

ABSTRACT

Title of Document: Innovation as Group Process: Hierarchy, Status, and the Dilemma of Participative Leadership
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Organizations that are characterized by vertical authority structures, where decisions are made and implemented through a clear chain-of-command, are commonly seen as less responsive, less innovative, and less dynamic than organizations that have authority distributed more horizontally. This study takes aim at this presumption by miniaturizing authority structures to the level of the group, where group process theory can be marshaled to predict, measure, and assess outcomes for group innovation in an experimental setting.

Using status theory, I propose that hierarchical groups will be more rather than less innovative than egalitarian groups. I conduct an experimental test by manipulating hierarchy in groups instructed to complete a common task, with outcomes mapped to innovative performance. Findings show that hierarchical groups are actually no more, and no less, innovative than egalitarian groups. Irrespective of authority structure, innovation appears to be most likely in groups in which a clear

leader emerges who makes others in the group feel like her equal during group interaction.

Other findings are presented to explain the apparent no-effect of authority structure on innovation. I will show that status processes advantage each type of group differently with respect to innovation. Hierarchical groups are advantaged by the presence of a clear leader; egalitarian groups are advantaged by the participative interaction that comes naturally to status peers. But the two conditions must occur together to maximize the likelihood for innovation, and this poses a problem for groups who seek to innovate, because status dynamics that promote one of the conditions undercut the status dynamics that promote the other. In egalitarian groups, when authority seekers try to take charge and lead, participative interaction is endangered because members resent the status move. In hierarchical groups, when higher ranking members act participatively, group leadership is contested because others feel empowered to take charge. Each group type therefore faces a dilemma of participative leadership, and because the dilemma is reversed across group types, the net effect of authority structure on innovation is no apparent effect. Implications of the findings for theory and practice are discussed.

INNOVATION AS GROUP PROCESS: HIERARCHY, STATUS, AND THE
DILEMMA OF PARTICIPATIVE LEADERSHIP

By

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Dedication

For Erica – spouse, mother, do-gooder, forgiver of sins. Still the most beautiful person I know.

Acknowledgements

It was less than four years ago when my assignments officer informed me that I had been selected for graduate training en route to teach leadership at the U.S. Naval Academy. When I told my boss about my selection, he said, “I just don’t think I could take that on.”

“Take *what* on?” I asked, oblivious to the road ahead.

“The work it takes to get a Ph.D. – I don’t think I could take *that* on.”

My boss’s admission, quaint as it seemed at the time, resonates loud and clear four years on. After 20 years in the Navy, I thought graduate school would feel like a sabbatical from “real work.” I was wrong, and clumsy about it. In my first semester I suggested to my advisor, likely the country’s foremost military sociologist, that the department create a sub-specialty, just for me, centered on leadership as an academic discipline. My advisor urged that I first learn a little about what sociology has to offer. In my second year I (unsuccessfully) defended a dissertation proposal, sure that after two semesters of statistics and a smattering of Sociology coursework that I was ready for autonomous research. So my first acknowledgement goes to David Segal, for his wisdom in giving me just short of enough rope to hang myself.

Getting access to Naval Academy midshipmen as research participants is a rare gift. I want to thank Rear Admiral (Select) Matthew Klunder, Commandant of Midshipmen, for his decisive role, and Ms. Erin Johnson at the Naval Academy’s Human Research Protection Program for making the IRB process smooth and painless. Mrs. Lou Cox at the Naval Academy’s Office of Institutional Research

assisted heroically with the fielding of the Intranet survey, and provided data from the Naval Academy's data warehouse, without which this study was "dead in the water."

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Lastly, and in particular, I want to thank Jeffrey Lucas, whose scholarship, teaching, mentorship, and "walk and talks" around campus made me want to be a social psychologist. Jeff and his wife Karen are wonderful role models as teammates, parents to three great kids, and friends. Erica and I look forward to many years of friendship.

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Chapter 1 – Introduction

Purpose of the Project and Research Question

This dissertation project originated from a question that formed in my mind in the first semester of graduate training in sociology, and has persisted since. I became concerned with the popularly conceived notion that the manifest function of military hierarchy to instill discipline at the individual level and to impose order at the organizational level has the latent consequence of de-skilling military leaders as innovators and agents of change. I asked myself whether there was something inherent about a hierarchy of authority so prevalent in military life that militates against officers' inclination – even their ability – to think creatively, and further, to implement creative solutions when they become apparent. My exposure to institutional theory made clear that the question applies to other organizational forms marked by hierarchical authority and decision-making.

The question of whether hierarchy interferes with innovation is not new, nor is it limited to formal organizations. Sociologists and scholars across the social sciences have long been interested in the dynamics of change in social organizations, formal and informal, especially those which by virtue of their structure tend to resist change, and these are the rule rather than the exception. The literature on the subject is massive, and it appears settled that a vertically-stratified hierarchy of relations among people, in which those at the top are recognized as more powerful, higher in status, or more generally advantaged by the arrangement than those at the bottom, tends to be self-preserving, and thus inclined toward maintaining the status quo.

Scholarship focused on organizational change and renewal has prescribed ways to penetrate, subvert, or otherwise neutralize the hierarchy in order to cut through established ways of thinking, create space for new ideas, and make ripe the conditions necessary for organizational survival, adaptation, and growth. The scholarship concerning innovation is part of this tradition, premised on the assumption that in order for vertically stratified organizations to change and adapt, they must somehow suspend the fetters of hierarchy to achieve genuinely new and useful solutions to organizational problems. The prescription for *innovation teams* embedded in organizations emerged as a solution to the dilemma. These teams are conceived as life spaces within the organization in which hierarchy is neutralized for the sake of generating innovative products and processes (Kanter 1983; Troyer and Silver 1999).

The question at the heart of this project is simply whether the assumption about the limiting effects of hierarchy on innovation maintains at the level of the small group – precisely the level where innovation teams operate. My research question is: does the presence of an organizationally-defined and non-contested vertical hierarchy (such as military rank), in a task-oriented small group, promote or stifle innovation in the task, relative to groups where no such hierarchy exists?

While the answer seems obvious at first glance, I will argue based on group process theory that hierarchical groups are more likely to be innovative than groups lacking the same hierarchy. This counter-intuitive claim rests on the proposition, derived from theory, that participative interaction is more likely, and relational conflict is less likely, in newly-formed hierarchical groups than in newly-formed

egalitarian groups. Because participative interaction is noted in the literature as positively related to innovation, and relational conflict as negatively related, it follows that hierarchical groups will be more innovative than egalitarian groups.

Hypotheses, Methods, Main Findings, and Definitions

Hypotheses. Marshalling group process theory and research in sociology and findings in the organizational literature, I have developed the following hypotheses, which will be elaborated in greater depth later:

Hypothesis One: *Relational conflict in groups will have a negative relationship with innovative performance in groups.* Relational conflict is known to have detrimental effects on group performance (Jehn 1994; 1995; Pelled, Eisenhart, and Xin 1999), and research shows a consistent pattern of findings that groups experiencing higher degrees of interpersonal conflict in the task setting tend to be less innovative in the task (Amason and Spazienza 1997; Kurtzberg and Amabile 2000).

Hypothesis Two: *Participative interaction in groups will have a positive relationship with innovative performance in groups.* Sarin and O'Connor (2009) argue persuasively that if team leaders engage team members in group discussion and decision-making, group performance will benefit directly from an increased sense of ownership of group outcomes across the group, and indirectly from better communication patterns during participative exchange. Kahai and colleagues (2004) support this argument.

Hypothesis Three: *Participative interaction will mediate the relationship between relational conflict and innovative performance in groups.* While it is established that relational conflict is negatively related to innovative performance (see Kurtzberg and Amabile 2000 for a review), we know less about the relationship between participative interaction, relational conflict, and innovative performance. Presuming I find the relationship I expect in Hypothesis Two above, Hypothesis Three provides the mechanism to examine the interaction among these variables. I expect participative interaction to mediate the relationship between relational conflict and innovative performance because I propose that interpersonal conflict will lead group members to withdraw from discussion, self-censor inputs, and more generally feel a greater sense of inequality between themselves and those whom they perceive as being valued more by the group. It is this sense of exclusion and inequality I predict will account for, to some degree, the negative relationship between relational conflict and innovative performance.

Hypothesis Four: *Hierarchical groups will achieve more participative interaction than egalitarian groups.* Based on group process theory and research, I expect hierarchical groups to be less prone to status contests than egalitarian groups, and therefore to be more fertile ground for participative interaction. Members of hierarchical groups have their relative status established by their rank. Egalitarian group members, by contrast, will likely negotiate the status order as part of their task, and this negotiation will lead to feelings of inequality among group members as the status order emerges.

Hypothesis Five: *Hierarchical groups will experience less relational conflict than egalitarian groups.* I predict that status contests in egalitarian groups will result in a higher level of overall relational conflict in hierarchical groups than in egalitarian groups. I envisage the conflict resulting from status contests as additive to conflict emerging from other dynamics.

Hypothesis Six: *Innovative performance will be highest in hierarchical groups with power clearly displayed, next highest in hierarchical groups with power suppressed, and lowest in egalitarian groups.* Greater relational conflict and less participative interaction in egalitarian groups will result in lower degrees of innovative performance in those groups than in hierarchical groups. The effect of the experimental suppression of authority in groups will cause those groups to fall between non-suppressed authority groups and egalitarian groups on each of the variables of interest, and lead to the following set of hypotheses:

Hypothesis 6A: *Innovative performance will be higher in hierarchical groups where authority is non-suppressed than in egalitarian groups.*

Hypothesis 6B: *Innovative performance will be higher in hierarchical groups where authority is suppressed than in egalitarian groups.*

Hypothesis 6C: *Innovative performance will be higher in hierarchical groups where authority is non-suppressed than in hierarchical groups where authority is suppressed.*

Hypothesis Seven: *Participative interaction will mediate the relationship between hierarchy and innovative performance.* My theoretical argument suggests that hierarchy is not by nature related to innovative performance, but rather related through its effect on the nature of interaction in the group, and specifically through its effect on participative interaction and relational conflict. Thus, relational conflict and participative interaction are plausible mediating variables which together may account for the main effect I predict in Hypothesis Six. Because I am also predicting the mediation effect in Hypothesis Three, then it follows that participative interaction will overpower relational conflict as the mediating variable in Hypothesis Seven.

Methods. Using U.S. Naval Academy midshipmen as research participants, I assigned a task to groups of four or five midshipmen in which they worked together to construct a mission statement for the Naval Academy in the year 2034. The task was designed to tap the creativity of group members, stimulate conflict in reconciling diverse opinion through group process, and produce variation in the dependent variable; that is, the *innovativeness of the performances* of groups.

Participants were randomly assigned to two kinds of groups. Hierarchical groups were composed of midshipmen stratified by military rank; half of the hierarchical groups (Non-Suppressed Authority Groups) wore rank insignia during group interaction – the other half (Suppressed Authority Groups) removed their rank insignia just prior to the group exercise, but their ranks were known by other members. Egalitarian groups are composed of midshipmen of equal rank. Measuring and controlling for other factors found to influence group process dynamics, I attempted to isolate the main effects of hierarchy on innovative performance.

Main Findings. There are seven main findings from my study.

Finding One: The manipulation of hierarchy had no apparent effect on the group's innovative performance.

Finding Two: Relational conflict is decisive in predicting innovative performance of groups, and the relationship is negative.

Finding Three: Groups achieved greater innovative performance when a consensus is reached within the group on who emerged as the leader for the task, and the leader consensus condition is independent of the experimental manipulation of hierarchy.

Finding Four: When groups achieved a consensus of agreement on who emerged as the group leader, and that leader exercised a participatory leadership style, they experienced greater innovative performance and less relational and task conflict than other groups, and the leader presence/style condition is independent of the experimental manipulation of hierarchy.

Finding Five: Egalitarian groups tend to vary in character between groups that are led by a single participative leader, and groups that lack clear leadership and are non-participative; while hierarchical groups tend to vary in character between

groups that are led by a single non-participative leader, and groups that lack clear leadership and are participative.

Finding Six: When group interaction is non-participative, emergent leaders in hierarchical groups who are senior in rank to their evaluators are evaluated as more collaborative after the group exercise than members who emerge as leaders in egalitarian groups.

Finding Seven: In egalitarian groups, emergent leaders who are male are evaluated as more collaborative than emergent leaders who are female. In hierarchical groups, the difference is not statistically significant.

Key Definitions. I use the following definitions of key terms throughout the study:

- *Innovation* – products which are *new*, as judged with reference to the relevant unit of adoption, and *useful*, as judged by the consumer for whom the product is meant to benefit.
- *Innovative Performance* – the degree to which groups achieve innovation in a group task, relative to other groups. This is the primary dependent variable in the study.

- *Hierarchy* – an organizationally-defined and non-contested system of vertically stratified authority among group members. In this study, hierarchy is symbolized by military rank.
- *Hierarchical Groups* – groups that are characterized by the presence of hierarchy as defined above.
 - *Non-suppressed Authority Groups* – The first experimental condition. Groups that have the same definition as “Hierarchical Groups”
 - *Suppressed Authority Groups* – The second experimental condition. Groups that are characterized by the presence of hierarchy as defined above, except that members remove their rank insignia during group interaction, but not before other group members know their rank.
- *Egalitarian Groups* – The third experimental condition. Groups that are characterized by the absence of hierarchy as defined above.
- *Relational Conflict* – interpersonal dynamics among group members characterized by negative emotions and attitudes, including distrust, resentment, feeling devalued, feeling non-collaborative, and feeling competitive rather than cooperative during group interaction.
- *Task Conflict* – the degree of disagreement among group members concerning the assigned task.
- *Participative Interaction* – the degree of feeling among group members that their contributions to group goals are equal to the contributions of the group leader, where the group leader is defined by each individual member.

- *Emergent Leaders* – participants identified by each group member as the person who “most stood out” as the leader for the group exercise.

Chapter 2 – Innovation in Organizational Groups – Theory and Research

Bureaucracy and Innovation

Highly bureaucratic organizations have long been burdened with the image of the slow, plodding behemoth – unresponsive, unimaginative, static, and impregnable. Henry Kissinger “lamented the stifling influence of the foreign policy bureaucracy on creative diplomacy” (Burns 1978: 300). The ideal-type organizational structure caricatured by Max Weber as the lifeblood of industrialization in the nineteenth century was just such a bureaucracy (Parsons 1937), and in twentieth century scholarship it came under attack by those concerned with bureaucratic adaptation to changing external environments (Blau 1956; Merton 1940). Research and conventional wisdom held that formalized processes, centralized decision-making, layers of authority, and routinized operations – those hallmarks of bureaucratic structure – poisoned the well for adaptive change and innovation in organizations (Blau 1956; Homans 1961).

In his classic work on scientific management in American industry, Aitken argues that the innovation of scientific management practices introduced by Frederick Taylor at the Watertown Arsenal from 1908 to 1915 was rejected by the workers based on suspicion and distrust even when they personally benefited from higher pay (Aitken 1960). The irony in this case is that the bureaucracy opposed becoming, in essence, more bureaucratic. Even change to enforce more structure, as scientific management promised, was resisted.

The dilemma for organizations that must both endure and adapt has long been recognized by practitioners and scholars. Blau (1956) argues that bureaucracies are burdened by the paradoxical demand for both organizational stasis and dynamism. In his view, bureaucratic structures of centralized authority, formalized procedures, and routinized operations met the demand of increasing economies of scale during industrialization. Mass production required mass process and control, leading to increasingly depersonalized administration of production functions.

The intended consequence of bureaucratic administration was increased efficiency in production, but this came at the cost of responsiveness to changing external conditions. The strength of bureaucracy in managing the scale of industrial production had the unintended consequence of blinding the institution to changing environmental conditions. Implications of bureaucratic stasis prompted a flurry of research among organizational scholars to prescribe strategies for bureaucratic adaptation and change.

The Institutional Logic of Innovation Teams

One line of prescriptive research is the work of Zaltman, Duncan, and Holbek (1973). In *Innovations and Organizations*, they deconstruct organizational structure as it relates to innovation at the level of the organization, identifying five dimensions of structure: complexity, centralization, formalization, interpersonal relations, and ability to deal with conflict. Their review of the literature on innovation in organizations concludes that none of the extant theories deal adequately with the *process* of innovation, which following Shepard (1967) they view as consisting of two phases: initiation and implementation. For Zaltman and colleagues, each

dimension of organizational structure impinges differently on each phase of the innovation process. More complex and centralized structures, for example, inhibit innovation in the initiation stage but foster innovation in the implementation stage. Bureaucratic organizations wield the power to overcome internal resistance to change, but the institutional logic of bureaucracy treats change as anathema in the first place (Troyer 2004).

Scholars proposed that innovative solutions required a suspension of the bureaucratic logic in the life space of the bureaucracy. Troyer and Silver (1999) argue that team-based innovation in bureaucracies takes place as a democratic repertoire of action within a broader bureaucratic repertoire of action. They suggest that innovation teams are more productive, more creative, and more satisfied when their group interactions are governed by democratic principles; that is, norms of equal voice of team members, open communication, and high levels of participation in debate and decisions. Creativity scholars in psychology echo this theme, noting the trove of evidence that creative thought and activity are nurtured by environments which are unconstrained and non-controlling (Amabile 1996).

Small Group Innovation: The Organizational Psychology Perspective

Recent organizational scholarship has shifted the unit of analysis from the organization to the innovation team embedded within it. In their work stressing team-level innovation, Kurtzberg and Amabile (2000) highlight the role of conflict within innovative teams. They define three types of conflict: task-based conflict, relation-based conflict, and process-based conflict. The first type, in moderation, is productive and conducive to innovation, while any degree of the latter two is a barrier

to innovation. Task-based conflict promotes innovation by generating constructive debate and insight on the substantive issues involved. Relation-based conflict arises from emotional tension among discordant members, diverts the team from substantive debate, compromises trust among members of the team, and carries the potential for team dissolution. Process-based conflict appears when team members have trouble coordinating their activities and functions within the team.

Kurtzberg and Amabile's work is part of an active literature in organizational scholarship to conceptualize creativity and innovation as a group dynamic (Chen 2006; Drach-Zahavy and Somech 2001; Nemeth and Staw 1989; West and Anderson 1996). Other lines of research focus either at the level of the organization, where the goal is to map the characteristics of innovative organizations (Becker and Whisler 1967; Eckvall 1996; Jaskyte and Dressler 2005; Shepard 1967); or at the level of the individual, where the goal is to map the characteristics of innovative group leadership (Abrams et al. 2008; Avolio, Jung, and Sivasubramaniam 1996; Buijs 2007; Kahai, Sosik, and Avolio 2004; Maier and McRay 1972; Sarin and McDermott 2003; Sarin and O'Connor 2009; West and Anderson 1996). Methodological approaches tend to be weighted toward surveys of teams and their supervisors engaged in new product development or similar boundary-pushing activity within organizations (De Dreu 2006; Lambertini and Orsini 2000; Pinto, Pinto, and Prescott 1993). All of these approaches examine individuals, groups, and organizations in their natural settings.

