COGNITIVE INDEPENDENCE AND COHESION

IN DECISION-MAKING GROUPS

By

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DEDICATION

This manuscript is whole-heartedly dedicated to my parents, Pauline and Jerry Trindel, for so selflessly providing me with the tools that I've needed to succeed and so wisely allowing me to choose my own path. Without their unwavering support and guidance I would never have had the strength and confidence necessary to fulfill the requirements for this degree.

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ABSTRACT

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Cognitive Independence (CI) can be defined as the tendency to form opinions and make decisions based on personal knowledge as well as additional information that appears to be valid and factual. CI implies a tendency away from normative influence and toward informational influence. In this project CI is investigated in multiple forms in terms of its effects on group decision-making. Over the course of four studies the construct is identified and defined, a scale is designed to measure it and its predictive power in state and trait variable forms are investigated on the Hidden Profile group-decision-making task (Stasser & Titus, 1985). General predictions throughout the project are that CI and group cohesion predict success on a Hidden Profile murder-mystery task. These predictions are supported by the results of the main study in which trait and state-level CI significantly predicted novel information exchange and novel information exchange and group cohesion in turn significantly predicted decision-making success.

Results are discussed in terms of their place in multiple literatures, including the study of

group bias toward shared information, group personality research, the dissent and conflict

literature, and the social influence literature.

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CHAPTER 1

INTRODUCTION

Statement of Purpose

In our society nearly every decision of great importance is left to some type of a group. We tend to rely on work groups to make more informed choices on the job, our group of friends to help us navigate the social world, and a group of close relatives to help us decide on important life choices. On a larger scale, institutions typically appoint a group of people to a board or committee to make important decisions that will affect the functioning of a particular establishment. Even local, state, and federal government have the group at the core of their functioning. Perhaps most telling with respect to the credence that we lend to groups over individuals is the fact that decisions about the fate of a person charged with a serious crime is left to groups of people that we call juries. Such groups are often even charged with the responsibility of making life-or-death decisions that society would never wish to bestow upon any individual.

There appears to be a ubiquitous belief that significant decisions, especially those having serious repercussions, should be made by some type of a group rather than by any single individual. This belief likely derives from the assumption that two or more heads are better than one. It is likely that this belief comes from the notion that groups allow us to control for one another's biases and prejudices while working together to produce something greater than any one group member could produce alone.

Such widespread acceptance of this role for groups in society raises the question of whether or not groups actually *are* superior in certain ways when it comes to making choices. This question has inspired a great deal of research comparing group and team performance to individual performance in a wide range of situations. Reviews of the literature on individual and group decision-making (i.e. Davis, 1969; Hill, 1982; Kerr & Tindale, 2004) have accumulated as more and more data on the topic are presented to the research community. The general consensus among researchers in this area seems to be that, quite often, groups actually do *not* live up to their potential when it comes to decision-making.

The purpose of the present research is to contribute to the literatures on group decision-making processes and the efficacy of the group versus the individual in completing a task. More specifically, this research is designed to investigate a particular variable that is often overlooked in contemporary small group research, that of independent thinking, or Cognitive Independence (CI), of the group's members. The proposed study will examine this cognitive independence variable in multiple forms to determine its possible effects on group decision-making.

Social Influence and Persuasion

Evidence of the deleterious influence of group influence on decision-making can be traced back to such classic social psychological research as Asch's (1956) studies. In this seminal work, Asch demonstrated that minority group members were likely to make errors in judging simple perceptual stimuli, especially when individuals were required to publicly express their judgments (Asch, 1956). Although this research is often cited as an early influence in the domain of social influence and persuasion, it has obvious ties to

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group decision-making research as well. Group members may not perform to the level of their abilities quite often due to the formation and influence of norms and normative influence (Deutsch & Gerard, 1955; Kaplan, 1989).

Normative influence seems to be particularly problematic. Aronson, Wilson and Akert (2005) define normative influence as social pressure leading individuals to conform in order to be liked or accepted. Normative influence can be contrasted with informational influence in terms of the target's perception of the influence source. When the influence source is perceived to have accurate information about an ambiguous situation and the target conforms, this change is described as informational influence (Aronson et al., 2005)

As compared to informational influence, normative influence has been demonstrated to lengthen decision time and to decrease individual support for the group choice (Reid, Ball, & Morely, 1997), although the effect of normative influence seems to vary depending on the complexity of the task (Cruz, Henningsen & Williams, 2000; Kaplan & Miller, 1987; Kelly, Jackson, Hutson-Comeaux, 1997). It seems intuitive however, that if group members refuse to share their knowledge and perspectives with their cohort due to fear of censure or ostracism, there is a risk of loss in overall group capability.

There are many ties between the social influence literature and the group decision-making literature. The group decision-making process involves sharing, altering, compromising, and sometimes all-out-changing the opinions, beliefs or judgments of multiple people in order to create a unified group output. Depending on the decision-making task, information has to be collectively recalled, differentiated, pooled,

manipulated and/or aggregated in order for group members to come to some agreement regarding a choice. Rarely would a group of people ever come together with exactly the same ideas, opinions, and plans for a given task. Usually some attitude or opinion change on the part of one or more group members is required. Whether endorsement of the new attitude or opinion occurs as a genuine private change, or is merely change for the sake of public acquiescence, will depend on the perceptions of the individual group members and the group setting as a whole.

In the social influence literature, this distinction between public and private attitudes and attitude change is an important one, and has been conceptualized differently over the years (Allen, 1965; Festinger, 1953; MacDonald & Nail, 2005; Nail, 1986). There is the common observation that attitudes and beliefs that are publicly expressed are not always analogous to those that are privately held. For example, in one study by DePaulo, Kashy, Kirkendol, Wyer, and Epstein (1996) interaction diaries kept by college students revealed that an average of one lie per every three social interactions was told in order to keep social interactions pleasant. Participants seemed to lie most often about their feelings, actions, plans and whereabouts. Participants in this study did not regard these everyday lies as serious, nor did they report planning the deceptions or worrying much about being caught (DePaulo et al., 1996). Examples of other areas of research in which public and private attitudes have been robustly demonstrated as discrepant include cognitive dissonance (e.g. Festinger, 1957) and modern racism (e.g. Gaertner & Dovidio, 1977).

Descriptive Models of Social Influence

Some of the more relevant experiences and responses to acts of persuasion that could occur in a group decision-making context will be described here. One early descriptive model of social influence proposed by Willis (1963) posited four types of possible responses to persuasive messages. According to this model, when presented with a message of disagreement from a persuasive source, a target could choose to either agree with the source (i.e. change his or her preexisting attitude), or disagree with the source (i.e. retain his or her original attitude). According to Willis (1963), if the target were to accept the message and undergo an attitude change, then the target could be deemed as conforming. On the other hand, if the target chose to disagree and retain the preexisting attitude, then the target was demonstrating what Willis called independence.

Independence can be defined as "behavior or belief that results when the influence target gives zero weight to the norms, positions, or standards of another or others" (Nail, MacDonald, & Levy 2000, p. 456; see also Nail, 1986; Willis, 1965). Thus being independent means being less influenced by the opinions and ideas of others. This influence is normative in nature. The influence source communicates a message of persuasion based on opinions and standards, and not necessarily one that has any basis in factual data or information.

The classic theoretical definition of conformity is "behavior intended to fulfill normative group expectancies as presently perceived by the individual" (Hollander & Willis, 1967, p. 64). In other words, group members realize what is desired and expected of them by their cohort and work to retain harmony by acting in accordance with those expectations. Nail, MacDonald, and Levy (2000), however, later defined conformity as

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"behavior or belief that is consistent with the norms, positions, or standards of group members based on one or more motives on the part of the influencee" (pp. 456). According to this conceptualization, the aforementioned "motives" range from being accurate, to being accepted, to establishing one's self-concept. Nail et al. (2000), argue that the classic definition of conformity (Hollander & Willis, 1967) is inadequate as it focuses only on normative and not informational influence. They argue that conformity includes not only movement toward the influence source for the sake of maintaining the approval of group members, but also movement for the sake of being right (Nail, et al. 2000).

For purposes of the current research, the classic definition of conformity offered by Hollander and Willis (1967) will be retained. A change in opinion or behavior for the sake of *accuracy* will not be classified as conformity in this text, but rather as a desire for correctness and a tendency toward knowledgeable flexibility. Within this framework, a change in attitude post influence-exposure will be labeled as conformity only if the message of influence is normative in nature. Attitude change based on information that is perceived to be factual (informational influence) will not be considered conformity here, regardless of the source.

Willis' (1963) classic conceptualization of social influence did not stop at defining conformity and independence as the only target responses to disagreement from an influence source. The model went on to address labels for target postexposure responses to agreement from the influence source. In this conceptualization uniformity, or congruence, would be the proper label for a target that retained his or her original attitude after being exposed to a source who expressed agreement for that preexisting

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attitude. On the other hand, if the influence source agreed with the target, and *then* the

target changed his or her attitude postexposure, this would be labeled as anticonformity.

Willis' (1963) early model was extremely important and influential because it was

the first to explain and underscore the difference between independence and

anticonformity (Nail et al., 2000). In both cases, the target of influence does not

conform, but the preexisting attitude does differ, and thus the type or quality of the

nonconformity varies. When the target is independent, influence is resisted and the

preexisting attitude is retained. In contrast, in the case of anticonformity, there actually is

attitude change. The change in attitude seems to be an active attempt to rebel against the

influence source, regardless of preexposure attitude. In this way, anticonformity seems

closer to the conformity response than it is to the independence response. The target is

changing his or her attitude in response to the influence source; the change is merely in

the opposite direction.

Since Willis' (1963) pivotal descriptive social response model was introduced,

several other models have been proposed that build upon the ideas detailed above. One

important issue regarding social influence in group decision-making that was introduced

earlier is that of public versus private attitude change. Willis' (1963) model did not

distinguish between such surface and deeper level attitude shift. This distinction is an

especially important one when considering social influence within the specific framework

of a decision-making group. Group members may quite often agree to endorse a

particular decision while privately feeling as though they would have chosen differently.

Ceding to the pressure of one's cohort to publicly agree while engaging in the process of

group decision-making is something quite different than privately changing one's beliefs,

attitudes, or understanding of the particular task. The distinction could directly affect a group member's ability to contribute to the process and could also affect the type of information that a given group member would be willing to share.

The necessity of the public versus private distinction complicates the descriptive modeling approach to social influence. For example, Nail's (1986) descriptive model of social response presents some more intricate labeling for responses to an influence source. This model went beyond its predecessors by including the now widely recognized constructs of conversion and compliance. Both conversion and compliance can be conceptualized as types of conformity, but they are distinguished by the level of public and private endorsement of the message. When a target (group member) is exposed to a persuasive message that serves to alter his or her preexisting attitude at both the public (behavioral) and private (attitudinal) levels, the process can be labeled as conversion (Moscovici, 1973; Moscovici & Personnaz, 1980). It was conversion that Willis (1963) was likely referring to when discussing conformity. On the other hand, compliance refers to a situation in which the target publicly changes his or her attitude to conform to the influence source, but the target's privately held attitude remains unchanged (Nail, 1986; Nail et al., 2000).

Although Nail's (1986) model included the important constructs of conversion and compliance, it did not include the construct of disinhibitory (also called behavioral) contagion (Levy, 1992; Wheeler, 1966). Disinhibitory contagion refers to a situation in which the influence target (group member) does not have a well-formed preexisting attitude prior to the persuasive message. When the influence source then disagrees with the target, the target publicly changes to agree with the influence source. This public

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change does not involve surrendering a previously held attitude or belief, however, as it would in conformity or more specifically, conversion. Rather, in the process of disinhibitory contagion, the target moves from a state of internal conflict to a state of agreement with the influence source (Levy, 1992).

Increasingly complex models of social influence response have been proposed (e.g., Nail et al., 2000), but such models are not relevant to the current research. For the purpose of discussing descriptive social influence modeling as it relates to group decision-making, it is unnecessary to go further with such detailed and complex descriptive models.

Two Types of Influence, Two Routes to Persuasion

The process of group decision-making should involve group members learning from one another and building upon one another's stores of knowledge and ideas. It is through this process of information-exchange that the quality of group product can exceed that of any one member working alone. The process that is being described here is essentially that of informational influence. The exchange of relevant information should work to strengthen the group's potential output, whereas a normative pressure to agree would presumably work in the opposite direction. The rationale for this claim is that pressure to agree does not facilitate an environment conducive to free information-exchange. Group members in such a setting might feel that although they would like to communicate their novel information to the others, they should instead simply follow along with the flow of the group rather than dissent.

Petty and Cacioppo (1981, 1986) argued that there are essentially two ways in which an influence source can change a target's attitude in their classic elaboration

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likelihood model (ELM). According to this theory, information perceived by the target to be of a factual or important nature is processed differently than is information perceived to be less important or valid. In this conceptualization, information that is carefully and effortfully evaluated by a target corresponds to the central route to persuasion. The message recipient uses cognitive effort in this process to fully evaluate the incoming information and to decide if it has the merit to dictate attitude change. In order to use this strategy, the target must be both motivated and able to allocate the necessary cognitive effort.

In contrast to the effortful evaluation that occurs under the central route to processing a persuasive message, the ELM also posits a second route that requires very little cognitive effort. In this peripheral route to persuasion, processes and factors that are rather irrelevant to the persuasive message itself can determine our actual willingness to change (Petty & Cacioppo 1981, 1986). Such irrelevant factors can include classical conditioning (Pavlov, 1927; Cacioppo, Marshall-Goodell, Tassinary, & Petty, 1992), mere exposure to the attitude (Zajonc, 1968; Cacioppo & Petty, 1989), the mere presence of an expert source, induction of a positive mood (Petty & Cacioppo, 1981; McGuire, 1985), the physical attractiveness of the source (Petty & Cacioppo, 1980; Puckett, Petty, Cacioppo, & Fisher, 1983), and even a smile (Laird, 1974) or a nod of the head (Wells & Petty, 1980).

The ELM and other dual process models of persuasion (i.e., the heuristic/systematic model; Chaiken, 1987) are relevant to the group decision-making process because they suggest a framework for understanding why, when and how group members will be persuaded to agree with the suggestions or ideas of other group

members. The ELM suggests that the central and peripheral routes to persuasion fall on a continuum with one end signifying virtually no evaluation effort and the other end representing careful and effortful evaluation of all information in the message (Petty, 1985). The choice of route depends primarily on capability and motivational factors. The model holds that targets generally wish to be accurate and that "any variable that increases the likelihood of thinking increases the likelihood of engaging the central route" (Petty, 1994, p. 2).

Just as informational influence could presumably be beneficial for the group decision-making process, utilization of the central route to processing should be as well. Each can be conceptualized as the theoretical counterpart of the other: The influence source in the group would be well advised to attempt to persuade fellow group members via informational influence, while the message recipient would be well advised to follow the central route to persuasion. In this way, group members can help to maximize the group's potential without irrelevant sources circumventing the process.

Dissent and Minority Influence

In order for a given group member to exert informational influence, he or she must be willing and able to communicate his or her information to the group, particularly if this information is new or novel. Exerting such influence can often result in disagreement or dissent from the other group members. Dissent is not always a pleasant experience, either for the dissident or for the rest of the group members. For the potential of the group's information stores to be maximally utilized however, group members must be willing to disagree when necessary.

Bias toward Shared Information

A reluctance to disagree with the group and a biased attitude against novel information is documented by researchers such as Stasser and Titus (1985) who developed a class of tasks using a Hidden Profile procedure (Stasser, 1988). In a Hidden Profile scenario, all of the information that is needed to choose a superior decision alternative is bestowed upon the group as a whole. The individual pieces of information composing the required collective, however, are dispersed among group members. In this way, no single group member has all of the information necessary to arrive at the optimal decision alone. Hence, it is imperative in this scenario that each group member is willing to share his or her novel information with the group in order to reach the best possible decision. Groups consistently display a less than optimal ability to integrate information properly in this task and as such, final decision quality suffers (Stasser & Titus, 1985; Stasser, 1988).

Each group member has only a portion of the information necessary to find the Hidden Profile and arrive at the optimal decision choice. As such, discovery of the Hidden Profile will depend upon each group member's willingness to share his or her critical information, and to consider the shared information offered by other group members during the discussion process. In this type of task, group discussion that focuses primarily on shared information makes it difficult for group members to arrive at an optimal decision alternative (Stasser & Stewart 1992).

