing a movie in proportion to its cost – cheap ones we can get away with little or no marketing; expensive ones can benefit from saturation TV marketing.

Table B.4 Impact of MPAA Movie Rating on Size of Potential Viewer Base

MPAA Rating	Projected Impact
G	0%
PG	-10%
PG-13	-15%
R	-25%
NC-17	-40%

As you can see, "R" or "NC-17" movies take a big hit in that a good proportion of people who go to see movies are excluded from the start. Even if those movies are good, we won't get as many people coming to see them simply because the potential viewer base is smaller! Obviously, "G" films give us the largest possible base, so we should keep an eye out for any of those.

Table B.5 Average Expected Ticket Price in Dollars for Potential Movies

Average Expected Ticket Price	Movie Title
A Lifetime of Anger	\$ 7.50
Rio	\$ 7.50
Southern Accents	\$ 7.50
Chosin Reservoir	\$ 7.25
Degeneration	\$ 7.00
Light Years	\$ 7.00
On Campus	\$ 7.00
Renegade	\$ 6.75
Fast Food	\$ 6.50
Sex Ed	\$ 6.50
Rikki-Tikki-Tavi	\$ 6.00

We had the bean-counters in Finance use their fancy regression models to predict the average ticket price for each potential movie based on projected demographics. These financial models take into account a host of factors and they're usually pretty accurate. As you can see from Table 3, the potential movies for next year are predicted to have average ticket prices ranging from \$6.00 to \$7.50.

Script Evaluation Memo

To: Vice-President of Script Evaluation

From: Script Evaluation Staff

RE: Script Quality ratings for potential movies

Here is the information you requested regarding the movie screenplays that were sent to us for evaluation. We generated quality ratings by having two of our most experienced readers go through each screenplay and assign a rating on a scale of 1 to 10, then we averaged the ratings.

When we made our ratings, as always, we paid attention to the quality of the dialogue, plot coherence, pacing, and factors appropriate to each type of movie. For example, for dramas we considered character development and plot twists, whereas for science fiction films we looked for a unique vision of the future and a realistic extrapolation from current society. In other words, we took into account that what makes one kind of movie good is not necessarily the same thing that makes another kind of movie good.

We don't have to tell you that Script Quality is very important to the success of a movie – everything is riding on it. We can have all the big-name stars we want but if the script is terrible, it's not going to make back the money needed to pay all those stars! Make sure the other execs realize this.

Table B.6 Year 1 Script Quality Ratings and Expected MPAA Ratings for Potential Movies

Movie Title	Script Quality	Expected MPAA Rating
Degeneration	10	PG-13
On Campus	10	R
Southern Accents	10	R
Fast Food	9	PG
Sex Ed	8	PG-13
Rio	8	R
Chosin Reservoir	7	PG-13
Light Years	7	PG
Renegade	6	PG-13
Rikki-Tikki-Tavi	5	G
A Lifetime of Anger	4	PG-13

Table B.7 Year 2 Script Quality Ratings and Expected MPAA Ratings for Potential Movies

Movie Title	Script Quality	Expected MPAA Rating
The Wolf's Lair	10	PG-13
Extrapolation	9	PG-13
Welcome to My Room	9	PG
The Devil Made Me Do It	8	R
We, The People	8	PG-13
A Good Day to Die	7	PG-13
Hoover	7	PG
Line of Duty	6	PG-13
The Reactor	6	PG-13
Air Cav	5	PG-13
Oil & Water	3	G

Talent Appraisal Memo

To: Vice-President, Talent Appraisal

From: Talent Appraisal Staff

RE: Skill Ratings for Actors, Actresses, and Directors

We were finally able to compile the information regarding actor and director skill values. It took quite a bit of work, but we now have the data you requested.

Basically, we surveyed a panel of movie critics and asked them to rate a list of actors, actresses, and directors for their professional skill. For directors, we asked the critics to consider things like artistic vision, ability to inspire actors and actresses, work ethic, and capturing the “feel” of situations. For those in front of the camera, skill consists of raw acting talent, intensity, emotional expressiveness, and range.

Director Skill pertains to the ability of a director to create a unified artistic vision and get the most out of the actors and actresses. Director ratings were made on a scale of 1-10, with 1 indicating a true hack with no talent and 10 indicating a director who could make an Oscar-winner with volunteers from regional theater. Some of these ratings may surprise you. Acting Skill is primarily a function of an actor/actresses’ ability to credibly display a range of emotions. Some actors/actresses are very good in limited roles, but the truly great ones can yearn, pine, lust, cry and rage with amazing ability. Actors and actresses are rated on a 5-point scale, with 1 indicating an actor/actress who would be challenged to do well on a soap opera and 5 indicating an actor/actress that can do any role with convincing authority.

With regard to how the Acting Skill of the various actors/actresses affects the overall Acting Quality of the movie, here is what our research seems to suggest:

- (1) The Acting Skill of supporting actors can pretty much be ignored – these people are usually not on screen long enough for their flaws to do much damage.
- (2) Acting Quality can be estimated by averaging the Acting Skill ratings for the Lead Roles. When there are only two lead roles, however, it’s actually a little less than average if there is a large discrepancy in the Acting Skill values of the leads. In other words, the lesser actor weighs the film down.

Table B.8 Director Skill Ratings

Director	Skill Rating (0-5 stars)
John Carpenter	3.5
Chris Columbus	2
Stanley Eider	3
Nora Ephron	4
Milos Foreman	4.5
William Friedkin	3
Jonathan Glazer	3.5
Ron Howard	4
Jean Jacques-Annaud	3.5
Stephen King	2.5
Neil LaBute	4
Mimi Leder	3.5
Ang Lee	5
Barry Levinson	4
Michael Mann	4
Garry Marshall	3.5
John McTiernan	4
Sam Mendes	3.5
Mike Nichols	4
Wolfgang Peterson	3.5
Sam Raimi	3
Harold Ramis	3
Brett Ratner	2
Ivan Reitman	2.5
George Romero	3
Joel Schumacher	1.5
Ridley Scott	5
Bryan Singer	2.5
Steven Soderbergh	5
Oliver Stone	5
Billy Bob Thornton	3.5
Simon West	2
Robert Zemeckis	4.5

Table B.9 Acting Skill Ratings for Lead Actors (0-5 Stars)

Actor/Actress	Skill	Actor/Actress	Skill	Actor/Actress	Skill
Ben Affleck	3 ½	Ed Harris	4 ½	Freddie Prinze, Jr.	3
Jessica Alba	3 ½	Josh Hartnett	3	Dennis Quaid	3 ½
Kevin Bacon	4	Ethan Hawke	3 ½	Daniel Radcliffe	3 ½
Alec Baldwin	4 ½	Katie Holmes	3	Len Randall	4 ½
Tom Berenger	4	Jeremy Irons	4 ½	Christina Ricci	5
Halle Berry	3 ½	Samuel L. Jackson	4	Denise Richards	2
Sandra Bullock	2 ½	Angelina Jolie	3	Chris Rock	3
Steve Buscemi	4	Ashley Judd	4	Keri Russell	3 ½
Nicholas Cage	3 ½	Nastassia Kinski	4 ½	Kurt Russell	4
Hayden Christensen	3	Eriq La Salle	3 ½	Elisabeth Shue	4
Jennifer Connelly	4 ½	Jude Law	4 ½	Gary Sinise	4 ½
Russell Crowe	5	Donal Logue	4	Tom Skelton	4 ½
Emily Cryton	5	Jennifer Lopez	3	Kevin Spacey	5
Matt Damon	4 ½	John Malkovich	4 ½	DeWayne Stevens	4
Keith David	4	Julianna Margulies	4	Sharon Stone	3
Daniel Day-Lewis	4 ½	James Marsden	3 ½	Madeline Stowe	4 ½
Vin Diesel	3 ½	Dylan McDermott	3	Kiefer Sutherland	3
Richard Dreyfuss	4	Rose McGowan	3 ½	Mena Suvari	3 ½
Eliza Dushku	4	Tobey McQuire	4 ½	Uma Thurman	4
Charles Dutton	3 ½	Teri Miller	4 ½	Amber Valletta	4 ½
Dakota Fanning	4 ½	Bill Murray	5	Mark Wahlberg	4
Will Ferrell	4	Liam Neeson	4 ½	Denzel Washington	5
Linda Fiorentino	4	Ronda Nelson	4	Damon Wayans	3
James Franco	3 ½	Edward Norton	5	Sigourney Weaver	5
Morgan Freeman	5	Chris O'Donnell	2 ½	Elijah Wood	4 ½
John Goodman	4	Haley Joel Osment	4	Michelle Yeoh	3 ½
Jake Gyllenhaal	4	Jason Owens	5	Catherine Zeta-Jones	3 ½
Gene Hackman	5	Anna Paquin	4 ½		
Tom Hanks	5	Natalie Portman	4 ½		