My project takes a different approach. I take seriously Stolte, Fine, and Cook's (2001) assertion that the strength of social psychology as an empirical domain is its capacity to model social phenomena in miniature so that they can be examined

with precision. This study applies a fresh theoretical approach, an original methodology for measuring group innovation, and the experimental method to examine innovation expressly as a group-level phenomenon, for the purpose of more refined insight into how and why innovation occurs in groups. I designed this project to conceive of, measure, test, and assess the phenomenon of innovation as a group process.

Small Group Innovation: The Sociological Perspective

Sociological social psychology is a particularly fitting body of literature for conceptualizing innovation as a group process. Group process research has plumbed the depths of small group interaction since the emergence of the field following World War II. Foundational studies of small human groups by Bales and colleagues in the 1950s examined communication patterns among ad hoc group members in the laboratory (Bales et al. 1951; Bales and Slater 1955). Variations in these patterns, along with other empirical findings in early social psychology, spawned sociological theory and research, most notably the work of Thibault and Kelley (1959), Homans (1961), Emerson (1962), Blau (1964), and Berger and colleagues (1972; 1977; 1980). These scholars engaged in projects to focus a scientific lens on what they considered the most fundamental unit of social relations – the small group interacting face-to-face. Their work formed the basis of research programs that stretch into the present.

It is therefore surprising that small group research in sociology has not yet applied itself to the phenomenon of group innovation within bureaucratic settings. Organizational innovation lies at the juncture of psychology and sociology, as well as at the nexus of micro-social processes and macro-social structures, precisely the

milieu of sociological social psychology. This project will marshal theories of status in group process research to complement the work in the organizational literature toward explaining the effect of one dimension of organizational structure – formal authority – on the group process of innovation.

Innovation as Group Process

Homans (1961) was perhaps the first sociological theorist to address the phenomenon of innovation in groups. Drawing heavily on Bales and other early work in small group research, Homans theorized that ad hoc groups stratify according to status, with patterns of interaction conditioned by an emergent and stable hierarchy of prestige within the group. Prestige accrues to members of a group according to resources they provide the group which other group members cannot or will not provide. Those with higher prestige become the target of interaction for the greater percentage of others in the group, who value interactions with prestigious members more than with others. Those of higher prestige are seen as offering resources of greater value, and a consensus about the value of these resources, as well as about the prestige accrued by the members providing them, forms naturally and becomes stable, even among those members of the group with lower prestige.

As group members gain status, expectations build for their competence, and their performance is evaluated more favorably by other group members. Expectations of competence become a self-fulfilling prophecy, and performance evaluations map to status positions, validating the status order. Once stable, the status order becomes a status resource for high-status members, with benefits diffusing to other members. Because high status becomes rewarding in itself to members with high status in the

group, these members become less inclined to risk losing it through overt displays of power over other members. In effect, high status members often choose to exercise discretion with their power over low status members. Because lower status members appreciate the discretion shown them by higher status members, discretion with power serves as an additional source of prestige for high status members, and one moreover which is available only to them. Thus, both high and low status members have an instrumental interest in legitimating the status hierarchy.

Homans (1961) describes a simple three-layer model for status hierarchy in groups: the upper class sets the group norms for interaction, using their high prestige to win approval and consensus for those norms; the middle class assumes the role of enforcer of group norms, sanctioning non-conformity with social ostracism, and rewarding conformity with social acceptance; the lower class, having no relative status to offer in social exchange with the upper two classes, are confronted with the alternatives of ostracism and acceptance, and more often choose the latter by conforming to group norms.

Within this framework, Homans argues that innovation in groups with stable status hierarchies is most likely to emerge from the upper and lower classes, though for different reasons. Homans defines innovation as a deviation from group norms, a repertoire of action that is new and novel from accepted repertoires of action in the group. Upper class innovators, having already secured their status, have little to risk in violating group norms relative to the others, and are therefore more apt to innovate. Lower class innovators are those who, despite social influence toward conformity, persist in deviant activity, earning rejection or even ostracism from the group. These

deviants apparently consider ostracism an acceptable price to pay for their integrity – for “sticking to their guns.” Of the two types of innovative actions, those initiated by the upper class are more effective in changing group norms, because the innovations they advocate are more likely to be endorsed by other group members than those initiated by lower class members.

Homans’s analysis of status processes in the middle class gives us a glimpse of what might occur in democratic groups prescribed by Troyer and Silver (1999), that is, among equal-status group members. According to Homans, the most influential social control mechanisms for the middle class are not those imposed by higher-status members, but those imposed by status peers. Homans gives two reasons for this condition. First, middle class members, lacking by definition any surplus in status, have only their conformity to offer in exchange with other middle status members. They therefore risk much in deviating from the group, since the ostracism they might receive in return from other middle class members invites, at best, demotion to the lower class and, at worst, exclusion from the group.

Second, if middle class members deviate from group norms and turn out to be correct, those members make a claim for superior status, which their middle class peers may not be prepared to concede, and their upper class superiors may not be prepared to accept. Whether middle class members are qualitatively correct in deviating, they risk ostracism. In status terms, middle class members are therefore confronted with a higher risk for deviant behavior than are either of the two other classes. For this reason, middle status members are more motivated to internalize the existing status structure.

Homans's middle status conceptualization in groups differentiated by status prompts the question of whether the same resistance obtains in groups comprised entirely of middle-class members. Will members of egalitarian groups as I define them in this study, for example, seek to preserve the existing egalitarian structure by opposing claims for status? If so, this could have implications for innovation, because new ideas at the root of innovation may have the appearance of a status claim by the member proffering the idea. I will examine this possibility empirically in my design by measuring whether egalitarian group members feel differently about those who emerge as leaders in their groups than hierarchical group members feel about their leaders.

Egalitarian Groups, Status Organizing Processes, and Status Contests

Another theory of relevance to the research question is the foundational work by Berger and colleagues (1977) in the Expectation States research program. In their formulation, groups brought together to collaborate on a task in which all members are expected to contribute, and in which no status order exists *a priori*, will engage in status seeking behavior to structure the group interaction toward accomplishing the task. The emerging status structure takes shape according to a *status organizing process* (Berger et al. 1980). Members who demonstrate task competence earn status in the group, and these members enjoy more opportunities to communicate, communicate more frequently, and have their communications validated more often by the group. Each validation reinforces the status structure, which becomes self-legitimizing as interaction proceeds. The resulting status hierarchy structures interaction and becomes a strategic asset for task accomplishment.

Berger and colleagues point out that socially valued status characteristics imported into the group setting (such as gender, race, and education), can and do serve as markers for expectations of competence, even when the status characteristic has no apparent relation to the task. Status characteristics of this type are called *diffuse* – people tend to use diffuse characteristics to make generalized expectations of task competence.

Thus, in the absence of obvious indicators of task competence, possessing diffuse status characteristics advantages certain members over others in status organizing processes. Members may use their diffuse status characteristics strategically in *moves* (Goffman 1959) to earn more status. For example, members make a status move when they say, “When I was at Harvard...”

Accepting the premise that status organizing processes operate as a general principle in task groups, we can imagine that status moves in egalitarian groups will undermine the egalitarian logic upon which the group is formed, creating conflict and a legitimacy problem for the status order as it emerges. Those members on the short end of status processes in egalitarian groups might resent both their place in the emerging hierarchy, and the apparent violation of the group norm of “equal voice,” resulting in relation-based conflict among group members vying for status. This conflict has the potential to undermine innovation (Kurtzberg and Amabile 2000).

Owens and Sutton (2001) label this status striving among group members as *status contests*. They conceive of status striving as a basis for competition among group members, resulting in a zero-sum contest for status among members who enter the interaction as status equals. It is conceivable that the logic of status contests

impugns the egalitarianism meant to stimulate creativity and innovation in egalitarian groups.

Kanter's Dilemma of Participation

Rosabeth Kanter (1983) observed group dynamics in innovation teams embedded in large, bureaucratic organizations in the U.S. in the 1980s. Her conclusions bear directly on the current study. Kanter discovered that innovation teams in large organizations premised on participative egalitarianism often become “politicized” by the emergent status structure, and this implicit differentiation undermined the equal-status premise of the group. According to Kanter, “[e]ven though implicit [status] ‘rankings’ are manifest in practice, as the group carries out its deliberations, it is threatening to the fragile solidarity of a newborn team to acknowledge them” (Kanter 1983:263). Kanter argues that the “myth of team” becomes internalized by members of participative groups such that displays of dominance or submission (even subtle ones) threaten the legitimacy of the group, leading to a lowered sense of commitment toward the group task.

Thus, members of egalitarian groups who find their contributions less valuable to the group preserve the mythology of equal status by withholding contributions. Meanwhile, those members who find themselves dominating the interaction “feel guilty or uneasy” about their dominance and thus censor themselves in the interest of preserving the illusion of equal status.

Kanter sees formal hierarchy as a potential solution to this dilemma of participation. She argues that the presence of formal hierarchy in a group circumvents the tension of status striving because “the hierarchy was created by

someone else and does not force the group members to confront their own differences or inadequacies” (Kanter 1983:263).

In sum, Kanter, Homans, and Owens and Sutton make solid cases for the undermining of participative interaction in groups comprised of equal-status members. We should expect status organizing processes to militate against the participative interaction that egalitarian teams were conceived to promote. As status orders emerge in egalitarian groups, members are free to accept or reject them, and both choices have deleterious implications for participative interaction.

On the one hand, if members accept the status order, lower-status members acknowledge their own inferiority, de-value their own contributions, and participate less. On the other hand, if members reject the status order, they engage in activity to restore the egalitarian premise, including behavior aimed at discrediting the contributions of would-be status-seekers, and courting conflict to subvert status moves by other members. Participative interaction is compromised in the first case; relational conflict festers in the second. In either case, innovation likely suffers.

Where innovation is concerned, it may be that egalitarian groups carry the seeds of their own demise through the outcomes of status organizing processes. Group members appear to confront a *dilemma of egalitarianism* as the status order takes shape.

Organizational Rank as a Diffuse Status Characteristic

Status theory suggests, meanwhile, that groups stratified by organizational rank may be advantaged in precisely the domains where egalitarian groups are vulnerable. Where status organizing processes may cause dysfunctional conflict and

reduced participation in egalitarian groups, hierarchy imposes an order that has the potential to neutralize the adverse effects of status dynamics. In this project, organizational rank is operationalized as military rank, a particularly potent status characteristic. Huntington provides an elegant description of military rank in *The Soldier and the State*. He writes, “[Military] [r]ank inheres in the individual and reflects his [*sic*] professional achievement measured in terms of experience, seniority, education, and ability” (Huntington 1957:17). Military rank thus carries the presumption of ability and competence, and it demands obedience. “The greater competence and knowledge of the superior military officer must be assumed. In operations, and even more particularly in combat, ready obedience cannot conflict with military competence: it is the essence of military competence” (Huntington 1957:75). Huntington makes plain the objective, non-contested nature of rank as the mark of authority and competence. He argues that rank could have no less claim to authority, providing at its root a modicum of order and predictability to the chaos of war fighting.

Huntington’s formulation of the presumption of competence speaks directly to the status component of military rank. The presumption of competence lies at the heart of status theorizing in the group process literature. Status Characteristics Theory asserts that status accrues to categories of people who by virtue of their socially valued attributes command an expectation of competence from others. In the U.S. population, being male, white, educated, and middle-aged are diffuse status characteristics that confer status and a *de facto* expectation of competence in *any* task,

so long as the attribute is not explicitly disassociated from the task (Berger et al. 1980; Ridgeway 1991).

Group process theorists have postulated the relationship between organizational rank and status dynamics in task groups. Ridgeway and Berger (1986) use Expectation States theory to suggest that organizational rank serves as a referential structure, a system of expectations about performance and rewards for performance imported into the task setting from the organizational environment. The referential structure legitimates the presumption of greater competence in the task among group members with higher organizational rank. Task group participants embedded in larger organizations are assumed to regard organizational rank as a jointly constructed reality, one which conditions expectations not just about who will perform best in the task, but also that those performances warrant the imparting of higher status as a reward for the performance.

Thus, referential structures are a self-validating mechanism for the emergence and stability of status hierarchies in task groups, and a primary source of legitimacy for the authority and status rewards that ensue. Ridgeway and Berger (1986) suggest that referential structures lend considerable force and predictability to the emergence of a status hierarchy coincident with organizational rank in the task group.

Based on the presumption of competence coincident with rank in military settings noted by Huntington above, I submit that the referential structure of military rank is a particularly potent source of legitimacy for authority and status. I expect participants in hierarchical groups not only to yield authority to higher ranking group members, but also to feel that they ought to.

Empirical evidence confirms that differences in military rank (in this case, between Air Force officers and Air Force enlisted personnel) explained propensity for participants of higher rank to influence participants of lower rank on a task unrelated to military competence (Berger et al. 1972). As a diffuse status characteristic, military rank would impose both a hierarchy of status and a hierarchy of authority, making the status order it invokes particularly potent and stable.

In military settings, theory suggests that bearers of superior rank enjoy almost total insulation from risk, a condition that grants them both freedom of action to innovate and freedom from the vagaries of status striving. Their superiority in terms of both authority and status assured, ranking members are likely to perceive less risk in providing and supporting new ideas. Similar conditions hold for lower-ranked group members. Their (lack of) authority too is guaranteed by their rank, so that radical ideas are relatively less risky to provide or support, as compared to egalitarian groups.

With status organizing processes neutralized, and group members incentivized by status benefits to restrict overt uses of power, I propose that hierarchical groups are advantaged relative to egalitarian groups as a solution to the dilemma of egalitarianism, promoting participative interaction, easing relational conflict, and fostering innovative performance.

Authority, Status, and Innovation: An Anecdote

Consider the following anecdote from my personal experience as a naval officer, in which a senior navy leader demonstrates sensitivity to the effects of hierarchy on innovation. In the early 2000s, naval aviation was in the midst of an

efficiency revolution. Navy leadership had decided that post-Cold War budgets were too constrained to permit business as usual, and that naval aviation as an enterprise needed to work smarter, with a keener eye on operational efficiency, if they were to meet both current operational demands and capitalize for the future. The situation called for organizational innovation. Toward this goal, one particular admiral met with his staff to gather ideas on how to proceed, and with much dramatic flourish, he began the meeting by removing the rank insignia from his uniform – two-star stick pins worn on each collar – and throwing them on the table.

One imagines the admiral was hoping for a catharsis. His gesture was likely meant to convey the message that, at least in this life space, hierarchy would serve as no obstacle to the airing of ideas and problem solving. Whatever his intent, the admiral apparently subscribed to the popular notion that formal authority inhibited innovation. His gesture was therefore an innovation itself, and moreover, was an innovation only he could have made – a similar gesture from any other person in the room would have been non-credible. The bureaucratic setting in which the meeting was embedded made the innovation both possible and powerful. Whether the gesture inspired greater creative work by the group than would otherwise have occurred is unknown, but what seems clear is that the admiral thought it worth the risk.

Moreover, the admiral's gesture likely enhanced his status in the group, whose members appreciated the discretion he demonstrated, perhaps rewarding him with unspoken gratitude, which the admiral may have sensed and appreciated in turn.

The admiral, in effect, offered his surplus status (a product of his rank) as a resource of exchange with the group as a whole by defrocking himself, in hopes of

winning commitment from group members toward the task. He might have also, during group discussion, offered his surplus status in exchange with individual members by validating and/or adopting their contributions. With his example, the admiral could use his status to set the interaction norms for the group. If he was supportive of suggestions, he likely cultivated an open exchange of ideas. If he suppressed dissent and opposing views, the group likely responded in kind by withholding or self-censoring contributions, unwilling to risk decreased status within the group and/or ostracism from the group.

The admiral's surplus status in this setting may also have functioned as a check on his own power, because he presumably valued the status coincident with his authority and knew that overt power use had the potential to compromise his status. The admiral probably knew too that he stood to gain substantial goodwill from members who appreciated his deferential behavior, and risked little in deferring, since his power was assured in any case by his rank. Other members, meanwhile, likely felt similarly disinclined toward status striving behavior, because their status was set by rank.

Extending the logic of this argument to my project, I propose that the presence of hierarchy serves as a status *de-fuser* within the group, because it has the effect of attenuating status organizing processes. The referential structure (Ridgeway and Berger 1986) of military hierarchy in hierarchical groups frees the group from the dysfunctional effects of status contests, and they are able to apply themselves more productively than egalitarian groups toward the task of innovation.

Chapter 3 – Propositions and Hypotheses

Propositions

The theoretical arguments in the previous chapter lead to the following set of propositions:

Proposition One (organizational theory): *Relational conflict and participative interaction in ad hoc task groups are negatively correlated.* Research indicates that people who are having a difficult time connecting on a personal level with others in the group often display more negative patterns of conflict resolution, such as forcing or withdrawal, while members experiencing less interpersonal conflict with others tend to choose more positive patterns of conflict resolution, such as confronting and compromise (Sarin and O'Connor 2009). These findings suggest that strategies that lead to (or are the result of) noxious interpersonal relations among group members are the very same that lead to (or are the result of) non-participative styles of interaction. For example, members may well chose more directive (that is, less participative) influence strategies on members with whom they are not getting along, while choosing more participative influence strategies on those with whom they enjoy better relations. Note that the causal connection between relational conflict and participative interaction is not addressed in the proposition. Research has not yet examined the causal link, nor is causality important for the hypotheses that flow from this proposition.

Proposition Two (organizational theory): *Relational conflict stifles innovative performance in groups.* Jehn (1994; 1995) found that relational conflict has detrimental effects on group performance. Kurtzberg and Amabile (2000) provide a comprehensive review of the research findings examining the link between team interpersonal conflict and team innovation. In their review, the evidence clearly points to a negative relationship between interpersonal conflict and innovation in teams.

Proposition Three (organizational theory): *Participative interaction promotes innovative performance in groups.* Sarin and O'Connor (2009) found that a participative management style from the team leader promoted functional conflict resolution, improved the quality of communication, and improved collaboration among team members. Their findings suggest that participative interaction between the leader and team members result in behaviors that benefit the goals of the group. Extending this proposition to the current study, I propose that when the goal of the group is innovation, we can expect participative interaction to result in greater degrees of innovative performance.