A rather large body of research using the various forms of this task has revealed that group members do not perform well under the conditions that define this situation (i.e. Engel, 1992; Stasser, 1991; Stasser & Stewart, 1992; Stasser, Taylor, & Hannah,

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1989; Stasser & Titus, 1985; Stewart & Stasser, 1992; Stewart, Wittenbaum, & Stasser, 1995). For example, in the original study utilizing this paradigm Stasser and Titus (1985) instructed groups of participants to choose the best of three possible candidates (A, B, or C) as a hypothetical student body president. Candidate A had the most positive attributes and hence was the best possible choice.

Groups whose individual members had all of the relevant information at the start of the task were likely to choose candidate A for president, with 67% of them indicating that they preferred that candidate prior to group discussion. In this condition, group members were even more likely to choose candidate A following group discussion, with 83% of them reporting the optimal decision choice at that point. On the other hand, when individual group members received only partial information about the three candidates prior to discussion, only 23% of them chose candidate A. In this condition, even fewer participants chose the optimal candidate after talking with their fellow group members. Only 18% of these participants chose candidate A following group discussion (Stasser & Titus, 1985).

The possible explanations for these results are many and varied. One key issue and direction of research that has grown from these findings is an attempt to understand more about the preference for shared information in group discussion. The greater probability of discussing shared information at the expense of unshared information has been specifically examined and documented (Wittenbaum & Stasser, 1996). It is this preference for shared information that researchers have primarily focused on and attempted to explain.

Wittenbaum, Hubbell, and Zuckerman (1999) reported evidence for a mutual enhancement effect of discussing shared information. Participants in their study actually evaluated one another more positively when shared information was mentioned. Stewart, Stasser, and Billings (1998) hypothesized that groups who were held more accountable would be less likely to demonstrate such a strong bias for shared information. The results of this study indicated, however, that groups who were held more accountable were actually *less* likely to consider the unshared information. The focus during group discussion in these groups shifted instead to irrelevant details. Schulz-Hardt, Frey, Luthgens, and Moscovici (2000) reported similar findings, i.e., that accuracy motivation produced no differences in biased information seeking among groups. On the other hand, greater commitment to the task and greater confidence in the group did result in less biased information seeking according to their results (Schulz-Hardt et al., 2000).

Results such as these illustrate the complexity of biased information processing during group discussion. On a larger scale, this line of research also points to the complexity of understanding the tendency to avoid dissent during group discussion.

Normative Conformity Pressure

Due to some intimidation factor, it may be difficult in situations akin to the Hidden Profile scenario to present new information to the group, or to disagree with the cohort. Indeed, research findings indicate that there is often a pressure from group leaders who tend to seek compliance and punish deviancy in the group (Baron, Kerr, & Miller, 1993; Den Hartog, De Hoogh, & Keegan, 2007; Rahim, Kim & Kim, 1994). This type of pressure typically translates into a tendency toward positioning oneself with the group's majority perspective, so as to avoid censure. Pressure to conform does not only

exist in a top-down format within the group, however, with the group's leader or majority always exerting influence on the individual group members. There is a corresponding force however, possibly even one stronger than that of leader influence, that works in something of a bottom-up fashion.

It is well-known and understood that people generally prefer others who are similar to them. Festinger (1950) argued that individuals choose to associate with similar others because such affiliation serves to reduce uncertainty and facilitate the achievement of goals. Furthermore, when individuals meet with agreement from their fellow group members regarding their beliefs and ideas, they will tend to feel more confident about the validity of those beliefs and, consequently, their positive expectations about themselves and their group will be fulfilled (Insko, 1983; Kelley & Volkart, 1962).

Self-categorization theory (Haslam et al., 1998; Turner, 1985, Turner at al., 1997) posits that individuals seek to maximize their similarity to salient ingroup norms while maximizing their dissimilarity to the salient norms of the outgroup. According to this conceptualization, group members are highly motivated to conform to ingroup norms and actively search for information about those norms via the arguments of fellow group members. With this drive to avoid dissent coming from both within the individual and from the other members of the group including the group leader, it is of little surprise that sharing novel or anti-normative information with the group may be unpleasant and distasteful. To the extent that the novel information is perceived by the group's members as useful or helpful for the group's goals, dissent may be perceived as less upsetting or threatening.

However dissent or disagreement is experienced emotionally by the group's members, ample support exists in the literature for its utility in terms of accuracy in group decision-making. Schulz-Hardt, Jochims, and Frey (2002) investigated the utility of two types of dissent; genuine and contrived. Genuine dissent in a decision-making group was induced in this study by constructing groups whose members were known to favor differing alternatives. Contrived dissent in a decision-making group was created by employing the use of a "devil's advocate." The results of this study indicated that genuine dissent in the group was more effective in preventing biased information seeking than was devil's advocacy. Even so, contrived dissent was beneficial for homogeneous groups with no genuine dissenters. In other words, dissent seems to have a positive effect on attenuating the group's tendency to search for confirmatory information, with genuine consent having a greater impact than contrived dissent (Schulz-Hardt, Jochims, & Frey 2002).

Nemeth (1986) argued that minority dissent is conceptually beneficial because it surprises majority members and leads them to seek a better understanding of the minority position. This shift in perspective promotes divergent thinking, which is incompatible with a preference toward shared information or biased information seeking. Divergent thinking promotes creative thinking, which in turn promotes a more complete management of the available information. When presented with the position of a dissenter, issues and problems are considered from multiple perspectives, and group members entertain more possible solutions, which in turn promotes better detection of any optimal solutions within that set (Nemeth & Staw, 1989 Moscovici, 1978; Moscovici & Personnaz, 1980).

Certain types of genuine dissent, and certain group conditions at the time of the dissent, are likely to be more beneficial for some groups than for others. De Dreu (2002), for example, noted a mediating effect of what he termed reflexivity on the dissent–effectiveness relationship. De Dreu (2002) defined reflexivity as a tendency to reflect upon the circumstances and strategies of the group and find ways to adapt them to the current and anticipated environment in which the group is operating. De Dreu and West (2001) also reported relationship-mediating evidence for the importance of group member participation in the decision-making process. The authors demonstrated that minority dissent does stimulate divergent thought and creativity, but that such cognitive processes would only manifest as innovation if groups had high levels of participation among members.

Dissent versus Conflict

Dissent and conflict, as they affect and exist in group processes, should not be confused. Although they are closely related, these terms are not interchangeable. Dissent simply involves disagreement, or the presentation of a novel conceptualization of the relevant information. Conflict, on the other hand, involves going one step further with the process and including a certain level of tension in the construct. This tension presumably derives from the perceived need to defend one's view against competing ones. As such, conflict can be thought of as the tension that arises from real or perceived differences among group members (De Dreu, Harinck, & Van Vianen, 1999; Thomas, 1992; Wall & Callister, 1995).

In a recent meta-analysis, De Dreu and Weingart (2003) reported a strong negative effect of task and relationship conflict on team member satisfaction and team

performance. Although the negative relationship between satisfaction, performance and *relationship* conflict was expected, the correlation between satisfaction, performance and *task* conflict was in the direction opposite that which was predicted. In other words, the meta-analysis demonstrated that the effect of tension over task issues (i.e., procedure, policies) was no different than the effect of tension over social issues within the group (i.e., personal taste, interpersonal style) in terms of the affect on satisfaction and performance of the team (De Dreu & Weingart, 2003).

The results of this meta-analysis were surprising because it has long been believed that although relational conflict would likely be harmful to group processes, task conflict was akin to dissent in its capacity to spawn divergent thought and creativity (De Dreu & Weingert, 2003). Upon further consideration of the issue, however, it becomes clear that the addition of tension to the dissent process is likely what makes both task and relationship conflict harmful to group processes.

<center>Cohesion</center>

As much as dissent and disagreement seem to foster more optimal group performance via divergent thought and creativity, it makes intuitive sense that groups would seem to benefit from some force of unification as well. Ideally, a decision-making group should be a collection of individuals who bring to the table their own unique ideas, experiences and perspectives. However, they ought to also have the skills and abilities to achieve and sustain some sense of harmony within the group as they work together toward some unified output. If there is no sense of confederacy among the members of a group then it will be difficult for them to produce as a unit.

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These forces of dissent and accord in a group need not be mutually exclusive. It may be that conflict, as was discussed above, is typically a manifestation of dissent devoid of unification. It is possible that a lack of trust or regard for one's fellow group members, or a lack of commitment to the work of the group, may be the main factor that facilitates the transition from dissent to conflict. This would be a transition that group members should work to avoid, as it would be detrimental to both morale and output.

When researchers investigate the effects of harmony or commitment among group members on the output of the group, the quality being investigated is cohesiveness. The construct of cohesion began, and is still sometimes treated, as a unidimensional property. Lewin first identified cohesion as an essential group property that characterized the willingness of group members to stick together. Here, cohesion is understood to be the sum of all pressures working on a group to keep individuals together (Baron & Kerr, 2003; Dion, 2000; Patnoe, 1988). Festinger (1950) later defined cohesion in a similar way, calling it "the resultant forces which are acting on the members to stay in the group" (p. 274).

Cohesion as a Multidimensional Construct

An alternative perspective on cohesion later suggested that there are actually different *types* of cohesiveness, and that group cohesion should be conceptualized in a multidimensional way. Several factor-analytic studies have supported a multidimensional conceptualization (i.e., Carron, Widmeyer, & Brawley, 1985; Gal & Manning, 1987; Hagstrom & Selvin, 1965; Johnson & Fortman, 1988; Stokes, 1983). This development is important theoretically because it suggests that different types of

cohesion can be differentially related to specific group processes, and that specificity with regard to this construct would lead to greater understanding and predictive power.

With regard to the current study, the bidimensional construct proposed by Stephen Zaccaro and colleagues will be used (i.e. Zaccaro, 1991; Zaccaro & Lowe, 1988; Zaccaro & McCoy, 1988). In this perspective, there are two types of cohesion that operate differentially in group processes, and that can more specifically predict particular effects. The first type of cohesion is called interpersonal or social cohesion. This type can be thought of as the degree to which positive social relationships exist among group members. In other words, this construct describes how much group members do, or do not "like" one another. The second type of cohesion in this conceptualization is labeled task cohesion, and this type refers to the degree to which group members feel committed to the group's work. Task cohesion describes the degree to which individuals within the group collectively feel committed to the task itself, rather than how those group members feel about one another (Zaccaro & Lowe, 1988).

A meta-analysis by Mullen and Copper (1994) underscored the theoretical utility of this distinction between task and social cohesion. The review investigated the relationship among cohesiveness and performance in groups, and the authors reported an overall positive effect of cohesiveness on performance that was significant but small. When they broke down the effects of cohesion by examining separately the presumed dimensions, the results suggested that task commitment accounted for a greater proportion of the variance in the cohesiveness-performance effect (Mullen & Copper 1994).

Arguments in favor of conceptualizing cohesion as a multidimensional construct, and the coexistence of dissent and cohesion in the group are supported by research demonstrating the efficacy of cohesion in reducing conformity. Conversely, Janis' (1972) popular but generally unsupported model of groupthink identified cohesion as the main antecedent of this dangerous conformist group mindset. Bernthal and Insko (1993) argued, however, that work with Janis' (1972) groupthink model tended to consider only the socioemotional type of cohesion, which is more likely to lead to normative influence and hence suboptimal decision-making. Bernthal and Insko (1993) argued that task cohesion, in contrast, should help group members to avoid a pressure to conform, and hence help them to make better decisions. They therefore predicted differential outcomes of task cohesiveness and social cohesiveness, a distinction that would help to clarify the role that cohesiveness receives in the groupthink theoretical framework. The authors' predictions were supported in that groupthink tendencies were lowest when socioemotional cohesion levels were low and task cohesion levels were high in the group. They also noted, importantly, that many of the tactics recommended by Janis to counteract groupthink essentially tend to increase task cohesion (Bernthal & Insko, 1993).

Present Research

The present research is an attempt to integrate the types of benefits that come from dissent with those that originate with cohesion in group decision-making. Willingness to disagree and/or present novel information to the group does not have to compromise the group's goals. Although the processes involved in dissent, disagreement and qualification may be somewhat uncomfortable for the group's members, and

although these processes may require a greater expenditure of time in the process of group decision-making, the available research demonstrates that dissent is beneficial to group decision-making. At the same time, research indicates that benefits can also be expected from the presence of group cohesiveness, especially that of task cohesion.

A likely contributor to an individual's willingness to disagree when necessary is that person's willingness or capacity to think independently. Groups are often presented with complex tasks that require them to process multiple pieces of critical information. Each of the group's members must be willing to work with and understand the presented information and share their insights about it with the other group members. It is only through this information-sharing process that the group could possibly reach its given potential.

Individuals in the group will have difficulty processing, pooling, and considering the available information as effectively as possible if they are not willing or able to think independently about the information. It is this Cognitive Independence (CI) that makes it possible for us to avoid the pitfalls of normative influence and pressure to conform to the group's majority position.

The present research project is designed to test the prediction that CI is beneficial for group decision-making. This may seem counterintuitive at first consideration, but the idea is supported in the literature that has been reviewed above. The construct of CI is investigated here as both a state and a trait variable. Both social and task cohesion are also varied to investigate the effects and predictive power of each construct (CI and cohesion) individually and together.

It is likely that individuals vary in their natural tendency to take the time and effort to think for themselves.   In most situations, and especially in group decision-making scenarios, if one group member would rather just "go with the flow" then someone else will inevitably step in and make decisions for the group. People are likely to differ reliably on their willingness to allocate cognitive effort toward this end, with some finding it worthwhile to evaluate information and formulate unique opinions and standpoints, and others finding little fulfillment in such effort. I predict that an individual difference variable will be revealed and that this trait, called CI, will reliably predict performance in group decision-making. Support for this prediction will be detailed in the first of three pilot studies via scale development and further examined in the main study of this text.

As the trait measure of CI is developed, it will be compared and contrasted with related constructs, including Need for Cognition, an individual difference variable describing one's desire to engage in issue-relevant thinking when forming attitudes (Cacioppo et. al, 1986; Cacioppo & Petty, 1983). Although a relationship between CI and Need for Cognition is expected and will be explored, the two constructs are not considered to be one and the same. CI involves a tendency to think for oneself when making decisions and forming opinions. Need for cognition involves a desire to explore relevant information in depth. The difference between the constructs is subtle, but Need for Cognition could be thought of as a prerequisite for CI.

In the second and third pilot studies reported here, CI is examined as a state variable, with social and task cohesion varied as well in a 2 x 2 factorial design. I predict that although individuals likely have a dispositional tendency either toward or away from CI, there is

also variability within a person on this hypothetical continuum. In reporting the results of pilot studies two and three, evidence for the state variability of this construct will be presented as it predicts group performance on a Hidden Profile task. Evidence also will be reported from these studies for the hypothesized beneficial effect of CI in concert with cohesion in group decision-making.

The main study in this project will include a full model designed to test predictions derived from the research that preceded it. CI will be manipulated as a state variable, as will group cohesion. CI will further be measured as a trait variable using the CI Scale developed here. The effects of each of the three variables will be investigated in terms of how they affect group decision-making within the context of the Hidden Profile procedure. The general hypothesis in this project is that CI and cohesion will benefit group decision-making. Interactions between these predictor variables and patterns of influence for each will be investigated throughout the project.

CHAPTER 2

PILOT STUDY 1

Participants and Procedure

The goal of Pilot Study 1 was to develop and validate a scale to measure CI. To

this end, a pool of 46 items was created by the author in an attempt to assess the

conceptual definition of independence discussed earlier in this text. Some items were

worded in the positive direction (suggestive of a high tendency toward CI), whereas other

items were framed in the negative direction (suggestive of a low tendency toward CI).

For example, one item worded in a positive direction was: "I have pretty strong ideas

and values that are the basis for my decisions."   An item on the scale framed in a

negative direction was: "Generally I am easily convinced."

Independence was earlier defined as "behavior or belief that results when the

influence target gives zero weight to the norms, positions, or standards of another or

others" (Nail, MacDonald, & Levy, 2000, p. 456; see also Nail, 1986; Willis, 1965). The

operational definition of CI will not involve behavior however, but instead beliefs,

opinions, and attitudes. This is a private, or attitudinal construct, rather than one that

directly translates to behavior. As such, CI can be defined as beliefs, opinions, and

attitudes that result when the influencee gives zero weight to the norms, positions, or

standards of another or others.

