An Empirical Investigation of the Effects of Pre-Decision Agreement, Group Development, and Communication Style on Group Decision Making Performance

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This study examined the hypotheses that communication style would mediate the relationship between pre-decision agreement and group added value and that this relationship would be moderated by Forming or Feedback. Seventy-five 3-person groups from a university in the Pacific Northwest participated in the study (Mean age 20.71 years). Eighty-eight percent were Caucasian, 70% female, 30% male. Two survival tasks were given individually and as a group and pre-decision agreement was measured. Moderated mediation analysis revealed that Forming moderated the first stage of the model using tentative language as the mediator. Groups that formed were less hesitant, regardless of level of pre-decision agreement, but this did not impact outcome. Possible explanations and suggestions for future research are provided.

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AN EMPIRICAL INVESTIGATION OF THE EFFECTS OF PRE-DECISION AGREEMENT,
GROUP DEVELOPMENT, AND COMMUNICATION STYLE ON GROUP DECISION
MAKING PERFORMANCE

A DISSERTATION
SUBMITTED TO THE FACULTY
OF
SCHOOL OF PROFESSIONAL PSYCHOLOGY
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ABSTRACT

This study examined the hypotheses that communication style would mediate the relationship between pre-decision agreement and group added value and that this relationship would be moderated by Forming or Feedback. Seventy-five 3-person groups from a university in the Pacific Northwest participated in the study (Mean age 20.71 years). Eighty-eight percent were Caucasian, 70% female, 30% male. Two survival tasks were given individually and as a group and pre-decision agreement was measured. Moderated mediation analysis revealed that Forming moderated the first stage of the model using tentative language as the mediator. Groups that formed were less hesitant, regardless of level of pre-decision agreement, but this did not impact outcome. Possible explanations and suggestions for future research are provided.

KEYWORDS: GROUP DECISION MAKING, PRE-DECISION AGREEMENT, HOMOGENEITY, COMMUNICATION, WORD USAGE, GROUP DEVELOPMENT
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INTRODUCTION AND STATEMENT OF THE PROBLEM

As we move further into the twenty-first century, organizations are using groups more and more to make important decisions. Often teams are brought together, usually on short notice, and are asked to analyze situations and provide recommendations under fixed and sometimes tight deadlines (Ericksen & Dyer, 2004). Once formed, these groups are often expected to find ways to work together effectively, sometimes with little familiarity regarding the task, and in the end are expected to produce high quality outcomes (Watson, Michaelson, & Sharp, 1991).

For this reason, group decision making is an important line of research as a majority of decisions made in political, business, and educational settings are made by groups rather than individuals (Shulz-Hardt, Frey, Luthgens, & Moscovici, 2000). Decision making groups are often used based on the assumption that they produce higher quality decisions than do individuals working alone (Brodbeck, Kerschreiter, Mojsisch, Frey, & Schulz-Hardt, 2002). However, some groups have been found to perform at a level below the sum of the individual performances of group members (Pavitt, 2003; Watson et al., 1991). Although this is not always the case, researchers have long wondered why some groups perform better than others (Orlitzky & Hirokawa, 2001). Group decision making is a complex phenomenon with a myriad of variables influencing the quality of the decision. Therefore, identifying the factors that maximize the performance of groups and lead to improved decision quality will be useful for decision makers in multiple organizational contexts.

The main theoretical perspectives for understanding group decision making consist of input-process-output (I-P-O) models (Guzzo & Shea, 1992). Ilgen, Hollenbeck, Johnson, and Jundt (2005), in their review, adapted this model and called it an IMOI model. The label “processes” was relabeled “mediator”. This was in response to three insufficiencies in the I-P-O
model identified by Moreland (1996). These insufficiencies were that many previous researchers mislabeled cognitive and affective states as processes rather than mediating states (e.g., cohesion), I-P-O models were linear and did not account for feedback loops where outputs become inputs in the next decision making cycle, and this early model failed to account for the interaction of inputs and processes. Accounting for these interactions incorporates the influence of the context of the group interaction to include when, where, and with whom various process become relevant (Ilgen et al., 2005).

In these models, inputs are variables, both at the individual and team level that groups bring to a discussion (e.g. cognitive abilities, pre-decision preferences, personality characteristics). Mediators can include patterns of interaction of the group discussion (e.g. communication style) or mediating states such as cohesion. Finally, outputs are what characterize group products, such as performance (Hewes, 1996). While several researchers have examined aspects of this model, such as input-output or mediator-output relationships, few have examined the linkages among all three factors simultaneously (Littlepage, Schmidt, Whisler, & Frost, 1995). This paper will test a model that includes all three components of the decision making process.

For this research project I will examine several variables that have been found to impact group decision making performance. Specifically, I will examine whether group communication style, as operationalized by group word usage, mediates the relationship between the input variable of pre-decision agreement (PDA) and the output variable of group added value (GAV). Furthermore, I will also examine whether this mediational model is moderated by the group development activities of Forming (Tuckman, 1965), and Feedback (Tindale, 1989).
PDA is conceptualized as the degree to which group members’ individual preferences were similar to the preferences of the other group members prior to group discussion. GAV is conceptualized as the variance in group decision quality that cannot be accounted for by differences in the expertise of group members. Previous research by Fox (2007) has shown that PDA is negatively associated with GAV; that is the more group members shared similar preferences before the start of the group decision making task, the lower their group added value at the end of the task. The current study hypothesizes that the effects of PDA on GAV result, in part, from the communication style of the group; specifically, the words group members use to express themselves during the decision making interaction. Consequently, this study intends to examine communication style as a mediator of the relationship between PDA and GAV.

A primary mode of communication is through verbal exchange using words. Little research, however, has been conducted on the ways members of groups use words with each other (Pennebaker, Mehl, & Niederhoffer, 2003) and what impact word usage may have on group outcomes like decision making. Poole and Hirokawa (1996) stated:

The unique chemistry of social interaction can distill the best that each member has to offer, creating a resonance of ideas and a synthesis of viewpoints. A different chemistry can stop the reaction and contaminate the product. The catalyst for such social chemistry is communication (p. 3).

Consequently, studying communication processes, conceptualized here as communication style, that either enhance or hinder the decision making process is important for the field of group decision making.

Forming is a process used to improve the relationships between group members in order to obtain trust and group cohesiveness (Tuckman, 1965). Half of the groups in this study, all of
whom were meeting for the first time, were randomly assigned to experience a brief Forming activity to encourage group cohesion and trust. Additionally, the other half of the groups in this study also received performance Feedback by informing group members of their relative performance compared to the performance of the other members in their group on an individual decision making task that was then completed as a group. These factors were incorporated to determine if these activities can incrementally improve group performance and moderate the relationship of PDA and GAV, as well as the relationship between PDA and group communication style.

The purpose of this study is to examine the relationships among these input, mediator, and output variables to determine if communication style mediates the effects of pre-decision agreement on group added value, and whether this relationship is moderated by the group development activities of Forming and Feedback. The ultimate goal is to determine potential intervention strategies that can enhance the decision making process and improve group performance above and beyond the performance of individual members.

First, possible mediators of the relationship between Pre-Decision Agreement and group decision making performance will be identified. Specifically, differences in communication style that mediate the relationship between pre-decision agreement and group performance will be examined. Next, I will test to see if the mediated relationships are moderated by the group development variables of Feedback and Forming. Group interactions themselves will be examined in order to statistically analyze communication patterns (i.e. Communication Style) in an attempt to determine aspects of group process that can enhance and/or inhibit the group decision making process. The goal is to add to previous research findings and contribute a detailed level of understanding of how groups actually make decisions.
In the following sections, these variables, and their impact on the decision making process, will be examined in greater depth. A review of relevant literature is provided with regard to these variables as well as the rationale for their importance. A report of the research methodology, results, and discussion of the findings will follow.
LITERATURE REVIEW
Socio-emotional and cognitive aspects of group decision making

Broadly speaking the research on group decision making has focused on two lines of inquiry: the cognitive aspects of decision making and the socio-emotional functioning, or social processes of the group. Within the aforementioned IMOI framework, one can conceptualize the cognitive aspects as input variables and the socio-emotional functioning of a group can be conceptualized as either an input or process depending on the design of the study conducted. Researchers have long been interested in understanding both cognitive and socio-emotional components of group decision making and uncovering their correlates with effectiveness; however, these two streams of inquiry have seldom been studied in tandem (Cohen & Bailey, 1997). Rather, the cognitive aspects and social processes of groups related to decision making have traditionally been studied separately.

Early work on group decision making focused on the social processes of group functioning. This body of literature focused on group process behaviors and the impacts of those behaviors on the quality of decisions (e.g. Tuckman, 1965). Tuckman discovered a progression of development in group interaction that, when completed adequately, led to higher quality decisions (1965, 1977). This line of research, however, was virtually abandoned due to inconsistent findings (Kerr & Tindale, 2004).

Recent research has focused on the cognitive aspects of group decision making. According to the cognitive approach, the ability of groups to share and merge information is a major determinant of decision accuracy (Orlitzky & Hirokawa, 2001; Reimer & Hoffrage, 2005). Researchers in this area focus on information sharing and variables that hinder the information sharing process (e.g. Brodbeck et al., 2002; Stasser & Titus, 1987). For example, Stasser and
Titus (1985) used a hidden profile paradigm to examine information sharing in groups. They asked groups to solve a problem and gave each member information that was needed to solve it; however, the same information was not necessarily given to each member. The researchers found that group members tended to focus on shared information and failed to discuss relevant information that was only given to some of the group members. As a result, group decision quality was found to be impacted negatively due to this restricted focus on shared information.

Although much of recent research has focused on cognitive factors, some authors have called for a re-examination of the contributions of social processes and individual differences as they may affect group decision making (Kaplan & Wilke, 2001). Team process has been defined as the ways the team members interact over time, and the operating procedures the team adopts to convert its inputs into outputs (Bond & Ng, 2004). Team researchers agree that something happens during team member interactions that affect team process, although these researchers have not yet identified what process variables affect which group outcomes (Bond & Ng, 2004). A number of authors have suggested that decision making “failure” can be traced to the group’s interaction processes (Hirokawa, 1987). Identifying what these mediating interaction processes are can contribute greatly to the study of group decision making and provide data regarding how to improve the quality of those decisions. Without examining the group processes of decision making groups, researchers cannot explain how groups with similar a priori properties produce different outcomes (Chiu, 2001).

The current study blends the cognitive and socio-emotional approaches by examining the effects of social processes (group development and process behaviors), conceptualized as the mediation component of the IMOI model; and cognitive aspects of the group (pre-decision agreement), conceptualized as the input component of the IMOI model, to explain group
performance or the output component. The first variable to be discussed is the input variable pre-decision agreement.

Input: Pre-Decision Agreement

The primary task of most decision making groups is to choose the best alternative from a set of possibilities, usually with the goal of consensus among the group members (Stasser & Titus, 1985). Stasser and Titus stated that group discussion tends to focus on supporting information for an emerging consensus. When members share initial preferences, the group can move toward a premature consensus, which can reduce the quality of decisions (Kerr & Tindale, 2004). Kelly and Karau (1999) found that initial preferences were major determinants of groups’ final decision as well as groups’ interaction processes, and noted that discussion was biased in favor of initial preferences. It can be argued that when the initial preferences of group members support the poorest alternative, the group will likely select that alternative, especially if the members’ initial preferences were homogenous.

Previous research indicated that groups tend to rely on shared rather than unshared information and that discussion is often biased to provide information that supports the existing preferences of group members, also known as the confirmatory bias (Stasser & Titus, 1985). Biased information sampling has been proposed to be more prevalent in homogenous groups (e.g., groups where initial agreement among members is high) resulting in poorer quality decisions (Shulz-Hardt et al., 2000). This search for agreement prematurely narrows the information seeking function of the group and fewer alternatives are discussed. Such a biased search for information to support the initial consensus can then lead to early summaries of agreement, which has been associated with an increase in decision making errors (Sundstrom,
Busby & Bobrow, 1997). These decision making errors also contribute to the reduced quality of group decisions.

Lam and Schaubroeck (2000) found that in face-to-face groups, members were inhibited from discussing all options in detail when they all initially agreed on the best alternative. The researchers stated that one of the basic problems faced by decision making groups is that they are not normally able or motivated to share information fully. This problem is exacerbated in situations that involve high levels of pre-decision agreement. Group members will focus on the agreement and they are more likely to come to a premature consensus.