Proposition Four (group process theory): *Status organizing processes create more relational conflict in newly-formed egalitarian groups than in newly-formed hierarchical groups, and create more participative interaction in newly-formed hierarchical groups than in newly-formed egalitarian groups.* This formulation derives from the argument in the previous chapter. I propose that the

conflict resulting from status contests is additive to the conflict resulting from other interpersonal dynamics, such as those relating to personality. Where relational conflict arises naturally from dynamics unrelated to status, the conflict that arises from status contests will add to this conflict, creating a higher level of overall conflict in egalitarian groups relative to hierarchical groups.

Admittedly, this formulation is a simplification – it is quite possible, after all, that interpersonal dynamics deriving from status contests will balance (rather than add to) interpersonal dynamics arising from personality clashes. Consider for example the case where an egalitarian member, who is gregarious and forceful by nature, makes a status move on another member, who happens to be shy and accommodating by nature. It is plausible that the status move in this situation does not result in increased conflict, because both members – who are getting along to begin with – accept, even endorse, the status move, and therefore nullify conflict that may have occurred due to their personality differences alone. Whereas on the other hand, if both members are gregarious and forceful by nature, the status move has the effect postulated in the previous arguments – it adds to the level of conflict.

The nature of the interpersonal dynamics between members before the status move may well be a moderating variable on the effect of the status move on relational conflict, but I will not examine the potential moderating effect in this study. Instead, I am proposing that, on average, status contests create more conflict than they nullify, and because status contests will be more prevalent in egalitarian groups than in hierarchical groups, we will see greater overall relational conflict (and less participative interaction) in egalitarian groups than in hierarchical groups.

Proposition Five (syllogism): *Newly-formed hierarchical groups will be more innovative than newly-formed egalitarian groups.* This proposition is the logical derivative of Propositions Two through Four – if relational conflict and participative interaction are negatively correlated in groups; if relational conflict inhibits innovative performance and participative interaction enhances innovative performance; and if egalitarian groups are by virtue of status contests more prone to relational conflict; then it follows that hierarchical groups will be by nature more innovative than egalitarian groups.

Hypotheses

My research design allows me to test the above propositions by specifying different conditions of hierarchy in experimental groups, then exposing causal connections by analyzing the between-group differences in the variables of interest. The following hypotheses derive from the propositions as tests within the confines of my design:

Hypothesis One (from Proposition Two): *Relational conflict in groups will have a negative relationship with innovative performance.* Relational conflict is known to have detrimental effects on group performance (Jehn 1994; 1995; Pelled, Eisenhart, and Xin 1999), and research shows a consistent pattern of findings that groups experiencing higher degrees of interpersonal conflict in the task setting tend to be less innovative in the task (Amason and Spazienza 1997; Kurtzberg and Amabile 2000).

Hypothesis Two (from Proposition Three): *Participative interaction in groups will have a positive relationship with innovative performance.* Sarin and O'Connor (2009) argue persuasively that if team leaders engage team members in group discussion and decision-making, group performance will benefit directly from an increased sense of ownership of group outcomes across the group, and indirectly from better communication patterns during participative exchange. Kahai and colleagues (2004) support this argument. When group performance is measured as innovative performance, we can expect that groups achieving higher levels of participative interaction will achieve higher levels of innovative performance.

Hypothesis Three (my formulation): *Participative interaction will mediate the relationship between relational conflict and innovative performance in groups.* While it is well established that relational conflict is negatively related to innovative performance (see Kurtzberg and Amabile 2000 for a review), we know less about the relationship between participative interaction, relational conflict, and innovative performance. Presuming I find the relationship I expect in Hypothesis Two above, Hypothesis Three provides the mechanism to examine the interaction among these variables. I expect participative interaction to mediate the relationship between relational conflict and innovative performance because I propose that interpersonal conflict will lead group members to withdraw from discussion, self-sensor inputs, and more generally feel a greater sense of inequality between themselves and those whom they perceive as being valued more by the group. It is this sense of exclusion and

inequality I predict will account for, to some degree, the negative relationship between relational conflict and innovative performance.

Hypothesis Four (from Proposition Four): *Hierarchical groups will achieve more participative interaction than egalitarian groups.* Based on group process theory and research, I expect hierarchical groups to be less prone to status contests than egalitarian groups, and therefore to be more fertile ground for participative interaction. Members of hierarchical groups have their relative status already established by their rank. Egalitarian group members, by contrast, will likely negotiate the status order as part of their task, and this negotiation will lead to feelings of inequality among group members as the status order emerges.

Hypothesis Five (from Proposition Four): *Hierarchical groups will experience less relational conflict than egalitarian groups.* I predict that status contests in egalitarian groups will result in a higher level of overall relational conflict in hierarchical groups than in egalitarian groups. I envisage the conflict resulting from status contests as additive to conflict emerging from other dynamics.

Hypothesis Six (from Proposition Five – my central hypothesis): *Innovative performance will be higher in hierarchical groups than in egalitarian groups.* Greater relational conflict and less participative interaction in egalitarian groups will result in lower degrees of innovative performance in those groups than in

hierarchical groups. If the logic of the argument used to derive hypothesis six holds, then we can expect the following results as well:

Hypothesis 6A: *Innovative performance will be higher in hierarchical groups where authority is non-suppressed than in egalitarian groups.*

Hypothesis 6B: *Innovative performance will be higher in hierarchical groups where authority is suppressed than in egalitarian groups.*

Hypothesis 6C: *Innovative performance will be higher in hierarchical groups where authority is non-suppressed than in hierarchical groups where authority is suppressed.*

The logic of this set of hypotheses derives from a key assumption: that the removal of rank insignia by participants will have the effect of attenuating hierarchy but not eliminating hierarchy entirely from group structure. Greater relational conflict and less participative interaction in egalitarian groups will result in lower degrees of innovative performance in those groups than in hierarchical groups. The effect of the experimental suppression of authority in groups will attenuate (but not eliminate entirely) the effect of hierarchy on innovation, and will therefore cause those groups to fall between non-suppressed authority groups and egalitarian groups on each of the variables of interest.

Hypothesis Seven (my formulation): *Participative interaction will mediate the relationship between hierarchy and innovative performance.* My theoretical argument suggests that hierarchy is not by nature related to innovative performance, but rather related through its effect on the nature of interaction in the group, and specifically through its effect on participative interaction and relational conflict. Thus, relational conflict and participative interaction are plausible mediating variables which together may account for the main effect I predict in Hypothesis Six. Because I am also predicting the mediation effect in Hypothesis Three, then it follows that participative interaction will overpower relational conflict as the mediating variable in Hypothesis Seven.

Chapter 4 – Method

Research Sample

My research sample consisted of undergraduate officer candidates (midshipmen) at the U.S. Naval Academy in Annapolis, Maryland. Research participants were drawn from a population undergoing military socialization, training, and education. Participants were recruited by campus-wide email to participate in the research as volunteers. Total sample size was 206 midshipmen assigned randomly to 46 experimental groups. There were 145 men and 61 women; 169 European Americans and 37 minorities. Participants were evenly distributed across class years: 48 seniors, 47 juniors, 58 sophomores, and 53 freshmen. Other sample demographics are provided in Table 4-1.

Table 4-1: Research Sample Demographics

Sample Demographics				
Attribute		N	Mean	Std. Deviation
Age			20.55	.9962
Gender	Male	145		
	Female	61		
Race	White	169		
	Black	9		
	Hispanic	6		
	Asian	5		
	Pacific Islander	2		
	American Indian/Alaskan Native	9		
	Unknown	6		
Athletic Honors	Non-Varsity Athlete	189		
	Varsity Athlete	16		
Academic Honors	Non-Superintendent's List	184		
	Superintendent's List	21		
Prior Military Service	Direct Admission	173		
	Prior Service	32		
Class Year	Freshman	53		
	Sophomore	58		
	Junior	47		
	Senior	48		
Academic Major	Engineering	59		
	Math and Science	34		
	Humanities/Social Science	59		
	Undeclared	54		

Rank Among Midshipmen. Comment is warranted on the authority structure among the student body at the Naval Academy to elucidate the logic behind the manipulation of hierarchy in the study. At the Naval Academy, midshipmen are charged with policing themselves in their individual and collective adherence to institutional policies and regulations, under supervision of academy staff officers and faculty. Authority to enforce regulations through administrative processes is delegated by the staff to midshipmen in roughly three tiers of authority: seniors comprise the upper stratum, juniors and sophomores the middle stratum, and freshmen the lower stratum. Seniors hold leadership positions within the student body and are responsible to the staff officers for the proper conduct and military performance of the lower three classes. Juniors and sophomores jointly conduct military indoctrination and training of freshmen. Freshmen have no authority within the student body and are expected to follow the orders of the upper three classes (Department of the Navy 2008).

Rank at the Naval Academy is not confined to the insignia on the collar or sleeve. The whole of midshipman life is structured by rank. Privileges and entitlements, such as ownership of an automobile, or permission to wear civilian clothes off campus, are dispensed according to rank. Personal relationships are forbidden between the upper three classes and freshmen. Seats around the lunch and dinner table are assigned by rank, and there are corridors in the mess hall only juniors and seniors can transit. In short, midshipmen are ideal participants for this project, since rank is so easily manipulated.

Egalitarian groups were comprised of midshipmen from the same class year, and therefore of equal military rank. There were four senior groups, three junior groups, four sophomore groups, and six freshmen groups.

Hierarchical groups were divided into two sub-conditions. Non-suppressed authority groups were comprised of one senior, one freshman, and a mix of two or three sophomores and juniors. This makeup produced a clear and consistent vertical hierarchy within groups – one upper stratum participant, two or three middle stratum participants, and one lower stratum participant. Suppressed authority groups had the same rank structure as non-suppressed authority groups, except that the experimenter asked these participants to remove their rank insignia during the exercise, but only after each member knew the rank of the other members. This manipulation had no apparent effect on the variables of interest, so non-suppressed authority groups and suppressed authority groups were pooled for analysis as hierarchical groups.

It is possible that the “suppressed authority” manipulation failed due to a flaw in the design. Recall the anecdote presented in Chapter Two, in which I describe the Navy admiral who removed his rank insignia at the beginning of a meeting with subordinates, presumably to signal the group that rank should not suppress the open exchange of ideas and critical discussion in the meeting. I attempted to send the same signal in Suppressed Authority groups by asking participants to remove their rank insignia prior to the group exercise. Yet I may have inadvertently reinforced (rather than suppressed) the presence of rank by leveraging my influence as a researcher (and a naval officer) to get them to do something they would not otherwise do, that is, remove their rank insignia. Thus, suppressed authority groups may have felt the

presence of rank as strongly, or even more strongly, than non-suppressed authority groups. I cannot know for sure whether this dynamic occurred, because I conducted no manipulation check between these conditions, but it is apparent from the results that organizational rank was equally present across the conditions of hierarchical groups. There were 17 egalitarian groups and 29 hierarchical groups. Experimental groups were composed of four or five midshipmen – there were 24 four-person groups and 22 five-person groups, with group size evenly distributed among experimental conditions. Comparison of means between four and five-person groups revealed no apparent effect of group size on any of the variables under study; therefore, four and five-person groups were pooled for analysis.

Procedure

Participant Recruitment and Random Group Assignment. After volunteering for the study by email, participants were directed to complete an online survey administered through the Naval Academy's Office of Institutional Research. Details on the contents of the survey are discussed below. Participants were then instructed by email to report for the experiment over lunch hour on a normal school day in one of two experimental rooms, located in an academic building on campus. In the experimental room, participants completed a paper consent form, participated in the group exercise, and then completed a post-exercise paper survey over the course of one hour. Participants were provided pizza and soft drinks to be consumed while conducting the group exercise. Upon completion of the post-exercise surveys, participants were debriefed, cautioned not to discuss the experiment upon departure, thanked for their time, and excused from the experiment.

Data Collection. Data were collected via online and paper survey and through retrieval from an institutional data warehouse.

Online Survey. Volunteers responding to the recruiting email received instructions to navigate to the Naval Academy's intranet portal to complete an online survey. There they logged into the system, read and electronically acknowledged a consent form, and completed a series of online instruments.

The first instrument was a series of three timed exercises designed to measure divergent thinking, a known predictor of creativity. The second instrument was the Innovation Potential Indicator (Patterson 2000), a measure of attitudes and behaviors purported to correlate with innovative performance. Screen shots of the online surveys are provided at Appendix A. Both instruments required about 20 minutes to complete.

U.S. Naval Academy Data Warehouse. As part of their consent to participate, participants granted the researcher access to certain personal information stored in the Naval Academy's data warehouse, including demographic information, academic and military performance information, admissions data, and personality data. These data was compiled by the Naval Academy's Office of Institutional Research and provided to the researcher by permission of the Superintendent, United States Naval Academy.

Group Exercise and Paper Survey. Upon arrival at the experimental room, participants were welcomed and directed to sit at a square table in the room. There were four or five chairs arranged on three sides of the table – the fourth side contained a projector aimed at the wall. Placards marked with the letters A through E were propped on the table in front of each chair. Participants were free to choose any open seat. In the center of the table sat a laptop computer connected to the projector, which projected the computer screen onto the wall. Participants entered to find the computer’s screen-saver activated, and were instructed not to touch the computer until advised by the researcher.

As participants settled in, they helped themselves to complementary pizza and soft drinks and completed the paper consent form. The experiment began with the researcher reading the script provided at Appendix B. Groups in the “Suppressed Authority” condition were instructed to remove their rank insignia worn on the collars of their uniforms for the duration of the exercise.

The exercise consisted of two distinct tasks. The first task required the group to brainstorm about what social, economic, political, and technological changes in the next 25 years could affect the relationship between American society and its armed forces. The researcher left the room for five minutes during the brainstorm activity, then returned to begin the next task. The second task was a group exercise in which groups were instructed to work collectively to author a mission statement for “an institution, like the Naval Academy, responsible for preparing young men and women for officer service in the Navy and Marine Corps in the year 2034.” After describing the task, the researcher asked one of the participants to remove the screen-saver on

the computer screen, revealing the text of the current Naval Academy mission statement in an open Microsoft Word document. Groups were instructed to “use the current mission statement as a reference for their work,” and were directed to have their completed mission statement typed into the computer within exactly 30 minutes.

The structure of the task made possible a wide range of solutions. Care was taken to provide enough guidance so that groups knew generally what was expected, while leaving enough latitude and intellectual freedom to pursue unique solutions. Solutions ranged from no change to the existing mission statement (two groups) to complete re-writes of the existing mission statement. The researcher left the room for the duration of the exercise.

After 30 minutes, the researcher returned to administer the post-exercise questionnaire containing the group dynamic scales. No discussion occurred among group members during the completion of the post-exercise questionnaires. In total, participants spent one hour in the experimental room.

Human Subject Protection, Consent, and Anonymity. I have completed the online human subject protection program required by the University of Maryland IRB entitled “Human Participant Protections Education for Research Teams” sponsored by the National Cancer Institute. In addition and as required by the Department of the Navy Human Research Protection Program, I have completed an online research ethics training program sponsored by the Collaborative Institutional Training Initiative (CITI).

Human subject confidentiality and candor in response were crucial to the success of the study. I took appropriate measures to assure participants their participation was voluntary, and that their confidentiality would be protected.

As a naval officer, I was sensitive to the undue influence my rank and status might engender among participants during recruiting and in the research setting. I did not, for example, include my rank in the recruiting email, but rather presented myself as a Ph.D. candidate. I did identify myself as a naval officer in my introduction during group facilitation, but wore civilian clothes and played down my status as a naval officer to promote scientific objectivity in the research setting, and to minimize extraneous effects on participant behavior.

Consent forms explaining the purpose of the project, risks associated with the project, and benefits resulting from the project, were signed by each participant. The project was approved by the University of Maryland College Park Institutional Review Board, and by the U.S. Naval Academy Institutional Review Board.

Variables

Independent Variables. Descriptive statistics for the independent variables of interest are presented in Table 4-2 below. These variables were included in the analysis to enable statistical control of factors known or postulated to affect innovation in groups in order to isolate the main effect of hierarchy on innovation.

Independent variables are grouped into three categories: Diversity Variables, Group Dynamic Variables, and Group Characteristic Variables.

Diversity Variables account for the distribution of group members across the possible categories of a status characteristic. In this project, status characteristics examined are those which are likely to be visually apparent and salient among midshipmen participating in the exercise, such that different distributions of the characteristic within groups could plausibly affect the nature of relations among group members, and particularly the emergence of a status hierarchy within the group. For example, it is plausible that a sophomore with enlisted service and a chest full of military ribbons may command greater status in the group than a junior, or even senior, who is lacking those ribbons, thus affecting the status dynamics within the group. The status characteristics deemed by the researcher likely to be both visibly apparent and salient to the task by group members are as follows:

1. **Military Rank.** Among midshipmen, rank is associated with class year – freshman lowest, senior highest. Senior-class midshipmen are further stratified by rank as midshipman officers, the lowest rank denoted by a single stripe or bar worn on the uniform, and the highest rank denoted by six stripes or bars. Rank as a status characteristic is manipulated in the experiment through assignment to groups according to class year. In addition to the experimental manipulation of rank, I calculated a rank diversity index according to the technique developed by Teachman (1980), using each class year as a rank category. There were 4 total rank categories represented, freshman through senior. I considered the rank differences among seniors negligible relative to rank differences between classes, and thus treated groups

composed entirely of seniors as egalitarian groups, even though these groups always consisted of midshipmen of different rank.