The original pool of 46 items was presented to 152 undergraduate student volunteers in a Likert-type answer format. The response options ranged from 1(very inaccurate) to 5 (very accurate). Also included in the packets presented to volunteers were three other scales incorporated to investigate the convergent and divergent validity of the CI scale. The scales included in the original packet were; The Big 5 personality scale (IPIP, 2001), the self-monitoring scale (Snyder & Gangestad, 1986), and the need for cognition scale (Cacioppo & Petty, 1982). The participants coded their answers for each statement in the packet on a scantron sheet.

Results and Discussion

An exploratory factor analysis on the initial data for the CI measure revealed a Cronbach's alpha (Cronbach, 1951) of .91. Two general factors emerged from this initial analysis with the first having an eigenvalue of 11.57 and the second having an eigenvalue of 3.45. Twenty-six items were dropped because either their item-total correlations or their factor loadings were below .35. The factor analysis was re-run with the remaining 20 items and the new analysis revealed an identical alpha level of .91 (see Appendix A). Again, a two-factor structure was evidenced both via examination of a scree plot and noting eigenvalues. The eigenvalue for the first factor in this new analysis was 8.74, and the second eigenvalue came to 1.64. Upon examination of the items that loaded on the two factors, they were named "relational-influence" for a vulnerability to and desire for the opinions of others in making decisions, and "factual-influence" for a tendency to make decisions based on valid or factual evidence.

The relational-influence factor correlated significantly with several other factors that were examined in this study. In terms of the Big Five subscales, relational-influence

correlated positively with extraversion ($r = .32$, $p < .01$), conscientiousness ($r = .16$, $p = .05$), and openness to experience ($r = .19$, $p = .02$), and negatively with neuroticism ($r = -.33$, $p < .01$). In other words, those participants who reported not feeling a vulnerability to, or desire for, the opinions of others in making decisions also reported being more extraverted, more conscientious, more open to experience, and less neurotic. There was no significant relationship between this factor and agreeableness ($r = .07$, $p = .36$).

The relational-influence factor also correlated significantly, and strongly, with need for cognition ($r = .33$ $p < .01$), but not with self-monitoring ($r = -.05$ $p = .41$). This suggests that individuals who are willing and able to make decisions for themselves do enjoy thinking and processing information, but are no more likely to be high self-monitors. The lack of a relationship between the factor of current interest and self-monitoring is significant as it suggests that CI is a latent factor, or a private tendency, that may or may not manifest socially.

The second CI factor, factual-influence, evidenced a pattern of relationships similar to that of the relational-influence factor discussed above. Factual-influence, or the degree to which participants reported looking for valid evidence on which to base their decisions, correlated significantly with extraversion ($r = .22$, $p < .01$), agreeableness ($r = .16$, $p = .04$), conscientiousness ($r = .23$, $p < .01$), and openness to experience ($r = .36$, $p < .01$). Again, a negative relationship was evidenced between the factual-influence factor and neuroticism although this relationship fell short of significance ($r = -.14$, $p = .09$).

The difference between the two CI factors in their relationships to the Big Five subscales lies in the significant relationship between the factual-influence factor and

agreeableness. This correlation is positive, which indicates that individuals who search for answers to questions based on factual evidence are not simply "stubborn." They are agreeable, but independent-minded as well. Again, this finding is a reminder of the private quality of the current construct. Cognitive Independence is just that - cognitive, and it may or may not manifest socially.

The factual-influence variable also evidences a strong positive relationship with need for cognition ($r = .36 \; p < .01$), which was expected, but it was not related to self-monitoring ($r = -.06$, $p = .47$). These relationships mirror those of the relational-influence factor, and the implications of such relationships are discussed above.

The negative relationship between each factor of the CI construct and neuroticism found in this population is worthy of brief elaboration. Neuroticism is the only Big Five factor that is framed in terms of a negative personality attribute. Neuroticism can be characterized by an individual's tendency to exhibit qualities such as anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability (Costa & McCrae, 1992). Because each factor of the CI construct is negatively correlated with neuroticism, it can be concluded that an individual's ability and/or willingness to think for him or herself is not compatible with such negative characteristics as those encompassed by the neuroticism factor. This particular negative relationship translates to a positive relationship between CI and emotional stability. Because the correlation between the two factors was strong ($r = .69$, $p < .001$) and they each evidenced very similar relationships with the additional measures reported here, throughout the remainder of this project trait-level CI will be conceptualized as a unidimensional construct.

Test-retest reliability was assessed for the 20-item scale on a separate group of 134 participants. These participants completed the measure at the beginning of the semester as a part of an online departmental mass-pretest. These participants then registered to participate in a group decision-making study (the main study in this project) at their convenience before the semester's end. At the end of the group decision-making study, the 20-item CI scale was re-administered. Reliability for the measure was strong within this population ($R = .89$, $p < .001$) indicating that trait CI scores demonstrate some stability over time.

CHAPTER 3

PILOT STUDY 2

Participants and Procedure

With a better understanding of the construct of interest, the goal of Pilot Study 2 was to manipulate CI as a state variable and determine its effect on a group decision-making task in the context of a 2 x 2 factorial design. I hypothesized that CI would positively affect group decision-making on a Hidden Profile task. With participants thinking more independently, and consequently evaluating evidence in a more thorough way, the often-found pitfalls of biased information search and process loss in group information processing should theoretically be attenuated. When group members think more about factual information relating to the task, and less about agreeing with and impressing the other group members, they are likely to evidence more optimal performance in their decision-making.

There is a potentially complicating theoretical issue regarding the conflict that might arise as a result of CI. Thinking independently about a task should buffer group members against the detrimental effects of conformity pressure and the like, but this tendency might also lead to a deleterious effect on group morale, and on group commitment to the work. The construct of cohesion was consequently introduced into the design as a variable that might buffer group members against any tension that might

arise as a result of dissent in the group. Cohesion could act to ensure that dissent in this process does not evolve into conflict.

In addition to the first hypothesis regarding CI and decision quality, I further hypothesized that cohesion would serve to keep the group unified in the midst of the dissent produced by CI. Hence, cohesion was expected to have a positive effect on group decision-making as well. I predicted that groups whose members were primed both for CI and social and task cohesion would evidence the most optimal performance on the Hidden Profile task.

To investigate this claim, 30 groups of 3 participants participated in a study in which CI and cohesiveness were primed, and performance on a Hidden Profile task was assessed. Group cohesiveness was primed in a manner inspired by the research of Zaccaro and McCoy (1988). This particular priming manipulation was chosen because it was developed for a disjunctive-type task, and the Hidden Profile task has been described as such by its creators, Stasser and Titus (1985). The task is disjunctive because in order for successful performance to occur, at least one group member must possess all of the necessary information to find the Hidden Profile, and this can only occur via group discussion of unshared information. Once all of the unshared information has been discussed, it takes only one group member with the right answer to lead the group to success.

Participants in this study were primed for both social and task cohesion, because higher levels of both have been demonstrated to have positive effects on performance on disjunctive tasks (Zaccaro and McCoy, 1988). Because the Hidden Profile task has been identified as disjunctive by its creators (Stasser & Titus, 1985), task and social cohesion

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were deliberately confounded to retain parsimony in the design of this group decision-making experiment. Social cohesion was primed by asking participants to wear name tags and engage in a brief introduction session lasting 10 minutes. During this time, participants were left alone and instructed to simply "talk to one another, and get to know one another." By doing so, participants would presumably feel more comfortable working with one another because they would be allowed to develop a rapport before getting started on their work. Those groups who were not primed for social cohesion simply skipped this step.

Task cohesion was primed by communicating to the participants about the importance of the task itself. Participants were told that the results of this study would be "crucial in setting standards for future research in this lab, and as such, participants should be very concerned with their group's overall performance." These participants were also told that results of previous studies utilizing this particular task had demonstrated that success in the task is "a good predictor of cognitive ability." The purpose of this prime was to get the group focused on and committed to the task. Those groups who were not primed for task cohesion were told that this is a "pilot study, and as such groups should not be overly concerned with their group's overall performance." Additionally, no comment was made to the non-cohesive groups about the task being a predictor of cognitive ability.

CI was primed individually following the group cohesion priming process. Participants read a brief description of either the "conventional thinker" personality style (see Appendix B), or that of an "independent thinker" personality style (see Appendix C). The descriptions were of equal length, and every attempt to keep them free of value

judgments was made, including the labels that were given. The "conventional thinker" was labeled as such in order to help minimize the negative connotation that the word "conformity" receives in our present society.

After reading the description of this personality style, participants were given 10 minutes to write about a time when they felt or acted like the person being described. Participants were told that if they could not recall a time when they personally felt or acted like the person being described, then they should write about some one they know who acts or has acted in this way (See Galinsky, Gruenfeld, & Magee, 2003, Gollwitzer, Heckhausen, & Steller, 1990 for similar priming procedures).

The purpose of this exercise was to prime a mind-set. Mind-set priming is a way of activating procedural knowledge, or a general way of thinking, rather than merely priming specific ideas or mental representations (Bargh & Chartrand, 2000). This style of priming was chosen because CI can be thought of as a way of approaching the world, i.e., as a cognitive style that affects all aspects of thinking about and experiencing the environment.

Following administration of the group cohesion and individual independence manipulation procedures, the participants were each presented with a packet of information regarding a murder mystery (Stasser & Stewart, 1992). The packets described the events surrounding the fictional murder of Robert Guion, the owner of a car dealership. Mr.Guion was found by his wife Marion, murdered outside of his home. Police had narrowed their search to three suspects: Mickey, Billy, and Eddie. Each of the suspects was an acquaintance of Mr. Guion, and each seemed as though he could possibly have been guilty for different reasons. It was the participants' job to work

through the 25 pages of information to determine which of the three suspects was actually

guilty.

Participants were given 30 minutes to read over the information individually, and

asked not to discuss any of it during this time. After 30 minutes had passed, the

participants were told that each packet was missing some crucial clues about what

happened to Mr. Guion. They were told that they must talk to their fellow group

members and piece together the relevant information to determine who the real killer

was.

Participants were further instructed to not show their packets to one another or to

write notes and pass them to one another either. Instead, they were asked to simply

discuss the information, and that their discussion could include as much detail as was

necessary. The groups were then left alone for 30 minutes with the chance to make a

decision that each member could agree upon. Each member was asked to record the

group's decision in their individual packets at the end of the group's discussion.

<div align="center">Results and Discussion</div>

Answer quality was analyzed in separate Chi-square tests of significance for each

of the predictor variables and in a logistic regression analysis for a test of interaction

among the predictors. A test of the main effect of CI on answer quality was

nonsignificant X^2 (1 $N = 30$) = .51, p = .47, as was a test of the main effect of cohesion on

this variable X^2 (1 $N = 30$) = 3.06, p = .08, although this effect did approach significance.

A test of the interaction among these two variables was nonsignificant X^2 (2 $N = 30$) =

3.64, p = .16.

Although the tests of main effects and the test of the interaction were not indicative of a strong relationship, the group means were in the hypothesized directions. When groups were both cognitively independent and cohesive, they invariably chose the correct answer ($M=1$, $SD = 0$). The second most successful groups were those who were cohesive but not cognitively independent ($M = .75$, $SD = .46$). When groups were cognitively independent but not cohesive they reached the correct answer 57% of the time ($M= .57$, $SD = .53$), and when they were neither cohesive nor cognitively independent they chose correctly 62% of the time ($M = .62$, $SD = .52$).

A power analysis and estimate of effect size was computed to determine whether this pilot study had adequate statistical power to detect a significant effect. Eta-square values presented in the small to medium range with the value for CI being .185 and the value for cohesion being .076. Power for these variables was well below the recommended .80 value, with levels at .167 for CI and .092 for the cohesion variable. This finding indicates that not enough groups were run in this study to test for meaningful effects.

In addition to the problem of low statistical power, it was determined that ceiling effects were likely compromising the validity of the findings, with 74% of all participants choosing the correct answer. For these reasons, it would be very difficult to assess the true variability in performance among groups based on the present sample and procedure. Accordingly, the decision was made to alter the task with the goal of increasing its difficulty, and then rerun the experiment to assess the new, and hopefully more variable, findings. Furthermore, since the effects of cohesion seemed to be stronger than those of

CI in this pilot study, the decision was made to strengthen the independence prime in the

new design.

CHAPTER 4

PILOT STUDY 3

Participants and Procedure

Ten groups, each composed of 3 participants, took part in Pilot Study 3, which

was essentially a replication of Pilot Study 2 with a few minor alterations. The

hypotheses, primes, and decision-making task were all the same except for three major

changes; one to the CI prime, one to the murder-mystery decision-making task itself, and

one to the post decision assessment of group work.

Because CI was the major factor of interest in this project, and because its effects

were quite weak in the previous study, the mind-set prime for this variable was

strengthened. The priming procedure from Pilot Study 2 was included in this study, with

two similar procedures added to it. The additional primes were included for two reasons;

to lengthen the time spent considering CI or cognitive conformity, and also to consider

the appropriate mindset in multiple ways.

As in Pilot Study 2, participants first read about the quality of either independent

thought or that of "conventional," (i.e., conformist) thought, and then wrote about a time

when they personally acted or felt a similar way. Participants were given 5 minutes for

this first task, and they were then asked to think about some situations in which CI or

conventionality might be beneficial. Participants were told that they need not go into

great detail in describing the situations, and the situations need not necessarily be

personally relevant. However, participants were to explain why and how CI or

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conventionality would be relevant and helpful in the situations that they listed. For this second task, participants were again given 5 minutes.

After these two activities were completed, the participants were asked to read about a hypothetical situation in which their university was considering housing a new football team. The pros, including increased school spirit, and the cons, including a tuition increase, were detailed. Participants were asked to record their initial position, whether they were individually for or against the new football team.

Participants were then asked to imagine a situation in which they had to discuss the issue with a group of people, some of whom disagreed with their initial opinion. The hypothetical group would then have to make a joint recommendation regarding the proposal to the athletics department. The decision was to be based on "what is best for the students at the university."

Participants were asked to write about how they thought the group discussion would work out, given the difference of opinion in the group. They were asked to write about the effect of thinking independently (or conventionally) in this situation. Participants were asked what it would mean to be an independent (or a conventional) thinker in this situation, and what might happen as a result of thinking in this way, given the situation. Participants were given 10 minutes to complete this activity (see Appendix D).

In this study, participants were given 5 minutes to complete the tasks for the first two priming manipulations, and 10 minutes to complete the last activity. This procedure devoted a total of 20 minutes to the CI prime. The purpose of this manipulation was to

get participants thinking about this mind set in different ways, with the hope that it would help to instill the particular mindset in each participant with greater strength.

The second change to Pilot Study 3 involved the task itself. To make the murder-mystery task more difficult, a fourth potential suspect was added to the lineup. Participants received the same packets in this study as those in Pilot Study 2 received, except that now not only were Mickey, Billy, and Eddie listed as suspects, so too was Marion Guion. In this way participants would have a 1 in 4 chance of choosing the correct suspect based on luck alone, rather than a 1 in 3 chance.

The third and final change to this procedure involved the post-decision-making material that was presented to participants. Immediately after making the group decision, participants were individually presented with a list of unshared critical pieces of information from the Hidden Profile task. Each of these nine pieces was necessary for discovering the Hidden Profile but they were dispersed evenly among the three packets so that no one group member had every piece. Participants were asked to check off a piece of information only if they specifically remembered discussing that point with the other group members (see Appendix E). This measure of discussing unshared information would allow for a new outcome variable to be measured, in addition to simple answer quality. The new outcome variable in this design makes it possible to investigate an earlier stage of decision-making, the information-exchange and sharing phase. Although final decision quality depends directly on information exchange, the relationship between the two outcome variables is not likely to be a perfect correlation. Investigating decision-making in two phases allows for a more sophisticated

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understanding of the processes involved, and how the independent variables of interest affect those processes.

<div align="center">Results and Discussion</div>

The results of Pilot study 3 revealed that the ceiling effects plaguing Pilot Study 2 were ameliorated with the overall mean of participants in this study choosing the correct answer 50% of the time. Chi-square tests of significance for main effects on the answer quality variable indicated that neither CI $X^2 = (1, N = 10)$ 1.67, $p = .20$ nor cohesion $X^2 (1, N = 10) = .4, p = .53$ significantly predicted answer quality. Results of a logistic regression to assess the interaction of these independent variables was nonsignificant as well $X^2 (2, N = 10) = 2.21, p = .33$. These nonsignificant results may be due to insufficient sample size. Only 10 groups took part in this study, as compared to the 30 groups who participated the previous study.