Brodbeck et al. (2002) found that in a hidden profile paradigm, consideration of unshared information was more likely when minority dissent was present. They found that minority dissent in pre-discussion preferences was positively associated with information gain. However, although they found an increase in information available to the group for discussion it was unclear whether that gain resulted in improved decision quality.

Davis developed a model that supports the above findings that initial preferences are important determinants of decisions in a group setting.

The SJS model is a weighted linear combination of member preferences where the weights are an exponential function of the distances between a given member’s preference and all other members’ preferences. The weight given to any member decreases exponentially as an increasing function of the discrepancy of that member’s preference from the other members of the group. Thus, members whose preferences are similar to one another receive larger weights and members whose preferences deviate from most other members receive very little weight (Davis as cited by Kerr & Tindale, 2004).
Initial agreement precludes discussion and more weight will be given to shared opinion regardless of accuracy.

High levels of pre-decision agreement have been shown to negatively impact group performance. Group members are less inclined to discuss all options thoroughly and information seeking biases occur where members focus on areas of agreement and shortcut the potential benefits of discussing all alternatives. There are several methodological limitations that need to be addressed by future research on the effects of pre-decision agreement. For example, high levels of pre-decision agreement have been associated with performance decrements on group decision making tasks. However, much of the research in this area has been done using a hidden profile paradigm in which the information provided to each group member is manipulated (e.g. Stasser & Titus, 1985; Brodbeck et al, 2002). In this paradigm, all of the information necessary to make a high quality decision is available to the group but some of the key information is uniquely held by group members. All that is required for the group to make the “correct” decision is for group members to share their uniquely held information. This is not likely to occur in naturalistic decision making groups where a group’s resources and knowledge relevant to the task are not manipulated and each group member has the same information for the task. Additionally, the “correct” decision is not know beforehand and typically requires a more complicated solution than choosing the optimal alternative among three options; therefore, developing more naturalistic models to measure this phenomenon would be beneficial in this area of research.

Secondly, much of the research done on decision making groups also uses an absolute value to measure performance (e.g. Stasser & Titus, 1985; Bond & Ng, 2004). This focus on an absolute value of performance implies that the basic task of groups is to identify the most
knowledgeable member and use their decision bypassing the need for the group altogether. However, part of the purpose of using groups to make decisions is that they produce higher quality decisions than do individuals working alone (Brodbeck et al., 2002). Additionally, using an absolute group score fails to acknowledge that groups vary in their level of task expertise and that this variance can explain a large portion of the variance in a group’s performance. Examining variables in addition to expertise can help explain additional variation in group performance. Therefore, utilizing a group performance variable that measures the added value of the group process itself above and beyond individual performance will be important in determining the usefulness of a decision making group.

Given that pre-decision agreement has been found to impact group decision quality negatively, determining variables that mediate this effect is necessary in order to improve group performance. Communication style is proposed to serve this function and will be discussed in the next section. First, literature examining group process will be reviewed followed by a discussion of communication and word usage, which is the operationalization of communication style in this study.

**Group Mediatonal Processes: Communication Style**

In this section I will discuss literature examining various group processes and argue that studying communication in greater depth is an important addition to the current group decision making knowledge base. Lastly, I will discuss the utility of examining the potential mediating effects of communication style on the relationship between pre-decision agreement and group added value and propose that word usage is a useful measure of communication style.

Group process refers to the interaction by group members with one another in service of the group interests (Sundstrom et al., 1997). This component of group decision making is the
least understood and examined component of the input-process-output model used to study group
decision making. Group process and interaction variables are often discussed as mediating
factors in the decision making process; however, no one has introduced a systematic model
suitable for statistical analysis of many group interactions both in their entirety and in fine detail
(Chiu, 2000).

There have been attempts to develop a scheme for understanding and measuring group
process; however, these are in the beginning stages of development and the authors state that
more research is needed (e.g., Chiu, 2001; Hirokawa & Johnston, 1989). It will be important to
determine processes that can be shown to inhibit or enhance the group decision making task in
order to fully develop a model that can be statistically analyzed.

It has been suggested that the amount of time a group uses to complete the decision
making task is a useful predictor of group performance (Sundstrom et al., 1997). Sundstrom et al.
found that groups that took longer to make their final decision tended to have better decision
quality. However, it could be argued that groups that take too much time are working
inefficiently and it may be beneficial to discover group processes that could aid groups in
decreasing the amount of time needed to make the highest quality decision. Chiu (2001) stated
that members often do not share valuable information due to unequal opportunities to participate;
therefore, the amount of time that each individual member spends talking may also be a useful
variable to examine.

Pre-decision agreement has been argued to be detrimental to the decision making process.
Sacks (1987) found that agreements reinforce the direction of the problem solving approach
whereas disagreements alter the direction of the discussion. Groups on the path to making a
suboptimal decision would benefit from disagreements that could shift the direction of the
discussion toward a more optimal choice. Therefore, it will be beneficial to determine what
group characteristics, experiences, and processes allow for individual members to voice
disagreements when they arise.

In a study done by Watson and Michaelson (1988) team members identified specific
behaviors that they believed had facilitated performance. High performing teams tended to show
concern for group members, shared more ideas, developed trust, and had a comfortable
atmosphere as demonstrated by self-report. Given that participants provided this information via
self-report the reliability of those findings are questionable and it will be important to test those
results objectively to determine their utility. However, it is reasonable to argue that the
comfortable atmosphere and trust developed in the group may have contributed to the sharing of
more ideas and presumably allowed for more disagreements to arise without inhibiting the
decision making process.

Further study of this type of interrelationship among process variables will add to the
growing research body on improving the performance of group decision making. The study of
group process has typically involved the use of self-report measures rather than an objective
analysis of the communication and interactive processes themselves (e.g. Watson & Michaelson,
1988). Efforts have been made to develop more objective methods (e.g. Chiu, 2000, 2001) but
they are in the beginning stages. Future studies would benefit utilizing more objective measures
to determine the effects of different group processes on the performance of decision making
groups.

Bond and Ng (2004) found that task focus, a group’s unity and emphasis on achieving its
assigned goals predicted group performance. Task focus was measured using self-report and, as
stated previously, developing objective methods to measure this construct will increase its
predictive utility in future studies. Determining interaction patterns that move away from task focus will help groups get on track more quickly before the discussion leads to a less than desirable outcome.

Hirokawa (1987) found four communication characteristics that distinguish the interactions associated with high and low quality decisions. High quality decisions were characterized by vigilance, second guessing, and accurate information processing while low quality groups did not engage in these behaviors and demonstrated poor information processing. Vigilance referred to careful, thoughtful, and systematic discussion of the pros and cons of each choice via other alternatives. Second guessing referred to retrospective questioning of choices made by the group or the challenging of questionable information introduced by group members. Information processing in high quality groups was the rejection of invalid information. Therefore, it is plausible that encouraging groups high in pre-decision agreement to engage in these behaviors could have beneficial effects on performance.

Discussion is essential for high quality group decision making because it allows members to pool information, check for errors, and exert influence over the preferences of others (Salazar, Hirokawa, Propp, Julian, & Leatham, 1994). Support for the importance of group discussion comes from two research directions in the literature: studies that demonstrate that groups do better than individuals, especially groups that freely interact versus groups with restricted interaction (e.g., Burleson, Levine & Samter, 1984), and studies that examine the facilitative influence of specific types of communication behaviors on group decision making (e.g., Hirokawa, 1985, 1987). Other researchers have stated that group communication processes are not as important as the input resources of groups such as intelligence and task knowledge. Steiner (1972) labeled communication as a process loss, a general category that contained group
variables that could hinder potential productivity but not enhance it. Davis (1973) developed a social decision scheme theory that accounts for group performance on the basis of non-communication variables. Decisions are seen as a function of overarching decision norms (e.g. consensus or majority rule) that combine member’s pre-discussion preferences into a final choice. Communication is conceptualized as a less than perfect medium through which individual preferences are made known (Davis, 1973). An argument can be made that given that communication is an imperfect medium, groups could benefit from learning more effective ways to communicate their pre-discussion preferences.

The literature conflicts regarding whether communication is important. According to Salazar et al. (1994) the problem is the failure of previous researchers to adequately test the group communication-performance relationship because they failed to separate out communication as a separate variable. Salazar et al. (1994) found that communication was important in improving decision quality, particularly if it involved task relevant issue evaluation and was goal directed. Separating out communication and process variables as important in their own right will be a useful step forward in determining group level processes that can improve group decision making in the future.

Communication

Communication is not natural in the same sense that, for example, certain rock formations or the paths of the planets around the sun of our solar system are made by nature. Communication is artificial, social, and conventional. Because communication is artificial, people need to be taught how to communicate (Borman, 1996, p. 84).

Communication research is a complicated area of focus and according to Poole and Hirokawa (1996) group communication processes have proven to be “elusive and difficult to
understand” (p. 4). Several models of communication with regard to group decision making have been put forth and in this section I will discuss several briefly and propose that the study of word usage is an important adjunct to this area of inquiry.

In the opening chapter to their book on communication and group decision making, Poole and Hirokawa (1996) distinguish two broad views of how communication influences decision making in groups. They assert that communication can be studied as “the medium of group interaction, and thereby the channel for the effects of various factors on group decision making process and outcomes”, or communication can be viewed as constitutive of group decisions, “as the means for creating a social reality in which a decision is constructed” (p.6). In this paper aspects of the former category of analysis where communication, as stated by Poole and Hirokawa, mediates the effects of traits, knowledge, and preferences on the task of decision making are examined. For example, as discussed above, levels of pre-decision agreement, or initial preferences, affect group outcomes. Examining whether differences in communication style channels this effect can have important implications in the study of group processes that may lead to improved outcomes.

Three main theoretical approaches regarding the study of the effects of communication processes on group decision making emerged in the 1980’s: the functional approach, the structurational approach, and symbolic convergence theory (Frey, 1996). They will be discussed briefly here, beginning with symbolic convergence theory. Developed by Ernest Bormann, this theory describes the process by which group members arrive at a common social reality (Bormann, 1983). Individuals share fantasies during group discussion and when a number of these overlap they constitute a fantasy type. Bormann defined fantasy as, “the creative and imaginative shared interpretation of events that fulfills a group psychological or rhetorical need”
These fantasies can be made of ideas regarding, for example, how information should be shared in groups (e.g. turn-taking), what constitutes good evidence, and a shared model for decision making. Bormann (1996) stated this model is useful for describing how decisions receive support through the sharing of these fantasies. However, this framework does not allow for prediction and control of group decision making, but does allow for understanding a group’s decision after the fact. This approach seems to fit with the latter thread of communication research mentioned above and is not the focus of the present study. Secondly, the present study seeks to find communication patterns that can be predictive of group outcome, which is not a component of symbolic convergence theory; therefore, this model of communication will not be utilized.

The second theoretical framework that emerged regarding communication and group decision making is the structurational approach. Poole, Seibold, and McPhee (1996) assert that the viability of a theory of group decision making hinges on how well it addresses the complexities of interaction. They assert that to do this effectively the framework must account for two theoretical tensions. First, interaction is conducted by individuals, each with particular predispositions and skills, who are influenced by norms, decision rules, and communication networks, that are system-level properties. Typically, according to these authors, researchers separate out individual and system level variables in order to study them and this separation tends to ignore the interdependence of individuals and systems. Poole et al. believe an adequate theory must “provide an interactive account of the interplay of member behavior and structural properties” (p. 115). The second tension described is between stability and change in group structures. Stability refers to the idea that structures and rules of group interaction are viewed as stable and group members adapt to them and change refers to structures being more alive and
created in an ongoing emergence of activity dependent on member interactions. Once again, the authors propose that researchers tend to bifurcate these differing sides of the coin rather than accounting for the interdependence of the two. In their view, the theory of structuration addresses these tensions (Poole et al., 1996).

In this framework the assumption is made that in order to understand group practices, one must analyze the structures that underlie them (Poole et al., 1996; Giddens, 1984). The rules and resources that individuals use to sustain a system are what Giddens (1984) labeled as structures. An example of a structure relevant to the present study is that when engaged in a decision making task one should seek areas of agreement. Then a pattern of consensus seeking likely emerges that partially defines the systemic components of the interaction, influencing the types of behaviors group members engage in. Members may engage in information seeking styles of communication that emphasizes areas of agreement, which may be related to the structure that disagreement is bad and should be avoided in order for the group to run smoothly.