Table 4-2: Independent Variables

Category	Independent Variables									
	Label	N	Rng	Min	Max	Mean		SD	Normality	
						Mean	SE		Skew	Kurtosis
Diversity Variables	Gender Diversity Index	46	1.00	0.00	1.00	0.68	.058	0.39	-1.07	-0.62
	Race Diversity Index	46	0.68	0.00	0.68	0.18	.028	0.19	0.67	-0.42
	Personality Diversity Index	46	1.00	0.00	1.00	0.63	.030	0.20	-1.27	2.19
	Athlete Diversity Index	46	1.00	0.00	1.00	0.23	.055	0.37	1.09	-0.71
	Rank Diversity Index	46	1.00	0.00	1.00	0.57	.066	0.45	-0.47	-1.76
	Supe's List Diversity Index	46	1.00	0.00	1.00	0.33	.058	0.39	0.41	-1.78
	Prior-Service Diversity Index	46	1.00	0.00	1.00	0.41	.064	0.43	0.16	-1.92
Group Characteristic Variables	GP Avg GPA (Cum)	46	1.17	2.30	3.48	3.04	.037	0.25	-0.47	0.64
	GP Avg SAT Score	46	270	1183	1452	1333	8.55	58.0	-0.24	0.33
	GP Avg Familiarity Score	46	1.61	0.75	2.36	1.23	.062	0.42	1.09	0.40
	GP Avg Innovative Personality Score	46	1.75	5.25	7.00	6.23	.069	0.47	-0.03	-0.57
	GP Avg Fluency Score	46	14.0	10.5	24.5	19.3	0.45	3.03	-0.59	0.45
	GP Avg IPI Score	46	8.75	9.50	18.25	13.27	0.29	1.97	0.52	0.26
Group Dynamic Variables	GP Avg Task Conflict Score	46	6.40	5.40	11.80	7.69	0.23	1.59	0.61	-0.37
	GP Avg Relational Conflict Score	46	5.83	0.00	5.83	2.87	0.23	1.54	0.13	-1.03
	GP Avg Participative Interaction	46	4.60	7.40	12.00	10.54	0.14	0.96	-1.14	1.60
	GP Avg Process Satisfaction Score	46	1.50	2.50	4.00	3.53	.060	0.41	-0.87	0.61
	GP Avg Product Satisfaction Score	46	2.00	2.00	4.00	3.25	.071	0.48	-0.47	-0.35

2. Gender and Race. Differences in race and gender are generally apparent, and variations in race and gender distribution within groups are known to affect interpersonal relations in small groups (Biernat and Kobrynowicz 1997).

3. Athletic and Academic regalia. Midshipmen who earn varsity letters as athletes at the Naval Academy wear a small “N” pin on their class uniforms. Also, midshipmen who achieve a grade point average of 3.4 or greater for the previous semester are authorized to wear a “star” pin on their class uniforms. These insignia were readily visible by participants engaged in the group exercise.

4. Military service regalia. Midshipmen earn military ribbons during the course of their service, which they wear on class uniforms above their left breast pocket. In general, the quantity and type of service ribbon correlates directly with tenure as midshipmen, with the exception of the approximately ten percent of midshipmen who enter the Naval Academy from enlisted service in any branch of the armed forces. These midshipmen have typically earned and display ribbons that reflect more extensive exposure to military (even combat) operations.

5. Personality. This is the only diversity variable that is not based on the categories of a status characteristic, but rather a measure of the distribution of personality types within the group. Personality types are mapped to Myers-Briggs Type Indicator (MBTI) scores, which were provided for participants by the Naval

Academy's data warehouse. Personality types were aggregated into four categories: Rationals, Idealists, Guardians, and Artisans, according to four major categories proposed by Keirse and Bates (1984). The personality diversity index is a measure of the distribution of the four personality categories across group members.

In Status Characteristics Theory, the *Burden of Proof* assumption holds that a status characteristic is deemed salient to the task by the group unless it is specifically dissociated from the task (Berger et al. 1977). In this experiment, none of the status characteristic variables were dissociated from the task by the experimenter.

For each of the characteristics, a diversity index is calculated according to the procedure developed by Teachman (1980). Diversity variables are indexed between zero and one, with maximum possible diversity indicated by a score of one. For example, a group comprised of two women and two men has a gender diversity index of "1", while a group comprised of all men has a gender diversity index of "0".

Group Characteristic variables are group-level variables that are described in the literature as valid proxy measures of creativity or productivity, and are aggregated to the group level by taking the mean of individual scores. They include intelligence proxy measures like Scholastic Aptitude Test (SAT) scores and Cumulative Grade Point Average (GPA) at USNA, and the degree of personal familiarity among group members (Goodman and Leyden 1991). The innovative personality variable is a measure of how close the personality profiles of group members match the Myers-Briggs Type Indicator (MBTI) profile which is postulated to be the most innovative

personality profile; that is, Extraverted, Intuitive, Thinking, and Perceiving - ENTP (Briggs-Myers et al. 2003).

Group Dynamic variables are group-level constructs aggregated from individual-level scores on scales administered in surveys. There are five scales employed in the project: the Relational Conflict Scale, the Participative Interaction Scale, the Task Conflict Scale, the Fluency Scale, and the Innovation Potential Indicator Scale.

Scales and Psychometrics. Among the five scales employed in the study, two (Relational Conflict and Participative Interaction) were created by the author, and three (Task Conflict, Fluency and Innovative Potential Indicator) were derived from the literature. The Relational Conflict Scale, Participative Interaction Scale, and Task Conflict Scale were administered immediately following the group exercise using paper surveys. See Appendix C for the composite survey. The Fluency Scale and Innovation Potential Indicator (IPI) Scale were administered through the Naval Academy's web-based survey portal. See Appendix A for HTML screen shots of the Intranet survey pages.

Psychometric properties of the scales are as follows:

Relational Conflict Scale. This scale was designed by the author to measure the degree of interpersonal conflict among group members during the group task. The scale contains items meant to elicit emotions and attitudes aligned with the definition of relational conflict noted earlier: *distrust, resentment, feeling devalued, feeling non-collaborative, and feeling competitive rather than cooperative during*

group interaction. A sample item from the scale: “On the whole, how much did you trust that other group members would take your contributions seriously, no matter how radical or unconventional?” Responses are mapped to a unipolar 4-point scale ranging from “Not at all” to “Greatly” for the emotion or attitude of interest.

Factor analysis was conducted using Principle Axis Factoring and Promax (oblique) rotation as recommended by Russell (2002), indicating a uni-dimensional scale with factor loadings exceeding .5 for each of the six scale items. For sample sizes above 200, a .5 factor loading is considered adequate for accurately reproducing the population loadings on the factor (Russell 2002). The factor explains 43 percent of the variance in the scale. Scale reliability is measured at .72 using Cronbach’s Alpha.

Participative Interaction Scale. This scale was designed by the author to measure the degree group members felt that their contributions were treated by the group leader as equal to his or her own contributions, with the group leader defined by each group member. The scale elicits the degree to which group members as a whole felt that the group leader included them in the group process and outcome. A sample item from the scale: “In group discussions relating to the group task, to what extent did the group leader (identified in Question 5) make you feel like his or her equal?” Responses are mapped to a unipolar 4-point scale ranging from “never” to “always”.

Factor analysis was conducted using Principle Axis Factoring and Promax rotation, indicating a uni-dimensional scale with factor loadings exceeding .7 for each

of the three scale items. The factor explains 77 percent of the variance in the scale. Reliability is measured at .86 using Cronbach's Alpha.

Task Conflict Scale. This scale is adapted from Friedmann and colleagues (2000) and measures the extent to which group members felt that there was dissension within the group about the task itself. A sample item from the scale: "To what extent were there *differences of opinion* among the group members?" Responses are mapped to a uni-polar 4-point scale ranging from "Never or almost never" to "Always or almost always."

Factor analysis was conducted using Principle Axis Factoring and Promax rotation, indicating a uni-dimensional scale with factor loadings exceeding .68 for each of the four scale items. The factor explains 63 percent of the variation in the scale. Reliability is measured at .81 using Cronbach's Alpha.

Fluency Scale. This scale was adapted from Sarin and O'Connor (2009) and is designed to measure each participant's capacity for divergent thinking, a key predictor of individual creativity (Torrance 1954). Participants are asked a series of two questions and provided three minutes to answer each question. The first question asks participants to list the uses of a brick. The second question asks for a list of consequences if everyone in the world suddenly and permanently went deaf. A third question was asked in which respondents listed as many "B" words as possible in three minutes, but this question was dropped from analysis due to its deleterious effects on the internal reliability of the measure. With the "B words" question

included, Cronbach's alpha is .48 – without the “B words” question, Cronbach's Alpha is .67.

Factor analysis with Varimax rotation reveals a uni-dimensional scale with factor loadings exceeding .8 for each item. Responses are measured for fluency – that is, the number of distinct responses are counted and then aggregated to yield a total fluency score.

The Innovation Potential Indicator (IPI). The IPI was adapted from Patterson (2000) and is designed to measure each participant's propensity for innovation-related attitudes and behaviors, such as openness to new experience, adaptability, and comfort with uncertainty. The scale was administered through the Naval Academy's Intranet portal. There are 36 items designed to measure a range of behaviors and attitudes proposed to correlate with innovative performance (Patterson 2000). Using factor analysis and Varimax rotation, the scale was reduced to six items that map to a single dimension of “Consistency of Work”, with a Cronbach's Alpha of .80. One of the items included is: “I _____ follow a strict system in the way I do my work.” Fill-in-the-blank responses are mapped to a uni-polar 5-point frequency scale ranging from “Never or Almost Never” to “Always or Almost Always.”

Data from the IPI were not developed in the analysis, for two reasons. Data from the scale did not correlate with any of the variables of interest, and attempts to contact the scale designer about scoring the measure went unanswered.

Multi-level Psychometric Analysis – Aggregating Individual-Level Data to Group-Level Constructs. The group dynamic variables are derived from the aggregation of individual-level data. Survey questions target each participant's individual experience of the phenomenon being measured. Participants completed the scales without consulting each other. Each scale, therefore, is purely a measure of the individual's experience. But the analysis demands that group dynamic variables operate at the group level. I must therefore examine and verify, to the extent possible, that data collected from individuals can be reliably composed to represent the group's aggregate score on the phenomenon being measured.

Van Mierlo and colleagues (2009) note the general lack of attention in the literature to the conceptual and empirical considerations of aggregating individual-level data to compose group-level constructs. They caution that in multi-level research, scale psychometric properties must be examined *within groups* to determine that there exists a common dimension among individual responses which can then be aggregated to benchmark a reliable and valid group-level phenomenon.

Lebreton and Senter (2008) review the literature on multi-level modeling techniques in organizational research and provide guidance for the measurement of within-group agreement. They take care to note the important conceptual difference between interrater reliability (IRR) and interrater agreement (IRA).

As the concept is applied to psychometric theory, IRR is a measure of the consistency, or relative agreement, of multiple raters judging multiple targets; if judges rate a target phenomenon consistently vis-à-vis the scores of other judges rating the same target, this suggests an empirical coherency of the phenomenon being

scored. IRR is concerned only with relative consistency of scores. IRA, by contrast, is concerned with the degree of absolute consistency of scores of multiple raters judging one or more targets. IRA more directly than IRR measures the interchangeability of ratings – the degree to which ratings from multiple sources can be substituted for one another without affecting the overall score for the measure.

IRA plays an important role in the psychometric evaluation of multi-level models. Kozlowski and Klein (2000) describe two types of multi-level constructs where higher-level phenomena are modeled by some combination of lower-level variables: composition and compilation. Compilation models assume no difference in the properties of aggregated and non-aggregated data. In compilation, there is no conceptual need for IRA analysis of lower-level data (Lebreten and Senter 2008).

Composition models, by contrast, presume that the higher-level phenomenon is to some degree operating at the lower level, and that the lower-level variable models the higher-level phenomenon writ small. By aggregating these lower-level variables to compose the higher-level variable, the researcher makes two implicit claims: first, that the lower-level variable is coherent – that is, valid and reliable – vis-à-vis the phenomenon it measures; and second, that the coherency survives aggregation such that the higher-level variable is valid and reliable by extension.

It is therefore vital in composition models to demonstrate that the lower-level variables are valid and reliable as empirical constructs in themselves, and when those constructs involve multiple raters judging one or more targets, as is the case in the present study, IRA becomes a critical psychometric tool. IRA provides cautionary evidence that the independent ratings of lower-level judges that compose the higher-

level variable through aggregation likely describe the same phenomenon, assuming that the scales themselves are valid and reliable.

For the group dynamic scales, I conducted an analysis of IRA proposed by Lebreten and Senter (2008). The analysis yielded Two indices for inter-rater agreement. The first was developed by James and colleagues (1984) and measures the proportional reduction in error variance as a result of agreement among raters – notationally r_{WG} . The reduction in error variance is calculated with reference to the error variance that would occur if each judge rated the target(s) completely randomly. The measure ranges between zero and one, with zero denoting perfect disagreement, and one denoting perfect agreement among raters. The literature recommends .70 as the minimum value of r_{WG} that demonstrates interrater agreement and justifies aggregation to group-level variables (Lebreten and Senter 2008).

The second IRA index is the average deviation (AD) developed by Burke et al. (1999). AD is the average per-item deviation from the item mean (or median) for all raters, expressed in terms of the metric used to map item responses. For example, an AD of .5 indicates that the raters being evaluated for agreement were one-half of one scale interval apart on their average ratings. The cutoff value used by researchers to define agreement varies with the number of response options in the scale. Burke and colleagues (1999) used an AD value of 1 to define interrater agreement on a five-point scale. Because my responses are mapped to a four-point scale, I define interrater agreement more conservatively, using an AD value of less than or equal to .5.

The science of IRA is still evolving, and there are not yet widely accepted statistical protocols for declaring agreement (Lebreton and Senter 2008). Researchers are left to exercise their best judgment. I apply the standard recommended by Burke et al. (1999), who proposed that a combination of AD and r_{WG} be evaluated as a check-and-balance approach to determining agreement. In Table 4-3, I present the results of my analysis, noting with symbols those instances where measured within-group agreement among raters does not meet the standard.

I debated whether to discard data from groups in which within-group agreement was suspect, but ultimately decided to leave those groups in the sample. As Lebreton and Senter (2008) make clear, standards on IRA are still evolving, and with my small sample size I did not feel I could afford data attrition without a clear case for removal. Data in Table 4-3 indicate a strong overall pattern of inter-rater agreement, and on this basis, I feel justified conceptually and empirically to aggregate individual-level data to compose group-level constructs. For each of the three group dynamic variables, individual-level data are aggregated to the group-level by computing the group mean.

Table 4-3: Within-Group Rater Agreement on Group Dynamic Scale Items

<u>Within-Group Agreement on Group Dynamic Scale Items</u>									
Gp	<u>Participative Interaction[†]</u>			<u>Relational Conflict</u>			<u>Task Conflict</u>		
	Rwg _j	Average Deviation		Rwg _j	Average Deviation		Rwg _j	Average Deviation	
		<u>ADmean</u>	<u>ADmedian</u>		<u>ADmean</u>	<u>ADmedian</u>		<u>ADmean</u>	<u>ADmedian</u>
4 [†]	.58 ^{††}	.63 ^{†††}	.50	.76	.69 ^{†††}	.38	.89	.50	.25
5	.95	.17	.17	.94	.42	.11	.92	.50	.25
6	.97	.15	.0	.93	.49	.31	.79	.20	.0
7 [†]	.95	.27	.0	.92	.49	.04	.95	.28	.0
8	.74	.54 ^{†††}	.17	.92	.42	.21	.88	.38	.38
9 [†]	1.00	.0	.0	.99	.17	.08	.96	.42	.25
10	.87	.38	.17	.93	.48	.38	.95	.38	.38
11	.84	.37	.33	.87	.56 ^{†††}	.04	.87	.48	.25
12	.95	.17	.17	.97	.34	.14	.96	.34	.25
14 [†]	.79	.52 ^{†††}	.33	.93	.39	.22	.94	.54 ^{†††}	.0
15	.95	.17	.17	.93	.47	.22	.83	.60 ^{†††}	.25
16 [†]	.79	.52 ^{†††}	.33	.89	.54 ^{†††}	.22	.96	.56 ^{†††}	.25
17 [†]	.97	.15	.0	.96	.31	.14	.93	.28	.0
18	.93	.30	.0	.93	.47	.22	.94	.48	.0
19	.82	.50	.50	.89	.44	.28	.85	.52 ^{†††}	.50
20	1.00	.0	.0	.92	.42	.22	.88	.63 ^{†††}	.63 ^{†††}
21	.98	.13	.0	.98	.28	.0	.97	.31	.13
22 [†]	.79	.52 ^{†††}	.33	.92	.48	.36	.96	.41	.13
23 [†]	.89	.44	.0	.98	.25	.11	.92	.28	.0
24	.32 ^{††}	.63 ^{†††}	.0	.73	.62 ^{†††}	.38	.89	.50	.25
25 [†]	.97	.15	.0	.97	.34	.14	.94	.50	.25
26 [†]	.67 ^{††}	.63 ^{†††}	.50	.93	.39	.0	.90	.20	.0
27	.94	.32	.0	.93	.46	.08	.91	.28	.0
28 [†]	.58 ^{††}	.58 ^{†††}	.50	.86	.56 ^{†††}	.33	.84	.38	.38
29 [†]	0 ^{††}	.92 ^{†††}	.83 ^{†††}	.73	.66 ^{†††}	.71 ^{†††}	.80	.42	.25
30 [†]	.55 ^{††}	.67 ^{†††}	.33	.92	.47	.31	.82	.38	.38

31	.29 ^{††}	.75 ^{†††}	.0	.97	.36	.04	.96	.48	.25
32	.60 ^{††}	.75 ^{†††}	.33	.69 ^{††}	.69 ^{†††}	.38	.84	.34	.25
33	.92	.43	.0	.89	.56 ^{†††}	.08	.87	.54 ^{†††}	.0
34 [†]	.79	.52 ^{†††}	.33	.97	.32	.06	.78	.60 ^{†††}	.25
35	.97	.15	.0	.91	.53 ^{†††}	.33	.95	.56 ^{†††}	.25
36 [†]	.89	.44	.0	.98	.18	.06	.94	.28	.0
37	.92	.38	.0	.94	.45	.25	.96	.48	.0
38	.79	.52 ^{†††}	.33	.85	.54 ^{†††}	.25	.93	.44	.25
39 [†]	.72	.59 ^{†††}	.0	.96	.34	.11	.94	.41	.13
40 [†]	.47 ^{††}	.72 ^{†††}	.33	.11 ^{††}	.82 ^{†††}	.42	.94	.30	.0
41	0 ^{††}	.77 ^{†††}	.0	.89	.50	.21	.87	.50	.25
42	.95	.17	.17	.87	.56 ^{†††}	.08	.73	.68 ^{†††}	.50
43	0 ^{††}	.89 ^{†††}	.67 ^{†††}	.94	.43	.14	.97	.19	.0
44	.93	.30	.0	.91	.44	.25	.92	.47	.38
45	0 ^{††}	.89 ^{†††}	.0	.51 ^{††}	.75 ^{†††}	.39	.97	.22	.13
46	.89	.44	.0	.89	.56 ^{†††}	.17	.89	.46	.25
47	.46 ^{††}	.75 ^{†††}	.17	.95	.41	.04	.88	.46	.25
48 [†]	.95	.27	.0	.95	.33	.0	.67 ^{††}	.62 ^{†††}	.25
49	.91	.42	.17	.96	.41	.04	.89	.42	.0
50	.55 ^{††}	.67 ^{†††}	.33	.90	.53 ^{†††}	.39	.84	.53 ^{†††}	.38

^{†††} Maximum acceptable AD_{mean} and AD_{median} is .50 (a *a priori* cutoff value) for aggregating data to the group level

^{††} Minimum acceptable Rwg_j is .70 for aggregating data to the group level (Lebreton and Senter 2008)

[†] Denotes groups that achieved a consensus on the identity of the group leader (n = 18)

Dependent Variable. I arrived at the measure for my dependent variable, innovative performance, only after combing the literature for one I could import or adapt to my needs, and found none that fit. I wanted a group task that was meaningful to the participants; one that came with a proven solution groups could adopt if they wanted; one that was unstructured enough to provide space for creative

solutions; and one just structured enough to make a comparative evaluation practical for the raters. I designed the mission statement task with these criteria in mind.