A 2 (CI/cognitive conformity) X 2 (Cohesive, noncohesive) ANOVA was run to assess the effects of these variables on the sharing of initially unshared information variable. This model was nonsignificant $F (3,6) = .93$ $p = .48$ as well, although the main effect for cohesion approached significance $F (1,6) = 2.20, p = .16$. As in the assessment of answer choice, the group means evidenced in an interesting pattern. Groups whose members were both cognitively independent and cohesive discussed the most unshared information with their fellow group members ($M = 6.33, SD = 2.08$), whereas cohesive but non-cognitively-independent groups discussed the second highest amount of unshared information ($M = 5.5, SD = .71$). Again, it was the non-cohesive and non-cognitively-independent groups who discussed the third highest amount of unshared information (M

= 5.0, SD = .00), with the cognitively independent but non-cohesive groups discussing the fewest pieces of unshared information with the group (M = 4.7 SD = .58).

Power analysis and estimate of effect size were computed to determine the statistical power of this third study. Eta-square values again were small in size, as could be expected. Effect sizes for CI were .185 on answer quality and .015 for the information-sharing outcome variable. These values yielded power levels of only .167 and .058 respectively. Effect sizes for the cohesion variable were quite low as well, with eta-square values of .076 for decision quality and .223 for shared information. These effect sizes yielded power levels of .092 for decision quality and .199 for shared information. All of these power levels are well below the recommended .80 level. The sample size required to detect a significant difference between groups in this study is estimated at 32 groups, or about 8 groups per cell.

Means for the groups in this study were in the hypothesized directions, much as they were in Pilot Study 2. Groups who were both cohesive and independent were most likely to arrive at the correct answer (M = .67, SD = .58). Groups who were independent but not cohesive were the second most likely to arrive at the optimal answer in this task (M = .65 SD = .58). Groups that were neither cohesive nor independent evidenced a 50% likelihood to reach the correct answer (M = .50, SD = .70), while none of the groups who were cohesive and conventional (not independent) were able to agree on the correct answer (M = .00, SD = .00).

Although drawing conclusions from this research is difficult given such a small sample size, an interesting pattern of results does appear to be emerging. It appears as though the factors of interest (CI and cohesion) could be affecting the decision-making

process in their own unique ways. According to the pattern of means that has emerged in both studies, independence and cohesion, especially when working together, have positively affected group decision-making on the Hidden Profile task. It also appears that cohesion ($M = 6.00$, $SD = 1.58$) may be more beneficial than CI ($M = 5.5$, $SD = 1.64$) in promoting the discussion of unshared information, whereas CI seems to have a stronger effect on the actual decision that is made ($M = .66$, $SD = .51$) than does cohesion ($M = .40$, $SD = .55$). This pattern of means could be suggesting that, during the divergent thought process of decision-making, cohesion is beneficial to the group, as more information is discussed when group members feel good about one another and about the task. At the same time, it is possible that after the relevant information has been presented, CI allows group members to manipulate that information and process it more effectively during the convergent stage of decision-making.

CHAPTER 5

MAIN STUDY

In the previous studies, the construct of CI was defined and developed. A 20-item scale was designed to measure CI as a trait variable, and a 20-minute priming procedure was created to manipulate it as a state. Some evidence emerged over the course of these studies to indicate that state-level CI could predict differences in group success on the Hidden Profile task. Evidence also emerged in support of the relevance of cohesion for success on this task.

The main study in this project was designed to provide a comprehensive test of the effects of state CI, trait CI, and cohesion on group decision-making. The effects of trait-level CI on Hidden Profile decision-making have not yet been investigated. The general hypothesis was that both CI and group cohesion would benefit group decision-making. CI would presumably attenuate the groups's well-documented preference for shared information on this task (Wittenbaum & Stasser, 1996) and instead prompt the willingness to share more novel information and to disagree with other group members. Cohesion could be expected to keep the group together and motivated throughout the dissent process.

Because the Hidden Profile task is designed to bring group members with diverse information together, willingness to voice disagreement with one another is essential for success in this paradigm. It is by virtue of this dissent process that unshared information

can become known to the group. Group members must share their unique information with one another in order to fully understand their decision options. When group members are made aware of all unshared critical pieces of information, their preferences will tend to shift in favor of the optimal choice.

Although the benefit of dissent and conflict in group interaction has been debated (De Dreu & Weingart, 2003), many studies cite evidence for its utility in particular types of group interaction (i.e., De Dreu, 2002; Nemeth, 1986; Nemeth, Rogers, & Brown, 2001; Schulz-Hardt et al., 2002). In fact, it was an original aim of the creators of the Hidden Profile paradigm (Stasser & Titus, 1985) to demonstrate that dissent among group members on this task increased the likelihood of solving the problem. The rationale was that disagreement would increase information exchange and lead to better performance. This prediction was not supported in the original study, although subsequently dissent has been supported as a predictor of success on the Hidden Profile (Stasser & Titus, 1985).

Shulz-Hardt and colleagues (2006) demonstrated that prediscussion dissent significantly predicted decision quality via the mediating effects of discussion and discussion intensity. When dissent was experimentally manipulated in this study via a particular information-distribution scheme, groups heterogeneous in their prediscussion preferences discussed the optimal decision choice more often and more intensely than did homogeneous groups. Although dissent was contrived at the prediscussion level in this study and could be alternatively labeled as diversity or heterogeneity, the results of this study lend further support to the argument that dissent is beneficial to the process of information exchange (Schultz-Hardt et al., 2006). In regard to the present study, these

findings suggest that, if state and trait-level CI do enhance the willingness to disagree and the tolerance of such dissent, they should enhance performance on the Hidden Profile task.

Cohesion is expected to predict better performance in this study by keeping the independently-minded group members working together. Gully et al. (1995) demonstrated that cohesion was particularly important for tasks requiring a high degree of coordination and communication among group members. The Hidden Profile paradigm exemplifies such a task, because group members must share and accept novel and complex information, consider multiple alternatives, decide which pieces of information are most important, and then integrate them.

Higher levels of both social and task cohesion have been demonstrated in the past to benefit group output on disjunctive tasks (Zacarro & McCoy, 1988). Although the Hidden Profile task has been identified as a disjunctive-type task by its originators (Stasser & Titus, 1985), cohesion has not yet been demonstrated as a predictor of success on this task in the published research. It is hypothesized that cohesion will predict success in the current study not only because the task-type is disjunctive but also because cohesion will serve to keep the group united throughout the rigors of the dissent process in group interaction.

Although both CI and cohesion are expected to positively affect group performance on the Hidden Profile task, it also possible that these variables will affect the specific phases of decision-making in this study differently. The pattern of means in Pilot studies 2 and 3 suggested that cohesion more strongly affected information-sharing whereas CI had its influence on final answer quality. This particular pattern of

relationships failed to reach significance. In contrast, existing research would suggest a different pattern of relationships among these variables.

In the first phase of decision-making, information-exchange must take place in order for the group to be successful. Group members must not only be willing to accept novel information from their groupmates, they must also be active in considering all possible outcomes for the group. Groups must be divergent thinkers during this phase as they work through all of the information that is available to them, both shared and unique. Dissent has been identified as a predictor of divergent thinking in multiple paradigms and settings (De Dreu & De Vries, 1993; Nemeth, 1986; Volpato, Maass, Mucchi-Faina, & Vitti, 1990). With this research in mind, it is expected in the current study that CI will have its greatest effect during the information exchange phase of the process (the initial phase). CI should increase willingness to dissent, divergent thinking, and thus novel information exchange.

In the second phase of the decision-making process, once information-sharing and evaluation has been completed, groups must then think convergently and agree upon a best possible decision. Cohesion would be expected to have a stronger influence on this phase of the task than on the initial phase, with groups whose members like one another more and feel more committed to their goal more easily converging upon a best possible answer alternative once information-sharing has taken place.

Cohesive groups may be more motivated than noncohesive groups as a byproduct of the cohesiveness manipulation. This possible side effect of the cohesiveness manipulation would serve the final stage of decision-making in this task as well. Groups whose members are more motivated would presumably function best under conditions in

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which all relevant information is available to everyone. It is at this stage of the process that group members must decide which pieces of information are most relevant and how to best piece them together to generate the best possible decision alternative. This process of weeding out important versus unimportant information at the group level, and further making sense of it while working to find the "Hidden Profile," presumably requires cohesion, motivation, and convergent thinking.

Trait-level CI is the newly added variable in this investigation of success in the decision-making process. I predict that trait and state-level CI will have similar effects. Group members high in trait CI are expected to share more initially unshared information because they will engage in more divergent thinking and because they will be more tolerant of dissent in the group. However, because trait-level CI is an individual-difference variable that is measured at the group level, some alternative predictions are also possible.

A review of the literature indicates that relationships between individual traits and outcomes often do not hold when aggregated at the group level. Group and team composition of personality characteristics have been investigated in a variety of ways. Group member characteristics have been averaged (Lepine, 2003; Porter et al., 2003; Taggar, 2002), diversity levels within the group have been investigated (i.e., Waldman, Atwater, & Davidson, 2004), proportion strategies have been used (Barry & Stewart, 1997) and high/medium/low group categorizations have been used (i.e., Bonner, 2000) to study the effects of personality at the group level. A problem in reviewing and summarizing this literature is that such aggregation strategies, as well as the outcome measures and task types vary widely in this research. It is challenging to understand the

intricacies of individual difference variables acting differently in the context of the group, and it is especially important to note the data collection and measurement techniques used when interpreting these results. This complexity in interpretation is highlighted when reviewing representative studies investigating Big Five variables in terms of how they affect group interaction.

Barry and Stewart (1997) demonstrated that positive correlations between individual job performance and the Big Five factors extraversion and conscientiousness reported elsewhere (Barrick & Mount, 1991) did not hold when aggregated at the group level. Specifically, the results of this study indicated that the performance of graduate student work groups could not be predicted by aggregated levels of conscientiousness. A curvilinear relationship between the aggregated extraversion of the group members and their work group output was also demonstrated (Barry & Stewart, 1997).

Bonner (2000) demonstrated that group members with very high levels of extraversion were likely to dominate the group decision-making process. Barry and Stewart (1997) demonstrated that although group-level extraversion was related to group output in a curvilinear fashion, extraversion was not related to openness of communication or to cohesion in the group. These authors reasoned that extraversion increases the quantity but not necessarily the quality of verbal exchanges in the group. Whereas Bonner (2000) investigated extraversion in laboratory groups with a majority aggregation strategy and influence as the outcome variable, Barry and Stewart (1997) investigated field groups with a proportion strategy and used outside ratings of performance quality as the outcome measure.

Although most of the published research on personality variables at the group-outcome-level investigates the effects of Big Five variables (Barry & Stewart, 1997; Graziano, Hair, & Fitch, 1997; Bonner, 2000; Lepine, 2003; Neuman, Wagner, & Christiansen, 1999), a few studies have investigated other trait variables in this context as well. One such study with particular relevance to the current project explored the possible effects of social desirability, need for cognition, and communication apprehension in predicting information-sharing on the Hidden Profile paradigm (Henningsen & Henningsen, 2004). In this study, only social desirability was able to negatively predict unique information-sharing in the group, with the individuals who scored higher on this measure being less likely to repeat novel information and more likely to repeat shared information instead. The authors' hypotheses regarding need for cognition and communication apprehension were not supported by the data. Communication apprehension had no significant impact on information exchange. This was surprising because past research has demonstrated that communication apprehension negatively predicts participation when investigated at the individual level (Jablin & Sussman, 1978; McCroskey & Richmond, 1992). Of similar interest, need for cognition was expected to be a positive predictor of group information exchange because this variable predicts related behaviors at the individual level (Cacioppo, Petty, Feinstein, & Jarvis, 1996; Baily, 1997; Levin, Huneke, & Jasper, 2000). Instead of predicting unique information-sharing in group decision-making, however, need for cognition significantly predicted bias toward shared information. In sum, two out of three of the trait variables in this study behaved very differently in group-level hidden-profile decision-making than

would be expected given previous individual-level data (Henningsen & Henningsen, 2004).

With the challenges and complexities of investigating individual traits at the group level in mind, specific predictions about the nature of the relationship between trait-level CI and outcomes in this study were not made. Instead, I made the more general prediction that CI would be more predictive of information-sharing than final answer quality in the group, based n the presumption that that trait-level CI will lead to greater divergent thinking and dissent. In this way, trait-level CI is expected to benefit the overall group decision-making process.   Group average, heterogeneity, highest maximum and lowest minimum scores on this variable were all used in the attempt to meaningfully predict information-sharing.

<center>Method</center>

Participants, Design and Procedure

A total of 228 undergraduate students at UT Arlington participated in this study. Participants were organized into 76 3-person groups. The design of the study was a 2 (manipulated CI/cognitive conformity) X 2 (manipulated cohesion/noncohesion) factorial, with trait-level CI left to vary naturally in the population.   Trait-level CI was assessed prior to the time of experiment. Participants completed the 20-item CI Scale (see Appendix A) online at the start of the semester as a part of a mass pretest prerequisite for all psychology experiments taking place at UT Arlington. Participants then registered for the decision-making experiment at their convenience throughout the course of the 4-month semester. At the time of the decision-making experiment the CI measure was re-administered. CI-measures collected at the time of the experiment were

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included in the analyses for participants who neglected to complete the measure at the time of the pretest (n = 94).

Upon arrival at the time of experiment, participants were told that this study was designed to investigate group and individual decision-making. Upon arrival, group members were either immediately brought into separate rooms (non-cohesive condition) or they were directed into one room and asked to sit at a round table (cohesive condition).

Groups receiving the cohesion manipulation began the study by sitting down together at a round table. It was in this setting that these group members gave consent to participate. After the consent process was completed, the participants in this condition were asked to create identification tags. Each participant was given an index card on which to fill in a name, a location where he or she had grown up, and a few favorite hobbies. Participants were given a moment to do this and then they were asked to adhere the card to themselves using either a piece of tape or a paper clip.   Participants were then left alone for a 10-minute introduction session.   The purpose of this session was to prime social cohesion. The instructions were: "Just talk to one another and get to know one another a bit during this time." Observation from previous such sessions indicated that participants did indeed use this time to talk to one another and often seemed to enjoy it, even continuing attempts to socialize after the 10-minute period was up.

In order to manipulate task cohesion groups were told: "The results of this study will be crucial in setting future standards for this lab, and as such all participants should be very concerned with their group's overall performance." Cohesive groups were also told that the results of previous studies indicated that performance on this task was a

"good predictor of cognitive ability." The purpose of this manipulation was to get the group focused on and committed to the task.

Meanwhile, groups in the non-cohesive condition completed the study consent process in individual rooms rather than all together. These groups were not given the 10-minute introduction opportunity and the participants did not create identification tags. In order to manipulate low-task-cohesion in this condition, groups were told that this is a "pilot study, and as such groups should not be overly concerned with their group's overall performance." Additionally, no comment was made to the non-cohesive groups about the task being a predictor of cognitive ability (see Zaccaro & Lowe, 1988; Zaccaro & McCoy, 1988).

After completing the appropriate cohesion manipulation, groups then completed the independence or conformist activities depending on their assigned condition. Group members spent time individually thinking and writing about a time when they either acted independently or "conventionally" (as a cognitive conformist). Participants began by reading over a description of either CI or cognitive conformity. They were asked to think about the mindset description and then try to recall a time when they personally acted or felt in a similar way. Participants then spent 5 minutes writing about the memory (see Appendices B and C).

Group members then engaged in two more activities in which they were instructed to use their assigned mindset to consider and write about additional issues. In the first of these two activities, the participant was instructed to list three situational examples in which it would be beneficial to behave in a manner consistent with the assigned mindset. In the second of these activities, the participant was presented with a

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description of an ambiguous situation and asked to use the assigned mindset while considering the best possible course of action in this scenario (see Appendix D). The total time spent on the mindset manipulation was 20 minutes.

After the priming procedures for cohesion and CI had been completed, the Hidden Profile murder mystery task was introduced. Participants were given 30 minutes to read through the packet of background material individually. Cohesive groups continued to sit together at the round table while doing this. These cohesive groups were instructed to "read quietly and please do not discuss the material until you are instructed to do so." The non-cohesive group members remained in their individual rooms during this time, where they had given consent and completed their CI activities. At this point, the noncohesive group members had not yet met or spoken to one another.