Structuration is the “process by which systems are produced and reproduced through members’ appropriation of rules and resources” (Poole et al., 1996). This process is what sustains group interaction and accounts for the interdependence between structures and systemic factors that influence the manner in which the task is carried out. Structural components are not static in and of themselves and exist in a continuous process of structuration (Poole et al.). By acting, group members create the conditions for future action (Shotter, 1983). When group members seek areas of agreement, according to this model, the seeking is not only a static rule but a process that creates the conditions for the future interactions of the group. It can be argued that these conditions would lead group members to continue to search for areas of agreement, which has been associated with decreased group performance.
The final approach to be reviewed is what has been labeled the functional perspective (Gouran & Hirokawa, 1983). The central premise of this approach is that “effective group decision making requires the satisfaction of functional tasks or requirements, called functional prerequisites, and that communication is the means by which these critical requirements are satisfied” (Frey, 1996, p. 32-33). Hirokawa (1985) found that the functions of a complete and accurate understanding of the decision situation and a complete and accurate assessment of the negative qualities associated with alternative choices were predictive of decision making effectiveness. Additionally, identifying realistic alternatives and assessment of positive consequences of different choices were found to be functions performed by high-quality groups (Hirokawa, 1988).

Salazar (1996) indicated many of the previous group decision making research studies have typically been correlational rather than experimental in nature. An experimental design can help determine the predictive validity of this framework, which will help deepen the study of communication functions in groups. Gouran and Hirokawa (1983) stated another deficiency of this approach is that coders and raters in the research done on this perspective did not assess how well communicative acts served the proposed functions of high-quality groups. They asserted that a statement may fulfill one of the functional requirements of a high-quality group mentioned above and not fulfill that function in the desired direction in terms of outcome. In their review, Gouran and Hirokawa (1983) called for a review of the theory that allows for analysis of the “functional impact on how well the members of a group engage in task requirements that are essential to making appropriate choices” (p. 59). Additionally, they stated the focus has been on task-related requirements without taking into account the social influences that can negatively influence participant’s ability to fulfill the above mentioned functions. Therefore, future research
should discuss social influences on the decision making process. The effects of providing performance feedback and conducting a forming intervention mentioned above, which will be discussed in depth in the following sections, would be an important addition to studying the influence of social factors on communication as well as group performance in general.

The purpose of this paper is not to assess the functional approach, however; it could be argued that the words group members use during a group decision making task likely fulfills some of the functional requirements that have been associated with high-quality groups within this framework. Word choice can be thought of as signals to other group members regarding the utility of the function they are engaged in, such as whether it is okay to express divergent opinions. For example, if group members are searching for areas of agreement because the language used early in the discussion signaled that unique information sharing is not valued, it is plausible that they are not adequately fulfilling the functional requirements of assessing the positive and negative qualities of a decision. These functions were found to be associated with high quality decisions (Hirokawa, 1985). Therefore, studying word usage and the potential of the words group members use to mediate the effects of pre-decision agreement on group performance can be an important addition to communication research and fill in some of the gaps mentioned by Gouran and Hirokawa in their review (1983). Research regarding word usage will be discussed next.

*Communication Style*

With regard to small group communication and performance, questions remain regarding the circumstances under which groups perform well or poorly (Salazar, 1996). Communication involves several aspects such as non-verbal cues, tone, and verbal expression of words. Several models for understanding group communication have been reviewed briefly with many questions
remaining. One aspect of the effect of communication on group performance that has not been explored to this author’s knowledge is the impact of word usage. Words are used to convey thoughts and emotions; therefore, it is illogical that so few investigators have focused on the effects of natural language usage (Chung & Pennebaker, 2007). Researchers in other disciplines within social psychology have studied this impact with some promising possibilities for application in the group decision making paradigm (e.g. Pennebaker, Slatcher, & Chung, 2005; Fitzsimons & Kay, 2004). In this section I will review several of these studies and provide hypotheses regarding how word usage may mediate the effects of pre-decision agreement on group performance.

Pennebaker and King (1999) reported that data on language usage suggested that linguistic style is an independent and meaningful way to explore personality. The Linguistic Inquiry and Word Count (LIWC) software program was developed by Pennebaker, Francis and Booth (2003) to test this application empirically. LIWC was originally developed to discover which features of writing about negative life experiences could predict health improvement (Pennebaker et al., 2003). The program has also been used to analyze transcripts of everyday conversations and has been found to be reliable across time, topic, and text source (Pennebaker & Graybeal, 2001; Mehl & Pennebaker, 2003). The program counts words from different categories (e.g. pronouns, tentative language, assent) and this strategy is based on the assumption that “the words people use convey psychological information over and above their literal meaning and independent of their semantic context” (Pennebaker et al., 2003, p. 550).

Utilizing this software program, Fitzsimons and Kay (2004) studied the effects of language usage on relationship perceptions of long time friends and of individuals reading transcripts of conversations between two people. They found that manipulating pronoun usage
can lead people to perceive their own and other relationships as closer and higher in quality. Those that used in-group pronouns such as “we” and “us” experienced a greater sense of social identity and caused others to be perceived as more similar to the self than those that used out-group types of pronouns like “they” and “them.”

Driver, Tabares, Shapiro, Nahm, and Gottman (2003) reviewed several studies conducted at the Gottman Laboratory that examined interactional patterns in marital success and failure. They found that language use greatly impacted the success or failure of the marriages they studied. The research reviewed utilized transcripts of interactions between couples to analyze communication styles that had differential effects on each couples relationship. They found that couples that use “we” language versus “I/him/her” language reported feeling more like a team and more satisfaction in their marriage. Perdue, Dovidio, Gurtman, and Tyler (1990) also found that pronoun usage impacts individual perceptions of group or category membership. They found that when “we” and “they” were used in discussion there was a corresponding influence on evaluation of in-group and out-group members.

Bucci and Freedman (1981) found that five elderly individuals diagnosed with depression utilized an elevated percentage of first person pronouns. They interpreted those findings as reflecting a weakness in connecting to others (Pennebaker et al., 2003). Similarly, in a study that compared currently depressed students with students who had never been depressed, Rude, Gortner, and Pennebaker (2004) found that the depressed students utilized more first person singular nouns than the non-depressed group, specifically the word “I”. These studies are correlational, however; they provide some interesting possibilities when one considers the potential impact of “I” usage during a group task.
Related to this point is the work done by Hewes (1996) on the socio-egocentric theory of small group communication. Group decision making is seen as a “multigoal, hierarchized process that requires of group members compromise between and among various goals”, which are task goals and social goals (Hewes, 1996). Individuals have limited cognitive capacity and much of it is devoted to individual problem solving tasks where each group member utilizes their past experiences to solve the problem at hand. Due to limited cognitive space for the task, social dimensions of the group process are simplified. Hewes posited that groups do this by engaging in an adult form of egocentric speech where the group is engaged in a collective monologue (1996). Members give the appearance of listening in order to meet the social goals of working in a group while waiting for their turn to speak. In the present context it seems likely that groups engaged in this type of interaction would use more “I” language and be less influenced by the opinions of others. Groups with high levels of pre-decision agreement would likely gravitate toward solutions that they themselves came up with, at the expense of considering alternatives that a minority opinion member suggested. Hewes (1996) proposed a turn taking mechanism that may allow for groups to appear to be conversing when in actuality they are waiting for the opportunity to report on the state of his or her thinking about the problem.

Successful groups may use more “we” and less “I” language than unsuccessful groups and investigating this empirically could lead to identifying potential markers of high performing groups. It is plausible that groups engaged in a decision making task that find more satisfaction and feel like a team may be more likely to feel safe enough to challenge each other’s ideas rather than seek early consensus. Groups that engaged in a forming activity may also utilize more “we” oriented language, potentially moderating and overcoming the negative effects of high levels of pre-decision agreement.
Driver et al. (2003) found that couples who were willing to accept influence (e.g. letting their partner win on even a small point) were more successful in their marriage. Arguably, groups in which minority opinion members feel that other members are willing to accept their input may perform at a higher level because more alternative solutions would be freely discussed. Additionally, a group’s willingness to accept influence may be moderated by whether or not the group received performance related feedback. It is plausible, as will be discussed in the next section, that groups that receive this feedback may be more willing to take into account a minority opinion when that individual was found to have performed the highest on the previous task.

On his website Pennebaker (2009) stated there are two types of words: content words (e.g. nouns and verbs) that tell us what is said and style words (e.g. pronouns and prepositions) that tell us how they are saying it. Pennebaker et al. (2003) asserted that LIWC is most effective with tracking stylistic aspects of language use. The style of language that individuals used as been found to be predictive of depression (Chung & Pennebaker, 2007; Rude et al. (2004) and levels of honesty (Newman, Pennebaker, Berry, & Richards, 2003). Weintrub (1981, 1989) studied individuals with an anxious disposition and found that this disposition correlated with the use of first person language and explainers (e.g. because, since). It is plausible that groups also develop a linguistic style that may be predictive of performance. The pronouns, prepositions, and conjunctions that group members use may indicate the linguistic style of a group, for example an anxious style indicated by utilization of singular pronoun, tentative words, and explainers. Groups that demonstrate less anxiety may not engage in consensus sharing as much as anxious groups who may be more likely to seek areas of agreement to lessen anxiety. Studying possible linguistic styles that overcome the negative effects of pre-decision agreement could provide
useful information for those seeking practical interventions to improve group decision-making. Additionally, interventions such as Forming and Feedback, that arguably lessen anxiety, may moderate this relationship.

Pennebaker et al. (2003) asserted that word use is a meaningful marker and occasional mediator of natural social and psychological processes. The current study proposes that the language group’s use can mediate the negative effects of pre-decision agreement on group performance. Utilizing the LIWC program, I will test several word categories that may serve this purpose. The LIWC program allows for the user to examine many different categories of language usage. As mentioned above, pronoun usage influences couples satisfactions in their marriage, interpersonal perceptions, and can be a marker for psychological states such as depression (Driver et al., 2003; Fitzsimons & Kay, 2004; Chung & Pennebaker, 2007). Examples of categories that may be relevant to group interaction include tentative language, certainty words, word count, and pronoun usage.

It has been argued above that the length of a group’s discussion may be a predictor of performance. Word count, an indicator of interaction length, may mediate the relationship of pre-decision agreement and group added value. For example groups that use fewer words may be indicative of premature foreclosure due to high levels of pre-decision decision agreement, which has been associated with poorer performance. Additionally, it can be argued that high levels of tentative and low levels of certainty language use may be an indicator of anxiety, which could be indicative of groups searching for areas of agreement to lessen anxiety. These styles of communication may mediate the effects of pre-decision agreement and group development is proposed as a moderator of this relationship, specifically the activities of Forming and Feedback. They will be discussed next.
Potential Moderators: Group Development

Group development has been an important area of research in the group decision-making literature and has been found to improve group decision quality (Tan, Wei, Huang, & Ng, 2000). However, this author has found no research that has examined the possible moderating effects of group development on the relationship between pre-decision agreement and group performance. Therefore, determining its possible effects on the negative impact of pre-decision agreement would be beneficial. Two different processes were controlled in the present study to manipulate group development: Forming and Performance Feedback. The literature regarding performance feedback is discussed first.

Performance feedback and work group performance

The research regarding the effectiveness of performance feedback with regard to decision making is highly variable (Kluger & DeNisi, 1996). Kluger and DeNisi conducted a meta-analysis of 131 studies, which revealed that feedback interventions improved performance on average but that in over one-third of the studies reviewed it decreased performance. In their analysis, Kluger and DeNisi defined feedback interventions as, “actions taken by (an) external agent(s) to provide information regarding some aspect(s) of one’s task performance” (1996, p. 255). The authors proposed a preliminary feedback intervention theory with the central assumption that feedback interventions change the locus of attention among three general and hierarchical levels of control: task learning, task motivation, and meta-task (including self-related) processes. They found that the lower in the hierarchy the feedback intervention induced locus of attention was, the stronger the effect of the intervention on performance (Kluger & DeNisi). In other words, framing the intervention in a manner that prevents the locus of attention
from the self and directs attention to task related variables is more likely to be useful in terms of performance gain.