Group Task. For the purpose of stimulating creative thinking and innovation, experimental groups were instructed to first engage in five minutes of brainstorming to discuss what economic, social, and political changes they envision in the next 25 years affecting the relationship between American society and its armed forces. Following the brainstorming session, groups were tasked to construct a mission statement for an institution, like the Naval Academy, responsible for preparing young men and women for officer service in the US Navy and Marine Corps in the year 2034. Groups were then provided a copy of the current mission statement for the Naval Academy, which they were told to “use as a reference” for their work.

When presenting the current mission statement to each group, I sought to loosely structure the task by discussing the mission statement as composed of six elements:

1. **PROCESS.** What is to be pursued by the institution as **PROCESS**. These are action verbs defining organizational process(es).
2. **OBJECT.** To what **OBJECT** are institutional processes directed. Subject noun defining the object of organizational process(es).
3. **HOW INFLUENCED.** **HOW** objects are to be **INFLUENCED** by process(es). Adjectives defining the realm(s) of process influence.
4. **CORE VALUES.** The **CORE VALUES** to which institutional processes are oriented. Nouns defining the minimum value-set of institutional products.

5. PRODUCT. The institutional **PRODUCT**. Subject noun(s) defining the output of organizational processes.
6. BENEFITS TO NAVAL SERVICE, NATION, AND SOCIETY. What **BENEFITS** accrue from institutional processes and products to the naval service, the nation, and society. Qualifying phrases describing why the institution is of value to service, nation, and society.

I did not direct groups to structure their mission statements in the same way as the current mission statement, but the mission statement component discussion likely served as a priming mechanism. In formulating the task this way, groups had recourse to a range of outcomes, from no change to radical change of the existing mission statement. This facilitated the creation of a continuous dependent variable for innovative performance.

Measuring Innovation. I was after the *innovativeness* of the group's product, and not mere difference between the group's product and the existing product. The question of what constitutes *innovation*, especially as it is distinguished from mere *change*, is an open debate in the literature. Johannessen and colleagues (2001) note the lack of conceptual precision in the organizational literature regarding the definition and measurement of innovation. Definitions in the literature center around products or processes that are new and useful with relation to the unit of adoption (Bailin 1998; Ford 1996; West and Farr 1990). For this project, I define innovation as products which are new, as judged with reference to the relevant unit of adoption, and useful, as judged by the consumer for whom the product is meant to benefit. I

define innovative performance as the degree to which groups achieve innovation in a group task, relative to other groups.

Quantifying Newness. The newness dimension of innovation is comparatively straightforward – it measures the degree to which each group’s mission statement differs qualitatively from the currently existing mission statement. To promote precision in the rating of newness, I structured the rating task along the six elements of the mission statement described earlier. Raters used a worksheet to systematically measure the degree of difference between the current mission statement and each group’s mission statement. Scores were weighted such that entirely new ideas received the most credit, followed by modifications to existing ideas. Ideas transcribed verbatim from the existing mission statement received no credit. Thus, higher newness scores indicate a greater degree of qualitative difference, in words, phrasing, and/or ideas, between the group’s mission statement and the existing mission statement. The Newness Rating Worksheet is provided in its entirety at Appendix D.

Two newness raters were recruited and paid an hourly fee for completing the Newness Rating Worksheet independently. Raw scores were converted to a ranking and compared for inter-rater reliability. The Intraclass Correlation Coefficient was .95, so the rankings from the two raters were averaged and then converted to z-scores. Transformation of Newness ranking to z-scores normalizes the frequency distribution of the variable, and prepares the variable as a component of innovative performance for summation with the other component, Usefulness. The resulting Newness variable’s descriptive statistics are listed in Table 4-4 below.

Quantifying Usefulness. The usefulness dimension of innovative performance is trickier; it involves both the question of subject (useful to *whom?*) and the question of reference (useful relative to *what standard?*). As noted by Johannessen and colleagues (2001), innovation itself is a relatively subjective phenomenon, and scholars have yet to define it with any empirical precision. The innovation literature typically operationalizes usefulness as a relative construct; innovative performance of teams is assessed by the expert opinion of a key stakeholder, such as a team manager, or through self-reports of the team itself. In both cases, usefulness is judged by a partial observer relative to innovations achieved longitudinally by the same team, or cross-sectionally by different teams.

In my project, independent raters are instructed to take the role of the subject as precisely the consumers of the product articulated in each mission statement. They judge the usefulness of those products relative to each other product in turn through a series 1,035 pairwise forced-choice comparisons, in which raters were asked to pick the more useful of the two mission statements based on the following criteria (quoted from the Usefulness Rating Worksheet at Appendix E):

During the comparison, you will judge which of the two mission statements has the greater promise to deliver value to the consumer. For the purposes of this project, I am defining the “consumer” as the “responsible American citizen,” who through her representatives in Congress holds the military accountable for providing a service to the nation. **In this rating task, you should think about the mission statements as the group’s articulation of the nature of the service provided, and it is up to you, as “the responsible American citizen,” to determine the value of the group’s articulation relative to the value of the comparison group’s articulation – its relative “usefulness” to the consumer. This is the definition of “usefulness” I want you to keep in mind while you conduct your comparisons.**

Regarding your perspective as a rater, while you conduct your comparisons, I ask you to locate yourself as a “responsible American citizen” in the year 2034, with a moderate interest in the U.S. military’s role in domestic and international affairs of the day, consistent with your rights and obligations of citizenship in a mature democracy. Importantly, whatever personal feelings you have about U.S. military affairs in the present, I want you to approach this rating assignment from the proverbial middle ground – you are neither radical nor aloof in your approach to military affairs. As the consumer of the product articulated in the mission statements, you are (as near as you can be) John AND Jane Q. Public in the year 2034.

Thus, usefulness raters were evaluating the value of the group’s product relative to the value of the comparison group’s product, from the perspective of the *average consumer* of that product. For further clarification, I asked the raters verbally to imagine a representative from the group pitching the mission statement as a salesperson, hoping to win their support as a voter and citizen for their vision of the Naval Academy’s mission. Raters were provided the script used during the experiment so that they understood precisely the instructions given to each experimental group. The Usefulness Rating Worksheet is provided in its entirety at Appendix E.

Usefulness rating scores are derived from the comparison matrix completed by each rater (see Appendix E). Each group’s usefulness score corresponds to the number of times the group number appears in the matrix. Assuming non-identical mission statements and perfect logic throughout the matrix, the best possible score is 45 (the group’s mission statement is judged superior to every other group’s mission statement); the worst possible score is zero. There were, however, two identical mission statements, because two of the experimental groups adopted the existing

mission statement verbatim. In addition, neither rater achieved perfect logic in their ratings. This resulted in several ties among the raw scores from both raters.

Each set of ratings were converted to rankings, and these were compared for inter-rater reliability. The Interclass Correlation Coefficient was .84, so rankings were averaged and standardized as z-scores, with a mean of zero, and a standard deviation of one. The Usefulness variable is the z-score associated with each average ranking – its descriptive statistics are listed in Table 4-4.

The dependent variable innovative performance is simply the sum of its two component variables equally weighted as z-scores. The measure aligns with the definition of innovative performance provided in the introduction: the degree to which group products are *new*, as judged with reference to the relevant unit of adoption, and *useful*, as judged relative to products produced by other groups.

As an illustration of the kinds of mission statements judged by the raters as new and useful, compare the current mission statement:

“To develop Midshipmen morally, mentally, and technically and to imbue them with the highest ideals of duty, honor, and commitment in order to graduate systems experts who are dedicated to a career of service and have the ability to manage and support ongoing operations.”

with the mission statement that earned its group the highest score for innovative performance:

“To empower Midshipmen with moral integrity, cultural awareness, adaptability, physical excellence, and the fortitude required to be warriors and leaders on the front lines as well as the home front. Upon receiving a commission, Midshipmen will be

prepared to confront and overcome moral and ethical challenges while executing the mission and maintaining the highest standards of honor and transparency.

Midshipmen will embrace a lifelong commitment to leadership extending beyond uniformed service to include command of community, nation, and the ever-changing global environment. As ambassadors to the world, midshipmen will demonstrate compassion, empathy, and cultural enlightenment, working to improve international relations while maintaining our nation’s timeless ideals of life, liberty, and the pursuit of happiness.”

Descriptive statistics for the dependent variables are presented in Table 4-4 below.

Table 4-4: Dependent Variables

Dependent Variables											
	N	Range	Min	Max	Mean		SD	Skewness		Kurtosis	
					Stat	SE	Stat	Stat	SE	Stat	SE
Newness	46	3.37	-1.67	1.70	.0000	.14744	1.00000	-.079	.350	-1.229	.688
Usefulness	46	3.59	-1.81	1.77	.0000	.14744	1.00000	-.073	.350	-1.086	.688
Innov perf	46	6.47	-3.00	3.47	.0000	.21091	1.43049	.407	.350	.262	.688

Chapter 5 – Findings

Data

Procedural Considerations and Diagnostics. Regression demands certain procedural care to render findings valid. The data were analyzed to check if regression assumptions held up. Among assumptions diagnosed were independence of observations, interval, linearity, normality, and multicollinearity. I must first demonstrate that linear regression techniques are appropriate for the data before testing hypotheses as planned with regression. I address each assumption and its analysis in turn.

1. Independence of Observations. If knowing the value of an observation allows one to know the value of the next observation, those observations are said to be auto-correlated. Autocorrelation among observations in regression analysis tends to bias the estimates of standard deviation and significance, though beta coefficients remain unbiased. I test for autocorrelation by computing the Durbin-Watson coefficient as part of residual analysis of the regression equation used to test Hypothesis Six below. The coefficient has a value of 2.05, indicating little to no autocorrelation in the model.

2. Linearity. Regression assumes a linear relationship between variables under study. I test for linearity between the dependent variable and key independent variables using an ANOVA technique. Results show that the dependent variable

innovative performance is linearly related to two of the three continuous independent variables: relational conflict and task conflict. The dependent variable does not have a linear relationship with the third independent variable of interest, participative interaction. For this reason, the relationship between innovative performance and participative interaction will be examined using a non-parametric test.

3. Normality. Variables are assumed to be normally distributed and interval-scaled in linear regression. In my project, I sacrifice a bit of precision in the measurement of both Newness and Usefulness by transforming interval-scaled raw ratings to ordinal-scaled rankings and then transforming rankings to z-scores. This procedure has the advantage of yielding a more normal distribution for the variables, and makes the scaling for each variable consistent so that they can be summed to yield the dependent variable equally determined by each component.

There is also definitional justification for the transformation of raw ratings to z-scores for Newness and Usefulness. Recall that my definition of innovative performance is *the degree to which groups achieve innovation in a group task, relative to other groups*, where innovation is defined as *products which are new, as judged with reference to the relevant unit of adoption, and useful, as judged by the consumer for whom the product is meant to benefit*. Z-scores are precisely the quantification of group performance relative to the whole of the other groups, since each rank Z-score is a measure of distance from the group mean standardized by the group standard deviation.

4. Interval. Regression assumes that variables are continuous, with equal intervals between discrete values. The ordinal nature of the dependent variable prompts the question of whether model assumptions are fatally violated, since I cannot (and should not) assume that intervals between discrete rankings (that is, between values of the dependent variable) are equal when ordinally scaled. However, Joreskog and Sorbom (1988) concluded that ordinal scales can be treated as continuous scales so long as the number of orderings exceeds 15, and Glew (2009) cites several studies indicating that parametric models like regression are robust with respect to the lack of interval-ness in ordinal scales. Based on these findings, I am confident that correlations and significance among key variables in the study are adequately modeled by regression.

5. Multicollinearity. When independent variables in regression are highly correlated with each other, the model is compromised. I examine multicollinearity in the regression model through diagnostic tools called Variable Inflation Factor (VIF) and Tolerance. VIF and Tolerance statistics indicate multicollinearity is not present in the models.

6. Number of Independent Variables. Statistics texts are circumspect about ball-parking the minimum number of cases for regression when the population variance is unknown, as is the case in this study. I employ the rule-of-thumb offered by Garson (1998) and limit the number of independent variables in regression equations to one per 20 observations. This limitation rules out regression equations

with more than two variables, but does allow me to test for mediation, and control for at least one other variable. Given the low number of variables with significant zero-order associations with key variables, I do not anticipate a need to regress more than two independent variables at a time.

Zero-Order Correlations. Zero-order correlations are provided in Table 5-1 below. Only those independent variables having a statistically significant correlation with the dependent variable or group dynamic variables are listed – among variables excluded are gender diversity, personality diversity, athletic diversity, group average SAT score, group average fluency score, and group average grade point average.

The shaded area in Table 5-1 highlights the lack of statistical significance in the correlation coefficients for each of the experimental manipulation dummy variables with the dependent variables and with the group dynamic variables. These results portend one of the key findings in the study: the apparent lack of effect of the manipulation of hierarchy within experimental groups on innovative performance, and a corresponding lack of effect of the manipulation of hierarchy on important group dynamics, such as relational conflict and task conflict.

There appears to be a strong and negative correlation between relational conflict and innovative performance, a strong and negative correlation between task conflict and innovative performance, and a positive correlation between the collective identification of a group leader and innovative performance. While participative interaction is not correlated with innovative performance, it does have a strong and negative correlation with relational conflict.

Table 5-1: Zero-Order Correlations

		Zero-Order Correlations - Pearson's Coefficient															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Dependent Variables	1. Innovative Performance	1															
	2. Usefulness	.715**	1														
	3. Newness	.715**	.023	1													
Experimental Condition Dummy Variables	4. Egalitarian Group	-.001	.100	-.101	1												
	5. Nonsuppressed Authority Group	-.027	-.069	.031	-.533**	1											
	6. Suppressed Authority Group	.028	-.034	.075	-.506**	-.460**	1										
Group Dynamic Variables	7. Relational Conflict	-.490**	-.571**	-.130	-.019	.009	.011	1									
	8. Task Conflict	-.405**	-.337*	-.243	.276	-.085	-.204	.466**	1								
	9. Group Led	.318*	.180	.275	-.060	.012	.051	-.082	-.215	1							
	10. Participative Interaction	.128	.248	-.063	-.086	.051	.039	-.633**	-.245	-.253	1						
Group Characteristic Variables	11. Fluency Group Average	.030	.011	.032	-.302*	-.127	.446**	-.079	-.159	.352*	.075	1					
	12. Familiarity Group Average	-.111	-.081	-.078	.656**	-.380**	-.301*	.116	.328*	-.017	-.231	-.224	1				
	13. Race Diversity	.211	.193	.109	-.002	-.073	.077	-.316*	-.049	.131	.213	-.141	.046	1			
	14. Rank Diversity	-.005	-.093	.086	-.981**	.515**	.504**	.035	-.310*	.034	.077	.279	-.639**	.014	1		
	15. Prior Service Diversity	-.176	-.121	-.131	.364*	-.185	-.194	-.133	.059	.154	-.004	-.042	.282	.250	-.359*	1	
	16. Group Average Age	-.130	-.037	-.149	-.013	-.010	.024	-.050	.047	.070	-.002	.097	.354*	.175	.097	.354*	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Tests of Hypotheses

Hypothesis One. *Relational conflict in groups will have a negative relationship with innovative performance.* Supported.

As presented in Table 5-1 above, the zero-order correlation between relational conflict and innovative performance is negative and statistically significant. This finding is consistent with the literature and indicates that groups experiencing higher degrees of interpersonal conflict among group members achieve lower degrees of innovative performance.

This finding has implications for the construct validity of the innovation measures employed in the current study, and helps to foreclose the possibility that the study did not properly capture innovation. As an additional test of the construct validity of the innovation measure, I examined the relationship between task conflict and innovative performance, which is noted in the literature as moderated by the level of task conflict (De Dreu 2006; Kurtzberg and Amabile 2000). There is evidently a threshold of task conflict below which innovation is enhanced, such that a modicum of disagreement about the task broadens perspective and encourages alternative approaches to solutions. Above this threshold, however, the dysfunctional properties of task conflict overcome its functional properties, and innovation suffers (De Dreu 2006; Kurtzberg and Amabile 2000).

To test whether this finding holds in the current study, I split the task conflict variable in half at the mean, and examined the relationship between task conflict and innovative performance for each sub-sample. For the high-task-conflict subsample, the correlation between task conflict and innovative performance is significant and

negative (Pearson's $R = -.553, p < .01, N = 21$). For the low-task-conflict subsample, the correlation between task conflict and innovative performance is non-significant ($N = 25$). This finding is consistent with studies reviewed by Kurtzberg and Amabile (2000) and provides additional evidence for the construct validity of the innovation measures.

Hypothesis Two. *Participative interaction in groups will have a positive relationship with innovative performance.* Partially supported.

Again referencing the correlations in Table 5-1, participative interaction appears not to be correlated with innovative performance. Participative interaction does not have a positive (or negative) relationship with innovative performance, and hypothesis two is not supported as it is worded.

However, there is a flaw in the wording of the hypothesis. Recall that participative interaction is defined in the study as *the degree of feeling among group members that their contributions to group goals are seen as equal with the contributions of the group leader, where the group leader is defined by each individual member.* Group leaders are not formally assigned in any of the groups, and it is the individual group members who through their own experience identify the person who “most stood out” as the group leader for the task. Members then calibrate their experience of participative interaction with this group leader in mind. Hence, when participative interaction is aggregated to the group level, its meaning only translates if each group member identifies the same target. For greater precision and alignment with the definition and measurement of participative interaction, Hypothesis Two ought to read as follows: *For groups where there is a consensus*

achieved on the identity of the group leader, participative interaction will have a positive relationship with innovative performance.