After the 30-minutes of quiet reading time had lapsed, the group members were given an additional 30 minutes to discuss the information and come to a decision regarding which suspect committed the murder. Cohesive groups remained at the round table for this phase of the study, whereas the noncohesive groups moved from their individual rooms to the round table so that they could now work together. A 4-suspect configuration was used in the murder mystery task to avoid the ceiling effects that had been encountered in earlier phases of this project. Participants were told that "each participant has information about this case that no one else has, and as such you must work together to find the real killer." Groups were told that there was a correct answer and that they would be informed of the identity of the true murderer at the end of the study. This 30-minute group decision-making interaction phase was videotaped for later behavioral analyses. Following the group decision-making phase, participants were

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presented with the "information-sharing checklist" to assess which of the nine critical pieces of information were shared during the group discussion (see Appendix E). The 20-item CI scale (see Appendix A) was then re-administered to participants in order to collect measures from those participants who had not completed the measure previously, and to assess test-retest reliability for the measure.

Rater training

Coders were recruited and trained to rate the videotaped group decision-making sessions. Rater training was an involved process. Raters were first trained to reliably code CI behaviors both at the group and individual level. They were presented with a written description of CI and the construct was discussed with them. In order to clarify the "opposite" of CI, coders were also given a description of cognitive conformity. The written descriptions provided to raters were the same ones given to participants in the main study (see Appendices B and C).

The major challenge in coding for behaviors that are cognitively independent or cognitively conformist is that these characteristics are by definition cognitive. Over time and in the course of viewing and discussing group behaviors however, raters were able to come to consensus regarding the degree to which groups and individuals within groups behaved in a CI manner.

Raters were also trained to code for group cohesion, motivation, and freedom to express ideas. Cohesion was coded at only the group level, whereas motivation and freedom were coded at both the group and individual group-member level. The motivation variable was included to assess the degree to which the group and its members seemed driven and enthusiastic during their interactions. The freedom to express ideas

variable was designed to assess how willing each group member, and the group as a

whole, seemed to feel in expressing their ideas and opinions. It was expected that ratings

of CI, cohesion, motivation and freedom behaviors would be related, but that each set of

ratings would assess some slightly unique process occurring within the group.

Raters also coded for certain time variables, including the total time spent discussing the

task, the time elapsed before the first piece of unique information was shared, and the

time spent off-task during the group interaction phase. Coders indicated which group

member shared the first piece of unshared information, and if there was a group leader,

the coders indicated who that person was. Disagreements among group members were

rated in terms of number and quality. The quality of disagreements during group

discussion was rated on a 5-point scale with a rating of 1 indicating that the group reacted

poorly to the disagreement and a rating of 5 indicating that the group reacted well. Poor

reactions within the group included behaviors such as falling silent for a period of time

after dissent was voiced, becoming angry or aggravated by the disagreement, and

ignoring the dissenter altogether. Positive reactions to dissent included addressing the

point of disagreement calmly and rationally, discussing the reasoning behind the dissent,

and compromising with the dissenter.   Inter-rater reliabilities among the coders are

reported in the Results section. Appendix G includes a copy of the entire murder mystery

videotape coding form.

<div align="center">Results</div>

Manipulation Checks

   The CI and cohesion manipulations were checked in terms of their effects on

behavior in the group. Groups receiving the CI manipulation were rated as more

<div align="center">55</div>

independent ($M = 3.9$, $SD = .89$) than those who received the cognitive conformist prime ($M = 3.26$, $SD = 1.13$). The result of this test of means indicated that the CI manipulation did affect the behavior of group members ($t = 4.51$, $p < .01$) according to ratings of their videotaped interactions. The cohesion manipulation was also effective ($t = 4.98$, $p < .001$) so that groups primed for high cohesion were identified as demonstrating more cohesive behaviors ($M = 3.75$, $SD = .66$) than were those primed for low cohesion ($M = 3.13$, $SD = 1.18$) during the interaction phase.

Sharing of Unshared Information

In this study three measures of the CI trait were used; group average, highest maximum, and a measure of group heterogeneity of CI. Highest maximum was defined by the individual with the highest scale score in the group. This high score was used as a predictor for each group's total performance. Heterogeneity was a dichotomous variable defined by the presence of at least a one-point difference between the highest maximum and the lowest minimum group-member scale score. Groups whose highest maximum and lowest minimum members differed at an amount of less than one point on the scale were labeled "homogeneous" (see Table 1 for intercorrelations).

Standard multiple regression was performed on the dependent variable unshared information. Predictor variables in this regression were state-level CI and trait-level CI conceptualized as group average, highest maximum, and heterogeneity level. The total variance in unshared information accounted for by the model was 27%.

Interactions among the measures of trait CI in this equation were explored for possible effects on the outcome variable. The continuous measures of average group CI and highest maximum group score were centered. The interaction between predictor

measures group CI average and group CI heterogeneity was significant, $t(1, 69) = 2.13$, p $= .03$, as was the interaction between highest maximum score and heterogeneity, $t(1, 69)$ $= -3.73$, $p < .01$. There was no significant interaction between the group CI average and highest maximum, however, $t(1, 69) = -.28$, $p = .78$. Interactions between manipulated CI and each of the trait CI measures were examined as well, with none of these interactions reaching significant levels. Manipulated cohesion interacted with group CI, average $t(1, 74) = 2.68$, $p = .01$, and as well with highest maximum score, $t(1, 74) = -2.82$, $p = .01$.

A full model including all possible 2-way interactions was compared to the reduced model with manipulated CI, average group CI, highest maximum, and heterogeneity scores included as predictors. The change in R^2 was nonsignificant ($R^2\Delta = .511$) when interactions were included in the model. Therefore, the reduced model was reserved. Table 1 reports descriptive statistics, beta weights, squared semipartial correlations, tests of multicollinearity, and Pearson correlations for the reduced regression model predicting novel information exchange.

Table 1 State and Trait-Level CI Predicting Novel Information-Exchange

Variable	M	SD	B	Sr2	VIF	Intercorrelations			
						1	2	3	4
Unshared	6.10	8.54							
CI Primed	1.49	.50	.14*	.05	1.04	.16			
Highest	4.31	.37	-1.05**	.24	4.68	-.23*	.01		
Group CI Average	3.83	.33	.83**	.15	4.35	-.08	.08	.77**	
Hetero	.40	.49	.53**	.15	1.79	.14	.17	.29	-.13

* = p < .05
** = p < .001

State-level CI was a positive predictor of sharing of unshared information in this model $t = 2.13$, $p = .051$. This result supported the hypothesis that CI at the manipulated level would benefit the decision-making process. The hypothesis regarding cohesion and group performance was not supported at this phase of the decision-making process, as evidenced by the finding that adding cohesion to the regression model reduced its overall predictive power.

The relationship between trait-level CI and sharing of unshared information appears to be complicated. Although the group average of CI personality scores evidenced a negative but nonsignificant bivariate correlation with the unshared information outcome variable ($r = -.08$, $p = .51$), group average becomes a significant positive predictor in the regression equation ($t = 3.97$, $p < .01$). This change can be

understood in terms of including the effects of heterogeneity and highest maximum score in the model.

Heterogeneity in group level CI was a significant positive predictor in the regression equation ($t = 3.92$, $p < .01$) indicating that having a mix of individuals high and low in CI within the group is beneficial for group decision-making. Although the group benefits from heterogeneity on this personality variable, the highest maximum group member score on trait-level independence was a significantly negative predictor of unshared information in the model ($t = -4.81$, $p < .001$). It seems that having a higher group average on the CI trait variable is beneficial for this phase of decision-making, but only when the group is heterogeneous and the highest group member has a relatively moderate score on the trait variable.

Because particular pairs of predictors in this model demonstrated high intercorrelations with one another (i.e., highest maximum CI and group average CI) tests of multicollinearity were performed to investigate possible redundancy among the predictors. Variance inflation estimates evidenced within an acceptable level. The highest VIF estimate corresponded to the highest maximum CI predictor with a value of 4.68. The VIF estimate for group average CI was 4.35, the estimate for group heterogeneity was 1.79 and state-level CI predictor yielded a VIF estimate of 1.04. Because these numbers are relatively low, one can assume that no two of the predictors are correlated highly enough to be regarded as statistically redundant with each other.

Next, I examined the possibility of curvilinear relationships between each of the measures of trait-level CI and the unique-information sharing outcome variable. I was particularly interested in examining the relationship between the highest maximum CI

measure and the unique-information sharing variable because this relationship is strong and negative in direction. However, squaring or cubing any of the predictors within this design, including most notably highest maximum CI, yielded only a reduction in the predictive power of the model. Plots of the relationships between those squared and cubed predictors did not produce any recognizable curvilinear pattern.

Answer Quality

The simple correlation between the two dependent variables, sharing of unshared information and answer quality, revealed a strong and significant relationship ($r = .66$, $p < .001$). This could be expected because the Hidden Profile procedure is designed as an "aha" disjunctive type of task. When at least one group member becomes aware of all of the necessary information, the correct answer (in this case the identity of the true murderer) should become clear to the group as a whole. In light of the inextricable link between the two phases of the decision-making task, the sharing of unshared information variable was used as an independent variable in the regression model predicting answer quality.

Exploratory logistic regression analysis was performed on answer quality as an outcome variable with all possible combinations of predictor variables to determine which regression model would best fit the data. Beginning with a model including only the unshared information variable as a predictor $X^2 (1, N = 76) = 16.90$, $p < .001$ increases in predictive power were investigated via other models. The only model more powerful in predicting answer quality was one that included both unshared information and manipulated cohesion as predictors $X^2 (2, N = 76) = 18.90$, $p < .001$. Table 2 shows

regression coefficients, Wald statistics, odds ratios, and 95% confidence intervals for

odds ratios for each of the predictors. The R^2 for this model was .15.

Table 2 Logistic Regression Analysis for Answer Quality

Variables	B	Chi-Square	Odds Ratio	Lower Confidence Interval	Upper Confidence Interval
Unshared Information	.30	5.47*	.74	.58	.95
Cohesion	.69	1.97	1.99	.76	5.17

$* = p < .05$
$** = p < .001$

Full Model

Path analysis was performed to test a full theoretical model suggested by the

results of the separate regression analyses reviewed above. A graphic illustration of the

model appears in Figure 1, including the standardized path coefficients and the

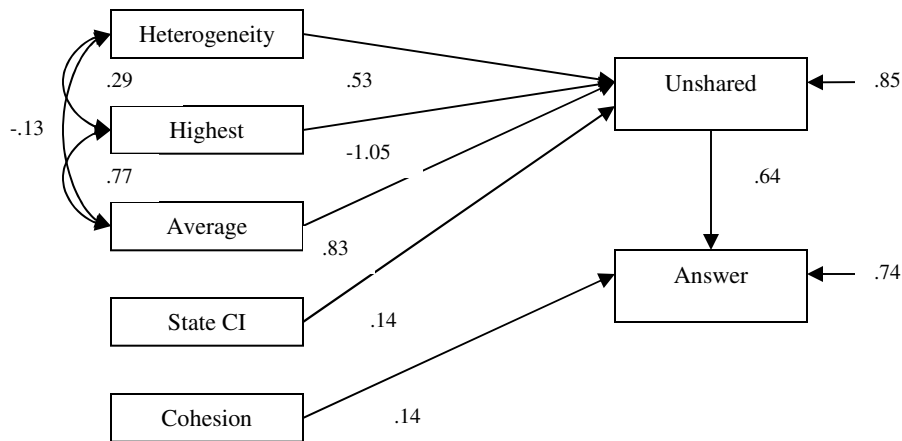correlations among exogenous variables.

Figure 1 Full Model

Note. Standardized Path Coefficients Appear on Single-Headed Straight Arrows; Correlations Appear on Double-headed Curved Arrows; All Path Coefficients Significant at $p < .05$ or Lower

Goodness of fit indices for this model are reported in Table 3. The maximum likelihood method of parameter estimation was used. The chi-square test of significance reported in Table 3 indicates that the model fits the data. Additional goodness of fit indices reported here include the normed fit index, or NFI (Bentler & Bonnet, 1980), the non-normed fit index, or NNFI (Bentler & Bonnet, 1980), and the comparative fit index, or CFI (Bentler, 1989). Each of these values is greater than .9, indicating an acceptable fit between model and data.

The initial model used in this analysis was retained without modification, with each path coefficient evidencing a statistically significant t value ($p < .05$). The analysis revealed an R^2 value of .28 for the unshared information variable and .46 for the answer quality variable.

Table 3 Goodness of Fit Indices for the Path Model

Model	Chi-square	df	p	NFI	NNFI	CFI
Null Model	195.36	21	.001	.000	--	--
Test Model	3.81	5	.577	.981	1.03	1.00

Note. $N = 76$. NFI = Normed fit index; NNFI = non-normed fit index; CFI = comparative fit index.

Although multicollinearity has been ruled out in this model, the intercorrelations among the aggregation measures of trait-CI are high, especially between group average CI and highest maximum score. These two variables are each strongly related to the sharing of unshared information, and group CI heterogeneity is an important predictor of unshared information as well. Unique information exchange is a strong predictor of final answer quality. Cohesion helps to meaningfully predict answer quality while manipulated CI helps to predict information-sharing. Overall the model test indicated that the effect of CI on answer quality is significant when mediated by information-sharing. Cohesion helps to strengthen the overall model by predicting answer quality independently of CI.

Behavioral Analyses of Videotape Data

Group interaction during the 30-minute discussion phase of the decision-making process was videotaped and rated by coders. Inter-rater reliability in coding among two undergraduate assistants for a subset of 26 groups including at least 6 groups in each cell of the design was demonstrated at acceptable to strong levels for the variable of interest. The raters went on to individually code the remainder of the data (25 groups each

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including at least 6 groups per cell) with regular checks of progress. Although the raters were blind to condition, they were aware of the general research questions and study design. Values of Cohen's Kappa (Cohen, 1960) were in the moderate range for ratings of motivation (.81), freedom (.83), length of time to first piece of unique information discussed (.86) and number of disagreements (.85). Kappa values were high for ratings of cohesion (.91), independence (.95) and disagreement reaction (.94).

<div align="center">Videotape Analysis on Unshared Information Variable</div>

An exploratory multiple regression was performed to investigate the relationships between sharing of initially unshared information as the outcome variable and group ratings of independence, cohesion, freedom to express ideas, and motivation as the predictors. The initial model that included all predictors accounted for 29% of the variance in the sharing of initially unshared information $F(4, 73) = 7.59$, $p < .001$. The R^2 value did not improve with removal of any of the predictors from the model. The strongest relationship in the model predicting information-sharing was between the outcome variable and ratings of motivation $t(1, N = 76) = 3.24$, $p < .01$. All predictors in the model demonstrated a positive relationship with the outcome variable except for freedom to express ideas, $t(1, N = 76) = 1.35$, $p = -.18$. Table 4 reports the means, standard deviations, and Pearson correlations for this model.

Table 4 Group-Level Behavioral Ratings Predicting Novel Information-Exchange

						Intercorrelations			
Variable	<u>M</u>	<u>SD</u>	<u>B</u>	<u>Sr2</u>	<u>VIF</u>	1	2	3	4
Unshared	5.14	2.01							
CI Rated	3.78	.85	.19	.02	1.93	.42**			
Cohesion	3.65	.75	.11	.01	1.56	.32*	.53**		
Freedom	4.18	.80	-.20	.02	2.16	.29*	.59**	.53**	
Motivation	4.26	.87	.47*	.10	2.14	.50**	.62**	.47**	.67*

$* = p < .05$
$** = p < .001$

The relationship between freedom to express ideas and willingness to share unshared information is significant, but this relationship is not as strong as the one between motivation and information-sharing. Freedom is a negative predictor when included in the regression model, suggesting that free groups may be more willing to discuss shared rather than unshared information. Tests of multicollinearity indicated that no two predictor variables were correlated so highly as to be regarded as statistically redundant. VIF estimates for ratings of independence and cohesion were less than 2 (1.93 and 1.56 respectively), whereas the VIF estimate for freedom was 2.16 and the value for motivation was 2.14.

Whereas free groups might be more willing to discuss shared information, additional analyses indicated that groups who disagree discuss more unshared information ($r = .24$, $p = .03$). Reaction to these disagreements were predicted by

measures of trait-level CI in the group $F (3, 73) = 3.85$, $p = .01$. In this regression

equation, highest maximum CI again negatively predicted group decision-making success

($t = -3.16$, $p < .01$) while average group CI ($t = 2.34$, $p = .02$) and a higher level of trait

heterogeneity ($t = 2.41$, $p = .02$) positively predicted disagreement quality in the group.