Screenplay Profile

Title: A Lifetime of Anger

Genre: Drama

Audience: Diverse

Plot Summary:

Two brothers grew up in a dysfunctional family, learning to battle life's problems with hate and bitterness. Pulled back together for the funeral of their grandmother, the one person who truly showed them love, the two end up at a bar and all the old issues come out. Through flashbacks, the movie traces the brothers' long and troubled history, including their mother running out, their baby sister dying in a household accident caused by their father's drinking, and physical abuse by their father towards one of the brothers. The flashbacks reveal the holes in the brothers' lives that come from shutting each other out. Repressing their anger, the two end up engaging in a drinking contest, which then leads to a shouting match and an all-out fight in the middle of the bar. Enraged, one brother finally aims a gun at the other but, at the last instant, turns the gun on himself and pulls the trigger. Mortally wounded, he confesses how empty his life has been and how he knows deep-down that he has been the cause of their division. There is just enough time for the two to reconcile before the one brother dies. Several scenes then show the positive impact on the brother who lived, as he finally ends up knocking on the door to his father's house. The movie ends as the door opens.

<u>Talent</u>	<u>Role</u>	<u>Type</u>
Alec Baldwin	Brother	Lead
Nicolas Cage	Brother	Lead
David Morse	Bartender	Support
Liv Tyler	Waitress	Support

Director: Billy Bob Thornton

Cost: \$20 million

Final Recommendation Sheet

1. You may only use the amount of money budgeted for this session, \$150 million. You cannot spend more than \$150 million; if a plan that involves overspending is mistakenly submitted, your group will not be eligible to receive the performance bonus. It is your responsibility to make sure that your plan is valid.
2. Any unused money will count towards your revenue.
3. All team members must sign the document; if any signatures are missing, the document will be returned.
4. You have 25 minutes to make your choices; if your team has not completed its selection process within the allotted time, only the valid choices you have selected will count and the unused portion of your budget will be counted as revenue.

****TO CHOOSE A MOVIE FOR PRODUCTION, DO THE FOLLOWING:**

- a. Indicate your choice by checking the appropriate box below
- b. Choose a dollar amount to spend on marketing (the default is \$0)

Title	Production \$	+	Marketing \$	=	Total \$
(All amounts are in millions of dollars)					
<input type="checkbox"/> A Lifetime of Anger	\$20	+	0 5 10 20	=	
<input type="checkbox"/> Chosin Reservoir	\$46	+	0 5 10 20	=	
<input type="checkbox"/> Rikki-Tikki-Tavi	\$65	+	0 5 10 20	=	
<input type="checkbox"/> Degeneration	\$51	+	0 5 10 20	=	
<input type="checkbox"/> Fast Food	\$25	+	0 5 10 20	=	
<input type="checkbox"/> Light Years	\$90	+	0 5 10 20	=	
<input type="checkbox"/> On Campus	\$12	+	0 5 10 20	=	
<input type="checkbox"/> Renegade	\$38	+	0 5 10 20	=	
<input type="checkbox"/> Rio	\$40	+	0 5 10 20	=	
<input type="checkbox"/> Sex Ed.	\$29	+	0 5 10 20	=	
<input type="checkbox"/> Southern Accents	\$23	+	0 5 10 20	=	

Total:

Signatures:

Vice-President, Industry Research: _____

Vice-President, Script Evaluation: _____

Vice-President, Talent Appraisal: _____

Vice-President, Marketing: _____

Final Recommendation Sheet

1. You may only use the amount of money budgeted for this session, \$150 million. You cannot spend more than \$150 million; if a plan that involves overspending is mistakenly submitted, your group will not be eligible to receive the performance bonus. It is your responsibility to make sure that your plan is valid.
2. Any unused money will count towards your revenue.
3. All team members must sign the document; if any signatures are missing, the document will be returned.
4. You have 25 minutes to make your choices; if your team has not completed its selection process within the allotted time, only the valid choices you have selected will count and the unused portion of your budget will be counted as revenue.

****TO CHOOSE A MOVIE FOR PRODUCTION, DO THE FOLLOWING:**

- a. Indicate your choice by checking the appropriate box below
- b. Choose a dollar amount to spend on marketing (the default is \$0)

Title	Production \$	+	Marketing \$	=	Total \$
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(All amounts are in millions of dollars)

<input type="checkbox"/> A Good Day to Die	<u>\$42</u>	+	0	5	10	20	=
<input type="checkbox"/> Air Cav	<u>\$49</u>	+	0	5	10	20	=
<input type="checkbox"/> Extrapolation	<u>\$27</u>	+	0	5	10	20	=
<input type="checkbox"/> Hoover	<u>\$55</u>	+	0	5	10	20	=
<input type="checkbox"/> Line of Duty	<u>\$46</u>	+	0	5	10	20	=
<input type="checkbox"/> Oil & Water	<u>\$23</u>	+	0	5	10	20	=
<input type="checkbox"/> The Devil Made Me Do It	<u>\$25</u>	+	0	5	10	20	=
<input type="checkbox"/> The Reactor	<u>\$67</u>	+	0	5	10	20	=
<input type="checkbox"/> The Wolf's Lair	<u>\$44</u>	+	0	5	10	20	=
<input type="checkbox"/> Welcome to My Room	<u>\$31</u>	+	0	5	10	20	=
<input type="checkbox"/> We, The People	<u>\$72</u>	+	0	5	10	20	=
<input type="checkbox"/>							

Total:

Signatures:

Vice-President, Industry Research: _____

Vice-President, Script Evaluation: _____

Vice-President, Talent Appraisal: _____

Vice-President, Marketing: _____

Revenue and Profit Sheet

Below is the list of possible movie selections for the first year. The first column shows the cost for each movie as given on the initial sheet; the second column indicates the marketing value of the movies (assumed to be \$10 million for any movie your studio did not produce). The third column highlights profit generated from each movie based on the amount of marketing indicated. Please review and discuss this information with the rest of your team. (All amounts are in millions of dollars.)

<u>Title</u>	<u>Production</u>	<u>Marketing</u>	<u>Revenue</u>	<u>Profit</u>
<input type="checkbox"/> A Lifetime of Anger	\$20	_____	_____	_____
<input type="checkbox"/> Chosin Reservoir	\$46	_____	_____	_____
<input type="checkbox"/> Rikki-Tikki-Tavi	\$65	_____	_____	_____
<input type="checkbox"/> Degeneration	\$51	_____	_____	_____
<input type="checkbox"/> Fast Food	\$25	_____	_____	_____
<input type="checkbox"/> Light Years	\$90	_____	_____	_____
<input type="checkbox"/> On Campus	\$12	_____	_____	_____
<input type="checkbox"/> Renegade	\$38	_____	_____	_____
<input type="checkbox"/> Rio	\$40	_____	_____	_____
<input type="checkbox"/> Sex Ed.	\$29	_____	_____	_____
<input type="checkbox"/> Southern Accents	\$23	_____	_____	_____

**A check mark in a box above indicates movies your studio produced.

Unspent + _____

Total Profit for this year: _____

Percentage of Maximum Profit: _____

Revenue and Profit Sheet

Below is the list of possible movie selections for the second year. The first column shows the cost for each movie as given on the initial sheet; the second column indicates the marketing value of the movies (assumed to be \$10 million for any movie your studio did not produce). The third column highlights profit generated from each movie based on the amount of marketing indicated. Please review and discuss this information with the rest of your team. (All amounts are in millions of dollars.)