A test of the re-worded hypothesis was conducted by computing Pearson's R for cases where the group achieved consensus on the identity of the group leader ($N = 18$). The correlation coefficient was significant and positive in these cases ($R = .581$, $p = .012$, 2-tailed). As expected, the correlation coefficient was non-significant in cases where the group failed to achieve consensus on the identity of the group leader. Hypothesis Two as re-worded is therefore supported. Hypothesis Two as originally worded is meaningless.

Hypothesis Three. *Participative interaction mediates the relationship between relational conflict and innovative performance in groups.* Not supported.

Baron and Kenny (1986) provide the seminal test for checking mediation effects. The process involves three steps: regressing the dependent variable on the independent variable, and looking for significance of the independent variable coefficient; regressing the mediator variable on the independent variable, and looking for significance of the independent variable coefficient; lastly, regressing the dependent variable on the independent variable, controlling for the mediating variable. Assuming significance of coefficients in steps one and two, three results are possible from step three: no mediation, indicated by a lack of (that is, a loss of) significance for the mediator variable coefficient; partial mediation, indicated by significance for the mediator variable coefficient and significance for the independent variable coefficient; and full mediation, indicated by significance for the mediator variable and lack of (that is, a loss of) significance for the independent variable.

As noted above, the relationship between participative interaction and innovative performance only holds when a consensus is achieved on the identity of the group leader. This narrows the sample size to 18 groups, which is below the accepted minimum sample size of 30 for regression analysis. I therefore proceed with caution using Baron and Kenny's (1986) procedure for testing mediation effects using regression.

Step One requires regressing the dependent variable (innovative performance) on the independent variable (relational conflict). The coefficient is highly significant and negative (Beta = $-.740$, $p < .001$). Step Two requires regressing the mediator variable (participative interaction) on the independent variable (relational conflict). Again, the coefficient is highly significant and negative (Beta = $-.830$, $p < .001$). Step Three tests for mediation, and requires regressing the dependent variable on the independent variable and mediator variable. The results show an *increase* in the strength of the relationship between relational conflict and innovative performance (Beta = $-.829$, $p = .017$), and an elimination of the relationship between participative interaction and innovative performance. Thus, the cautionary test for mediation reveals that relational conflict fully mediates the relationship between participative interaction and innovative performance, rather than the other way around. Hypothesis Three, therefore, is not supported.

Hypothesis Four. *Hierarchical groups achieve more participative interaction than egalitarian groups.* Not supported.

Non-suppressed Authority groups and Suppressed Authority groups were pooled together as hierarchical groups, and the mean of participative interaction for this pooled group was compared against the mean of participative interaction for Egalitarian groups using an independent sample comparison of means t-test. While the mean was slightly higher for hierarchical groups, the difference was not statistically significant (see Table 5-2 below). Hypothesis Four is not supported.

Of note, when limiting the sample to the 18 groups who achieved consensus on the identity of the group leader as in Hypothesis Three, there remains no significant difference in the means for participative interaction between hierarchical and egalitarian groups.

Hypothesis Five. *Hierarchical groups experience less relational conflict than egalitarian groups.* Not supported.

Again pooling Non-suppressed Authority groups together with Suppressed Authority groups as hierarchical groups, an independent sample comparison of means t-test was conducted for relational conflict. The means were nearly identical and the difference was not statistically significant (see Table 5-2 below).

Table 5-2: Group Dynamic Variables and Dependent Variable X Conditions

Group Dynamic and Innovative Performance Differences Across Conditions - Independent Sample Comparison of Means

	<u>Hierarchical Groups</u>			<u>Egalitarian Groups</u>			<u>df</u>	<u>t</u>
	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>		
Participative Interaction	29	10.60	.8955	17	10.43	1.091	44	.575
Relational Conflict	29	2.894	1.577	17	2.833	1.522	44	.127
Task Conflict	29	7.359	1.394	17	8.259	1.781	44	-1.906
Innovative Performance	29	.0010	1.496	17	-.0017	1.355	44	.006
	<u>Non-suppressed Authority Groups</u>			<u>Egalitarian Groups</u>			<u>df</u>	<u>t</u>
	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>		
Participative Interaction	15	10.61	.8594	17	10.43	1.091	30	.506
Relational Conflict	15	2.918	1.512	17	2.833	1.522	30	.157
Task Conflict	15	7.500	1.350	17	8.259	1.781	30	-1.344
Innovative Performance	15	-.0546	1.564	17	-.0017	1.355	30	-.102
	<u>Suppressed Authority Groups</u>			<u>Egalitarian Groups</u>			<u>df</u>	<u>t</u>
	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>		
Participative Interaction	14	10.59	.9653	17	10.43	1.091	29	.437
Relational Conflict	14	2.896	1.743	17	2.833	1.522	29	.108
Task Conflict	14	7.207	1.475	17	8.259	1.781	29	-1.765
Innovative Performance	14	.0606	1.477	17	-.0017	1.355	29	.122
	<u>Non-suppressed Authority Groups</u>			<u>Suppressed Authority Groups</u>			<u>df</u>	<u>t</u>
	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>		
Participative Interaction	15	10.61	.8594	14	10.59	.9653	27	.041
Relational Conflict	15	2.918	1.512	14	2.896	1.743	27	.009
Task Conflict	15	7.500	1.350	14	7.207	1.475	27	.558
Innovative Performance	15	-.0546	1.564	14	.0606	1.477	27	-.204

Hypothesis Six. *Innovative performance will be higher in hierarchical groups than in egalitarian groups.* Not supported.

As presented in Table 5-2, innovative performance is slightly higher in hierarchical groups than in egalitarian groups, but the difference is not statistically significant.

Hypothesis 6A: *Innovative performance will be higher in hierarchical groups where authority is non-suppressed than in egalitarian groups.* Not supported.

As presented in Table 5-2, innovative performance in non-suppressed authority groups is actually a fraction lower than innovative performance in egalitarian groups, but the difference is not statistically significant.

Hypothesis 6B: *Innovative performance will be higher in hierarchical groups where authority is suppressed than in egalitarian groups.* Not supported.

As presented in Table 5-2, innovative performance in hierarchical groups where authority is suppressed is slightly higher than innovative performance in egalitarian groups, but the difference is not statistically significant.

Hypothesis 6C: *Innovative performance will be higher in hierarchical groups where authority is non-suppressed than in hierarchical groups where authority is suppressed.* Not supported.

As presented in Table 5-2, innovative performance in hierarchical groups where authority is non-suppressed is slightly lower than innovative

performance in hierarchical groups where authority is suppressed, but the difference is not statistically significant.

Hypothesis Seven. *Participative interaction mediates the relationship between hierarchy and innovative performance.* Not applicable.

As stated above in the test of Hypothesis Six, there is no evidence of a relationship between hierarchy and innovative performance, and therefore no reason to test participative interaction as a mediator variable.

No Apparent Effect – A Manipulation Check. Three interpretations of the lack of effect of the experimental manipulation on the dependent variable emerge from the findings in Tables 5-1 and 5-2: either, 1) the study failed to capture innovation; 2) the hierarchy of authority *was not* manipulated by the experimental design, and thus the findings tell us nothing about the relationship between group hierarchy and innovation; or 3) the hierarchy of authority *was* manipulated by the experimental design, yet this manipulation had no apparent effect on the dependent variable.

Determining which interpretation holds is fundamental to understanding the implications of the findings. If the first interpretation holds and the innovation measure is not valid, I am left to consider findings unrelated to the dependent variable. If the second interpretation holds, we are left to explore findings unrelated to the experimental manipulation. If the last interpretation holds, then I propose there are interesting implications to consider.

As mentioned earlier, the construct validity of the innovation measure appears sound as evidenced by the strength of the relationship between relational conflict and innovative performance, and by the moderation effect noted in the relationship between task conflict and innovative performance. Both of these relationships are observed in the literature (Kurtzberg and Amabile 2000, Sarin and O'Connor 2009). This helps to foreclose the possibility that the study failed to capture innovation.

In order to settle whether hierarchy was manipulated by the experimental conditions, I conducted a manipulation check as follows. Recall that I define hierarchy as *an organizationally-defined and non-contested system of vertically stratified authority among group members*. In this study, hierarchy is symbolized by *military rank*. The experimental design assumes, first, that group members are sensitive to differences in rank (or lack of differences in rank), and second, that differences in rank translate directly to differences in perceived legitimate authority among group members. There is a way to determine if group members were sensitive to differences in rank, and whether these differences generalized to perceived differences in legitimate authority.

To test whether participants recognized rank as a source of legitimate authority, I examined the group leader emergence data. In all three experimental conditions, the group leader for the task was not formally identified, so that in every case the group leader could be chosen by each individual member based on group interaction. In the post-exercise survey, I ask each member to identify the individual who “most stood out” as the group leader for the task. Members were permitted to self-select as group leaders.

Filtering the sample for hierarchical groups only, I compared the frequency with which each class is selected as the group leader in groups with representatives from each class in the pair. Results show that seniors are statistically more likely to be selected as group leader than any other class ($t = 2.724, p < .05$ 2-tailed compared to juniors, $t = 4.730, p < .001$ 2-tailed compared to sophomores, and $t = 6.921, p < .001$ 2-tailed compared to freshmen); juniors are statistically more likely to be selected as group leaders than freshman ($t = 3.563, p < .01$ 2-tailed), but not statistically more likely to be selected than sophomores; and sophomores are statistically more likely to be selected as group leaders than freshman ($t = 2.472, p < .05$ 2-tailed). These results validate the 3-tiered model of hierarchy of authority among midshipmen described earlier, and confirmed that participants associated rank with authority.

Next, I checked the manipulation of authority across experimental conditions by analyzing the means of frequencies of group leader self-selection for each of the four classes in hierarchical groups and egalitarian groups. I found that seniors were statistically more likely to self-select as leaders in hierarchical groups than in egalitarian groups ($t = 2.012, p = .05$ 2-tailed); juniors self-selected as leaders more frequently in egalitarian groups than in hierarchical groups, but the difference is not statistically significant; and both sophomores and freshmen were statistically more likely to self-select as leaders in egalitarian groups than in hierarchical groups ($t = 2.421, p < .01$ 2-tailed for sophomores; $t = 2.061, p < .05$ 2-tailed for freshmen).

These findings suggest that the experimental manipulation activated what I am terming a leader self-expression among participants that is situational – when

confronted with differences in rank among group members, participants led and followed according to rank, with only juniors appearing to be conflicted about their leader self-expression across conditions.

Results of the manipulation check are displayed in Tables 5-3 and 5-4 below.

Table 5-3: Frequency of Leader Selection by Class (Hierarchical Groups Only)

Group Leader Selection Frequency by Pairs of Classes - Dependent Sample Comparison of Means									
		Mean	N	Std. Deviation		Mean	N	Std. Deviation	t
Pair 1	Freq of Seniors	.5556	24	.39369	Freq of Juniors	.2257	24	.24663	2.724*
Pair 2	Freq of Seniors	.6173	27	.39309	Freq of Sophomores	.1281	27	.19812	4.730***
Pair 3	Freq of Seniors	.5714	28	.39786	Freq of Freshmen	.0179	28	.09449	6.921***
Pair 4	Freq of Juniors	.2083	22	.24934	Freq of Sophomores	.1345	22	.19709	1.104
Pair 5	Freq of Juniors	.2355	23	.24734	Freq of Freshmen	.0217	23	.10426	3.563**
Pair 6	Freq of Sophomores	.1330	26	.20035	Freq of Freshmen	.0192	26	.09806	2.472*

*** $p < .001$ (2-tailed) ** $p < .01$ (2-tailed) * $p < .05$ (2-tailed)

In Table 5-3, limiting the analysis to hierarchical groups only, the frequency with which each class is selected as the group leader is compared in groups with representatives from each class in the pair. A dependent sample comparison of means reveals that seniors are statistically more likely to be selected as group leader than any other class; juniors are statistically more likely to be selected as group leaders than freshman, but not statistically more likely to be selected than sophomores; and sophomores are statistically more likely to be selected as group leaders than freshman.

Table 5-3 suggests an expectation of authority corresponding with rank. Seniors are clearly expected to assume a leadership role in group tasks. Juniors and sophomores are apparently seen as synonymous in terms of expectations to assume a leadership role. Freshmen are expected not to assume a leadership role. This table suggests a 3-tiered hierarchy of authority at the Naval Academy, with Juniors and Sophomores together comprising the middle layer.

Table 5-4 provides another check on the manipulation of authority across experimental conditions. The table presents the means of frequencies of group leader self-selection for each of the four classes in hierarchical groups and egalitarian groups. An independent sample comparison of means reveals that seniors were statistically more likely to self-select as leaders in hierarchical groups than in egalitarian groups; juniors self-selected as leaders more frequently in egalitarian groups than in hierarchical groups, but the difference is not statistically significant; and both sophomores and freshmen were statistically more likely to self-select as leaders in egalitarian groups than in hierarchical groups.

Table 5-4: Frequency of Leader Self-Selection by Class and Condition

Group Leader Self-Selection by Class and Condition - Independent Sample Comparison of Means								
	<u>Hierarchical Groups</u>			<u>Egalitarian Groups</u>				
	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>df</u>	<u>t</u>
Seniors	29	.5517	.50612	19	.2632	.45241	46	2.012*
Juniors	33	.1212	.33143	14	.2143	.42582	45	-0.808
Sophomores	41	.0976	.30041	17	.3529	.49259	56	-2.421**
Freshmen	28	.0714	.26227	25	.2800	.45826	51	-2.061*

** p < .01 (2-tailed) * p ≤ .05 (2-tailed)

Table 5-4 suggests that the experimental manipulation activated what I am terming a leader self-expression among participants that is situational – when confronted with differences in rank among group members, participants defaulted to their rightful places in the authority hierarchy, with only juniors appearing to be conflicted about their leader self-expression across conditions.

The findings relating to expectations of authority and leader self-expression strongly suggest that, where a hierarchy of rank existed within the group, participants were aware of the rank structure, and expected those of higher rank to assume an authority role within the group. It is apparent from these data that the experimental design successfully manipulated hierarchy as defined for this study.

Other Findings of Interest. The following additional findings emerged from my data which have relevance to the discussion to follow:

1. Groups achieved greater innovative performance when a consensus is reached within the group on who emerged as the leader for the task, and the leader consensus condition is independent of the experimental manipulation of hierarchy.

2. When groups achieved a consensus of agreement on who emerged as the group leader, and that leader exercised a participatory leadership style, they experienced greater innovative performance and less relational and task conflict than other groups, and the leader presence/style condition is independent of the experimental manipulation of hierarchy.

3. Egalitarian groups tend to vary in character between groups that are led by a single participative leader, and groups that lack clear leadership and are non-participative; while hierarchical groups tend to vary in character between groups that are led by a single non-participative leader, and groups that lack clear leadership and are participative.

4. When group interaction is non-participative, emergent leaders in hierarchical groups are evaluated as more collaborative after the group exercise by their evaluators than members who emerge as leaders in egalitarian groups. The effect is eliminated in groups marked by participative interaction.

5. Emergent leaders who are male are evaluated as more collaborative than emergent leaders who are female, but only in egalitarian groups; the effect is eliminated in hierarchical groups.

Chapter 6 – Discussion

Group Dynamics, Hierarchy, and Innovation

In Chapter Two I built the case that perhaps we have been treating hierarchical authority structure unfairly as it relates to innovation in teams. The preponderance of opinion seems to be that innovation suffers when it is pursued in an environment of hierarchy, and flourishes when pursued in an environment of equality.

Setting the scope condition to include just ad hoc task groups engaged in a group exercise, I argued there is reason to believe based on the theory of status organizing processes that it is actually egalitarian groups, premised on the norm of equal-status among members, that are most vulnerable to the relational conflict resulting from contested status. Relatively burdened by relational conflict, I argued, egalitarian groups are disadvantaged as instruments of innovation vis-à-vis groups that have status orders already set by a non-contested system of rank.

My findings, however, do not support my argument. Instead, I find that the group dynamic variables of interest – relational conflict, participative interaction, and task conflict – occur with insignificant difference in form and intensity across conditions of hierarchy. And since the predicted relationships held between these group dynamic variables and innovative performance, I failed to uncover a main effect of the presence or absence of institutional hierarchy of authority on innovative performance in teams.

A manipulation check yields strong evidence that the hierarchy of authority was manipulated in the expected direction among participants across conditions. Participants in hierarchical groups selected leaders for the group tasks according to

rank, and when participants of the same rank were compared for the frequency of self-selection as group leaders across conditions, results show that hierarchical groups activated leader self-expression among seniors and follower self-expressions among freshmen and sophomores, with juniors ambivalent across conditions.

With such strong evidence that authority structure was manipulated by the experimental conditions, why was there no apparent effect on group dynamics, and as a result, no apparent effect on innovation?

The Finding of No Apparent Effect – Some Possibilities

Several answers are plausible. It is possible, for example, that there are differential effects of hierarchy on innovation, but these effects interact with other effects unrelated to hierarchy in such a way as to mask the main effect between hierarchy and innovation. For example, it is plausible that status organizing processes in egalitarian groups in fact foster increased relational conflict (or decreased participative interaction), but this dysfunctional dynamic was offset enough by the increased familiarity among egalitarian group members so that the overall effect on relational conflict was neutralized. Means for the familiarity variable were statistically significant across conditions, with egalitarian group members more familiar with each other than hierarchical group members ($p < .001$, 2-tailed). Because low familiarity is linked to decreased group performance (Goodman and Leyden 1991), it is plausible that the dynamics cancelled each other in egalitarian groups.

We can examine this possibility (and others like it) by controlling for variables with theoretical links to innovation in the regression equation, and test whether these variables mask any true effects of hierarchy on innovation. The test fails if in the regression equation with innovative performance as the dependent variable, the coefficient for the hierarchy dummy variable remains non-significant when controlling for the variable under test.

Given my small sample size ($N = 46$ groups), I cannot include any more than two independent variables without risk to the assumptions for regression. Therefore, I computed a separate regression equation for each control variable with theoretical links to innovation, and found that the coefficients for the hierarchy dummy variables remain non-significant when controlling for each test variable. Test variables included in the analysis were each of the independent variables from all three categories listed in Table 4-2. Given this analysis, it appears unlikely that I found no apparent effect due to masking by interactive variables. I should note, however, that my small sample size precludes a comprehensive analysis of interaction effects, such as stepwise regression and beta analysis. It is possible but indeterminate that two or more independent variables in combination masked the main effect between hierarchy and innovative performance.