The relationships between the unshared information outcome variable and

individual ratings were also examined. CI scale scores were significantly correlated with

sharing of unshared information in terms of which group member shared the first piece of

unique information. Individuals higher in trait-level CI were more likely to share the first

piece of unique information in the group ($r = .14$, $p = .03$). In addition, the individual

with the highest CI score in the group was significantly more likely to be the first group

member to share unique information ($r = .23$, $p < .001$).

The model most efficient and parsimonious in predicting sharing of information at

the level of individual behavior accounted for 20% of the variance in the outcome

variable, $F (2, 225) = 27.43$, $p < .001$. This equation regressed sharing of unshared

information on a linear combination of motivation and freedom ratings among

individuals in groups. The strongest predictor in the model was again ratings of

motivation $t (1, N = 228) = 6.35$, $p < .001$. Whereas motivation was a positive predictor

in this equation, freedom was again a negative predictor. Freedom of each group member

to express ideas predicted the sharing of unshared information $t (1, N = 228) = -1.14$, p

$=.26$ and strengthened the overall predictive power of the equation, although the

relationship did not reach significance. Table 5 reports the means, standard deviations,

semipartial correlations, and Pearson correlations for this model. VIF values for the

predictors both equal 1.69.

Table 5 Individual-Level Behavioral Ratings Predicting Novel Information-Exchange

Variable	M	SD	B	SR2	VIF	1	2
						Intercorrelations	
Unshared	5.17	2.02					
Freedom	4.14	.94	-.09	.01	1.69	.23**	
Motivation	4.17	1.03	.49**	.14	1.69	.44**	.64**

* = p < .05
** = p < .001

Videotape Analysis of Answer Quality Variable

Analysis of rater data during the second phase of group decision-making was analyzed via the use of a logistic regression analysis. The model that best predicted answer quality at the group level included ratings of group-level CI, cohesion, freedom of group members to express ideas, and group motivation X^2 (4, $N = 76$) = 19.55, $p < .001$, $R^2 = .18$. Table 6 shows regression coefficients, chi-square statistics, odds ratios, and 95% confidence intervals for odds ratios for each of the four predictors.

Table 6 Logistic Regression Analysis for Answer Quality as a function of Group Ratings

Variables	B	Chi-Square	Odds Ratio	Lower Confidence Interval	Upper Confidence Interval
CI Rated	1.15	5.97*	3.16	1.23	7.94
Cohesion	.32	.53	1.37	.59	3.23
Freedom	-.44	.84	.64	.25	1.66
Motivation	.61	1.54	1.85	.70	4.87

* = p < .05
** = p < .001

Freedom to express ideas continued to relate negatively to outcomes in this task, although the relationship did not reach significance in this model. Higher ratings of freedom at the group level predicted poorer answer quality X^2 (1, $N = 76$) = .84, $p < .36$. Rated CI behavior was the strongest predictor in this model X^2 (1, $N = 76$) = 5.97, $p = .01$.

As in the analysis of information-sharing, the number and quality of disagreements in the group were investigated in terms of answer quality. In this second phase of decision-making, dissent was again a positive attribute for group output. Groups who disagreed more often and evidenced better reaction to those disagreements were more likely to arrive at the best possible answer in this study X^2 (2, $N = 76$) = 6.87, $p < .03$. A Chi-square test of significance indicated that manipulated (state-level) CI positively predicted both number of disagreements ($X^2 = 38.63$, $p < .001$) and disagreement reaction ($X^2 = 27.47$, $p < .001$). Answer quality could be significantly predicted by disagreement reaction when coupled with CI ratings at the individual level X^2 (2, $N = 228$) = 35.15, $p < .001$.

An additional logistic regression analysis was performed at the individual level, predicting answer quality as a function of group-member behaviors. Answer quality was regressed on ratings of individual motivation, freedom, and CI, as well as individual trait-level CI. The equation evidenced a stronger statistical predictive power than any other analysis reported in this project X^2 (4, $N = 228$) = 31.61, $p < .001$. Table 7 reports regression coefficients, chi-square statistics, odds ratios, and 95% confidence intervals for odds ratios for each of the four predictors.

Table 7 Logistic Regression Analysis for Answer Quality as a function of
Individual Ratings

Variables	B	Chi-Square	Odds Ratio	Lower Confidence Interval	Upper Confidence Interval
CI Measured	.27	1.16	.77	.47	1.25
CI Rated	.77	10.75**	.47	.29	.74
Freedom	-.46	3.94*	1.59	1.00	2.51
Motivation	.49	5.60*	.61	.40	.92

$* = p < .05$
$** = p < .001$

There was a strong positive relationship between ratings of individual CI and answer quality at the group level X^2 (1, $N = 228$) $= 10.75$, $p < .001$. To the extent that individuals in the group were acting in a cognitively independent manner, the group was significantly more likely to arrive at the correct answer. Trait-level CI added to this prediction model but manipulated CI did not. The motivation of the individual group members was also a significant positive predictor in this model such that behaviors indicative of motivation lead to better answer quality. Freedom to express ideas evidenced a negative relationship with the outcome variable. Individual trait-level CI added meaningfully to this prediction model and correlated positively with answer quality but was not a significant bivariate predictor.

The number and quality of disagreements were explored at the individual level. Rated motivation of each group member was significantly related to number of disagreements ($r = .23$, $p < .001$) and disagreement reaction ($r = .36$, $p < .001$). The freedom of each group member to express ideas in the group discussion was also

significantly related to number of group disagreements ($r = .24$, $p < .001$) and to

disagreement reaction ($r = .31$, $p < .001$).

Additional Videotape Analysis

The dissent and freedom variables become more intriguing with additional post

hoc analyses. Twenty percent of the variance in the number of disagreements among

groups could be accounted for via multiple regression, including group-level ratings of

freedom, cohesion, and CI, $F (3, 73) = 6.17$, $p < .001$. Table 8 reports the means,

standard deviations, Beta weights, semipartial correlations, and Pearson correlations for

this model.

Table 8 Group-Level Behavioral Ratings Predicting Number of Group Disagreements

Variable	M	SD	B	SR_2	VIF	Intercorrelations 1	2	3
Disagreements	1.9	1.78						
Freedom	4.16	.80	.29*	.63	1.36	.39**		
Cohesion Rated	3.62	.73	.19	.25	1.37	.35*	.51**	
CI Rated	4.71	8.50	.14	.19	1.01	.17	.03	.10

$* = p < .05$
$** = p < .001$

Disagreement reaction could be predicted by ratings of group freedom,

motivation, cohesion, and CI. Multiple regression testing this equation accounted for

30% of the variance in disagreement reaction, $F (4, 72) = 7.8$, $p < .001$. Table 9 reports

the means, standard deviations, Beta weights, semipartial correlations, and Pearson

correlations for this model.

Table 9 Group-Level Behavioral Ratings Predicting Quality of Group Disagreements

Variable	M	SD	B	SR2	VIF	1	2	3	4
						Intercorrelations			
Disagreement Reaction	3.10	1.46							
Freedom	4.16	.80	-.03	.00	2.01	.36*			
Motivation	4.23	.87	.32*	.06	1.86	.46**	.67**		
Cohesion Rated	3.62	.73	.33*	.08	1.41	.47**	.51**	.45*	
CI Rated	4.71	8.50	.06	.00	1.01	.10	.03	.29	.11

$* = p < .05$
$** = p < .001$

Freedom positively predicted the number of disagreements but negatively

predicted disagreement reaction, although the bivariate relationship was positive only in

the equation predicting disagreement number. Motivation was not a meaningful predictor

of the number of disagreements but it was a significant predictor of disagreement

reaction. Cohesion was a significant predictor of reaction to disagreements but not

number of disagreements. Rated CI was included in both equations as it helped to

account for a meaningful amount of variance in both variables, but its bivariate

relationship with each outcome variable was nonsignificant. Tests of multicollinearity in

this model yielded acceptable variance inflation levels. The highest VIF observed was

for the freedom variable (VIF = 2.0). The VIF estimate for ratings of motivation was

1.85, for ratings of cohesion the estimate was 1.41 and the VIF estimate for ratings of CI

was 1.01. Such low estimates indicate that the model variables are not statistically

redundant with one another.

Discussion

Cognitive Independence (CI) and Information Exchange

The main hypothesis in this project was that CI would benefit group decision-making. This hypothesis was supported by the data. CI was operationalized and measured in multiple ways. It was manipulated as a state variable at the group level, measured as a trait variable at the individual level and behaviors that demonstrated CI in the group interaction context were identified. In every form in which CI was investigated, the data indicated that in some way it positively affected group decision-making on the Hidden Profile task.

CI most strongly affected information exchange in this paradigm, which can be defined as the initial phase in the decision-making task. State-level CI did not, by itself, significantly predict differences in group output, but when combined with measured CI it did significantly affect information-sharing. This indicates that certain people are naturally independent thinkers and that these people are less likely to be biased in their group discussion and information exchange. Manipulating people to think independently also produces a positive effect on information exchange although this effect is not as strong as the one observed when group members are naturally independent thinkers.

Average group levels of CI positively predicted information exchange when the highest maximum score and the measure of diversity on the construct were included in the analysis. This result indicates that the group decision-making process benefits from a certain configuration of CI in the group, rather than overall higher levels. Groups including members who are mixed (both high and low) are better equipped to succeed at novel information-sharing. The person in the group with the highest CI score can put the

group at a disadvantage if his or her level of CI is very high. Taken together these results indicate that CI is beneficial for the first phase of decision-making in this Hidden Profile task, as long as group members are not all at the same level of CI and no one group member is too high on the construct. This result fits with the existing data supporting the benefits of group personality heterogeneity on a range of tasks (e.g., Milliken & Martins, 1996; Waldman et al., 2004).

CI in its state and trait-level forms predicting novel information exchange supported the hypothesis that CI would have its strongest effect on this initial phase of decision-making. CI presumably leads group members to think more divergently and to be more tolerant of dissent and disagreement in the group. This beneficial dissent and divergence may contribute to a group environment more open to informational influence but not normative influence among its members. When it is clear that other group members have information about the task that cognitively independent members do not have, CI group members appear to be open to that information and willing to share their own in return. This openness and information exchange in turn predicts success in the task in terms of final answer quality.

Given this reasoning, and the literature in which it is grounded, it was surprising that behavioral ratings of CI strongly predicted answer quality rather than information exchange. The second stage of the hidden-profile group decision-making process is one of convergence rather than divergence. Because the task is complicated and time is limited, the dissent and divergent thinking that CI creates would seem less beneficial and more harmful during this stage. Future research is needed to sort out the subtle intricacies regarding specific CI behaviors as opposed to CI mindset.

Group reaction to disagreements was positively affected by trait-level CI. The same configuration of trait-level CI that effectively predicted novel information-sharing in the group also effectively predicted reaction to disagreement in the group. The group reacts more positively to disagreement when group average CI is higher, when the group is more heterogeneous, and when the person in the group with the highest score is relatively moderate on the trait. These results indicate that there is a definite link between CI and dissent at the group level in that a major manifestation of CI in group behavior can be observed via tolerance of dissent.

CI appears to affect group behaviors in additional ways. Group members high in trait-level CI were significantly more likely to share the first piece of novel information during discussion. Additional analyses indicated that the group member highest on trait CI in the group, and the group member rated as displaying the most CI behaviors was most likely to share the first piece of unshared information. These findings appear to be closely related to divergent thinking and dissent in the group. Independent thinkers appear to be more comfortable communicating unique information and doing it relatively early in the group interaction process, which can be important when the group has limited deliberation time.

Group and individual freedom to express ideas was surprisingly a negative predictor of success on both phases of this task. Perhaps when group members feel too free and comfortable in the group they dominate that group and intimidate the other members. It is also possible that when group members feel free they prefer to discuss shared information in order to maintain their positive feelings of freedom in the group.

Discussing shared information leads the group members to enjoy the process more and feel more positively about the other group members (Wittenbaum et al., 1999).

The findings that the highest maximum CI score and the freedom to express ideas each negatively predict information-sharing can be explained in terms of group domination. It is possible that both very high CI group members and those that are highly free harm the group in similar ways, by dominating the group. In the context of a Hidden Profile task, it is imperative that all group members participate and that all members think deeply about the information. It is likely that when any one group member's level of freedom or CI becomes too high the group is harmed because their behaviors overwhelm the others. Because only one person can speak at a time, perhaps it tends to be the high CI group member and/or the high free group member who does this. Perhaps this high free or high CI group member intimidates the others. This would reduce the ability of the other group members to share effectively thereby directly harming the information exchange outcome and indirectly harming the final answer quality outcome in this task.

More research is needed to determine the exact role that the freedom-to-express-ideas variable might play in the group decision-making process, both in terms of how it relates to CI and how it affects the process on its own. It would be of particular interest to measure freedom as a trait variable and/or manipulate it as a state variable to assess its effects on group decision-making. It would also be interesting to identify the point at which freedom and/or CI become too high, and to more closely examine exactly how group processes are affected by these conditions. In the future, I would like to further investigate the effects of group interaction during this task by coding group-member

discussion so as to more specifically assess the variables of interest. I would also like to assess the attitudes and perceptions that group members have about one another, taking into account each member's level of CI, freedom to express ideas, and motivation.

Cohesion and Answer Quality

Although CI in its various forms most strongly affected the initial phase of decision-making in this task (information exchange) cohesion was a better predictor of the final phase, answer quality. The path analysis indicated that manipulated cohesion meaningfully added to information exchange in the prediction upon final answer quality. When individuals share pieces of novel information with the group, a cohesive group is more likely to take that final step and agree on the best possible answer.

I predicted that cohesion would be more important for the answer quality phase of group decision-making than for the information exchange phase because of differences in the processes occurring in these stages. Agreeing on a final answer in the group is a process requiring convergence, whereas information seeking and exchange process requiring divergence. Groups in this study were given no decision rule so it was up to them to decide how to reach their final answer within the 30 minute period. Cohesion proved to be important for this process, with group members who were more committed to both the task and each other being more likely to reach success in selecting the best possible answer in this Hidden Profile task. The effects of cohesion on this popular class of tasks have not, to my knowledge, been reported in the literature. This is surprising, but it is likely due to the fact that outcome measures in Hidden Profile studies often focus mainly on the information-sharing phase of the process, rather than on the final decision made.

In this study, task and social cohesion were deliberately confounded, rather than investigated separately, in order to retain parsimony within the design. Because the Hidden Profile task is a disjunctive task (Stasser & Titus, 1985) and Zaccaro and McCoy (1988) have demonstrated that laboratory groups primed for both task and social cohesion perform best on disjunctive tasks, the cohesion manipulation was designed in a dichotomous fashion. Groups were primed for either high task and social cohesion or low task and social cohesion, with no manipulation included for a high-low cohesion condition. In the future it would be advantageous to separate these two types of cohesion and tease apart their effects on the Hidden Profile task and on other tasks when included in a design with CI. When utilizing the procedure designed by Zaccaro and McCoy (1988) and used in this study, it would be reasonable to assume that social cohesion would have a stronger positive effect on the final decision phase of Hidden Profile decision-making than would task cohesion.

A perusal of the videotape data from this study leaves one with the impression that most of the groups who worked on the murder-mystery version of this task seemed to become naturally committed to it and were motivated to perform well. In fact, the mean rating of group-level motivation in this study was 4.23 on a 1 – 5 scale. Because the murder-mystery version of the Hidden Profile task is typically interesting to participants and motivation to solve the mystery tends to be high, manipulations of task cohesion seem less important than those of social cohesion. Because task cohesion will naturally tend to be higher on this task than it would be on other (less intrinsically interesting) tasks, it is this social cohesion construct that is likely to carry more of the cohesion effect on performance. Future research could be designed to investigate this hypothesis.

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Summary and Future Directions

Over the course of four studies included in this project, the variable Cognitive Independence (CI) was defined, a scale was developed to measure it as an individual difference, and its effects in terms of trait, state, and behavioral levels were investigated in group decision-making. Group cohesion was an additional variable of interest in this study, being manipulated at the state-level within the group and measured in terms of behavioral levels in group discussion. It was determined that both CI and cohesion positively affect group decision-making on the Hidden Profile task.

These findings are relevant for multiple areas in the literature. Most notably, the current data adds to the wealth of research investigating the bias toward shared information in group decision-making. Specifically, groups appear to be less biased when their members are cognitively independent, both at the state and trait-level. This effect is particularly pronounced when no one group member's individual difference level of CI is exceedingly high. Group cohesion and motivation also attenuate the bias toward shared information in this paradigm.