Title	Production	Marketing	Revenue	Profit
<input type="checkbox"/> A Good Day to Die	\$42			
<input type="checkbox"/> Air Cav	\$49			
<input type="checkbox"/> Extrapolation	\$27			
<input type="checkbox"/> Hoover	\$55			
<input type="checkbox"/> Line of Duty	\$46			
<input type="checkbox"/> Oil & Water	\$23			
<input type="checkbox"/> The Devil Made Me Do It	\$25			
<input type="checkbox"/> The Reactor	\$67			
<input type="checkbox"/> The Wolf's Lair	\$44			
<input type="checkbox"/> Welcome to My Room	\$31			
<input type="checkbox"/> We, The People	\$72			

**A check mark in a box above indicates movies your studio produced.

Unspent+ _____

Total Profit for this year: _____

Percentage of Maximum Profit: _____

Instructions to the Group for Tinsel Town

After participants are assigned to roles and given the training interventions, they will be given the following instructions:

Tinsel Town is a top management simulation in which you will play the role of a Vice President in a fictional Hollywood movie studio. The four Vice President positions consist of: VP Marketing, VP Industry Research, VP Talent Appraisal, and VP Script Evaluation. Your team's task is to decide which movies to produce across two simulated business years. Your overall goal is to achieve the highest possible profit across these two years.

Each of you has received a folder containing a general memo from the CEO that provides information about how to determine the movies with the best profit potential and summaries of screenplays that you can choose to purchase and turn into a movie. In addition, you each have received some information specific to your individual role. Your team should use this information to make decisions about what movies to produce and how much to spend marketing each one.

Each simulated year will begin with a period of 15 minutes where each team member will have the opportunity to silently and individually review the information at their disposal. No discussion or interaction is permitted during this time. You may take notes on the scratch paper provided, but do not share this information with others at this time.

After the 15-minute individual review period, you begin the discussion period. You will then have 25 minutes to discuss the task and reach agreement concerning which movies to produce and how much money to spend on marketing them. You must all be in agreement regarding your choices, and each person will indicate their agreement by signing the form where your collective recommendations are made (*hold up the form*).

Record the agreed-on recommendations on the provided form marked Final Recommendations by placing a check in the box next to a movie and circling a marketing amount (0, 5, 10, or 20 million dollars) to the right. The total cost of a movie is its production cost plus its marketing cost; sum these two values for each movie and indicate

the total in corresponding space. You may choose as many movies as you would like, subject to the constraint that you cannot spend more than 150 million dollars in any decision period. Therefore, the total at the bottom right of the Final Recommendations Sheet must be less than or equal to 150 million dollars.

At the end of each simulated year, I will collect your Final Recommendation sheet, calculate the total profit you generated, and provide feedback to your team. This sheet will show you the revenue and profit for the movies you selected as well as the revenue and profit of the movies you did not select. At the bottom of this sheet you will see your total profit and the percentage of the maximum profit that your team achieved. After you have had a brief chance to review this feedback, I will distribute the information for the second decision period, and we will complete the process one more time.

Are there any questions?

Experimenter Instructions to be Given to Groups in the Motivated Sharing Condition Before 15 Minute Silent Period

You will be participating in an intervention, called Motivated Sharing, developed to help your group make better decisions. Each Vice Presidential role is very important to the implementation of this approach and the goal is for each of you to bring forth the most important information from your roles and make sure that it is used in making the final decision.

In your packet you have a name tag identifying your role, please put this on so it is visible to the other group members. You will also find a sheet of instructions for the decision-making process. You will proceed with the generation phase and I will give you further instructions before you begin discussion.

Experimenter Instructions to be Given to Groups in the Motivated Sharing Condition Before 25 Minute Discussion Period

[Pass out role description sheets while talking] First, all of the different roles of your group members are important. Given the varied expertise in these roles, the information that each Vice President brings forth is information that you may not have, so it's very important that you listen to their advice and take it seriously. Using the forms that I just distributed, take a moment to go around and read aloud each member's expertise. *[pause to read]* Keep your role label viewable by all group members throughout discussion and remember what type of information they each have from introductions in the beginning.

Now that you know the importance of each other's expertise, let's go over the three biggest mistakes that happen in group decision making. [Distribute handout]. As you can see, the three biggest mistakes that group members make during decision-making are: (1) adopting the first solution proposed without further evaluating its consequences, you likely came up with your own solution during the individual study phase, but this solution should be further evaluated by you and the rest of the group as you all have different, and sometimes conflicting information. (2) changing the solution without question when a new solution is suggested, below you will find an example of the importance of conflict in decision making concerning the Challenger Space Shuttle disaster which is often blamed on faulty decision making and ignoring important information from experts. Do not make changes to your plan without critiquing why these changes were a good idea. (3) ignoring important information that others have. The other members of your group hold important information that is critical in coming to the best decision possible.

Every Vice President does not have the same information, but just because you don't have a piece of information at your disposal before another VP mentions it does not mean that it is just as important as the information you have in coming to the optimal decision. I will need a volunteer to be the note taker who will be writing on the dry erase board. [wait for a volunteer] You will write down each idea that is brought up on the dry erase board for all members to see. This will help to consolidate your ideas and have the

opportunity to view all of the available information at all times. Be sure to include information on all movies and from each role on the dry erase board in order to combine all information and have the opportunity to thoroughly review all alternatives. Once you have all of the ideas down, decide as a group which are the most critical points to come to a final decision.

Following this process, the full group will come to a final decision and fill out a Final Recommendation Sheet. This Final Recommendation Sheet will be scored and returned to you for further discussion prior to beginning the plan development for Year 2, during which you will implement this approach again.

Any questions?

Instructions for Decision-Making

Your group will be using the Motivated Sharing approach to help structure your decision-making process in order to reach the optimal decision. Please remember that each role will play an important part in the decision-making process. You will each be representing your own department as well as your role as a member of the group. The following steps should be followed to implement this approach:



- Generating your recommendations (15 minutes):
 1. Individually review all of your information
 2. Identify a list of movies that will result in the highest profit
 3. Write down your choices along with the reasons for your choices on the sheet of blank, lined paper
- Presenting your recommendations (10 minutes):
 1. Discuss aloud which movies you chose and why
 2. The note taker should clearly write down all ideas on the flip chart
- Critiquing all recommendations (15 minutes):
 1. For the choices that you disagree with, voice your opinion and give reasons why it is a poor choice, keeping in mind the three biggest mistakes of decision-making groups
 2. If you think you are missing a piece of information, look at the role descriptions to see who may have this knowledge
 3. Discard movies that will not help in reaching the highest profit and keep the movies that will help in reaching the highest profit
 4. The note taker should transfer only the ideas that survived the critique to the blank flip-chart for a final review

Openly discuss the ideas that survived the critique and mistake check and come to a final decision. Remember to take notes and avoid the decision-making flaws throughout this process. Record this decision on the Final Recommendation Sheet. This will be scored and returned to you before the first year for you to review then you will implement this same approach for year 2.

Decision-Making Mistakes and the Importance of Conflict

1. Adopting the first solution proposed without further evaluation
 - You likely came up with your own solution during the group study phase, but this should not necessarily be the solution that goes on the Final Recommendation Sheet. Ideas should be further evaluated by you and the rest of the group.
2. Engaging in un-conflicted change
 - You should not make changes to your plan without critiquing the reasons why this change is a good idea.
3. Ignoring important information
 - The other members of your group hold pertinent information based on their area of expertise that you do not have. Do not ignore this information for it will be very important in making the optimal decision.