London (1975) stated that successful performance of groups is dependent upon the facility with which a group can identify its most competent person. This proposition makes theoretical sense as a group is likely to perform best when it is aware of its most knowledgeable member. Tindale, Kulik, and Scott (1991) stated that groups seem to solve problems by somehow identifying their best member and then forming a consensus around that individual’s response. Knowledge of each member’s competence allows groups to properly weight the input of each group member. One manner in which this knowledge can be enhanced is through a feedback process in which group members are informed of each others’ relative performance on similar tasks.

Hollenbeck et al. (1995) defined hierarchical sensitivity as the ability of a group’s leader to effectively weight each group member’s judgments in order to make the highest quality decision for the group. They found hierarchical sensitivity to be a key determinant of effective functioning for hierarchical groups. Specifically, they found that sensitivity to the validity of group members’ input was positively associated with effective decision making (Hollenbeck et al.). It can be argued that all groups, regardless of structure, would demonstrate higher levels of decision making accuracy if members were to weight accurately each member’s input when making decisions. As mentioned previously, feedback regarding performance can enhance group members’ weighting ability. In this manner hierarchical sensitivity can be enhanced thus creating the conditions for improved decision quality.

However, identifying a group’s highest performing member is not the only, nor most effective, use of providing feedback to increase the effectiveness of decision making groups.
Providing feedback regarding the poorest performer can also have beneficial effects on decision quality. Knowing that one has performed poorly can motivate individuals to work harder in order to perform better. Matsui, Okada, and Inoshita (1987) found that group members performing below a stated target improved their performance after receiving negative feedback. Steelman and Rutkowski (2004) found that research on 360-degree feedback groups resulted in relatively greater performance gains from those receiving low ratings than those receiving more favorable ratings.

The main strategy individuals use to reduce the impact of negative feedback is to reject it (Steelman & Rutkowski, 2004). Many individuals do not want it and often supervisors are reluctant to provide negative feedback to others (Audia & Locke, 2003). Therefore, it is important to consider variables that can moderate the impact of negative feedback in order to realize the gains such feedback may provide. Steelman and Rutkowski (2004) found that individuals were more motivated to improve their performance based on negative feedback when the source of the feedback was credible, of high quality, and delivered in a considerate manner. Audia and Locke (2003) found that feedback sources perceived as having expert power lead to greater acceptance of negative feedback than messages coming from sources holding coercive power. Several variables influence the impact of feedback on group performance and the quality of the feedback and the perception of the feedback source are important with regard to the usefulness of the feedback provided.

Tindale (1989) studied the impact of individual and group level feedback on individual and group level performance. The author found that groups with high levels of confidence and poor decision quality will not improve performance without negative feedback (Tindale).
Therefore, providing groups with feedback, especially negative feedback, is an important aspect of group decision making and efforts to maximize group performance.

Communication style, conceptualized as word usage, has been proposed as a mediator of the relationship between pre-decision agreement and group added value. Feedback may serve as a moderator in this model. For example, groups high in pre-decision agreement may use more “I” and certainty language and less “we” language with shorter interactions that are related to decreased performance. As mentioned above, groups in the Feedback condition may be more willing to accept minority opinion influence and it is plausible that this difference is reflected in a shift of the aforementioned relationships such that groups use more inclusive (i.e. higher “we” and lower “I” use) language, interact for a longer period of time, and use less tentative language.

Groups may utilize less tentative language because they are more able to accurately locate expertise within the group, which would arguably reduce anxiety. Additionally, groups high in pre-decision agreement may avoid “I” and certainty language if the minority member was found to have performed best on the previous task because they would be more likely to question the majority opinion. Members that were told they were not the highest performer are also more likely to use inclusive language rather than engage in the collective monologue style of communication. Finally, Feedback may moderate the impact of communication style on performance for similar reasons mentioned previously. For example, there may be more skepticism, in spite of high levels of pre-decision agreement, when a group member found to have the poorest performance is using “I” and certainty language to make their case. For these reasons, Feedback is proposed as a moderator of the meditational model proposed above. Forming is also proposed as a moderator of this relationship and will be discussed next.
Forming and work group performance

Forming is a process used to improve the relationships between group members in order to obtain trust and group cohesiveness (Tuckman, 1965). Early strategies are important for group development and an appropriate initial interaction can influence future group effectiveness (Erickson & Dyer, 2004). An example of an early strategy to enhance group development may be as circumscribed as encouraging the group to spend some time sharing personal information in order to get to know one another. The current study examines a forming activity similar to this example as a possible strategy for improving group performance. The term “forming” was developed by Tuckman as part of a linear model of group development that is known as Forming, Storming, Norming, and Performing (1965, 1977). Tuckman’s research built on an earlier model of group development introduced by Bales and Strodtebeck (1951). Bales and Strodtebeck proposed that under certain conditions groups tend to move emphasis from problems of orientation to evaluation and eventually control. Tuckman chose to focus on the socio-emotional elements of group development in an effort to define a healthy group process for decision making groups.

An alternative model of group development was proposed by Gersick and termed punctuated equilibrium (1988, 1989). This model sought to understand the timing and mechanisms of change within the group context. Group development was defined by Gersick as the path a group takes over its life span toward the accomplishment of its main tasks. Gersick attempted to understand the interplay between development and environmental contingencies. Gersick found that at the midpoint of the life of a group a transition occurs and if this transition is successful, groups tend to display a sudden burst of output and improve performance for the remainder of the group’s life. This model is less applicable to the current study than Tuckman’s
because the groups in this study were not under time constraints. However, Gersick found that the first moments of a group’s life greatly influence the rest of the group experience (1988). Therefore, it can be argued that some type of forming at the beginning of a group’s life can have positive effects on the rest of the group process and improve overall performance.

Both linear models and the punctuated equilibrium have little empirical support and may be best understood as complementary rather than in conflict with each other (Chang, Bordia, & Duck, 2003). However, not all researchers agree that these models are adequate. Seers and Woodruff (1997) argued that the punctuated equilibrium model reflects task pacing under a deadline rather than the process of group development. Both Seers and Woodruff (1997) and Seeger (1983) state that only groups that have never met show the phase movement described by models such as that of Tuckman. This is directly applicable to the current study as the groups met for the first time during the project. Therefore, the use of a forming activity can be logically assumed to impact group performance in a beneficial manner.

There is relatively little research that has examined the effects of group development on overall performance. Tan et al. (2000) studied virtual groups and asked the group members to share background information about themselves with other members of the group. This forming activity was found to improve both relational development and the quality of decisions made by the group. Additionally, the authors noted that groups that experienced the brief forming activity moved more rapidly into productive performance than groups that did not have the experience.

The current study will use the concept of forming, as developed by Tuckman (1965), to examine whether this activity moderates the mediational effects of communication style on pre-decision agreement (PDA) and group performance. As stated previously, forming is a process used to improve the relationships between group members in order to obtain trust and group
cohesiveness (Tuckman, 1965). Through this process groups identify boundaries of both interpersonal and task behaviors. Well performing groups, according to Tuckman, will have successfully completed the forming stage. Forming might moderate the relationship between PDA and communication style because the activity increases a sense of “groupness”, resulting in less “I” and greater “we” word usage. This feeling of “groupness” may also decrease anxiety in the group, resulting in less tentative language use.

Additionally, an important aspect of group discussion is the sharing of divergent ideas. As mentioned previously, the lack of discussion regarding alternative solutions has detrimental effects on the outcome of a group decision making activity. It is reasonable to predict that groups that have formed appropriately will feel more confident sharing information and providing alternative solutions in order to improve performance on decision-making tasks. Groups that received Forming could feel comfortable challenging opinions, which may be reflected in longer interactions and less certainty language use. Arguably, groups that are willing to challenge each other may be more likely to challenge members utilizing certainty language, particularly if “groupness” is high, and propose solutions as possibilities instead of a given. These processes can allow groups high in PDA to overcome its influence and examine more options in an open, safe, dialogic environment.

*Pre-Decision Agreement and Group Development*

The sharing and merging of information is arguably a social process and consequently, may be affected by the socio-emotional functioning of the group. Very little research has been done on the combined effects of pre-decision agreement and group development on work group performance. Given the above discussion, it is reasonable to predict that group development (Forming and Feedback) may enhance group decision making in the presence of high levels of
pre-decision agreement. For example, groups high in pre-decision agreement that receive feedback may realize that similar opinions do not necessarily translate to effective performance thus, they may explore alternative solutions to the problem, as potentially measured by interaction length (i.e. word count), in order to account for the discrepancy between perceived agreement and objective performance.

In a previous study (Fox, 2007), I examined whether the activities of Forming and Feedback moderated the effect of pre-decision agreement on group added value and these activities were not found to moderate this relationship. In the present study I am going to focus on whether these group development activities moderate the mediated relationship of pre-decision agreement and group added value previously discussed.
PURPOSE OF THE STUDY AND HYPOTHESES

The purpose of this study is to determine if communication style, operationalized as word usage, mediates the relationship between Pre-Decision Agreement and Group Added Value. Additionally, the purpose of the study is to determine if the utilization of a Forming or Feedback intervention moderates this relationship. High levels of Pre-Decision Agreement have been found to negatively impact group performance. Determining factors that can offset this effect will be useful knowledge for those wishing to improve the performance of decision making teams. The activities of Forming and Feedback could aid in altering the course of the decision making process, having a moderating effect and enabling groups to overcome the negative effects of high levels of Pre-Decision Agreement. Given this proposed effect, determining whether the words group members use can mediate these effects will deepen our understanding of what makes a decision making group successful or not.

The utility of this study clinically is that it seeks to identify group processes that mediate the inhibitory effect of Pre-Decision Agreement on the decision making process, which results in poorer quality decisions. Once these patterns of interaction are discovered, those working with decision making teams in the field can develop interventions aimed at helping groups overcome these tendencies in order to improve the quality of their decisions.

This study also addresses some of the research critiques mentioned in the previous section and will provide a unique contribution to the research literature on group decision making. As mentioned, Pre-Decision Agreement is typically studied using the shared mental model paradigm in which the information supplied to each group member is manipulated. As stated, this is not likely to occur in naturalistic settings. This study more closely approximates a
naturalistic scenario as the same information is provided to each individual as would be more likely in a real-world scenario.

In this study Group Added Value is conceptualized as the output of group performance. This will be more fully explained in the methods section but essentially it is a measure of performance above and beyond the performance of the individuals in the group. It can be either positive or negative indicating whether the group performed at a level above and beyond the level of the individuals comprising the group or below.

Finally, an objective measure will be used in this study of several group process variables using Linguistic Inquiry and Word Count (LIWC) software program developed by Pennebaker et al. (2003). The program has not been used to analyze interactions in a group decision making context to this author’s knowledge and will likely be a further contribution to the literature on group decision making. If significant relationships are found with other study variables, further research could be done to cross-validate the findings with other group process measurement tools that are currently in development.

There are several goals for the current study. This study will seek to determine group process variables (i.e. word usage) that mediate the effect of Pre-Decision Agreement on Group Added value and whether the activities of Forming and Feedback serve as moderators of this relationship. The hypotheses of this study are:

*Hypothesis 1:* Word Count (WC) mediates the relationship of Pre-Decision Agreement (PDA) and Group Added Value (GAV).

*Hypothesis 1A:* The meditational effects of WC on PDA and GAV are moderated by Forming.
Hypothesis 1B: The meditational effects of WC on PDA and GAV are moderated by Feedback.

Hypothesis 2: “I” usage mediates the relationship of PDA and GAV.

Hypothesis 2A: The meditational effects of “I” usage on PDA and GAV are moderated by Forming.

Hypothesis 2B: The meditational effects of “I” usage on PDA and GAV are moderated by Feedback.

Hypothesis 3: “We” usage mediates the relationship of PDA and GAV.

Hypothesis 3A: The meditational effects of “We” usage on PDA and GAV are moderated by Forming.

Hypothesis 3B: The meditational effects of “We” usage on PDA and GAV are moderated by Feedback.

Hypothesis 4: Tentative usage mediates the relationship of PDA and GAV.

Hypothesis 4A: The meditational effects of Tentative usage on PDA and GAV are moderated by Forming.