Lastly, it is possible that the study's findings are real, and that there is no true main effect of hierarchy of authority on innovation. This finding is unexpected, and because this is the first study of its kind testing the relationship directly, it is unprecedented. Having done my best to foreclose alternative explanations, I now turn to an examination of the possibility the study's results are real.

Deconstructing No Apparent Effect

I begin by invoking the theoretical underpinnings of the argument made in Chapter Two. Recall that the foundation for my assertion that hierarchical groups would be more innovative than egalitarian groups was the hypothesized relationships between group dynamic variables – namely relational conflict and participative interaction – and hierarchy. Based on the theories of status, I reasoned that because the system of hierarchy present in hierarchical groups was imposed by someone else – that is, by the institution of the Naval Academy – then hierarchical group members would accept the status order tied to rank as non-contested, fix their expectations about who would lead and who would follow, and get to work.

By contrast, egalitarian groups would spend at least a portion of their time setting the status order, which in the absence of rank needed to be negotiated, and another portion of their time legitimating claims to authority based on status. Claims for leadership in the egalitarian group, I reasoned, would spawn resentment from others who want to lead but must follow, and if egalitarian group leaders attempted to exercise coercion, or some other negative influence strategy, they were likely confronted with resistance from others challenging their legitimacy as an authority figure. Hierarchical leaders encounter less resistance due to the institutional clout behind rank.

Checking Assumptions

My argument makes two key assumptions. The first assumption is that, on average, hierarchical leaders encounter less resistance to their authority than egalitarian leaders. The second is that emergent leadership does not moderate the

relationship between hierarchy and innovation. I find support for the first assumption, but find the second assumption is invalid – emergent leadership is consequential for innovation, yet I do not account for it in my design.

Resisting Authority – The Collaboration Variables. My data allows an indirect test of the first assumption regarding resistance to authority. Prior to the group exercise, each member was asked to score each of the other members on this question: “How do you perceive [target member’s] potential as a collaborator with you on a group task?” Following the exercise, each member scored each of the other members on this similar question: “How do you evaluate [target member’s] potential as a collaborator with you on a group task after today’s exercise.”

Two collaboration variables derive from these questions that have relevance to the assumption test. The first is the raw post-exercise collaboration score attributed to each target member. The second is a collaboration change variable that measures the difference between the pre and post-exercise responses, and provides a measure of the extent to which the target’s behavior during the exercise enhanced (or detracted from) the target’s standing as a collaborator.

By examining collaboration variables for those cases where group leaders are selected as targets, I am able to estimate the degree to which members felt collaborative with the group leader, and I am able to estimate the shift in the target’s status (as a collaborator) resulting from his or her leadership during the exercise. If the argument put forward in Chapter Two holds, I should expect both variables to be

lower in egalitarian groups than in hierarchical groups, as members presumably react against the status-seeking by egalitarian leaders.

To check the construct validity of the collaboration variables, I computed their correlation with relational conflict and participative interaction. As expected, both the collaboration potential (leader) and collaboration change (leader) variables are negatively correlated with relational conflict ($R = -.502, p < .001, N = 141$ and $R = -.328, p < .001, N = 159$, respectively), indicating that when members felt collaborative with their group leader and were more positive about leaders as collaborators, they also experienced less relational conflict with the group as a whole. Also as expected is the significant and positive associations between the collaboration variables and the participative interaction variable ($R = .405, p < .001, N = 141$ for collaboration potential (leader) and $R = .334, p < .001, N = 159$ for collaboration change (leader)), indicating that members felt more collaborative with leaders and more positive about leaders as collaborators when leaders were more participative in their leadership style.

I expect based on the argument posed in Chapter Two that members of hierarchical groups, on average, would feel more collaborative with their leaders than members of egalitarian groups, because (I presume) leaders of hierarchical groups would, on average, be considered more legitimate as leaders than leaders of egalitarian groups. To test whether this proposition holds for the sample, I compared the means for the collaboration (leader) variables for target leaders against the means for the average ratings for the rest of the group. Presumably, target leaders will be rated higher than the average rating assigned to the rest of the group for hierarchical

groups, but not for egalitarian groups. The results of the test are presented in Table 6-1 below.

Table 6-1: Collaboration Variable Comparison of Target Leader Against Group Average

Collaboration Variables for Target Leader Against Group Average - Dependent Sample Comparison of Means (Hierarchical Groups Only)										
		Mean	N [†]	Std. Deviation		Mean	N [†]	Std. Deviation	df	t
Pair 1	Target Leader Collaboration Potential (Post-Exercise)	4.410	78	.7286	Group Average Collaboration Potential (Post-Exercise)	4.136	78	.4771	77	4.135***
Pair 2	Target Leader Collaboration Potential (Change from Pre to Post-Exercise)	.6410	78	1.019	Group Average Collaboration Potential (Change from Pre to Post-Exercise)	.4840	78	.6863	77	2.084*
Collaboration Variables for Target Leader Against Group Average - Dependent Sample Comparison of Means (Egalitarian Groups Only)										
Pair 1	Target Leader Collaboration Potential (Post-Exercise)	4.130	54	1.117	Group Average Collaboration Potential (Post-Exercise)	3.992	54	.5776	53	1.289
Pair 2	Target Leader Collaboration Potential (Change from Pre to Post-Exercise)	.5926	54	1.325	Group Average Collaboration Potential (Change from Pre to Post-Exercise)	.3719	54	.7087	53	1.726

[†] Only those members of hierarchical groups who selected leaders more senior in rank than themselves are included in this analysis (members who self-selected as leaders are also excluded from both hierarchical and egalitarian subsamples)

*** p < .001 (2-tailed) * p < .05 (2-tailed)

Results show that emergent leaders in hierarchical groups were rated as collaborators higher than the average for all members in the group, while the

difference is not significant in egalitarian groups. This suggests that, as expected, leaders senior in rank to evaluators were given greater credit for their leadership than leaders who were equal in rank to evaluators. Implications of this finding will be discussed later.

The Moderating Role of Emergent Leadership. The second key assumption made in Chapter Two is that I do not account in my argument for the presence and style of leadership employed by the emergent leader – I assume no moderating role for leadership on the dependent and group dynamic variables.

To check whether the presence and style of leadership was consequential, I conducted two analyses: one focused on the presence of leadership; that is, whether the group was led by a single or by multiple leaders; and I focused on the style of leadership from those named as leader(s) in groups.

Leader Presence – A Note on Conceptual Imprecision. My analysis of the presence of leadership in groups makes a key assumption: that evaluators answered the question of “who most stood out as the leader” during the task by identifying the person who took charge of the group in accomplishing the task. It is entirely possible, however, that participants interpreted the meaning of “who most stood out as the leader” differently. Bales and Slater (1955) note the different roles leaders can perform in decision making groups; some leaders take charge of moving the task along, others attend to the socio-emotional needs of group members in the interest of preserving cohesion. In my project, for example, evaluators may have named as

group leader the member with the most novel ideas, or the one who best managed relational conflict among group members by attending to the socio-emotional needs of the group. This member need not have been the same as the one who took charge of the group.

One consequence of variation in interpretation of the leader identity question among members within groups is spurious reporting of group consensus (or dissension) on leader identity. On the one hand, groups appearing to agree through their survey answers on “who most stood out as the leader” may in fact disagree that the identified leader took charge of the group. On the other hand, groups appearing to disagree on the identity of the group leader may in fact agree on the person who most took charge of the group, but instead report who best fit their interpretation of leader behavior in the group. In either case, the unanimity of opinion on who most took charge of the group is misreported.

Conceptual imprecision regarding leadership in the measurement phase is unfortunately not repairable in the analysis phase. I cannot be sure whether participants achieved true consensus on who most took charge of the group, only whether they achieved consensus on who most stood out as a leader. I therefore proceed with caution and acknowledge the possibility that the leader presence condition does not necessarily mean that a single leader took charge of the group, and the absence of the condition does not necessarily mean that no one member took charge of the group. Evidence will be presented later to suggest participants on average equated standing out as a leader with taking charge, but for now, the caution is noted.

As for the frequency of leader consensus within groups, a clear consensus on the identity of the group leader was the exception, even among hierarchical groups. Eighteen of the 46 groups reached a consensus on who “most stood out” as the group leader for the task. These groups were evenly split across conditions – 12 hierarchical groups and six egalitarian groups (chi-squared statistic not significant). Of note, of the 12 hierarchical groups (out of 29) that reached a consensus on the identity of the group leader, 11 of them agreed it was the highest ranking member in the group. This result was statistically significant ($\chi^2 = 9.216$, $df = 1$, $p < .01$).

Turning to the effect of leadership style, I split the group-level participative interaction variable in half at the mean, then ran t-tests on the difference in means for the group dynamic variables and dependent variable across the high and low-participative interaction subsamples. As expected, the difference in means for the relational conflict variable is statistically significant ($p < .001$, 2-tailed) indicating that relational conflict is moderated by participative interaction. There was no significant difference, however, in innovative performance across levels of participative interaction.

Probing further I discovered that groups who reached a consensus on the identity of the group leader were more innovative than groups who did not ($p < .05$, 2-tailed), though there were no statistical differences in the group dynamic means. It appears therefore that in terms of innovation, it matters whether groups produce a clear leader, but the tendency of a single leader emerging is not determined by the presence of hierarchy in the group.

Accounting for Leadership - The Leader Style/Presence Matrix. Intrigued by these discoveries of the association between the emergent leadership and group dynamics and outcomes, I segmented my sample into four subsamples to see whether I could find patterns in the group dynamic and innovation variables determined by the experimental conditions. The four subsamples are diagrammed in Figure One below.

The subsamples are segmented along two axes – one partitioning groups in which a clear leader emerges from groups in which no clear leader emerges (leader presence axis); and the second splitting groups at the mean of participative interaction (leader style axis).

Figure 6-1: Leader Style/Presence Matrix

Leader Presence Axis	Clear Leader Emerges	3 The Despot's Staff Meeting	1 The Manhattan Project
	No Clear Leader Emerges	4 The Crowded Kitchen	2 The Book Club
		Non-Participative Interaction	Participative Interaction
		Leader Style Axis	

I have applied whimsical labels to each subsample in Figure One to evoke images of the character of the interaction in each quadrant. Subsample (Quadrant)

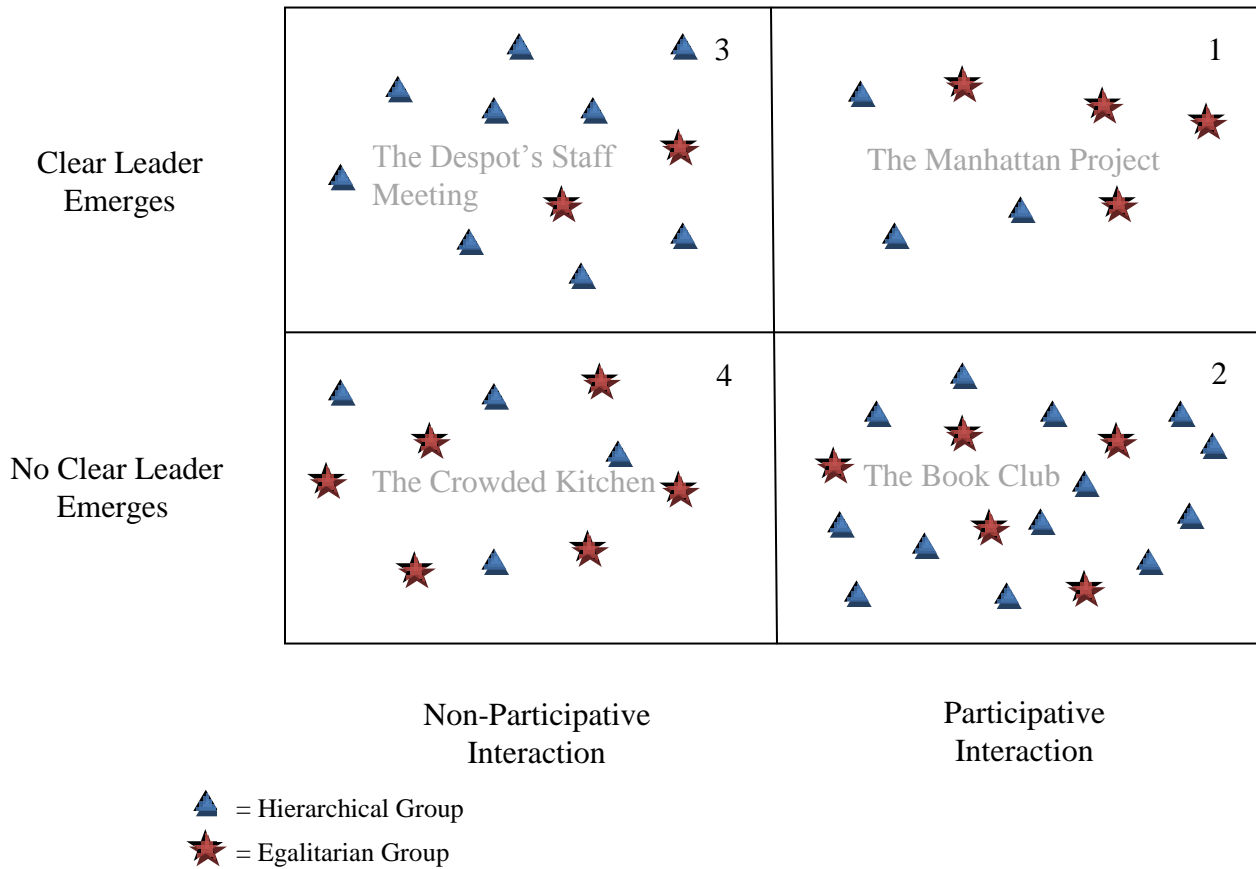
One is named The Manhattan Project because this quadrant is populated by groups experiencing participative interaction that derives from the example of a single leader. Subsample (Quadrant) Two is named The Book Club because its groups are characterized by participative interaction modeled by two or more members. Subsample (Quadrant) Three is named the Despot's Staff Meeting because its groups take direction from a single leader who does not model participative interaction. Subsample (Quadrant) Four is named the Crowded Kitchen because its groups experience non-participative interaction modeled by two or more members, evoking a "too many chefs" image. Figure 6-1 as an analytical tool allows me to account for both the presence and the style of leadership in groups in my examination of the effect of hierarchy on innovation.

Figure 6-2 below presents the distribution of groups by experimental condition across the subsamples in graphical form. Note that the relative position of groups within each quadrant is meaningless – the display is meant only to illustrate the distribution of groups by condition across the four subsamples.

I computed the chi-squared statistic for the contingency table represented by Figure 6-2. For egalitarian groups, there is no association between the leader presence and leader style conditions – Fisher's Exact Test statistic yields $p > .05$ – and therefore no reportable clustering of egalitarian groups in particular quadrants in Figure 6-2. There is, however, an association between the leader presence and leader style conditions for hierarchical groups. The chi-squared statistic for the contingency table including just hierarchical groups is statistically significant ($p < .05$), though none of the cell residuals are statistically significant. It appears in total, therefore,

that hierarchical groups tend to cluster in quadrants two and three, and the clustering exceeds what is expected by chance.

Figure 6-2: Leader Style/Presence Matrix With Group Symbols by Condition



For a more definitive test of the clustering observed in Figure 6-2, I ran another chi-squared analysis of the contingency table formed when groups from quadrants two and three are aggregated together, and groups from quadrants one and four are aggregated together. The 2X2 contingency table that results is presented in Table 6-2 below.

Table 6-2: Leader Style/Presence Quadrants Composite Contingency Table

Quadrants 1&4 / 2&3 by Conditions Contingency Table [†]				
		Experimental Condition		Total
		Hierarchical	Egalitarian	
Quadrants 2&3 Participative/Non-Led Non-Participative/Led	Count	22	7	29
	Expected Count	18.3	10.7	29.0
	Std. Residual	.9	-1.1	
Quadrants 1&4 Participative/Led Non-Participative/Non-Led	Count	7	10	17
	Expected Count	10.7	6.3	17.0
	Std. Residual	-1.1	1.5	
Total	Count	29	17	46
	Expected Count	29.0	17.0	46.0

[†] $\chi^2 = 5.534, p < .05$ (2-tailed), $df = 1$

The significant chi-squared in Table 6-2 suggests that egalitarian groups do in fact cluster in quadrants one and four, beyond that which would be expected by chance.

There is yet a more precise test of the clustering observed in the matrix. By examining the data at the individual level, where individual participants are coded by membership in groups distributed across the matrix, we have the advantage of an increased N to measure chi-squared and evaluate cell residuals in the contingency table for patterns of relationships. I computed the chi-squared for the contingency table that results when quadrant membership is set against experimental condition at the individual level. The resulting 2X4 table is presented in Table 6-3 below.

Table 6-3: Leader Style/Presence Quadrant by Condition

Matrix Quadrant by InnovPerf Top Quartile Contingency Table [†]				
		Experimental Condition		Total
		Hierarchical	Egalitarian	
Quadrant 1 Participative Interaction Clear Leader	Count	12	17	29
	Expected Count	18.4	10.6	29.0
	Std. Residual	-1.5	2.0*	
Quadrant 2 Participative Interaction No Clear Leader	Count	60	23	83
	Expected Count	52.8	30.2	83.0
	Std. Residual	1.0	-1.3	
Quadrant 3 Non-Participative Interaction Clear Leader	Count	42	9	51
	Expected Count	32.4	18.6	51.0
	Std. Residual	1.7*	-2.2*	
Quadrant 4 Non-Participative Interaction No Clear Leader	Count	17	26	43
	Expected Count	27.3	15.7	43.0
	Std. Residual	-2.0*	2.6**	
Total	Count	131	75	206
	Expected Count	131.0	75.0	206.0

[†] $\chi^2 = 27.39, p < .001, df = 3$

*** $p < .001$ ** $p < .01$ * $p < .05$

Results in Tables 6-2 and 6-3 confirm that clustering observed in Figure 6-2 exceeds that which would occur by chance, and we can conclude that the clustering in quadrants two and three in the Leader Style/Presence Matrix is caused by the hierarchical structure of the group. Similarly, we can conclude that the clustering in quadrants one and four in the Leader Style/Presence Matrix is caused by the egalitarian structure of the group.

Thus, it appears that egalitarian groups more often vary in character between groups that are either proactively led by a participative leader (The Manhattan Project), or set adrift amid more than one non-participative member (The Crowded Kitchen). Hierarchical groups, by contrast, appear to vary in character more often between groups that are either proactively led by a non-participative leader (The Despot's Staff Meeting) or mired in collegial but unproductive chat (The Book Club).