The Importance of Conflict

Some of our country's biggest disasters have occurred because someone with expert knowledge did not speak up. For instance, in 1986, the Challenger Space Shuttle broke apart and disintegrated in the air 73 seconds after its launch, and this disaster is often blamed on the decision-making process by those who chose to launch the shuttle on that day. Certain members of the decision-making group were aware that there was a flaw in the make-up of the space shuttle, and a few engineers strongly warned against launching on a day as cold as the one chosen, but their team did not take these warnings seriously, and the information was not passed onto the shuttle crew and the focus shifted to how quickly they could reach an agreement on when to launch the shuttle. This example demonstrates the importance of constructive conflict in decision-making groups.

Vice Presidential Role Introductions

Vice President of Script Evaluation

- I have expert information on the script quality ratings for potential movies.
- These ratings are important because even if a movie has very talented actors, actresses, and directors, it will not succeed with a low quality script, so this information will be very useful in combination with the information that you all hold.

Vice President of Industry Research

- I have expert information on the viewer appeal ratings for each film. Viewer Appeal is basically a function of popular interest in the type of film, as well as the popularity of the director, actors and actresses involved.
- Of course the movies we choose will only succeed if we make choices that the viewers will appeal to and have a desire to come see, so the information that I provide is a must in choosing movies that will be popular to the public.

Vice President of Talent Appraisal

- I have expert information on skill ratings for actors, actresses, and directors of potential movies.
- This information works in combination with information that the rest of you hold since it is important that the movies we choose have talented actors, actresses, and directors as well as a good script for them to be popular and successful.

Vice President of Marketing

- I have expert information on the impact of a marketing strategy, the movie ratings, and expected ticket prices. Can provide expertise on which marketing strategy will best suit your needs, the potential viewer base for each movie based on the movie rating, and what the average ticket price of each movie will be so we know how many people can and are likely to buy tickets to see the movie.
- This information works in conjunction with your information because it will be easier to market a movie with a good script, actors, actress, directors, and content.

Experimenter Instructions to be given to Groups in the Consensus Condition

After completing the pre-task measures and going through the individual study phase of Tinsel Town, the following instructions will be given to the whole group:

Before completing your decision-making task, you will be provided with some pointers on how to come to the best decision possible. As you know, you are each playing the role of a Vice President in a fictional Hollywood movie studio. You will all be working together to make a group decision that you all agree upon. Be sure that you use all of the information given to you in coming to your final decision. This will involve sharing your information with the group as well as listening to your other group member's ideas.

Also, keep in mind that there are some constraints in making your decision. There is a constraint on the amount of money you can spend as well as on the amount of time you are allotted to come to a final decision as a group. You may choose as many movies as you would like, subject to the constraint that you cannot spend more than 150 million dollars in any decision period. Be sure that you do not go over this amount of spending money when coming to a final decision.

Keep in mind that you only have 25 minutes once you begin discussing your information to come to an agreed upon decision. Use your time wisely and make sure that you have reached consensus within 25 minutes. Talk about your ideas and share your information during the discussion time, just make sure that you do not go over your allotted amount of spending or over the amount of time given to you to complete the task. Strive to arrive at a plan that everyone agrees with within the time limit.

Following the open discussion, the full group will come to a final decision and fill out a Final Recommendation Sheet. This Final Recommendation Sheet will be scored and returned to you for further discussion prior to beginning the plan development for Year 2. Any questions?

Appendix C: Measures

Demographics

Please answer the following seven questions by circling or writing an answer:

Please answer honestly. Your responses will be kept confidential and in no way impact the determination of how well your group performs.

1. Age: _____

2. College Education Level:

Please indicate the number of credit hours that you have completed: _____

3. Sex: Male Female

4. Ethnicity:

White/Caucasian

African American

Asian/Pacific Islander

Native American

Hispanic

Other: Please Specify _____

5. Are you employed for pay: Yes No

6. Current Employment Status

Full-time employee

Part-time employee

7. How many years have you been working for pay? _____

Information Sharing (Phase 1 and 2)

Using the following scale (0-5), indicate how much information pertaining to their vice presidential role (including your own) each group member shared with the rest of the group:

Please answer honestly. Your responses will be kept confidential and in no way impact the determination of how well your group performs.

*Write each answer as a whole number next to each vice presidential role below the scale

- | | |
|---|---|
| 0 | They did not share any information pertaining to their role |
| 1 | They shared very little information pertaining to their role |
| 2 | They shared some information pertaining to their role |
| 3 | They shared a moderate amount of information pertaining to their role |
| 4 | They shared a large amount of information pertaining to their role |
| 5 | They shared a very large amount of information pertaining to their role |

Vice President of Marketing _____
 Vice President of Industry Research _____
 Vice President of Script Evaluation _____
 Vice President of Talent Appraisal _____

Using the following scale (0-5), please answer each question regarding your group:

- | | |
|---|-------------------|
| 0 | Strongly disagree |
| 1 | Disagree |
| 2 | Neutral |
| 3 | Agree |
| 4 | Strongly Agree |

1. My group considered information provided by **each** member in choosing movies _____
2. We went about choosing movies in a very systematic and orderly fashion _____
3. My group made movie choices based on the information provided to as opposed to personal feelings _____
4. We scrutinized our individual movie choices and considered alternatives before making our final decisions _____
5. I was very aware of the type of information that was held by each of my group members _____
6. My group identified and discussed the key pieces of information about each movie that we chose to make _____
7. We tried to choose movies that looked good to all members _____

Information Sharing (Phase 3)

Information Sharing (Phase 3)

Using the numbers 1-4, please RANK each of the group members (including yourself--be honest!) in terms of who contributed the most to the group's discussion:

#1 = MOST #2= SECOND MOST #3 = THIRD MOST #4 = LEAST

Vice President of Marketing ____ Vice President of Industry Research ____

Vice President of Script Evaluation ____ Vice President of Talent Appraisal ____

Using the following scale (1-4), please INDICATE how much task-related information each person shared with others in the group. In other words, how much data did each member share out loud that was specifically provided to that person and no one else?

1 = Basically no information

2 = A little information here and there

3 = A moderate amount of information (at times, or for selected movies)

4 = A great deal of information throughout discussion

How much data on advertising cost & impact did the VP of Marketing share? ____

How much data on movie appeal did the VP of Industry Research share? ____

How much data on script quality did the VP of Script Evaluation share? ____

How much data on actor/director skill levels did the VP of Talent Appraisal share? ____

Information Usage

Using the following scale (0-4), please describe your group's decision process:

0	Strongly disagree
1	Disagree
2	Neutral
3	Agree
4	Strongly Agree

1. Information provided by all members was used to make our decisions ____
2. We chose our movies and marketing levels in a very systematic and orderly fashion ____
3. Our final choices were based on the information provided to us (as opposed to our personal feelings) ____
4. Once we had a tentative plan, we deliberately considered alternative movies before making our final decisions ____
5. After we had identified an initial set of movies, we talked about the key pieces of information we had on each one ____
6. We tended to go with the first movies suggested without too much discussion ____
7. Everyone in the group supplied some useful information that was used to make decisions ____
8. Our choices were made in a pretty random fashion ____
9. We went over the pros and cons of each movie before deciding what to produce ____
10. Group members had a pretty good understanding of who had what information ____

Debriefing

Thank you for your participation!

This document provides further insight into the study in which you just participated. Please refrain from sharing these details with other students who may take part in this study in the future. Thank you!