Hypothesis 4B: The meditational effects of Tentative usage on PDA and GAV are moderated by Feedback.

Hypothesis 5: Certainty word usage mediates the relationship of PDA and GAV.

Hypothesis 5A: The meditational effects of Certainty usage on PDA and GAV are moderated by Forming.

Hypothesis 5B: The meditational effects of Certainty usage on PDA and GAV are moderated by Feedback.
METHODS

Participants

Participants were recruited from undergraduate psychology classes at a university in the Pacific Northwest. Data were collected from a total of 276 participants in 92, three-person groups. Demographic data were available for 88 of the 92 groups. Seventy percent of the participants were female and 30% were male. Additionally, 88% were Caucasian with a mean age of 20.71 years of age. Finally, 32% were freshman, 35.5% were sophomores, 20.8% were juniors, and 11.6% were seniors.

Tasks

Participants completed two different decision making tasks: a desert survival task and a moon survival task, with the order counterbalanced across experimental conditions to control for order effects. In both scenarios, the groups were stranded and left with a number of items that may aid in their survival. The groups’ tasks were to rank order these items in terms of their importance to the groups’ survival with lower numbers indicating greater importance for survival and higher numbers indicating lesser importance for survival. The moon survival task required the groups to rank order 15 items compared to the desert survival task that required groups to rank order ten items. Participants completed each task individually and as a group.

Design

Participants were randomly assigned to one of four conditions: feedback only, forming only, forming and feedback, or neither of the two. In the Forming condition, before the first group task began, participants spun a wheel to randomly select a note card with a personal question on the back. After spinning the wheel, each participant answered the question associated with the card that they drew. The No Forming condition groups simply read a brief
paper on the stages of group development before beginning the group task. The time allowed for each of these activities was five minutes.

In the Feedback condition, group members were publicly informed as to how their individual rankings of the items compared to the rankings of experts after having completed the first task both individually and as a group. Participants received feedback in the following manner: “According to the experts, person A, you are the most in line with the experts. Person B, you are second most in agreement, and person C you are the least in agreement with the experts.” After receiving the feedback, participants began work on the second task. Those in the No Feedback condition began the second task immediately following completion of the first task.

Procedure

This studies methods and procedures were evaluated and approved by Pacific University’s Institutional Review Board. Participants completed questionnaires assessing self-esteem, personality factors, and group self-efficacy after informed consent to participate was obtained. Next depending on the experimental condition, participants either engaged in the forming activity or read a brief paper on the stages of group development. Then groups completed the first decision-making task, consisting of either the desert or moon survival scenario with the order counterbalanced across experimental conditions. They did each task individually first and then as a group. When completing the task individually, participants were limited to five minutes. There was no time limit for completing the task as a group. After the groups completed the first task, participants either received feedback about their individual performances prior to beginning the second task or immediately began the second task. Each group was videotaped while performing both decision making tasks. After both tasks were completed, the groups were provided with the expert rankings, debriefed, given their extra credit,
and thanked for their participation. As incentive for their involvement, participants received extra credit in their psychology courses. In addition, the best performing individual was offered a $20 award and the best performing group received a $60 award divided amongst the group members equally.

The videotaped interactions were transcribed by a transcription service and reviewed by several clinical psychology graduate students in order to correct transcription errors. These students watched the videotapes and corrected mistranscribed sections, filled in sections the service deemed inaudible, and corrected any speaker mislabels (e.g. if a statement was credited to person A but was originally spoken by speaker C). Additionally, this author prepared each transcript for the LIWC program. Specifically, word spelling was checked, contractions were spelled out (e.g. can’t was changed to cannot), filler words were labeled using the disfluency code (e.g. like was changed to rlike when it was used as a filler with no connection to evaluation of an object), and the transcripts were divided by speaker so each individuals word usage could be analyzed separately as well as the groups word usage as a whole.

**Measures**

*Individual Performance*

Individual performance was measured by assessing the quality of the decisions made by each individual on the second decision making task. Individual decision quality was determined by comparing individuals’ ranking of each item to the items true rank as determined by survival experts and calculating the absolute value of the difference between the two rankings. For example, if an individual rated oxygen as “4” and the experts rated it as “1”, the absolute difference would be “3”. Difference scores were calculated for each item and then summed to determine a decision quality score. These scores were then reversed and standardized into z-
scores so that higher scores reflected higher decision quality and scores from both tasks had the same scale.

**Pre-decision Agreement**

Pre-Decision Agreement was measured using Kendall’s coefficient of concordance (Kendall’s W). It is a non-parametric statistical procedure that is used for assessing the agreement between multiple raters. Its values are similar to a correlation coefficient, ranging from 0 to 1. Increasing values of Kendall’s W indicates increasing levels of agreement. The coefficients for this procedure were derived utilizing individual rankings of the survival items prior to the group discussion. The procedure for determining these individual scores is described above.

**Group Performance**

There are two common methods for measuring group performance: absolute group performance and group added value. Absolute group performance is simply the accuracy of group decisions. Group added value is the gain or loss of the quality of the group decision above and beyond the decisions of the individual group members. There is controversy regarding which measure is more appropriate for measuring effective group performance. The former is a more objective measure, but the latter can be argued as a measure of group process. That is, even if a group starts with a relatively low level of expertise concerning the decision to be made, it may be able to create a higher quality decision if the decision making process of the group creates an environment that allows group members to move beyond contributions of the individuals to create a decision that is greater than the sum of the individuals’ contributions. Therefore, the impact of the process variables examined in this study was related to Group Added Value.
Typically, group added value has been operationalized as some form of difference between a group’s score and the score of the best performing member or the average of individual scores within a group (e.g., Watson et al., 1991). Edwards has documented the problems associated with the use of difference scores (2001); therefore, Group Added Value was operationalized by means of a residual score. Group Added Value equaled the residual of the group performance score, with the variance of the individual member scores statistically removed via a multiple regression procedure for each group.

Word Usage

Group Process will be measured using the Linguistic Inquiry and Word Count computer software (Pennebaker et al., 2003). It is a text analysis program that quantifies the usage of over 2300 words or word stems into one of over 70 categories, including categories created by the user. Example categories include number of words total, tentative language, pronoun use, and the number of certainty words.

The word usage categories that will be examined in this study are word count, personal pronouns, tentative words, and certainty words. The word count category is simply the number of words used in a given interaction. The I usage category consists of words such as “I”, “me”, and “mine”, whereas, the we usage category consists of words such as “we”, “us”, and “our”. The tentative category counts the use of words like “maybe”, “perhaps”, and “guess” while the certainty category searches for words such as “always” or “never”. For this study words will be measured at the group level, or how much each group utilized these categories of words, to ensure enough statistical power for analysis.
Data Analysis

Data will be analyzed for 75 of the 92 groups. Twelve groups had unusable data due to technical problems with the video tape (e.g., no sound) and 5 groups were missing transcripts for one of the two tasks and were removed from the sample.

Simple Mediation

The proposed mediators will be tested utilizing the basic meditational model developed by Baron and Kenny (1986). The relationships among independent (e.g. PDA), dependent, (e.g. GAV), and mediator variables (e.g. word usage) are analyzed using a three step procedure and I will use examples from the current study to illustrate. First, word usage will be regressed onto PDA, GAV will be regressed on PDA, and finally GAV will be regressed on both PDA and the word usage variable being examined. There are several criteria for establishing mediation with this procedure and, according to Edwards and Lambert (2007), most researchers use the four conditions outlined by Baron and Kenny (1986).

The first condition stipulates that PDA must affect the word usage variable in the first step. Secondly, PDA should be shown to affect GAV in the second equation and thirdly, the word usage variable must affect GAV in the third equation when PDA is controlled for. Lastly, if the first three conditions are met the effect of PDA on GAV must be less in the third equation than in the second. Complete mediation occurs if PDA has no effect on GAV when word usage is controlled, and partial mediation occurs if the effect of PDA on GAV is significantly reduced when word usage is controlled (Baron & Kenny, 1986). If any of these conditions are violated then mediation has not occurred, according to this model. However, these relationships may be moderated by additional variables (e.g. Forming and Feedback) and analysis utilizing a moderated mediation model would be warranted.
Moderated Mediation

Analysis will be conducted using the analytical framework developed by Edwards and Lambert (2007) to test a moderated mediation model. The authors integrated moderated regression analysis and path analysis. This model was developed to test each path of a mediation model for the effect of a proposed moderator where the mediated effect varies across levels of the moderator (See Figure 1).

Prior to analysis all variables will be mean centered. Mediation is framed in terms of a path model and relationships among variables are expressed using regression equations. Moderation is incorporated by supplementing these equations with the moderator and it’s product with the independent and mediator variables. The regressions will be conducted to determine the coefficients to be entered into the following equations suggested by the authors:

\[
M = a_{05} + a_{X5}X + a_{Z5}Z + a_{XZ5}XZ + e_{M5}
\]

\[
Y = b_{020} + b_{X20}X + b_{M20}M + b_{Z20}Z + b_{XZ20}XZ + b_{MZ20}MZ + e_{Y20}
\]

\[
Y = [b_{020} + b_{Z20}Z + (a_{05} + a_{Z5}Z)(b_{M20} + b_{MZ20}Z)Z] + [(b_{X20} + b_{XZ20}XZ) + (a_{X5} + a_{XZ5}Z)(b_{M20} + b_{MZ20}Z)]X + e_{Y20} + b_{M20}e_{M5} + b_{MZ20}Ze_{M5}
\]

For these equations X, Y, Z, and M refer to PDA, GAV, the moderator (i.e. Forming or Feedback) and the mediator (i.e. word usage category), respectively. The other variables refer to various relationships within the model such that for equation 5 \(a_{X5}\) is the relationship between PDA and the mediator, \(a_{Z5}\) refers to the main effect of the moderating variable (i.e. Forming or Feedback), and \(a_{XZ5}\) refers to the interaction effect between the moderator variable and PDA, which tells whether the relationship between PDA and the mediator is moderated. For equation 20 \(b_{X20}\) refers to the relationship between PDA and GAV, \(b_{M20}\) refers to the relationship between the mediator and GAV, \(b_{MZ20}\) refers to the interaction effect between the moderator variable and
GAV, which tells whether the relationship between the mediator and GAV is moderated. Additionally, $b_{XZ20}$ refers to the direct effect moderation of PDA and GAV.

Individual coefficients from equations 5 and 20 will be tested using the standard errors reported by the regression module. Expressions containing products of coefficients, such as indirect and total effects will be tested using bias corrected confidence intervals based on coefficient estimates from 1,000 bootstrap samples generated by constrained nonlinear regression analysis and these expressions will be generated using equation 25. This is done to test the statistical significance of those coefficients to determine whether there is a difference in the moderator conditions (i.e. between Feedback and no Feedback). Equations 5 and 20 will be rerun with the coefficients estimated from the bootstrap analysis. These bootstrap samples are used to establish confidence intervals which are bias corrected and used to determine the statistical significance of the values from these equations. Bias corrected confidence intervals will be derived to test, using equation 25, the first and second stage as well as indirect, direct, and total effects utilizing coefficients derived from equations 5 and 20. First and second stage effects refer to the paths $X$ to $M$ and $M$ to $Y$, respectively, which also constitutes the indirect effect. The direct effect is $X$ to $Y$ and the total effect represents all of the relationships.

Equation 25 will be applied to coefficients from equations 5 and 20 to compute simple effects. For example, for no Forming, $Z = 0$, the first stage, second stage, and direct effect reduce to $a_{X5}$, $b_{M20}$, and $b_{X20}$, respectively. The indirect effect for the no Forming condition equals the product of the first and second stages, and the total effect equals the sum of the direct and indirect effects. For the Forming condition, $Z = 1$, such that the first stage of the indirect effect becomes $a_{X5} + a_{XZ5}$, the second stage becomes $b_{M20} + b_{MZ20}$, and the direct effect becomes $b_{X20} + b_{XZ20}$. As for no forming, the indirect effect for Forming equals the product of the first and
second stages, and the total effect is the sum of the direct and indirect effects. Comparing these
effects for no Forming and Forming determines whether there is a statistically significant
difference between the two conditions. If there is a significant difference for any of the paths,
that path is considered to have been moderated. This procedure will be replicated for Feedback
as well.