The current project is also relevant to dissent and conflict research. CI predicts disagreements in group decision-making, but it also predicts better reactions to disagreements as well as more optimal information exchange and decision quality. CI appears to manifest partly in dissent and divergent thinking in the group interaction process. As a predictor of dissent and a predictor of success in decision-making, CI is a valuable addition to the literature in support of dissent in decision-making.

The current data are also relevant to the area of group personality research. A recurring theme in this literature, regardless of the particular individual difference

variable being investigated, is that including a mix of group members high and low on the trait is beneficial. This mixture or "heterogeneity effect" could also be labeled as deep-level diversity, as opposed to surface level diversity in which group members may be affected by obvious demographic differences between them (e.g., age, race). A few studies have reported effects and interactions between deep and surface-level diversity, but all of them have been with work teams rather than laboratory groups (Mohammed & Angell, 2004; Phillips & Lloyd, 2006; Phillips, Northcraft, & Neale, 2006). In the future, it would be interesting to investigate how this particular type of deep-level diversity might interact with diversity at the surface level. It could be predicted that cognitively independent groups are more tolerant of surface-level diversity and more willing to disagree with diverse group members when the group's success depends on that dissent.

In the future, CI should be investigated in multiple ways, both at the individual and group levels. It would be interesting to investigate the effects of CI on different types of group tasks using different types of outcome variables. The current data indicate that CI is beneficial for the divergent thinking phase of this task rather than the convergent phase. It can be predicted that CI most strongly affects performance on tasks that require divergent thinking, such as creative tasks. It can also be predicted that an additive-type task would be more suitable for the CI group, especially for very high CI group members. Because disjunctive tasks require each group member to contribute for success, a group member too high on CI might overwhelm the others and therefore harm overall group performance. However if success in the group could be achieved via the combination of individual work and reasoning, without the harmful effects of high CI

members overshadowing the others' required input, the negative effect of highest maximum CI observed in this study might disappear.

The relationship between cognitive and social independence should be investigated more fully, as should the role of dissent and reaction to dissent as they relate to these variables. Further investigations of CI behavioral data and the utility of the CI scale in predicting behavior both at the individual and group levels are necessary to further understand the meaning of this construct. For example, CI seems to be very relevant for tests of social influence and persuasion. Openness to informational influence appears to be a central attribute of CI. On the other hand, CI should also predict resistance to normative influence. These effects are assumed but not directly tested in the current research. Investigating intricacies such as these would help us to more thoroughly identify CI as a construct and elucidate relationships among variables of interest.

Investigating CI at the individual level will be important in the future. CI is inherently an individual-level variable and it is likely that its individual-level effects are stronger than its group-level effects. Results indicating that the variable has predictive power in the group are encouraging for future studies of CI individuals.

APPENDIX A

CI SCALE

Below there are several statements. Please read and think about each one carefully. Once you have thought about each statement, consider the degree to which it is accurate in describing <u>you</u>. Then choose the answer option from the scale below to code each statement. Think about how you are *now*, in relation to other people of your age and gender, and try to describe yourself in the most honest way possible. Your answers will be kept strictly confidential.

Response Options

1. Very Inaccurate	2. Moderately Inaccurate	3. Neutral	4. Moderately Accurate	5. Very Accurate

1. I don't change my mind just because someone disagrees with me.

2. I get worried that I'm wrong when others express opinions that differ from mine.

3. I have pretty strong ideas and values that are a basis for my decisions.

4. In group situations, I listen to the opinions and ideas of others but still make up my own mind.

5. When making important decisions I am inclined to follow the judgment of important others.

6. When confronted with a problem I am able to come up with my own solution.

7. Before forming an opinion I often wait to see if I can find out what others are thinking.

8. Generally I am easily convinced.

9. Often I find it hard to form an opinion about a topic without first discussing it with others.

10. I pride myself on making my own decisions.

11. Once I know what I think it takes valid evidence to change my mind.

12. I have my own ideas and opinions.

13. Sometimes I just accept what my friends think because it's easier that way.

14. I rely on the opinions of others when I need to make a decision.

15. It's hard for me to make up my mind until I check with my friends and family members.

16. When I have an important decision to make I need to know what other people think.

17. When I make a choice, I need to know that others think I did the right thing.

18. When some one tries to talk me into agreeing with them it doesn't usually take much effort.

19. I change my mind about issues pretty easily when people try to persuade me.

20. When significant others disagree with me it makes me think I'm probably wrong.

APPENDIX B

ORIGINAL COGNITIVE CONFORMIST PRIME

Conventional Thinker

A *conventional thinker* is some one who follows the lead of others and feels pressure to compromise when others disagree with his or her opinions and beliefs. When deciding what to do or how to feel about an issue a conventional thinker is influenced greatly by the positions and standards of others.

When making a decision, a conventional thinker tends to "go along with the crowd" to a certain degree. A conventional thinker makes up his or her mind about things using whatever knowledge and experience that is available. Usually a conventional thinker forms his or her opinions and beliefs from the experience and learning of important others. This type of person does not like disagreeing with people, and tries to avoid it whenever possible. A conventional thinker doesn't work to change the opinions of others, instead trying to find some type of common ground with others.

Today you will be working on a decision-making task. Prior research shows that participants who think conventionally on tasks like these perform better than those who do not. In order to get you ready for your decision-making task we would like you to think of a time when you acted conventionally. Use the above description as a guide. Try to remember details of the situation like who was there, how you felt, etc. Take about 10 minutes to write about that occasion in the space below.

_____

_____

_____

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_____

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_____

_____

APPENDIX C

ORIGINAL COGNITIVE INDEPENDENCE PRIME

Independent Thinker

An *independent thinker* is some one who makes his or her own mind up about things and does not feel pressured to change his or her mind when others disagree. When deciding what to do or how to feel about an issue an independent thinker is not influenced much at all by the positions and standards of others.

An independent thinker tends not to just "go along with the crowd." An independent thinker makes up his or her mind about things using whatever knowledge and experience that is available. This type of person doesn't mind disagreeing with people, but he or she also doesn't disagree just for the sake of doing so. An independent thinker doesn't necessarily work to change the opinions of others, but merely retains his or her opinions and standards regardless of what others think or say.

Today you will be working on a decision-making task. Prior research shows that participants who think independently on tasks like these perform better than those who do not. In order to get you ready for your decision-making task we would like you to think of a time when you acted independently. Use the above description as a guide. Try to remember details of the situation like who was there, how you felt, etc. Take about 10 minutes to write about that occasion in the space below.

_____

_____

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APPENDIX D

ADDITIONAL PRIMING MATERIALS

Conventional Thinker

Now that you have spent some time thinking about when you *personally* have acted as a conventional thinker, we'd like you to think about this in a more general way.
Try to think of some situations in which a person might benefit from thinking conventionally. When would a conventional thinker make a good decision as compared to some one who was not thinking conventionally?
Spend about 5 minutes thinking about this, and try to list 3 such situations below. You do not need to include much detail, just list ideas.

Situation 1

_____

_____

_____

Situation 2

_____

_____

_____

Situation 3

_____

_____

_____

Conventional Thinker

Now we would like you to consider the following situation:

The athletics department at UTA is suggesting that tuition be increased by $200 per semester for each student. The extra money would allow the department to get a new division one Mavericks football team started! Simply stated, the advantages of having a football team include, but are not limited to: Increased visibility of our school, attracting new types of students to UTA, increased school spirit, enjoyment of attending games, and possibly changing UTA into more of a residential, rather than a commuter-type campus. Obviously, the main disadvantage is the tuition increase.
Using only the information that you have here, are you in favor of this tuition increase and the resulting introduction of a football team or are you opposed to it?

I am _____

Now imagine that you are on a committee with several other students from UTA. It is your job, as a group, to make a recommendation either in favor or against this proposal to the athletics department. This recommendation is to be based on the group's opinion of what is best for the students.
You meet with the group and find out that there are 7 members, including you. As you begin to discuss the proposal, you find out that 5 of the 7 members disagree with your opinion on the proposal and 1 person is neutral.
In the space below and on the following page, please describe why it would be a good idea to think conventionally in this situation. What does thinking conventionally in this situation mean? How would thinking conventionally affect your behavior here? What do you think would happen as a result of your thinking conventionally? Take about 10 minutes to complete this task.

_____

_____

_____

_____

_____

_____

_____

Independent Thinker

Now that you have spent some time thinking about when you *personally* have acted as an independent thinker, we'd like you to think about this in a more general way.
Try to think of some situations in which a person might benefit from thinking independently. When would an independent thinker make a good decision as compared to some one who was not thinking independently?
Spend about 5 minutes thinking about this, and try to list 3 such situations below. You do not need to include much detail, just list ideas.

Situation 1

_____

_____

_____

Situation 2

_____

_____

_____

Situation 3

_____

_____

_____

Independent Thinker

Now we would like you to consider the following situation:

The athletics department at UTA is suggesting that tuition be increased by $200 per semester for each student. The extra money would allow the department to get a new division one Mavericks football team started! Simply stated, the advantages of having a football team include, but are not limited to: Increased visibility of our school, attracting new types of students to UTA, increased school spirit, enjoyment of attending games, and possibly changing UTA into more of a residential, rather than a commuter-type campus. Obviously, the main disadvantage is the tuition increase.
Using only the information that you have here, are you in favor of this tuition increase and the resulting introduction of a football team or are you opposed to it?

I am _____

Now imagine that you are on a committee with several other students from UTA. It is your job, as a group, to make a recommendation either in favor or against this proposal to the athletics department. This recommendation is to be based on the group's opinion of what is best for the students.
You meet with the group and find out that there are 7 members, including you. As you begin to discuss the proposal, you find out that 5 of the 7 members disagree with your opinion on the proposal and 1 person is neutral.
In the space below and on the following page, please describe why it would be a good idea to think independently in this situation. What does thinking independently in this situation mean? How would thinking independently affect your behavior here? What do you think would happen as a result of your thinking independently? Take about 10 minutes to complete this task.

_____

_____

_____

_____

_____

_____

_____

APPENDIX E

INFORMATION-SHARING CHECKLIST

Information-sharing Checklist

While working with your group on this task, you had to discuss certain clues in order to discover who the real killer was. Some of this information was in your packet, and the rest of it was in the packets that the other group members received.

Take a moment and look through the clues below. If you remember discussing the clue with your group, put a check mark beside it. If you do not remember discussing the clue, then leave the space beside it blank.

Only mark the clue if you specifically remember the group discussing it.

_____1. Rick Rooney, Mickey's golf partner, told Lt. Moody that Mickey arrived at the golf course at 7AM last Saturday, as usual.

_____2. Dave Daniels, the owner of the Quick Stop where Mr. Guion's wallet was found, said he found the wallet at about 7AM.

_____3. Dave Daniels, the owner of the Quick stop where Mr. Guion's wallet was found said that the car that that he heard right before he found the wallet ran quietly. He confirmed that it could have been a truck.

_____4. Sam Nietzel, the parts manager for Guion Lincoln/Mercury, said that before Eddie's daughter Sue Sullivan quit her job there she had a loud argument with Mr. Guion. He said he couldn't make out what they were saying but that they sounded very upset.

_____5. Lt. Moody interviewed Millie Smith, a waitress at Ray's Café, and who remembered that Mickey had stopped there for coffee last Saturday morning. She told the lieutenant that he got there at about 6:30 and stayed for about 15 minutes.

_____6. Marion Guion told Lt. Moody that Billy came by late on Friday to ask Mr. Guion for a pay advance, and that Mr. Guion gave him the money. She also noted that they joked about it.

_____7. Mrs. Guion told Lt. Moody that she heard a car on the gravel at about 6:40 that morning. She said when she looked out the window the only thing she saw was her husband's pickup in the carport, no one else driving up.

_____8. Mrs. Guion confirmed that Eddie had a pretty serious hearing problem. She said that he doesn't like to wear his hearing aid when he's working because he's afraid that it will fall out.

_____9. Billy said, in his second interview, that the crow bar was laying in front of the garage when he saw it, and he picked it up and moved it so that he could get the mower out of the shed.

APPENDIX F

MURDER MYSTERY BEHAVIORAL DATA CODING FORM

Murder Mystery Coding Form

Coder Name: _____   Video Tape number: _____
                                  Group number:_____

Questions:
   1. How long does the group spend discussing the task?
          a. Start time: _____
          b. Stop time: _____
          c. The group spent _____ minutes discussing the task
   2. How long does the group talk before some one mentions an unshared piece of
       information? [See your Information-sharing Checklist for pieces of unshared
       information]
          a. Start time: _____
          b. Unshared information mentioned at time: _____
          c. After _____ minutes, some one mentioned a piece of unshared
              information.
          d. Group member number _____ mentioned the first piece of unshared
              information. [Group members are numbered 1, 2, 3 going from right to
              left on your screen]
   3. What percentage of time does the group spend "off-task?" _____ % of discussion
       time is spent off-task. [Off-task is any discussion or activity that is *not* related to
       solving the murder-mystery]
   4. Does there seem to be a group leader? _____
          a. If yes, then who is the group leader? _____ [Group members are
              numbered 1, 2, 3 going from right to left on your screen]
   5. Does any member of this group ignore the instruction to "not look at anyone
       else's packet?" _____
   6. Count the number of times that a group member disagrees with the others during
       the discussion. There are _____ disagreements during the discussion.
          a. For each disagreement that you counted, how did the group react based on
              the following scale:

   _____

          1   3   5
        Poorly   Decently   Well

          Disagreement # 1 reaction: _____
          Disagreement # 2 reaction: _____
          Disagreement # 3 reaction: _____
          Disagreement # 4 reaction: _____
          Disagreement # 5 reaction: _____
[Only rate reactions to the first 5 disagreements]

Answer the following questions in a scale of 1 – 5 where:

1	3	5
Not at all	Somewhat	Very

7. How motivated does this group seem? _____
    a. How motivated does each group member seem to be? [Group members are numbered 1, 2, 3 going from right to left on your screen]
        i. Group member #1 is motivated at a level of _____
        ii. Group member #2 is motivated at a level of _____
        iii. Group member #3 is motivated at a level of _____
8. How free do the group members seem to share their opinions and ideas? _____
    a. How free does each group member seem to be in sharing his or her ideas? [Group members are numbered 1, 2, 3 going from right to left on your screen]
        i. Group member #1 is free to share ideas at a level of _____
        ii. Group member #2 is free to share ideas at a level of _____
        iii. Group member #3 is free to share ideas at a level of _____
9. How cohesive does this group seem? [See your description of cohesiveness] _____
10. How independently-minded does this group seem? [See your description of an independent thinker] _____
    a. How independently-minded does each group member seem? [Group members are numbered 1, 2, 3 going from right to left on your screen]
        i. Group member #1 is independent at a level of _____
        ii. Group member #2 is independent at a level of _____
        iii. Group member #3 is independent at a level of _____
11. The correct answer in this task is that the real murderer is "Eddie Sullivan." Did the group get the right answer? _____

REFERENCES

Allen, V. L. (1965). Effect of extraneous cognitive activity on dissonance

reduction. *Psychological Reports, 16,* 1145-1151.

Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one

against a unanimous majority. *Psychological Monographs*, *70,* 70.

Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle: A practical

guide to priming and automaticity research. In H. T. Reis, & C. M. Judd (Eds).

Handbook of research methods in social and personality psychology (253-285). New

York, NY: Cambridge University Press.

Bailey, J. R. (1997). Need for cognition and response mode in the active

construction of an information domain. *Journal of Economic Psychology, 18*, 69-85.

Baron, R. S. & Nerr, N. L., & Miller, N. (2003). *Group process, group decision,*

group action. New York, NY: Open University Press.

Barrick, M. R. & Mount, M.K. (1991). The Big Five personality dimensions and

job performance: A meta-analysis. *Personnel Psychology, 44*, 1-26.

Barry, B. & Stewart, G.L. (1997). Composition, process and performance in self-

managed groups: The role of personality. *Journal of Applied Psychology, 82*, 62–78.

Bernthal, P. R. & Insko C. A. (1993). Cohesiveness without groupthink: The

interactive effects of social and task cohesion. *Group & Organization Management, 18,*

66-87.

Bonner, B.L. (2000). The effects of extraversion on influence in ambiguous group tasks. *Small Group Research, 31*, 225-244.

Cacioppo, J.T., Marshall-Goodell, B. S., Tassinary, L. G. Petty, R. E. (1992). Rudimentary determinants of attitudes: Classical conditioning is more effective when prior knowledge about the attitude stimulus is low than high. *Journal of Experimental Social Psychology, 28*, 207-233.