Study Purpose: When group members have varying information at their disposal as you and your group members did as different vice presidents of Tinsel Town, there is “common information”, or information known to all group members prior to discussion, and “unique information”, which is known to only one or a subset of members prior to discussion. In this setting, there is often a “hidden profile”, or a situation in which using only the common information would lead to an inferior decision than would be made if all group members were aware of the unique information. Unfortunately, groups tend to discuss common information at a higher rate than the critical, unique information, and thus fail to uncover the hidden profile. The purpose of this study is to test a new structured intervention designed to improve group decisions in the presence of a hidden profile by making groups aware of common mistakes that past groups have made and guiding them in the process of extracting all critical information before making a decision.

Expected Findings: We expect that groups who are given the structured intervention will share more unique information and make better overall decisions than groups who are not given the structured intervention.

Implications of Findings: If successful, the new intervention can be applied to a variety of decision-making groups in organizations to improve the quality of important decisions by aiding them in avoiding common pitfalls and assuring that all critical information is extracted before a final decision is made, thus decreasing mistakes and increasing productivity.

Relevant References: *These articles can be found in the IUPUI University Library, or in full-text on the IUPUI University Library website.*

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

Stasser, G., and Titus, W. (2003). Hidden profiles: A brief history. *Psychological Inquiry*, 14, 304-313.

Questions?

If you have any further questions in the future, please contact one of the researchers:
Dennis Devine, (Associate Professor of Psychology at IUPUI), at DDEVINE@IUPUI.EDU, 317-272-2459, or Angela Donovan, (Graduate Student at IUPUI), at ASDONOVA@IUPUI.EDU.

Video Coding Instructions and Form

For each of the four Vice Presidential Roles (Industry Research, Script Evaluation, Marketing, Talent Appraisal), you will find tables for Value Information and for Other Information.

Value Information:

Absolute Values: Absolute values represent exact numbers. The correct numbers are given for each role and each movie. When one of these values is mentioned, circle it. These pieces of information can only be counted once.

Relative Values: Relative information is represented by a participant stating that the Absolute Value is higher or lower than a value given for another movie, or indicating whether the number is high or low depending on the scale without giving the precise Absolute Value. This can be spoken in terms of “higher/lower, better/worse, more/less, good/bad, high/low. For example “The Star Appeal for Extrapolation is low” or “The Star Appeal for Line of Duty is higher than Extrapolation”. When a relative piece of information is shared, indicate with a hash mark in the given box. Multiple hash marks can be given (for example, if both statement above were mentioned, two hash marks would be given).

Other Information:

Read over these carefully before coding. When a participant mentions one of these pieces of information, indicate with a hash mark. These pieces of information can only be counted once.

Algorithms:

Algorithm information is not explicitly provided in any participant’s written information, but if a group figures out any of these algorithms, indicate with a hash mark. These pieces of information can only be counted once.

Incorrect Information:

If a participant shares a piece of information that is incorrect (for example, gives the wrong Content Appeal for “Hoover”), indicate this mistake with an X mark in the relative column for that movie. Multiple X marks can be given. Indicate the final number of incorrect statements in the given spot on the final page.

Use the last box to record any other questions/comments that you have. Take any free-hand notes in this box. If you have a concern about a particular part of a tape, include the time on the tape where this problem is (i.e. 2:34, or 15:43).

Be as precise as possible. Use “rewind” and “pause” as much as necessary.

Good Luck!

Industry Research Value Information

Focus Group Research on Viewer Appeal of Potential Movies.

Table C.1 Industry Research Absolute and Relative Information

Movie Title	Content Appeal		Star Appeal	
	Absolute	Relative	Absolute	Relative
Air Cav	160.00		55.00	
A Good Day to Die	60.00		85.00	
Extrapolation	115.00		35.00	
Hoover	95.00		85.00	
Line of Duty	140.00		100.00	
Oil & Water	170.00		70.00	
The Devil Made Me Do It	115.00		25.00	
The Reactor	190.00		95.00	
The Wolf's Lair	100.00		65.00	
Welcome to My Room	150.00		50.00	
We, The People	180.00		80.00	

Industry Research Other Information

Table C.2 Industry Research Strategic Information

“Star Appeal” ranges from 0-100 (0=unknown cast, 100=all A-list stars)	
“Content Appeal” ranges from 0-200 (0=no one was interested, 200=broad demographic appeal, focus group dying to see it be made into a movie)	
A movie’s appeal is the sum of its Content Appeal and Star Appeal	
The typical/average Star Appeal (Average =134)	
The typical/average Content Appeal (Average=67)	
The distribution shape for Star Appeal (fairly equal number of movies above and below the average)	
The distribution shape for Content Appeal (fairly equal number of movies above and below the average)	
Action/adventure, science fiction, war and suspense films tend to have more appeal than drama or comedy.	
Movies with lots of special effects tend to do the best across all genres, particularly due to repeat viewers.	

Script Evaluation Value Information

Script Quality Ratings and Expected MPAA Ratings for Potential Movies.

Table C.3 Script Evaluation Absolute and Relative Information

Movie Title	Script Quality		Expected MPAA Rating	
	Absolute	Relative	Absolute	Relative
A Good Day to Die	7		PG-13	
Air Cav	5		PG-13	
Extrapolation	9		PG-13	
Hoover	7		PG	
Line of Duty	6		PG-13	
Oil & Water	3		G	
The Devil Made Me Do It	8		R	
The Reactor	6		PG-13	
The Wolf's Lair	10		PG-13	
We, The People	8		PG-13	
Welcome to My Room	9		PG	

Script Evaluation Other Information

Table C.4 Script Evaluation Strategic Information

“Script Quality” Ratings ranges from 1-10.	
The typical/average “Script Quality” Rating (Average=7)	
The distribution shape of “Script Quality” Ratings (fairly equal number of movies above and below the average)	
A movie must have a high “Script Quality” Rating (a good script) regardless of how big the actors in the movie are to be successful	

Marketing Value Information

Average Expected Ticket Price in Dollars for Potential Movies.

Table C.5 Marketing Absolute and Relative Information

Movie Title	Expected Ticket Price	
	Absolute	Relative
A Good Day to Die	\$ 7.50	
Air Cav	\$ 7.00	
Extrapolation	\$ 6.25	
Hoover	\$ 7.50	
Line of Duty	\$ 6.75	
Oil & Water	\$ 6.25	
The Devil Made Me Do It	\$ 7.50	
The Reactor	\$ 6.75	
The Wolf's Lair	\$ 7.50	
We, The People	\$ 7.00	
Welcome to My Room	\$ 6.50	

Table C.6 Marketing Strategy Cost and Impact

Strategy	Cost in Millions		Impact on Viewer Appeal	
	Absolute	Relative	Absolute	Relative
Word-of-Mouth	\$0		+0%	
Print + Outdoor	\$5		+30%	
Pre-Release TV	\$10		+55%	
Saturation TV	\$20		+75%	

Table C.7 Impact of MPAA Movie Rating on Size of Potential Viewer Base

MPAA Rating	Projected Impact	
	Absolute	Relative
G	0%	
PG	-10%	
PG-13	-15%	
R	-25%	
NC-17	-40%	

Marketing Other Information

Table C.8 Marketing Strategic Information

Marketing has more impact for movies with high content appeal and start appeal	
A Marketing strategy should be chosen in proportion to the movie's cost	
Average Expected Ticket Prices range from \$6.00 to \$7.50	
The typical/average Expected Ticket Price (average is about \$7.00, most typical is \$7.50)	
The distribution shape of Expected Ticket Prices (fairly equal number of movies above and below the average)	
(Assuming good viewer appeal), the more expensive the marketing strategy chosen, the more impact it has in general and people are more likely to come see the movie	

Talent Appraisal Value Information

Table C.9 Talent Appraisal Absolute and Relative Information for Directors

Director	Skill Rating	
	Absolute	Relative
A Good Day to Die	5	
Air Cav	3.5	
Extrapolation	2.5	
Hoover	4.5	
Line of Duty	2	
Oil & Water	2	
The Devil Made Me Do It	3.5	
The Reactor	4	
The Wolf's Lair	3	
We, The People	4	
Welcome to My Room	2.5	