According to Edwards and Lambert (2007), confidence intervals that do not contain zero
will be considered statistically significant relationship. Confidence intervals for the differences
between conditions of each moderator (e.g. Forming minus no Forming) that are significant
represent a moderating effect for that path in the model. For a more detailed description of the
methodology please refer to Edwards and Lambert (2007). They provide an empirical example as
well as the syntax for SPSS to test the model.

![Figure 1](image-url)

Figure 1

*Model of Moderated Mediation Analyses*
RESULTS

Table 1 shows means, standard deviations, and intercorrelations for the key variables in the study. The mediator variable I usage was significantly correlated with the dependent variable GAV. The correlations between PDA, GAV, and the mediator variables ranged from -.39 to .27. This suggested that a moderated meditational model is a more appropriate framework to test the relationships among study variables. The mediator variables of I use and tentative word use were found to be significantly correlated (-.39, p < .05) as were use of certainty and tentative words (.30, p < .05). Certainty and tentative words represent opposites and a significant correlation between the two categories is expected. The fact that I use and tentative language use were significantly correlated does not preclude examining them separately in this model (Edwards & Lambert, 2007).

Table 1

Means, Standard Deviations, and Intercorrelations

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std.Dev</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Group Added Value</td>
<td>.00</td>
<td>.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Pre-Decision Agreement</td>
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<td>.13</td>
<td>-.36*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>3. Word Count</td>
<td>954.83</td>
<td>517.75</td>
<td>.13</td>
<td>.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I</td>
<td>5.62</td>
<td>1.54</td>
<td>-.25*</td>
<td>.27*</td>
<td>-.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. We</td>
<td>1.89</td>
<td>1.09</td>
<td>.18</td>
<td>-.10</td>
<td>.22</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Tentative</td>
<td>3.42</td>
<td>1.04</td>
<td>.08</td>
<td>-.01</td>
<td>.09</td>
<td>-.39*</td>
<td>-.09</td>
<td></td>
</tr>
<tr>
<td>7. Certainty</td>
<td>.97</td>
<td>.49</td>
<td>-.04</td>
<td>.12</td>
<td>-.02</td>
<td>-.08</td>
<td>.05</td>
<td>.30*</td>
</tr>
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</table>

*p < .05
Regression results are reported in Tables 2 and 3 for Forming and Feedback as moderators, respectively, and simple effects are given in Tables 4 and 5 (See Appendix A) for Forming and Feedback, respectively, including effects that represent the three paths of the basic mediated model as well as the indirect and total effects of the model. Models depicting simple paths are shown in Figures 2 and 3 in Appendix B for Forming and Feedback, respectively.

Table 2

<table>
<thead>
<tr>
<th>Mediating Variable</th>
<th>$a_{X5}$</th>
<th>$a_{Z5}$</th>
<th>$a_{XZ5}$</th>
<th>$R^2$</th>
<th>$b_{X20}$</th>
<th>$b_{M20}$</th>
<th>$b_{Z20}$</th>
<th>$b_{XZ20}$</th>
<th>$b_{MZ20}$</th>
<th>$R^2$</th>
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</thead>
<tbody>
<tr>
<td>Word Count</td>
<td>784.77</td>
<td>146.49</td>
<td>137.02</td>
<td>.07</td>
<td>-2.07*</td>
<td>.00</td>
<td>.38*</td>
<td>-1.36</td>
<td>.00</td>
<td>.24</td>
</tr>
<tr>
<td>I</td>
<td>2.83</td>
<td>-.32</td>
<td>1.26</td>
<td>.09</td>
<td>-1.67</td>
<td>-.06</td>
<td>.40*</td>
<td>-1.09</td>
<td>-.04</td>
<td>.22</td>
</tr>
<tr>
<td>We</td>
<td>-.40</td>
<td>-.02</td>
<td>-1.00</td>
<td>.01</td>
<td>-1.78</td>
<td>.12</td>
<td>.43</td>
<td>-1.24</td>
<td>-.03</td>
<td>.22</td>
</tr>
<tr>
<td>Tentative</td>
<td>1.51</td>
<td>-.08</td>
<td>-3.70*</td>
<td>.05</td>
<td>-2.01*</td>
<td>.13</td>
<td>.43*</td>
<td>-1.41</td>
<td>-.25</td>
<td>.23</td>
</tr>
<tr>
<td>Certainty</td>
<td>1.08</td>
<td>-.01</td>
<td>-1.46</td>
<td>.05</td>
<td>-2.12*</td>
<td>.27</td>
<td>.43*</td>
<td>-1.09</td>
<td>-.43</td>
<td>.22</td>
</tr>
</tbody>
</table>

* $p < .05$

$N = 75$. Entries under columns labeled $a_{X5}$, $a_{Z5}$, and $a_{XZ5}$ are unstandardized coefficient estimates from Equation 5, which uses each mediator as the dependent variable. Entries under columns labeled $b_{X20}$, $b_{M20}$, $b_{Z20}$, $b_{XZ20}$, and $b_{MZ20}$ are unstandardized coefficient estimates from Equation 20, which uses Group Added Value as the dependent variable.

Hypothesis 1: Word Count as the Mediator

As reported in the analysis section, simple mediation was tested using three steps, each tested using regression analysis. For step one PDA was regressed on word count (WC) and was not found to significantly affect WC ($\beta = 884.71$, $SE = 456.60$, $p > .05$). Step 2 revealed that PDA was a predictor of GAV ($\beta = -2.25$, $SE = .69$, $p < .05$) but conditions in step 3 were not satisfied for mediation. The effect of PDA on GAV was not reduced ($\beta = -2.56$, $SE = .70$, $p <$
.05) in the presence of WC (β = .00, SE = .00, p < .05), therefore, WC did not mediate the relationship between PDA and GAV.

Table 3

**Coefficient Estimates for Mediating Variables with Feedback as a Moderator**

<table>
<thead>
<tr>
<th>Mediating Variable</th>
<th>( a_{X5} )</th>
<th>( a_{Z5} )</th>
<th>( a_{XZ5} )</th>
<th>( R^2 )</th>
<th>( b_{XZ20} )</th>
<th>( b_{M20} )</th>
<th>( b_{Z20} )</th>
<th>( b_{XZ20} )</th>
<th>( b_{MZ20} )</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Count</td>
<td>279.70</td>
<td>-796.44</td>
<td>1309</td>
<td>.08</td>
<td>-2.41*</td>
<td>.00</td>
<td>.28</td>
<td>-.32</td>
<td>.00</td>
<td>.18</td>
</tr>
<tr>
<td>I</td>
<td>1.98</td>
<td>-1.82</td>
<td>1.84</td>
<td>.12</td>
<td>-2.25*</td>
<td>-.04</td>
<td>-.49</td>
<td>.81</td>
<td>-.11</td>
<td>.16</td>
</tr>
<tr>
<td>We</td>
<td>-1.59</td>
<td>-1.06</td>
<td>1.38</td>
<td>.02</td>
<td>-2.08*</td>
<td>.17</td>
<td>.08</td>
<td>.06</td>
<td>-.11</td>
<td>.16</td>
</tr>
<tr>
<td>Tentative</td>
<td>.66</td>
<td>.92</td>
<td>-1.62</td>
<td>.01</td>
<td>-2.32*</td>
<td>-.04</td>
<td>-.21</td>
<td>.48</td>
<td>.24</td>
<td>.16</td>
</tr>
<tr>
<td>Certainty</td>
<td>.77</td>
<td>.38</td>
<td>-.66</td>
<td>.03</td>
<td>-2.22*</td>
<td>-.15</td>
<td>-.01</td>
<td>.17</td>
<td>.36</td>
<td>.14</td>
</tr>
</tbody>
</table>

* \( p < .05 \)

\( N = 75 \). Entries under columns labeled \( a_{X5} \), \( a_{Z5} \), and \( a_{XZ5} \) are unstandardized coefficient estimates from Equation 5, which uses each mediator as the dependent variable. Entries under columns labeled \( b_{XZ20} \), \( b_{M20} \), \( b_{Z20} \), \( b_{XZ20} \), and \( b_{MZ20} \) are unstandardized coefficient estimates from Equation 20, which uses Group Added Value as the dependent variable.

**Hypothesis 1A: Forming as the Moderator**

Coefficient estimates in Table 2 show that Forming did not moderate the path from Pre-Decision Agreement (PDA) to Word Count (WC) (\( a_{XZ5} = 137.02, p > .05 \)), the path from WC to Group Added Value (GAV) (\( b_{MZ20} = .00, p > .05 \)), or the path from PDA to GAV (\( b_{XZ20} = -1.36, p > .05 \)). Using the procedure described in the analysis section equation 25 was applied to coefficients in Table 2 to compute simple effects, as reported in Table 4, and portrayed in Figures 2A and 2B. For no Forming, \( Z = 0 \), the first stage, second stage, and direct effect equaled 784.78, 0.00, and -2.07, respectively. The indirect effect was 0.240, and the total effect equaled -1.83. For the Forming condition, \( Z = 1 \), the first stage of the indirect effect was 921.80, the
second stage was 0.00, and the direct effect was -3.42, all non-significant. The indirect effect for Forming equals 0.26, and the total effect is the sum of the direct and indirect effects, or -3.17 in this case. Comparing these effects for no Forming and Forming shows that first stage of the indirect effect (921.80 – 784.77 = 137.03, p > .05) and the second stage of the indirect effect (0.00 – 0.00, p > .05) did not differ. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Forming and Forming (.26 - .24 = .02, p > .05) or the direct effect (-3.42 + 2.07 = -1.36, p > .05), or the total effect (-3.17 + 1.83 = -1.34, p > .05). Forming did not moderate any of the paths with WC as the mediator of PDA and GAV.

Hypothesis 1B: Feedback as the Moderator

Coefficient estimates in Table 3 show that Feedback did not moderate the path from Pre-Decision Agreement (PDA) to Word Count (WC) (a_{XZ5} = 1309.79, p > .05), the path from WC to Group Added Value (GAV) (b_{MZ20} = 0.00, p > .05), or the path from PDA to GAV (b_{XZ20} = -.32, p > .05). Equation 25 was applied to coefficients in Table 3 to compute simple effects, as reported in Table 5, and portrayed in Figures 3A and 3B. For no Feedback, Z = 0, and the first stage, second stage, and direct effect equaled 279.70, 0.00, and -2.41, respectively. The indirect effect was 0.00, and the total effect was -2.41, all non-significant. For the Feedback condition, Z = 1, the first stage of the indirect effect was 1589.49, the second stage was 0.00, and the direct effect was -2.73, all non-significant. The indirect effect for Feedback equaled 0.00, and the total effect was -2.73 in this case. Comparing these effects for no Feedback and Feedback shows that first stage of the indirect effect (1589.49 – 279.70 = 1309.79, p > .05) and the second stage of the indirect effect (0.00 – 0.00 = 0.00, p > .05) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Feedback and Feedback (0.00 – 0.00 = 0.00, p > .05) or the direct effect (-2.73+
2.41 = -3.2, p > .05), or the total effect (-2.73 \pm 2.41 = -3.2, p > .05). Feedback did not moderate any of the paths with WC as the mediator of PDA and GAV.

Hypothesis 2: I Usage as the Mediator

For step one PDA was regressed on I usage (IU) and was found to significantly affect IU (β = 3.26, SE = 1.34, p < .05). Step 2 revealed that PDA was a predictor of GAV (β = -2.25, SE = .69, p < .05) but conditions in step 3 were not satisfied for mediation. IU was not significantly related to GAV after controlling for PDA (β = -0.9, SE = .06, p > .05), therefore, IU did not mediate the relationship between PDA and GAV.