Cacioppo, J. T. & Petty, R. E. (1980). Sex differences: Toward specifying the underlying processes. *Personality and Social Psychology Bulletin, 6(4),* 651-656.

Cacioppo, J. T. & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42,* 116-131.

Cacioppo, J. T. & Petty, R. E. (1989). Effects of message repetition on argument processing, recall, and persuasion. *Basic and Applied Social Psychology, 10,* 3-12.

Cacioppo, J.T., Petty, R.E., Feinstein, J.A. & Jarvis, W.B.G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological Bulletin, 119*, 197-253.

Cacioppo, J.T., Petty, R.E., Feinstein, J.A., & Rodriguez, R. (1986). Central and peripheral routes to persuasion: An individual difference perspective, *Journal of Personality and Social Psychology, 51*, 1032-1043.

Carron, A. V., Widmeyer, W. N. & Brawley, L. R. (1985). The development of an instrument to assess cohesion in sport teams: The Group Environment Questionnaire. *Journal of Sport Psychology, 7,* 244-266.

Chaiken, S. (1987). The heuristic model of persuasion. In M. P. Zanna, Olson, J. M., Herman, C. P. (Eds). In: *Social influence: The Ontario symposium,* (Vol. 5 pp. 3-39)*.* Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16,* 297-334.

Cruz, M.G., Henningsen, D.D. & Williams, M.L.M., 2000. The presence of norms in the absence of groups? The impact of normative influence under hidden-profile conditions. *Human Communication Research, 26,* 104-124.

Davis, J.H. (1969). *Group Performance*. Reading, MA: Addison-Wesley.

De Dreu, C. K. (2002). Team innovation and team effectiveness: The importance of minority dissent and reflexivity. *European Journal of Work and Organizational Psychology, 11,* 285-298.

De Dreu, C. K. & De Vries, N.K. (1993). Numerical support, information processing, and attitude change*. European Journal of Social Psychology, 23*, 647-662.

De Dreu, C. K., Harinck, F. & Van Vianen, A. E. M. (1999). Conflict and performance in groups and organizations. *International review of industrial and organizational psychology, 14* 369-414.

De Dreu, C. K. & West, M. A. (2001). Minority dissent and team innovation. The importance of participation in decision-making. *Journal of Applied Psychology, 86,* 1191-1201.

De Dreu, C. K. & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal of Applied Psychology, 88,* 741-749.

Den Hartog, D.N., De Hoogh, A.H.B., & Keegan, A.E. (2007). The interactive effects of belongingness of charisma on helping and compliance. *Journal of Applied Psychology*, 92, 1131-1139.

DePaulo, B.M, Kashy, D.A., Kirkendol, S.E. Wyer, M.M. and Epstein, J.A. (1996). Lying in everyday life. *Journal of Personality and Social Psychology, 70,* 979-995.

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology, 51*, 629-636.

Dion, K. L. (2000). Group cohesion: From 'field of forces' to multidimensional construct. *Group Dynamics: Theory, Research, and Practice, 4,* 7-26.

Festinger, L. (1950). Laboratory experiments: the role of group belongingness. In Miller, J. G. (Ed.) *Experiments in social process; a symposium on social psychology* (31-46). New York, NY: McGraw-Hill.

Festinger, L. (1953). An analysis of compliant behavior. In M. Sherif, & M.O. Wilson (Eds.) *Group relations at the crossroads* (232-256). Oxford, England: Harper.

Festinger, L. (1957). *A theory of cognitive dissonance*. Oxford, England: Row, Peterson.

Gal, R. & Manning, F. J. (1987). Morale and its components: A cross-national comparison. *Journal of Applied Social Psychology, 17,* 369-391.

Galinsky, A. D., Gruenfeld, G. H. & Magee, J. C. (2003). From Power to Action. *Journal of Personality and Social Psychology, 85(3),* 453-466.

Gaertner, S. L. & Dovidio, J. F., (1977). The subtlety of white racism, arousal, and helping behavior. *Journal of Personality and Social Psychology, 35,* 691-707 .

Gollwitzer, P.M., Heckhausen H. & Steller B. (1990). Deliberative and implemental mind-sets: Cognitive tuning toward congruous thoughts and information. *Journal of Personality and Social Psychology, 59,* 1119-1127.

Graziano, W.G., Hair, E.C., & Fitch, J.F. (1997). Competitiveness mediates the link between personality and group performance. *Journal of Personality and Social Psychology, 73*, 1394-1408.

Hagstrom, W. O. & Selvin, H. C. (1965). Two dimensions of cohesiveness in small groups. *Sociometry, 28,* 30-43.

Haslam, S. A., Turner, J. C., Oaks, P. J., Reynolds, K. J., Eggins, R. A., Nolan, M., & Tweedie, J. (1998). When do stereotypes become really consensual? Investigating the group-based dynamics of the conceptualization process. *European Journal of Social Psychology, 28,* 755-776.

Henningsen, D.D. & Henningsen, M.L.M. (2004). The effect of individual difference variables on information-sharing in decision-making groups. *Human Communication Research, 30*, 540-555.

Hollander, E. P., Willis, R. H. (1967). Some current issues in the psychology of conformity and nonconformity. *Psychological Bulletin, 68,* 62-76.

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

Insko, C. A. (1983). Conformity as a function of the consistency of positive self-evaluation with being liked and being right. *Journal of Experimental Social Psychology, 19,* 341-358.

International Personality Item Pool. (2001). A scientific collaboratory for the development of advanced measures of personality traits and other individual differences. Retrieved online from http://ipip.ori.org/.

Jablin, F.M. & Sussman, L. (1978). An exploration of communication and productivity in real brainstorming groups. *Human Communication Research, 4*, 329-337.

Janis, I. L. (1972). *Victims of groupthink: A psychological study of foreign-policy decisions and fiascoes.* Oxford, England: Houghton Mifflin.

Johnson, M. E. & Fortman, J.B. (1988). Internal structure of the Gross Cohesiveness Scale. *Small Group Behavior, 19,* 146-152.

Kaplan, M.F. & Miller, C.E. (1987). Group decision-making and normative versus informational influence: Effects of type of issue and assigned decision rule. *Journal of Personality and Social Psychology, 53,* 306-313.

Kelley, H. H., & Volkart, E. H. (1962). The resistance to change of group-anchored attitudes. *American Sociological Review, 17,* 453-465

Kelly, J.R., Jackson, J.W., Hutson-Comeaux, S.L. (1997). The effects of time pressure and task differences on influence modes and accuracy in decision-making groups. *Personality and Social Psychology Bulletin, 23,* 10-22.

Kerr, N.L. & Tindale, R.S. (2004). Group performance and decision-making. *Annual Review of Psychology, 55*, 623-655.

Laird, J. D. (1974). Self-attribution of emotion: The effects of expressive behavior on the quality of emotional experience. *Journal of Personality and Social Psychology, 29,* 475-486.

Levin, I.P., Huneke, M.E. & Jasper, J.D. (2000). Information processing at successive stages of decision-making: Need for cognition and inclusion-exclusion effects. *Organizational Behavior and Human Decision Processes, 82*, 171-193.

Levy, D. A. (1992). The liberating effects of interpersonal influence: An empirical investigation of disinhibitory contagion. *Journal of Social Psychology, 132,* 469-473.

LePine, J.A. (2003). Team adaptation and post change performance: Effects of team composition in terms of members' cognitive ability and personality. *Journal of Applied Psychology, 88*, 27-39.

MacDonald, G. & Nail, P. (2005). Attitude change and the public-private attitude distinction. *British Journal of Social Psychology*, *44,* 15-28.

Milliken, F.J. & Martins, L.L. (1996). Searching for common threads: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Review, 21*, 402-433.

Mohammed, S. & Angell, L.C. (2004). Surface- and deep-level diversity in workgroups: Examining the moderating effects of team orientation and team process on relationship conflict. *Journal of Organizational Behavior, 25*, 1015-1039.

Moscovici, S. (1973). Studies in social influence: II. Instrumental and symbolic influence. *European Journal of Social Psychology, 3*, 461-471.

Moscovici, S. & Personnaz, B. (1980). Studies in social influence V: Minority influence and conversion behavior in a perceptual task. *Journal of Experimental Social Psychology, 16*, 270-282

Mullen, B. and Copper, C. (1994). The relation between group cohesiveness and performance: An integration. *Psychological Bulletin, 115,* 210-227.

Nail, P. (1986). Toward an integration of some models and theories of social response. *Psychological Bulletin, 100,* 190-206.

Nail, P., MacDonald G. & Levy, D. A. (2000). Proposal of a four-dimensional model of social response. *Psychological Bulletin,126 ,* 454-470.

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

Nemeth, C.J., Rogers, J.D., & Brown, K.S. (2001). Devil's advocate vs. authentic dissent: Stimulating quantity and quality. *European Journal of Social Psychology, 31*, 707-729.

Nemeth, C. J., Staw, B. M. (1989). The tradeoffs of social control and innovation in groups and organizations. In L. Berkowitz (Ed.) *Advances in experimental social psychology, 22*, (pp. 175-210). San Diego, CA: Academic Press.

Neuman, G.A., Wagner, S. H., & Christiansen, N. D. (1999). The relationship between work-team personality composition and job performance of teams. *Group & Organization Management, 24*, 28-45.

Pavlov, I. P. (1927). *Conditioned reflexes: an investigation of the physiological activity of the cerebral cortex.* Oxford, England: Oxford Univ. Press

Petty, R. E., & Cacioppo, J. T. (1981). *Attitudes and persuasion: Classic and contemporary approaches.* Dubuque, IA: Wm. C. Brown.

Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York: Springer-Verlag.

Petty, R. E. (1994). Two routes to persuasion: State of the art. In G. d'Ydewalle, P. Eelen, P. Bertelson, (Eds), *International perspectives on psychological science, Vol. 2: The state of the art*. (pp. 229-247). Hillsdale, NJ, England: Lawrence Erlbaum Associates.

Phillips, K.W., & Lloyd, D.L. (2006). When surface and deep-level diversity collide: The effects of dissenting group members. *Organizational Behavior and Human Decision Processes, 99*, 143-160.

Phillips, K.W., Northcraft, G.B. & Neale, M.A. (2006). Surface-level diversity and information-sharing: When does deep-level diversity help? *Group Processes & Intergroup Relations, 9*, 467-482.

Porter, C.O.L.H.,Hollenbeck, J.R., Ilgen, D.R., Ellis, A.P.J., West, B.J., & Moon, H. (2003). Backing up behavior in teams: The role of personality and legitimacy of need. *Journal of Applied Psychology*, *82*, 30-43.

Puckett, J. M., Petty, R. E., Cacioppo, J. T., Fischer, D. L. (1983). The relative impact of age and attractiveness stereotypes on persuasion. *Journal of Gerontology, 38,* 340-343.

Rahim, M.A., Kim, N.H., & Kim, J.S. (1994). Bases of Leader power, subordinate compliance, and satisfaction with supervision: A cross-cultural study of

managers in the U.S. and S. Korea. *The International Journal of Organizational Analysis, 2*, 136-154.

Reid, F. J. M., Ball, L. J., Morley, A. M., Evans, J. B. T. (1997). Styles of group discussion in computer-mediated decision-making. *British Journal of Social Psychology, 36,* 241-262.

Schulz-Hardt, S., Frey, D., Luthgens, C., & Moscovici, S. (2000). Biased information search in group decision-making. *Journal of Personality and Social Psychology, 78*, 655-669.

Schulz-Hardt, S. Jochims, M., & Frey, D. (2002). Productive conflict in group decision-making: Genuine and contrived dissent as strategies to counteract biased information seeking. *Organizational Behavior and Human Decision Processes, 88,* 563-586.

Schulz-Hardt, S., Brodbeck, F.C., Mojzisch, A. Kerschreiter, R., & Frey, D. (2006). Group decision-making in Hidden Profile situations: Dissent as a facilitator for decision quality. *Journal of Personality and Social Psychology, 91,* 1080-1092.

Snyder, M. & Gangestad, S. (1986). On the nature of self-monitoring: Matters of assessment, matters of validity. *Journal of Personality and Social Psychology, 51,* 125-139.

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

Stasser, G. (1988). Computer simulation as a research tool: The DISCUSS model of group decision-making. *Journal of Experimental Social Psychology, 24,* 393-422.

Stasser, G. (1991). Pooling of unshared information during group discussion. In S. Worchel, W. Wood, J. A. Simpson (Eds.), *Group process and productivity* (pp. 48-67) Thousand Oaks, CA, US: Sage Publications.

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

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

Stewart, D. D., Billings, R. S. & Stasser, G. (1998). Accountability and the discussion of unshared, critical information in decision-making groups. *Group Dynamics: Theory, Research, and Practice, 2,* 18-23.

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

Stokes, J. P. (1983). Components of group cohesion: Intermember attraction, instrumental value, and risk taking. *Small Group Behavior, 14,* 163-173.

Taggar, S. (2002). Individual creativity and group ability to utilize individual creative resources: A multilevel model. *Academy of Management Journal, 45*, 315-330.

Thomas, K. W. (1992). Conflict and negotiation processes in organizations. In M. D. Dunnette, D. Marvin; L. M. Hough, (Eds) *Handbook of industrial and organizational psychology, Vol. 3 (2.)* (pp. 651-717). Palo Alto, CA, US: Consulting Psychologists Press.

Turner, J.C. (1985). Social categorization and self-concept: A social cognitive theory of group behavior. In E.J. Lawler (Ed.) Advances in group processes: Theory and research (Vol. 2, pp. 77-121). Greenwich, CT: JAI Press.

Turner, J.C., Hogg, M.A., Oaks, P.J., Reicher, S.D., & Wetherell, M.S. (1987). *Rediscovering the social group: A self-categorization Theory*. Cambridge, M.A.: Basil Blackwell

Volpato, C., Maass, A., Mucchi-Faina, A. & Vitti, E. (1990). Minority influence and social categorization. *European Journal of Social Psychology, 20,* 119-132.

Waldman, D.A., Atwater, L.E. & Davidson, R.A. (2004). The role of individualism and the Five Factor Model in the prediction of performance in a leaderless group discussion. *Journal of Personality, 72*, 1-28.

Wall, J.A. & Callister, R. R. (1995). Conflict and its management. *Journal of Management, 21,* 515-558.

Wells, G. L. & Petty, R. E. (1980). The effects of overt head movements on persuasion: Compatibility and incompatibility of responses. *Basic and Applied Social Psychology 1,* 219-230.

Wheeler, L. (1966). Toward a theory of behavioral contagion. *Psychological Review, 73*, 179-192.

Willis, R. H. (1963). Two dimensions of conformity-nonconformity. *Sociometry 26*, 499-513.

Willis, R. H. (1965). Conformity, independence, and anticonformity. *Human Relations, 18*, 373-388.

Wittenbaum, G.M., Hubbell, A.P., Zuckerman, C. (1999). Mutual enhancement: Toward an understanding of the collective preference for shared information. *Journal of Personality and Social Psychology, 77,* 967-978.

Wittenbaum, G.M. & Stasser, G. (1996). Management of information in small groups. In J.L. Nye & A.M. Brower; (Eds) *What's social about social cognition? Research on socially shared cognition in small group.* (pp. 651-717). Thousand Oaks, CA, US: Sage Publications, Inc

Zaccaro, S. J. (1991). Nonequivalent associations between forms of cohesiveness and group-related outcomes: Evidence for multidimensionality. *Journal of Social Psychology, 131,* 387-399.

Zaccaro, S. J. & Lowe, C. A. (1988). Cohesiveness and performance on an additive task: Evidence for multidimensionality. *Journal of Social Psychology, 128,* 547-558.

Zaccaro, S. J. & McCoy, M. C. (1988). The effects of task and interpersonal cohesiveness on performance of a disjunctive group task. *Journal of Applied Social Psychology, 18,* 837-851.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9*, 1-27.

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Kelly Trindel was in 1978 in Fredonia, New York, a small college town south of Buffalo. She was the fifth child born to parents Pauline and Jerry Trindel. She received her Bachelor of Science degree from the University of North Carolina at Greensboro in 1996 with a major of Psychology. Three years later she received her Master of Science degree in Research Psychology at East Carolina University in Greenville, North Carolina. In 2007 Ms. Trindel fulfilled a life-long goal by receiving her Doctor of Philosophy degree in Experimental Psychology from the University of Texas at Arlington. She is currently an Assistant Professor of Psychology at Wingate University in North Carolina. Her research interests include group decision making, self perceptions and the social collective, as well as happiness and positive psychology.