Table C.10 Talent Appraisal Absolute and Relative Information for Actors/Actresses

Movie Title	Actor/Actress Skill Rating (0-5 Stars)			
	Absolute			Relative
A Good Day to Die	5	4.5		
Air Cav	5	4	3.5	
Extrapolation	3.5	3.5		
Hoover	4			
Line of Duty	3	3	3	
Oil & Water	2.5	3.5	3	3
The Devil Made Me Do It	4.5	4.5	5	
The Reactor	4	5	3.5	
The Wolf's Lair	4.5	4.5		
We, The People	5	5	3.5	
Welcome to My Room	3.5	4.5		

Talent Appraisal Other Information

Table C.11 Talent Appraisal Strategic Information

“Director Skill Ratings” range from 0-5 (0=a hack with no talent, 5=director who could make an Oscar-winner with volunteers from regional theater	
“Actor Skill Ratings” range from 0-5 (0= challenged to do well on a soap opera, 5= can do any role convincingly)	
Acting Quality can be estimated by averaging the Acting Skill ratings for the Lead Roles	
Acting Quality is a little less than average if there is a large discrepancy in the Acting Skill values of the leads.	
The Acting Skill of supporting actors can be ignored as they are not on screen enough to help or hurt	

Algorithms

Table C.12 Algorithm Information

#Viewers (in millions) = Viewer Appeal*Movie Quality*MPAA Rating	
Viewer Appeal = (Content Appeal + Star Appeal)*Marketing Level	
Movie Quality = Script Quality*Director Skill*Acting Quality	

Total # Incorrect Statements _____

Appendix D: Phase 1 and 2 Observations

Phase 1:

Control Condition

Beginning of discussion

Tends to start slow and not begin until one person speaks up and recommends a way to start. Typically, these start with an individual recommending a movie and asking what others think of it, or asking what movies everyone liked the most. This typically consists of each person saying a ranking of the movies that they like the best.

Strategy

Following naming their best movies, one or two are usually chosen as the “best movies” then a scattered discussion begins, with members randomly asking what the other team members thought of a particular movie out of the movies that they did not choose as “favorites”

Groups have very loose or no action strategy in choosing movies. Rather, they discuss at random and based on the entire discussion pick the best ones as they go along, sometimes changing their mind along the way.

While alternatives are discussed, there tends to be a rush to finish and reach consensus. Often seem content choosing a few movies without having gone over “what if” scenarios and alternatives to the choice they made. One group even commented after finishing that they cared more about getting the extra credit than doing well and therefore just wanted to finish.

Role Recognition

Members were cognizant of the fact that they had varying information. They used their own information to voice which movies were highest based on their roles and shared their particular information freely.

Transactive memory was low, with other members seeming to not fully understand the other's information. Only one group introduced their roles, and these were only introduced as "I am the script evaluator person" and did not go into any detail about what this role means as far as their type of information. This led to other members sometimes asking "what did you have for yours?" but not addressing their information for what it is (i.e. asking "what is the content appeal for this movie?").

Conflict

Some cognitive conflict occurred that was objective and based on numbers in the roles, expressing disagreement with another individual's top choices based on opposing numbers.

There were several instances of avoidance of affective conflict. Group members backed down and made it clear that they were okay with whatever the other members wanted.

- "I would choose these movies, but that's just me"
- "That's fine, whatever, I like that movie too, so we can use that one" (after voicing an opinion to choose a different movie)
- "We don't have to choose it, I just chose it"
- "If you guys wanna do this instead, that's fine with me"

Leaders

Generally, one person would take the role as "leader" and direct the conversation. This typically consisted of this person asking others what movies they liked and giving the most opinion. They were mostly directive leaders, keeping the conversation going in the direction of a decision.

One group had an individual who took the role as a leader, but did so in a dominant fashion. This person asked all of the questions, chose the movies, and when another member would speak up in opposition or with a different opinion, she would stick to her original opinion and shoot down their idea. Eventually, the others backed

down from speaking up. This caused a lot of alternatives to be ignored and variables to not be taken into account.

Decisions

Decisions were made mostly with objective data, based on the numbers. However, subjectivity played a role in the decisions, more for some groups than others. Group #1 discussed in depth which movies they personally liked and which actors and actresses they felt “fit” into certain roles and made decisions weighing heavily on these feelings.

- “I don’t think it’s a good idea to kill off your main actor”
- “I just don’t see Chris Rock in a serious role, he’s supposed to be funny”
- “It has a 9 out of 10 for script quality, but I just don’t see Britney Spears in that role”

Final decisions were often made very quickly without fully discussing alternatives. Members always made sure that all were in agreement before making a final decision.

Non-Verbal Observations

Typically 3 out of 4 members were engaged. Some groups were completely unenthusiastic and seemed to not care about the task at all, sitting back and talking very low. Attitude seemed to be reaching consensus more than discussing alternatives.

Experimental Condition

Beginning of Discussion

Groups all began discussion immediately, already seeming to have a strategy in mind. This typically consisted of the note taker standing up and asking the others which movies were the best for them, or by sharing with the other group members what information they had then voicing their opinions based on that information.

Several of the videotapes watched were of the second year rather than the first, and the groups seemed to already have a plan of action and set right into decision-making using the same strategy that they used the first time.

Strategy

All groups had some strategy, involving the dry-erase board in all groups but one. The group that did not use the dry erase board had very low enthusiasm and decided to stay seated and come to a decision quickly. They also spoke so lowly that I could not hear their discussion and therefore could not code their conversations.

Examples of strategies adopted are as follows:

- Each member voices their highest ranked movies based on their particular role. For the movies that were agreed upon by all four members, the name of the movie along with the statistics from each role were written on the dry erase board. Decisions were made based on looking at these “keepers” and making a decision through discussion.
- Note-taker suggests that everyone talk about which movies they had ranked highest based on their role in order to combine the information. Each role was written on the dry-erase board with the 4 highest ranking movies underneath the role. Note taker then erased movies that were not agreed upon, and numbers were added to the movies that were agreed upon to come to a better objective decision of which movies to choose.
- Write down all eleven movies on the dry erase board with the statistics from each role next to them. No decision made until all movies are written down. Once all are written, go back and erase those that they do not like, and discuss the pros and cons of those that remain and continue erasing until they have only a few left that they can produce.
- Discuss which movies they definitely do not want to produce before writing on the dry-erase board, then use the board to write down the movies that they want to further discuss with the statistics next to them. They proceed by putting stars next to the ones that they really like, and eventually two stars next to their choices.
- Throughout they use the board to erase and re-write movies that they are unsure of to discuss alternatives.
- Note taker makes three separate piles of movies using the paper scripts based on discussion, including a “no” pile, a “maybe” pile, and a “yes” pile. The “maybe”

and “yes” movies are then written on the board with statistics for further discussion and decision.

- The note taker took the lead and shared the movies with the highest content appeal, then asked for everyone else to share their information. After each member shared their information, the ones that they all agreed upon were written on the board with their statistics to make a final decision.

Role Recognition

Several groups began by introducing their roles. When they introduced their roles, they typically would show the group members exactly what information they had and often explained what it meant rather than just saying the name of their role.

Group members were aware of each other’s and their own roles. Tended to use each other as a source of information. Transactive memory was relatively high throughout.

- “I shouldn’t recommend this movie since I am the script evaluator and it has the worst script quality.”
- “I shouldn’t recommend it either because the director is a 2.”
- What does the market strategy “saturation” mean? (asked of the Marketing VP)
- “What was your highest movie for everything?”
- “What rating was Light Years for you?”
- “How did Rikki Tikki Tavi do as far as Talent?” (asked to the Talent Appraisal VP)
- “What was the ticket price for Rikki Tikki Tavi?” (asked to the Marketing VP)
- “What does the middle marketing amount mean?” (asked of the Marketing VP)
- “How was the star appeal for that one?” (to VP of Industry Research)

Members went back to the information in their memo

- “my thing said that if you have something with no actors, you don’t spend any money marketing...your only form of marketing is work of mouth so you don’t spend any money marketing.