Hypothesis 2A: Forming as the Moderator

Coefficient estimates in Table 2 show that Forming did not moderate the path from Pre-Decision Agreement (PDA) to I usage (IU) (a_{XZ} = 1.26, p > .05), the path from IU to Group Added Value (GAV) (b_{MZ} = -0.04, p > .05), or the path from PDA to GAV (b_{XZ} = -1.09, p > .05). Equation 25 was applied to coefficients in Table 2 to compute simple effects, as reported in Table 4, and portrayed in figures 2C and 2D. For no Forming, Z = 0, and the first stage, second stage, and direct effect equaled 2.83, -0.06, and -1.67, respectively and were non-significant. The indirect effect for the no Forming condition equaled -0.16, and the total effect equaled -1.83. For the Forming condition, Z = 1, the first stage of the indirect effect was 4.09, the second stage was -0.10, and the direct effect was -3.15, all non-significant. The indirect effect for Forming equaled -0.40, and the total effect was -3.15 in this case. Comparing these effects for no Forming and Forming shows that first stage of the indirect effect (4.09 - 2.83 = 1.26, p > .05) and the second stage of the indirect effect (-0.10 + .06 = -0.04, p > .05) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Forming and Forming (-0.40 + .16 = -0.24, p > .05), the direct effect (-2.76 +
1.67 = -1.09, p > .05), or the total effect (-3.15 + 1.83 = -1.32, p > .05). Forming did not moderate any of the paths with I as the mediator of PDA and GAV.

**Hypothesis 2B: Feedback as the Moderator**

Coefficient estimates in Table 3 show that Feedback did not moderate the path from Pre-Decision Agreement (PDA) to I usage (IU) (a_{XZ5} = 1.84, p > .05), the path from IU to Group Added Value (GAV) (b_{MZ20} = -.11, p > .05), or the path from PDA to GAV (b_{XZ20} = .81, p > .05).

Equation 25 was applied to coefficients in Table 3 to compute simple effects, as reported in Table 5, and portrayed in Figures 3C and 3D. For no Feedback, Z = 0, and the first stage, second stage, and direct effect equaled 1.98, -.04, and -2.25, respectively. The indirect effect was -.09, and the total effect was -2.24, all non-significant. For the Feedback condition, Z = 1, the first stage of the indirect effect was 3.83, and the second stage was -.15, both non-significant, and the direct effect was -1.45, which was significant. The indirect effect for Feedback equaled -.59, non-significant, and the total effect was -2.03, which was significant in this case. Comparing these effects for no Feedback and Feedback shows that first stage of the indirect effect (3.83 – 1.98 = 1.84, p > .05), and the second stage of the indirect effect (-.15 + .04 = -.11, p > .05) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Feedback and Feedback (-.59 + .09 = -.50, p > .05) or the direct effect (-1.45 + 2.25 = .81, p > .05), nor did the total effect (-2.03 + 2.34 = .31, p > .05). Feedback did not moderate any of the paths with I as the mediator of PDA and GAV.

**Hypothesis 3: We Usage as the Mediator**

For step one PDA was regressed on We usage (WE) and was not found to significantly affect WE (β = -.82, SE = .98, p > .05). Step 2 revealed that PDA was a predictor of GAV (β = -2.25, SE = .69, p < .05) but conditions in step 3 were not satisfied for mediation. WE use was not
significantly related to GAV after controlling for PDA ($\beta = .11$, $SE = .08$, $p > .05$), therefore, WE did not meditate the relationship between PDA and GAV.

**Hypothesis 3A: Forming as the Moderator**

Coefficient estimates in Table 2 show that Forming did not moderate the path from Pre-Decision Agreement (PDA) to We usage (WE) ($a_{XZ5} = -1.00$, $p < .05$), the path from WE to Group Added Value (GAV) ($b_{MZ20} = -.03$, $p > .05$), or the path from PDA to GAV ($b_{XZ20} = -1.24$, $p > .05$). Equation 25 was applied to coefficients in Table 2 to compute simple effects, as reported in Table 4, and portrayed in figures 2E and 2F. For no Forming, $Z = 0$, the first stage, second stage, and direct effect equaled -.40, .12, and -1.78, respectively and were non-significant. The indirect effect was -.05, and the total effect was -1.83. For the Forming condition, $Z = 1$, the first stage of the indirect effect was -1.39, the second stage was .09, and the direct effect was -3.02, which were significant. The indirect effect for Forming equaled -.13, and the total effect was -3.15, both non-significant in this case. Comparing these effects for no Forming and Forming shows that first stage of the indirect effect ($-1.39 + .40 = -1.00$, $p < .05$), and the second stage of the indirect effect ($.09 -.12 = -.03$, $p > .05$) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Forming and Forming ($-.13 + .05 = -.08$, $p > .05$), the direct effect ($-3.02 + 1.78 = -1.24$, $p > .05$), or the total effect ($-3.15 + 1.83 = -1.32$, $p > .05$). Forming did not moderate any of the paths with WE as the mediator of PDA and GAV.

**Hypothesis 3B: Feedback as the Moderator**

Coefficient estimates in Table 3 show that Feedback did not moderate the path from Pre-Decision Agreement (PDA) to We usage (WE) ($a_{XZ5} = 1.38$, $p > .05$), the path from WE to Group Added Value (GAV) ($b_{MZ20} = -.11$, $p > .05$), or the path from PDA to GAV ($b_{XZ20} = .06$, $p > .05$).
Equation 25 was applied to coefficients in Table 3 to compute simple effects, as reported in Table 5, and portrayed in Figures 3E and 3F. For no Feedback, $Z = 0$, and the first stage, second stage, and direct effect equaled -1.59, .17, and -2.08, respectively. The direct effect was significant for the no Feedback condition. The indirect effect was -.26, non-significant, and the total effect was -2.34, which was significant. For the Feedback condition, $Z = 1$, the first stage of the indirect effect was -.21, and the second stage was .06, and the direct effect was -2.02, which were all non-significant. The indirect effect for Feedback equaled -.01, and the total effect was -2.03, which were both non-significant in this case. Comparing these effects for no Feedback and Feedback shows that first stage of the indirect effect (-.21 + 1.59 = 1.38, $p > .05$) and the second stage of the indirect effect (.06 - .17 = -.11, $p > .05$) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Feedback and Feedback (-.01 + .26 = .25, $p > .05$), the direct effect (-2.02 + 2.08 = .06, $p > .05$), or the total effect (-2.03 + 2.34 = .31, $p > .05$). Feedback did not moderate any of the paths with WE as the mediator of PDA and GAV.

**Hypothesis 4: Tentative Usage as the Mediator**

For step one PDA was regressed on Tentative use (TENT) and was not found to significantly affect TENT ($\beta = -.04, SE = .94, p > .05$). Step 2 revealed that PDA was a predictor of GAV ($\beta = -2.25, SE = .69, p < .05$) but conditions in step 3 were not satisfied for mediation. TENT was not significantly related to GAV after controlling for PDA ($\beta = .06, SE = .09, p > .05$), therefore, TENT did not mediate the relationship between PDA and GAV.

**Hypothesis 4A: Forming as the Moderator**

Coefficient estimates in Table 2 show that Forming moderated the path from Pre-Decision Agreement (PDA) to Tentative (TENT) ($a_{xz5} = -3.70, p < .05$), but not the path from
TENT to Group Added Value (GAV) ($b_{M20} = -0.25, p > .05$), or the path from PDA to GAV ($b_{XZ20} = -1.41, p > .05$). Equation 25 was applied to coefficients in Table 2 to compute simple effects, as reported in Table 4, and portrayed in figures 2G and 2H. For no Forming, $Z = 0$, the first stage, second stage, and direct effect equaled 1.51, .125, and -2.01, respectively and all non-significant. The indirect effect was .188, and the total effect was -1.83. For the Forming condition, $Z = 1$, the first stage of the indirect effect was -2.19, the second stage was -.13, and the direct effect was -3.43, all non-significant. The indirect effect for Forming equaled .28, and the total effect was -3.15. Comparing these effects for no Forming and Forming shows that first stage of the indirect effect (-2.19 – 1.51 = -3.70, $p < .05$) was stronger for the Forming condition. The second stage of the indirect effect (-.13 – .13 = -.25, $p > .05$) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Forming and Forming (.28 - .19 = .09, $p > .05$) or the direct effect (-3.43 + 2.01 = -1.41, $p > .05$), or the total effect (-3.15 + 1.83 = -1.32, $p > .05$). Forming moderated the first stage effect of PDA on Tentative language use but Forming did not moderate any of the other paths with TENT as the mediator of PDA and GAV. This significant difference was sufficient to produce a larger effect for the Forming condition in the first stage of the model.

**Hypothesis 4B: Feedback as the Moderator**

Coefficient estimates in Table 3 show that Feedback did not moderate the path from Pre-Decision Agreement (PDA) to Tentative (TENT) ($a_{XZ5} = -1.62, p > .05$), the path from TENT to Group Added Value (GAV) ($b_{M20} = .24, p > .05$), or the path from PDA to GAV ($b_{XZ20} = .48, p > .05$). Equation 25 was applied to coefficients in Table 3 to compute simple effects, as reported in Table 5, and portrayed in Figures 3G and 3H. For no Feedback, $Z = 0$, the first stage, second stage, and direct effect equaled .66, -.04, and -2.32, respectively and all non-significant. The
indirect effect was -.02, and the total effect equaled -2.34. For the Feedback condition, Z = 1, the first stage of the indirect effect was -.95, the second stage was .21, and the direct effect was -2.03, all non-significant. The indirect effect equaled -.20, and the total effect was -2.03 in this case. Comparing these effects for no Feedback and Feedback shows that first stage of the indirect effect (-.95 – .66 = -1.62, p > .05) and the second stage of the indirect effect (.21 + .04 = .24, p > .05) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Feedback and Feedback (-.20 + .02= -.17, p > .05) or the direct effect (-1.84 + 2.32 = .48, p > .05), or the total effect (-2.03 + 2.34 = .31, p > .05). Feedback did not moderate any of the paths with TENT as the mediator of PDA and GAV.

Hypothesis 5: Certainty Usage as the Mediator

For step one PDA was regressed on Certainty use (CERT) and was not found to significantly affect CERT (β = .47, SE = .44, p > .05). Step 2 revealed that PDA was a predictor of GAV (β = -2.25, SE = .69, p < .05) but conditions in step 3 were not satisfied for mediation. CERT was not significantly related to GAV after controlling for PDA (β = .01, SE = .18, p > .05), therefore, CERT did not mediate the relationship between PDA and GAV.

Hypothesis 5B: Forming as the Moderator

Coefficient estimates in Table 2 show that Forming did not moderate the path from Pre-Decision Agreement (PDA) to Certainty (CERT) (a_{XZ5} = -1.46, p > .05), the path from CERT to Group Added Value (GAV) (b_{MZ20} = -.43, p > .05), or the path from PDA to GAV (b_{XZ20} = -1.09, p > .05). Equation 25 was applied to coefficients in Table 2 to compute simple effects, as reported in Table 4, and portrayed in Figures 2I and 2J. For no Forming, Z = 0, the first stage, second stage, and direct effect equaled 1.08, .27, and -2.12, respectively, all non-significant. The
indirect effect was .29, and the total effect equaled -1.83. For the Forming condition, Z = 1, the first stage of the indirect effect was -.38, the second stage was -.16, and the direct effect was -3.21, all non-significant. The indirect effect for Forming equals the product of the first and second stages, or .06, and the total effect is the sum of the direct and indirect effects, or -3.15 in this case. Comparing these effects for no Forming and Forming shows that first stage of the indirect effect (-.38 – 1.08 = -1.46, p > .05) and the second stage of the indirect effect (-.16 – .27 = -.43, p > .05) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Forming and Forming (.06 - .29 = -.23, p > .05) or the direct effect (-3.21+ 2.12 = -1.09, p > .05), or the total effect (-3.15 + 1.83 = -1.32, p > .05). Forming did not moderate any of the paths with CERT as the mediator of PDA and GAV.