Conflict

Cognitive conflict using objective data was often noted in the groups. Group members generally had no problem speaking up in opposition based on their roles and using their information to come up with other alternatives.

- (after one VP strongly recommends one movie, another says this): “The reason I didn’t choose it was because it didn’t have information on the actors and the director was only a 3”.
- “See, you are looking at how famous they are, and I am looking at their quality”

Only one case of avoiding affective conflict was noted, when a decision was agreed upon by all members except one, and she finally said “if you want to do those 2 movies, then that’s fine with me”.

Leaders

The person who was assigned to be the note takers almost always assumed the role of leader. They typically were a directive leader, offering a strategy, asking questions, and keeping the conversation directed toward a decision while using the dry erase board to keep track of progress.

In one case, the other group members relied on the note taker to lead the discussion and strayed, talking about unrelated personal matters while she was writing on the board. This can be thought of as a case of social loafing, relying on one person to do the work after she displayed that she would talk the most and ask for information when she needed it. The leader was still directive, asking all members for their information, but the other members probably would not have shared much information if she did not ask for it.

Decisions

Usually due to all observing the numbers in the same location on the dry erase board, alternatives were discussed in depth, with several “what if” scenarios discussed. Often movies were erased from the board, and added back to the board, and added up

again and again before a final decision was made. Groups also tended to take more time to think about their decision after they had come to their first solution.

Decisions were made objectively, not based on subjective opinions

- “I wouldn’t watch it, but based on the actors and numbers it is a good choice.”
- “I like this one because it has good actors and a good director”
- “I like this one because it has good ratings”

The dry erase board was used to add up the marketing numbers and look at several different marketing options before making a decision as well.

Some subjectivity was noted, with group members talking about their own opinions of the screenplays, but these were not used to make the final decisions except for in one case, where one group member convinced the others that they should not market a movie because he didn’t think that it was possible for the actors to play the roles they have in the movie (see issues with “Britney Spears” in recommendations section).

Non-Verbals

The note-taker was usually the most enthusiastic, remaining standing the entire time and acting as the leader, making eye contact and pointing to different members when asking them for information. Other members tended to face the dry erase board or the note-taker and listen to them leaning forward. Usually by the end of discussion they would resume a more laid-back position in their chairs. Most groups remained engaged the entire time, but enthusiasm was relatively low.

Commonalities

- Personalities amongst group members had a big impact on how they would act toward each other. When there was a person that seemed more “shy” they would typically not speak up until asked. When a dominant personality was present, they would share the most opinions and when in the control condition would assume the role as “leader”. Groups with all laid-back personalities would tend to make decisions quicker looking at fewer alternatives.

- All groups tended to use the information from the “revenue and profit” sheet to make decisions for year 2. (ex. Since a children’s movie made a lot of money in year 1, they would suggest picking one for year 2).
- Everyone seems to come up with a ranking system of their own during their silent review period and discussion almost always begins based on at least 1 person’s ranking system.

Problems with the Intervention with Suggested Changes

1. Name tags, which are currently made of paper and sat in front of the group members, often get crushed amongst all of the papers that they use to make decisions and are lost within the material and therefore not viewable.
Solution: Make new name tags that can be clipped to each VP’s shirt. This way, they will be visible at all times, seem more professional, not interfere with the materials, and stay on throughout both decision making years.
2. Note taker may not get up and use the board for year 2, or may write less on the board in year 2
Solution: Write a script up for what to say before the beginning of year 2. In it, include some reiterating points on how to use their decision-making time and come to the best decision, including using the board efficiently.
3. Seem to rush through the introductions of their roles that take place before discussion, causing them to have to show each other the type of information they have again during discussion.
Solution: In the role introductions, include a small sample of data using one of the movies that they have already read about as an example for what the data looks like.
4. All write something different on the dry erase board- some write ideas, some solutions, some write all movies, while others only put some.
Solution: Add more strategy to the instructions for the note taker. Add a sentence stating that the board should be used to combine all of the role’s information so they can see it all in one place and that they should use it to write down all of the movies and the data pertaining to each rol

Quantitative Comparisons between Control and Experimental

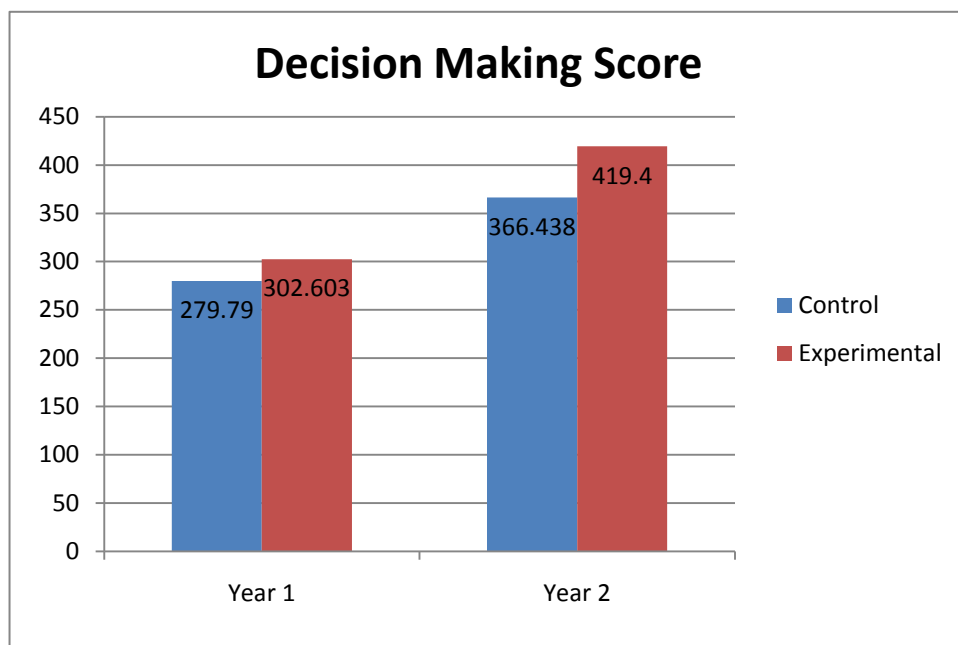


Figure D.1 Performance Scores from Phase 1

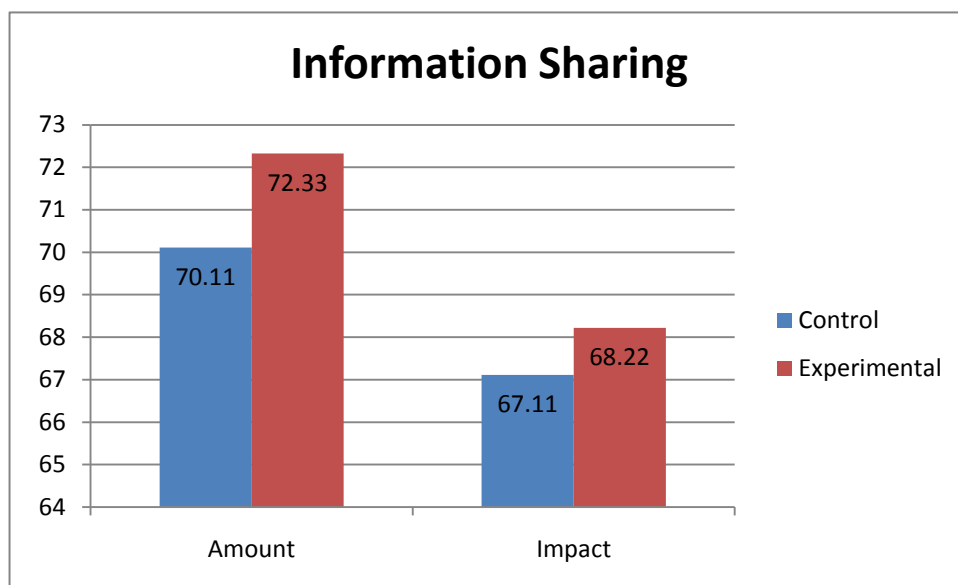


Figure D.2 Information Sharing Scores for Phase 1

Phase 2

Beginning of Discussion

All groups begin immediately once I tell them that they may begin discussion. The note taker 4/5 times got up to begin writing right away as well. The first thing said is generally one person asking the rest which movies ranked highest based on their information. Twice the question was specifically phrased as “which rank best according to the information that you have” indicating awareness that they all have different, important information.