Hypothesis 5B: Feedback as the Moderator

Coefficient estimates in Table 3 show that Feedback did not moderate the path from Pre-Decision Agreement (PDA) to Certainty (CERT) (a_{xz5} = -.66, p > .05), the path from CERT to Group Added Value (GAV) (b_{mz20} = .36, p > .05), or the path from PDA to GAV (b_{xz20} = .17, p > .05). Equation 25 was applied to coefficients in Table 3 to compute simple effects, as reported in Table 5, and portrayed in Figures 3I and 3J. For no Feedback, Z = 0, the first stage, second stage, and direct effect equaled .77, -.15, and -2.22, respectively and were non-significant. The indirect effect was -.12, and the total effect equaled -2.34. For the Feedback condition, Z = 1, the first stage of the indirect effect was .11, the second stage was .21, and the direct effect was -2.05, all non-significant. The indirect effect for Feedback equaled .02, and the total effect equaled -2.03. Comparing these effects for no Feedback and Feedback shows that first stage of the indirect effect (.11 – .77 = -.66, p > .05) and the second stage of the indirect effect (.21 + .15 =
.36, p > .05) did not differ between the conditions. When multiplied, the first and second stages did not produce a significant difference in the indirect effect for no Feedback and Feedback (.02 + .12 = .14, p > .05) or the direct effect (-2.05 + 2.22 = .17, p > .05), or the total effect (-2.03 + 2.34 = .31, p > .05). Feedback did not moderate any of the paths with CERT as the mediator of PDA and GAV. The implications of the results are discussed in the next chapter.
DISCUSSION AND CONCLUSIONS

In the present study several word usage variables were studied to determine if they mediated the relationship between pre-decision agreement and group added value. Additionally, the activities of Forming or Feedback were studied to determine if they moderated those relationships. Pre-decision agreement was found to directly affect I usage; however, I usage had no effect on group added value. Forming was found to moderate the first stage effect of tentative language use as the mediator of pre-decision agreement and group added value. The implications of these results as well as suggestions for future research and the limits of the study will be discussed.

Pre-decision agreement directly impacted levels I usage such that increasing levels of pre-decision agreement were associated with using more “I”, “me”, and “my” statements. I usage has been argued to be associated with an ego-centric style of communication (Hewes, 1996) and was argued to negatively impact group performance, particularly in the presence of high levels of pre-decision agreement. It was posited that groups with those characteristics would share their individual solutions, and if pre-discussion agreement was high, would be more likely to quickly foreclose on areas agreement, ultimately to the detriment of group performance. However, this result was not found as I usage was not related to GAV in a meaningful way in any of the conditions tested in this study.

Moderation of the first stage of the Moderated Mediation model put forth in this paper suggests that the relationship between pre-decision agreement and tentative language usage varies across levels of the Forming condition (i.e. whether the group engaged in a Forming activity) such that groups that Formed and were high in pre-decision agreement used less tentative language.
As stated previously, it can be argued that tentative language usage could be a marker of anxiety level in a group. It is reasonable to infer that Forming may have reduced anxiety level in the group, as predicted, allowing groups to speak more confidently than groups that did not have the opportunity to get to know one another prior to beginning the task. This result is interesting, however; the path from tentative language usage to group added value was not significant, suggesting that PDA’s effect on group performance did not occur through this path. This finding suggests that the level of confidence with which groups speak about possible solutions does not necessarily translate to improved outcomes.

Hollenbeck et al. (1995) developed the concept of hierarchical sensitivity that posits the ability of a group’s leader to effectively weight each group member’s judgments in order to make the highest quality decision for the group is a key determinant of effective functioning for hierarchical groups. Littlepage et al. (1995) stated confidence is an indicator that group members use to assign expertise and according to Hollenbeck et al. (1995) this would be associated with higher quality decisions; however, this does not seem to be the case. Other indicators may be used to accurately assign expertise and providing Feedback is a direct way of doing this. It is interesting that this was not related to improved outcomes and future research should address this to determine how groups actually determine expertise and what factors help members do this accurately. Tentative language use does not appear to be such an indicator.

Another result that was of particular interest was the lack of an effect for word count. A main premise in the literature on pre-decision agreement is that groups high in pre-decision agreement foreclose on solutions quickly without discussing other alternatives (e.g. Kerr & Tindale, 2004; Sundstrom et al., 1997). It is reasonable to argue that word count, an index of interaction length, would confirm this premise. However, the results of the present study indicate
that there was no effect for interaction length, suggesting that groups high in pre-decision agreement don’t necessarily reach decisions more quickly than groups low in pre-decision agreement. From this result one can speculate that something else is happening in groups high in pre-decision agreement that negatively impacts outcome. Perhaps these groups develop a sense of cohesion around areas of agreement and engage in more off topic discussion, or go into detail regarding the merits of a solution. It could be argued that this sense of cohesion could be related to a reduction in anxiety and an increase in confidence thus allowing group members to feel more comfortable discussing their thought processes more freely. Future research can address this discrepancy between the literature and the present study and speculations for future research are discussed after the limitations of the current study.

Limits of the Study

The study used students from a regional university in the Pacific Northwest; therefore, the results may not be generalizable to other populations in other settings. The students were brought together ad hoc to discuss a survival task, a topic that may be unfamiliar to many of the participants. These conditions are likely different than one would find in an organizational setting in which groups may be long standing solving problems in areas of expertise, although many members of groups in organizations are asked to solve novel problems that are extremely complex in nature. The students were offered extra credit for their participation, therefore, the sample may have been biased due to self-selection and thus the sample was not truly random.

The LIWC program used to analyze the group process variable of communication style was not developed for analysis of groups in a decision making context. To date there is no evidence that language use is an appropriate indicator of group process in a decision making paradigm, therefore, its use in this study is exploratory in nature and the results may lack
validity. However, given that the use of this instrument can provide important contributions that further research can cross-validate, its use was warranted. Additionally, the sample size may have lacked the statistical power necessary to properly test for effects in this model. LIWC cannot account for additional variance related to communication style, such as tone of voice or other non-verbal behaviors, which may have contributed to the lack of power needed to detect an effect for communication style. Finally, language was studied at a group level, therefore; order effects weren’t able to be analyzed nor were categories of word usage able to be analyzed by individual.

Suggestions for Future Research

The present study examined communication style but did not account for the function of communication. Hirokawa (1985, 1987) found that several functional components of communication (e.g. second guessing, identifying realistic alternatives, and vigilance) were associated with high quality decisions. It may be the case that communication style in combination with Functional aspects of language could be a fruitful area of future research. The communication style of a group could color the functional components of language to affect outcomes. For example, if a group member attempted to second guess a proposed solution using tentative language, the group may be less likely to be swayed than if the idea was proposed more confidently, particularly in the presence of high levels of pre-decision agreement.

Additionally, broader indices of communication style could be useful (D. Foster, personal communication, June 13, 2009). For example, creating an index where high levels of tentative and low levels of certainty language use represent an anxiety index that can be tested may provide further insights into how groups make the best possible decisions. A cohesion index could also be developed to determine more specifically the effects of Forming. For example,
high cohesion could include high levels of we and inclusive language, as measured by LIWC, and low cohesion could include high levels of I, you, and exclusive word usage. Future researchers could use these indices to determine if these group level communication styles moderate sequences of communication that have differential effects on group added value.

Interaction length was not found to mediate the relationship between pre-decision agreement and group added value in this study, nor did Forming or Feedback moderate this relationship. This is an important addition to the current literature on the effects of pre-decision agreement and determining what else is going on in groups with high levels of pre-decision agreement will be beneficial for those wishing to overcome this variables negative impact on group performance. Perhaps interaction length and cohesion interact in some way to alter the effects of high levels of pre-decision agreement.

Conclusions

Pre-decision agreement was found to negatively impact group added-value. This study attempted to determine the mechanisms by which this effect occurred. Communication style (i.e. Word usage) was tested as a potential mediating factor of this relationship. Several word usage variables were tested and none were found to mediate this relationship. Due to this I explored whether these effects may have been moderated by the development experiences that groups went through (i.e. Forming and Feedback).

Forming was found to moderate the first stage of moderated mediation models for tentative language usage. There were no significant moderated mediation results for word count (i.e. interaction length), I usage, we usage, and certainty usage. Although this study has several limitations, the results point to some interesting conclusions with regard to determining what factors can aid in the improvement of the group decision making process and can guide future
research in this important area of inquiry. Providing performance related Feedback and a
Forming activity can influence some aspects of communication style; however, this was not
found to be related to group performance in this study. Additionally, interaction length was not
found to impact group performance regardless of level of pre-decision agreement. Finally, high
levels of pre-decision agreement were associated with higher levels of I usage; however, this
effect did not impact group added value. Determining what other variables could account for the
variance of the effect of pre-decision agreement on group performance remains in question.

This study provides more questions than answers. For example, if interaction length does
not mediate the relationship of pre-decision agreement and group performance as much of the
literature suggests (e.g. Kerr & Tindale, 2004) then what is occurring in groups with high levels
of pre-decision agreement that negatively impacts outcomes? I speculated that perhaps groups
that discover they all agree may feel less tension, or perhaps less self-conscious, and discuss their
thought processes more openly. In this way, interaction length is not likely to be significantly
different between conditions, which is what was found in this study. This speculation may make
intuitive sense but in light of other findings in this study they do not hold much weight. Tentative
language and certainty language use, arguably measures of anxiety, had no significant effect on
outcome. Further research is necessary to ascertain what processes are involved.

Another question that remains to be answered is whether examining word usage is an
inappropriate indicator of group process. Further study utilizing the LIWC program in a group
context can answer this question. Furthermore, developing indices of anxiety and cohesion could
be useful when studied in tandem with functional components of communication. As mentioned
previously, communication style may interact with and “color” the functional components of
communication. Combining these components of communication can bridge the gap between what is said and how it is said.

Studying groups is a difficult task, as is attempting to analyze the effects of communication on group performance (Hirokawa, 1996). The concept of group communication style has been proposed in this study. While very little was found in terms of significant findings, this construct has intuitive appeal. Arguably groups develop a style of communicating that impacts each member's experience and willingness to share ideas and challenge those of others. Finding a way to measure this construct meaningfully would be an important addition to the literature and developing indices for anxiety and cohesion are proposed as two of many possibilities.
REFERENCES


http://homepage.psy.utexas.edu/homepage/Faculty/Pennebaker/Home2000/JWPhome.htm


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## APPENDIX A

Table 4

*Analysis of Simple Effects with Forming as a Moderator*

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<th>Mediating variable</th>
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74
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*Note. N = 75. For rows labeled Forming, No Forming, and Differences, table entries are simple effects computed from Equation 25 using coefficient estimates from Table 3. Zs = 0 and 1 for No Forming and Forming, respectively. For Forming, differences in simple effects were computed by subtracting the effects for No Forming from the effects for Forming. Tests of differences for the first stage, second stage, and direct effect are equivalent to tests of $a_{xz5}$, $b_{MZZ0}$, and $b_{XYZ0}$, respectively, as reported in Table 3. Tests of differences for the indirect and total effect were based on bias-corrected confidence intervals derived from bootstrap estimates. *$p < .05$
Table 5
*Analysis of Simple Effects with Feedback as a Moderator*

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<td>No Feedback</td>
<td>-1.59 .17</td>
<td>-2.08* -.26</td>
</tr>
<tr>
<td>Differences</td>
<td>1.38 -.11</td>
<td>.06 .25</td>
</tr>
<tr>
<td>Tentative Usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback</td>
<td>-.95 .21</td>
<td>-1.84 -.20</td>
</tr>
<tr>
<td>No Feedback</td>
<td>.66 .04</td>
<td>-2.32* -.02</td>
</tr>
<tr>
<td>Differences</td>
<td>-1.62 .24</td>
<td>.48 -.17</td>
</tr>
<tr>
<td>Certainty Usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback</td>
<td>.11 .21</td>
<td>-2.05 .02</td>
</tr>
<tr>
<td>No Feedback</td>
<td>.77 -.15</td>
<td>-2.22* -.12</td>
</tr>
</tbody>
</table>

Differences
Note. N = 75. For rows labeled Feedback, No Feedback, and Differences, table entries are simple effects computed from Equation 25 using coefficient estimates from Table 4. Zs = 0 and 1 for No Feedback and Feedback, respectively. For Feedback, differences in simple effects were computed by subtracting the effects for No Feedback from the effects for Feedback. Tests of differences for the first stage, second stage, and direct effect are equivalent to tests of $a_{ZS}$, $b_{MZ}$, and $b_{XZ}$, respectively, as reported in Table 4. Tests of differences for the indirect and total effect were based on bias-corrected confidence intervals derived from bootstrap estimates.

*p < .05
APPENDIX B

Figure 2

*Simple Effects with Forming as Moderator*
Mediated models showing simple effects for Forming and no Forming. For each model PDA represents pre-decision agreement and GAV represents group added value. *p < .05
Figure 3

*Simple Effects with Feedback as Moderator*
Mediated models showing simple effects for Feedback and no Feedback. For each model PDA represents pre-decision agreement and GAV represents group added value. *p < .05