Strategy

All groups used the strategy of going around to each role and announcing which movie/movies scored highest according to them (whether their answer be subjective or objective), then discussing those movies that they had in common.

The dry erase board was used in a slightly different way for each group, but they wrote more information than the experimental groups in phase 1, hopefully due to the extra instruction for them to include information on all roles and for all movies.

- Group 26: Each VP told how many movies they have that they would like to produce based on their role. The note taker then wrote down each movie that each VP had on the dry erase board along with the stats from that particular VP. Once all stats, including the price of the movie are down, they begin discussing and crossing out movies that they do not want and starring movies that they do and going over different scenarios until a final decision is made.
- Group 27: Began during the 15 minute discussion period so I was unable to film the beginning of the discussion as I was out of the room. Used the dry erase board to write down all suggested movies from each VP along with their statistics then talk about which ones look best based on the numbers. Note taker sits down after all movies and numbers are on the board to discuss, referencing back to what is written on the board throughout.

- Group 28: Began by announcing which movies were best for each role, note taker began taking notes on a piece of paper until another VP asked if she wanted him to take over the role of note taker on the dry erase board. She agreed and he used the board to write down each movie that they decided they may want to produce with the statistics from each role as well as the production cost next to each movie.
- Group 29: Stay sitting for the first part of the discussion, talking about which movies ranked highest according to each VP. After awhile, the VP who assumed the role of directive leader asked the note taker if she wanted to write everything down on the board so they could all see it. She then used the board to write down a few movies that they came down to during their final decisions.
- Group 30: Note taker made a chart on the board with all of the movies that were on the top of each VP's list. Chart had the movie name then went around and got the statistics from each VP. Put stars next to the ones that were the best.

Role Recognition

All groups were very aware of the differences between their roles. They discussed their own information in detail and at times even recalled specific information from other roles (i.e. the VP of SQ mentioned that a movie is rated R and this might be back because it takes away 75% of the viewer base, which is information only held by the VP of marketing).

Transactive memory was noted in all groups, with VP's asking other VP's what their statistics were on certain movies, using either task terms or terms very close.

- To TA: "What was the talent appraisal for degeneration?"
- SQ to IR: "What about the start appeal for degeneration?"
- Marketing to SQ: "what was renegade rated?"
- IR to TA: "What were your top movies for the talent?"
- To SQ: "What's the script quality?"

- To IR: “how about the star quality in that one, because maybe that can make up for the bad script”

There was also a circumstance where the VP of TA was unsure of where to find her particular ratings after she was asked about the actor rating for a movie, the other group members knew exactly where to find her memo and what her information looked like and helped her find it.

There was also recognition of each VP’s own role, describing them in detail and going back to the information read to reiterate what their information means

- “I had the script quality ratings so a couple of mine I chose because they had a good script”- SQ
- “I have all the actor and director ratings (then announces what they were for his best movies)- TA
- “the information that I was given, content appeal and star appeal, we basically need a balance between the two because if you have one more than the other...it just depends on what people like”
- “Degeneration was good from a marketing standpoint, I like the idea because it was pretty much right in the middle as far as the average expected ticket price and because it’s PG-13 it’s gonna have a fairly diverse viewer audience especially compared to R and NC-17, because it excludes some people it has a -17% impact but that’s still better than R.”
- “from my findings the best would be rikki tikki because it had a 200 content appeal and a 75 star appeal so that was the best regarding the two”
- “it’s not really all about the actors, it’s not gonna make a bad movie a really good movie just because good people are in it.” “basically it was on script quality, you can have all the actors, but the script isn’t good, it’s not going to do good”. “it has a really good script but it’s rated R so it’s going to take away 75% of viewers”
- “if the director’s not that great, then the movie’s not gonna be that great is what it says”

In addition, they talked about the scale that the numbers fell on in most groups rather than just saying a number (i.e. the number is on a scale from 0-200, with 200 being the best):

- “each movie is rated for content from 0-200, with 200 being the best, meaning that everybody wants to run to it cause of the demographic appeal, and start appeal is from 0-100 with 100 meaning that the big stars are in there and 0 is a more unknown cast.”

Conflict

Cognitive conflict was noted, with VP’s not being shy about speaking up against another VP’s opinion if their information is conflicting.

- after on VP says that they like a movie, Marketing says “yea but the thing with that one is your marketing cohort will only be couples and females, so it’s not gonna be as high as some of the other ones.”
- IR had oil and water as #3 on his list, but SQ said it was only a 3 and it was the lowest one and would not be a good idea to make
- “I know the devil ranks so low on yours...but it’s got such good actors.”

Also, they recognized the importance to take everything into account and consolidate information rather than only listening to their own.

- “it sounded like from what everyone brought together rikki tikki tavi is a good one”
- “we are basically forming an equation for each movie” then read over profit ratio information and discussed considering all information.
- “do you want to start writing on the board so we can all see it?”
- “it’s not really all about the actors, it’s not gonna make a bad movie a really good movie just because good people are in it.” “basically it was on script quality, you can have all the actors, but the script isn’t good, it’s not going to do good”.

- IR: “it’s better that we go by the numbers though” SQ: “Oh yea, because the way they figure it is probably just by the numbers” (talking about using the objective numbers rather than their own opinions)

Decisions

Decisions were ultimately made objectively based on the numbers. Some subjectively was spoken, but rarely contributed to any decisions

- “the other one I liked was the documentary but those usually don’t do well in theaters”
- “this one reminded me of Juno and that one did well”
- “I chose movies I would like then compared it to what information I was given”
- “based on a popular book so the people who read the book will want to see the movie.”

Alternatives were thoroughly discussed in all groups. None came to a decision without talking about “maybe” and “what if” scenarios. All took time after all movies were written down to deliberate on the best course of action and think about several different marketing strategies.

Non-Verbals

Fairly low enthusiasm, but good focus. Groups did not seem overly excited about the choices, but they all spoke up and shared information, usually leaning in and making eye contact or referring back to their memos and screenplays to get further information. Note taker generally stayed standing the entire time, but was not always the person to act as leader. No miscellaneous work being done or side conversation unrelated to the task.

Problems and Suggested Changes to Intervention

1. Person who is assigned to be the note taker sometimes is someone who does not want to get up and write, while another person does want to and either takes on the role of leader, telling that person when and what to write, or taking over the duty altogether.

Solution: Ask for a volunteer to be note taker. This way, it will be someone who will engage in the task and take good notes for the rest of the group. In a real world situation, the person who is the note taker in a meeting is likely the person who volunteers to do so or the “boss”. Since we do not have a head person, it could be a volunteer.

2. One group started before 15 minute silent period was up. Likely due to the fact that I left the room during their silent period.

Solution: Stay in the room during their silent period or at least check in on them often to be sure they are doing the task as instructed. Let them know that they cannot begin discussion without my consent.

Other Problems and Suggested Changes

1. Very difficult to hear the participants in room LD 138/145. Due to the fact that the camera is placed so far away to get all of them in the shot. Also, when I print for the group in the other room, it is next to the camera and drowns out their voices.

Solution: Work with the zoom function on the camera to be able to place it closer to the table and farther away from the printer. Continue to stress to the participants to speak up since they are being videotaped.