Before explaining how the experimental conditions might account for the observations in the matrix, we are well served to understand the association between each matrix quadrant and the other group dynamic variables, and between each matrix quadrant and innovative performance.

Figure 6-3: Frequency Distribution of Matrix Quadrant by Innovative Performance Quartile

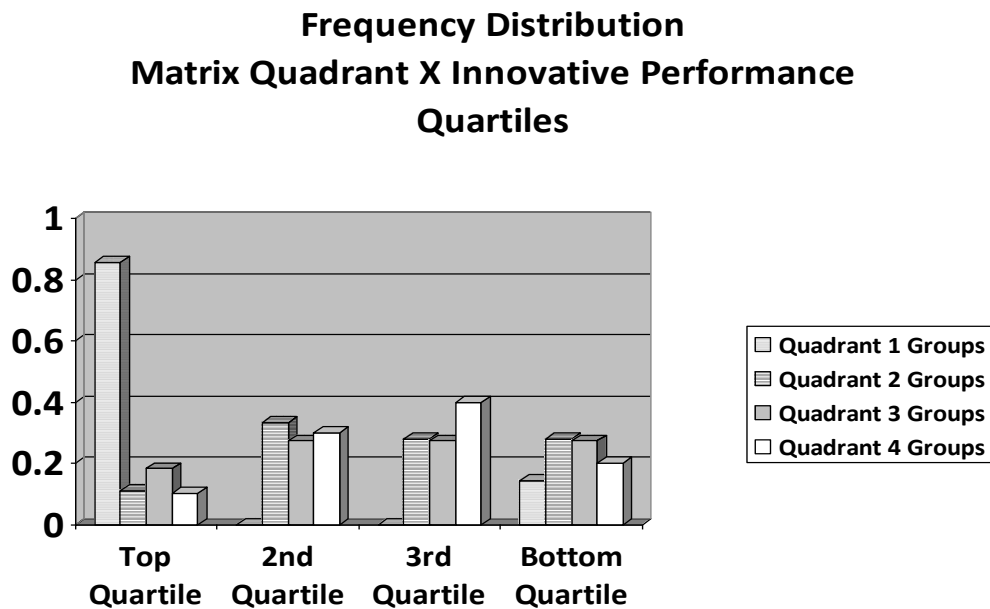
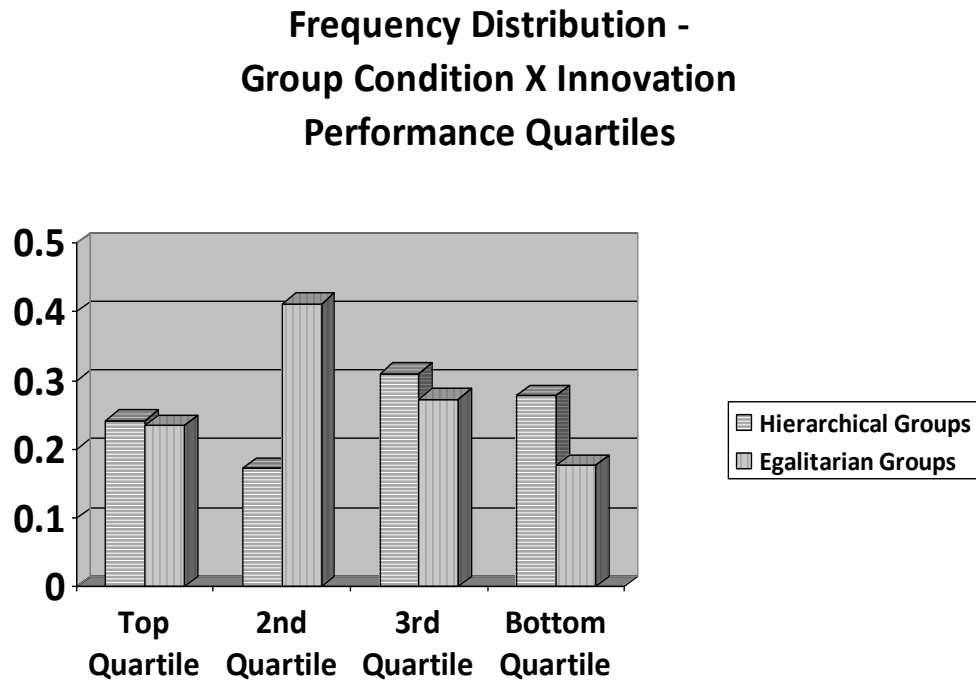


Figure 6-3 above depicts the frequency distributions of matrix quadrants set against innovative performance quartiles. Figure 6-4 below depicts the frequency

distributions of matrix quadrants set against experimental conditions. These are offered as a snapshot of the relationship between matrix quadrant classification, innovative performance, and experimental condition.

Figure 6-4: Frequency Distribution of Group Condition by Innovative Performance Quartiles



Note in Figure 6-3 that with the exception of quadrant one groups, there is a roughly even distribution of quadrants across quartiles, and an even distribution of experimental conditions across both quadrants and quartiles. Quadrant one groups cluster considerably in the top quartile. We examine this distribution in greater detail below.

In Figure 6-4, egalitarian groups appear to cluster in the 2nd quartile for innovative performance. There is in fact a statistically significant association

between experimental condition and 2nd quartile frequency ($\chi^2 = 23.22, p < .001, df = 6$). The data suggests that condition two groups – those characterized by Suppressed Authority – are less likely, and egalitarian groups more likely, to appear in the 2nd quartile for innovative performance. This result, while interesting, is not particularly meaningful.

In Table 6-4 below, I present the comparison of means matching each quadrant against each other quadrant for the two group conflict variables (relational and task) and the dependent variable innovative performance.

Table 6-4: Group Variables by Leader Style/Presence Quadrants

Group Dynamic and Innovative Performance Differences Across Matrix Quadrants - Independent Sample Comparison of Means								
	<u>Quadrant 1 (Part/Led)</u>				<u>Quadrant 2 (Part/NonLed)</u>			
	N	Mean	Std. Deviation		N	Mean	Std. Deviation	t
Relational Conflict	7	.7405	.5874		18	2.445	.6522	-6.018***
Task Conflict	7	6.321	.5345		18	7.806	1.651	-2.304*
Innovative Performance	7	1.616	1.512		18	-.3848	1.460	3.048**
	<u>Quadrant 1 (Part/Led)</u>				<u>Quadrant 3 (NonPart/Led)</u>			
	N	Mean	Std. Deviation		N	Mean	Std. Deviation	t
Relational Conflict	7	.7405	.5874		11	3.971	1.443	-5.587***
Task Conflict	7	6.321	.5345		11	7.873	1.337	-2.900**
Innovative Performance	7	1.616	1.512		11	-.1096	.9911	2.943**
	<u>Quadrant 1 (Part/Led)</u>				<u>Quadrant 4 (NonPart/NonLed)</u>			
	N	Mean	Std. Deviation		N	Mean	Std. Deviation	t
Relational Conflict	7	.7405	.5874		10	3.920	1.383	-5.689***
Task Conflict	7	6.321	.5345		10	8.245	1.781	-2.641*
Innovative Performance	7	1.616	1.512		10	-.0017	1.857	3.109**

	Quadrant 2 (Part/NonLed)				Quadrant 3 (NonPart/Led)				
	N	Mean	Std. Deviation		N	Mean	Std. Deviation	df	t
Relational Conflict	18	2.445	.6522		11	3.971	1.443	27	-3.912***
Task Conflict	18	7.806	1.651		11	7.873	1.337	27	-.114
Innovative Performance	18	-.3848	1.460		11	-.1096	.9911	27	-.551
	Quadrant 2 (Part/NonLed)				Quadrant 4 (NonPart/NonLed)				
	N	Mean	Std. Deviation		N	Mean	Std. Deviation	df	t
Relational Conflict	18	2.445	.6522		10	3.920	1.383	26	-3.885***
Task Conflict	18	7.806	1.651		10	8.245	1.781	26	-.646
Innovative Performance	18	-.3848	1.460		10	-.0017	1.857	26	-.126
	Quadrant 3 (NonPart/Led)				Quadrant 4 (NonPart/NonLed)				
	N	Mean	Std. Deviation		N	Mean	Std. Deviation	df	t
Relational Conflict	11	3.971	1.443		10	3.920	1.383	19	.083
Task Conflict	11	7.873	1.337		10	8.245	1.781	19	-.531
Innovative Performance	11	-.1096	.9911		10	-.0017	1.857	19	.465

***p < .001 (2-tailed) **p ≤ .01 (2-tailed) *p < .05 (2-tailed)

The Union of Group Leadership and Participative Interaction

Evidence from the data in Table 6-4 indicates that quadrant one is superior to all other quadrants in each of the three key variables. Quadrant one groups were extraordinarily innovative – six of the top nine groups in the innovative performance ranking were quadrant one groups, and over one half of the 11 groups in the top quartile for innovative performance were quadrant one groups.

To check whether quadrant one innovative performance was statistically significant, I constructed a 4X4 contingency table using individual-level data to determine the statistical dependence between matrix placement and innovative

performance by quartile. Individual-level data is more powerful than group-level data due to the increased sample size, allowing me to compute a chi-squared and analyze cell residuals for patterns of relationships. The resulting 4X4 contingency table is presented below in Table 6-5.

Table 6-5: Matrix Quadrants by Innovative Performance Quartile Contingency Table

Matrix Quadrants by Innovative Performance Quartiles - Contingency Table [†]						
		Innovative Performance_Quartiles				Total
		1.00	2.00	3.00	4.00	
Quadrant 1 Participative Interaction Clear Leader	Count	25	0	0	4	29
	Expected Count	6.6	8.0	7.7	6.6	29.0
	Std. Residual	7.1***	-2.8**	-2.8**	-1.0	
Quadrant 2 Participative Interaction No Clear Leader	Count	9	29	24	21	83
	Expected Count	18.9	23.0	22.2	18.9	83.0
	Std. Residual	-2.3*	1.3	.4	.5	
Quadrant 3 Non-Participative Interaction Clear Leader	Count	9	14	14	14	51
	Expected Count	11.6	14.1	13.6	11.6	51.0
	Std. Residual	-.8	.0	.1	.7	
Quadrant 4 Non-Participative Interaction No Clear Leader	Count	4	14	17	8	43
	Expected Count	9.8	11.9	11.5	9.8	43.0
	Std. Residual	-1.9*	.6	1.6	-.6	
Total	Count	47	57	55	47	206
	Expected Count	47.0	57.0	55.0	47.0	206.0

[†] $\chi^2 = 82.95, p < .001, df = 9$

*** $p < .001$ ** $p < .01$ * $p < .05$

Table 6-5 reveals a strong association between group dynamics that are characterized by the presence of a clear and participative group leader and the innovative performance of that group. The significant chi-squared for the table as a whole likely owes its power to the strength of the relationship between quadrant one membership and top quartile membership. Also of note is the cell residual for quadrant two/top quartile, which indicates that groups characterized by participative interaction though no clear leader emerges are underrepresented in the top quartile, and the relationship is stronger than that expected by chance. The same is true for quadrant four. Apparently, quadrant two and quadrant four groups are unlikely to be highly innovative. These quadrants have in common the lack of a consensus on “who most stood out” as the group leader.

Turning to the relationship between quadrants and relational conflict, the evidence in Table 6-5 shows that on average, quadrant one groups experienced less relational conflict than groups in any other quadrant, and that quadrant two groups (The Book Clubs) experienced less relational conflict than both quadrant three groups (The Despot’s Staff Meetings) and quadrant four groups (The Crowded Kitchens). There is virtually no difference, on average, in the level of relational conflict between quadrant three groups and quadrant four groups.

Lastly, quadrant one groups experienced less task conflict, on average, than did groups in any other quadrant. Like innovative performance, and unlike relational conflict, there were no differences in degree of task conflict among any of the other three quadrants. The data on the relationship between task conflict and the matrix

quadrants indicate that, among the quadrants, task conflict is minimized when participative interaction is married with the emergence of a single group leader.

The results from Table 6-5 suggest that participative interaction is necessary but not sufficient in maximizing innovative performance and minimizing relational conflict in task groups. Coincidentally, the emergence of a single group leader is a necessary but not sufficient condition for maximizing innovative performance and minimizing relational conflict in task groups. The data suggest that participative interaction and the emergence of a single group leader *must occur simultaneously* to maximize innovative performance and to minimize relational conflict.

Taken in total, results presented in Tables 6-4 and 6-5 reveal a powerful union between participative interaction and singular group leadership. It appears that when groups managed to achieve both in the course of their interaction, they performed more innovatively and with less conflict. Whether groups were hierarchical or egalitarian did not evidently matter – quadrant one groups emerged from both experimental conditions. What was important to innovative performance was that groups produced a single leader on whom all agreed, and that leader made the other members feel like her equal. Any other outcome, on average, prejudiced innovative performance.

Clustering Explained

I return now to the finding that the experimental conditions caused clustering for hierarchical groups in quadrants two and three, and clustering for egalitarian groups in quadrants one and four. Considering first the hierarchical group finding, this suggests that hierarchical groups tend, on average, to vary in character between

Book Clubs and Despot Staff Meetings; between collegial but unproductive forums, and directive, non-participative drills. Egalitarian groups, meanwhile, tend on average to vary in character between Manhattan Projects and Crowded Kitchens; between innovation incubators and gridlock.

It would seem that hierarchical groups, on average, achieve either participative interaction or singularity in leadership, but not both. In contrast, egalitarian groups, on average, achieve both participative interaction and singularity in leadership, or neither of those.

Aligned with the status argument from Chapter Two, I propose this result follows from the proposition that egalitarian leaders must be participative to earn their peer's endorsement as authority figures, such that any would-be leader in egalitarian groups either engages his peers as equals in the group task or never gets recognized as an authority in the first place.

A different dynamic obtains for authority seekers in hierarchical groups. Where authority is legitimated by rank, non-participative leadership modeled by more senior authority-seekers does not result in de-legitimation of authority, but rather in acquiescence from other group members to the legitimate authority of rank. Thus, more senior authority seekers retain their authority even when treating other members as inferiors, while peer authority seekers sabotage themselves as authorities when treating other members as inferiors, and therefore never attain a position of authority. This would explain the lower-than-expected counts for egalitarian groups in quadrant three, where emergent leaders were relatively non-participative in style.

Earlier I demonstrated that hierarchical leaders are evaluated as more collaborative than egalitarian leaders, on average, across the entire sample. This result should not surprise us given the status argument proffered in Chapter Two. Still, I wanted to know if this finding holds consistently across the matrix cells. I reasoned that if attitudes about emergent leaders shifted from cell to cell, and the shift was related to the experimental condition, perhaps that would help explain the clustering observed in Figure 6-2.

Consider the likelihood that attitudes about emergent leaders in highly collaborative and participative groups were different than attitudes in minimally collaborative and non-participative groups. To explore this possibility, I examined the collaboration (leader) variables in groups where “things went awry”; that is to say, where group interaction was relatively non-participative. Recall that in my instructions to groups in both conditions (see Appendix B for the exercise script), I state that “research shows that groups perform best when everyone gets involved in the group discussion and outcome. Therefore, I want you to involve everyone in the group discussion and outcome.” With these instructions in mind, it is likely that participants experiencing non-participative interaction had some level of concern that their group would not do well in the task.

To check whether membership in non-participative groups affected attitudes about their performance relative to members of participative groups, I examined the satisfaction variables derived from the post-exercise surveys, in which participants were asked how satisfied they were with the group’s final product (product satisfaction variable), and with the manner in which the group arrived at the final

product (process satisfaction variable). Partitioning the sample in half at the median for participative interaction, I computed an independent sample comparison of means, and found both product and process satisfaction variables differ significantly and in the expected direction ($t = 2.978$, $p < .01$ 2-tailed, $df = 204$, and $t = 2.491$, $p < .05$ 2-tailed, $df = 204$ for product and process satisfaction, respectively). Apparently, participants took to heart the instructions for “getting everyone involved” in the group discussion, because when interaction was relatively non-participative, participants were less satisfied with both the process and product, regardless of experimental condition.

Next, I reasoned that group members experiencing non-participative interaction and lower satisfaction with results would hold their leaders accountable for those shortcomings, and then wondered whether the degree to which leaders were held accountable differed across conditions. Status characteristics theory suggests that status differences lead to a double standard in accountability for incompetence, where higher status actors enjoy more leniency in evaluation than lower status actors when competency is in doubt (Foschi 2000). It is conceivable that members expressed their post-exercise dissatisfaction with “failed” leaders through the collaboration (leaders) variables discussed earlier.

Status, Competence, and the Gender Double-Standard. Before checking for the double standard effect associated with rank difference between target and evaluator, I thought it useful to first check the sample for the effect against the diffuse characteristic that is well-known to produce it – the characteristic of gender (see

Ridgeway 2001 for a review). I examined the collaboration (leader) variables for female target leaders against the collaboration (leader) variables for male target leaders. If status theory holds for this sample, I should expect to find that female leaders score lower on collaboration (leader) variables than male leaders, because as a diffuse status characteristic, gender differences tend to generalize into differential evaluations of competency as leaders (Ridgeway, 2001). In military settings in particular, researchers have found evidence of women being evaluated as less competent leaders than men (Boyce and Herd, 2003). Results of this analysis are presented in Table 6-6 below.

Table 6-6: Collaboration (Leader) Variables by Gender of Target Leader

Collaboration (Leader) Variables by Gender of Target Leader								
<u>Independent Sample Comparison of Means</u>								
	Male Target Leader			Female Target Leader			df	t
	N	Mean	Std. Deviation	N	Mean	Std. Deviation		
Collaborative Potential (Post-Exercise)	105	4.419	.7694	54	4.093	1.069	157	2.211*
Collaborative Potential (Change from Pre to Post-Exercise)	105	.8381	.9818	54	.2407	1.228	157	3.330***

*** $p = .001$ (2-tailed) * $p < .05$ (2-tailed)

Results in Table 6-6 support the prediction derived from status theory that diffuse status characteristics like gender lead to differential evaluations of the target leader. Female leaders are judged as less collaborative than male leaders across the

sample, both in raw terms, and in terms of attitude change of the evaluator from pre- to post-exercise. The difference is also meaningful. Male leaders score, on average, one-half response interval higher (on a 5-point scale) than female leaders. Rounding to the nearest integer, male leaders are credited as collaborators one response interval from pre-exercise to post-exercise, while female leaders are not credited at all as collaborators from pre- to post-exercise.

Intrigued by this powerful gender effect, I next examined the gender effect across experimental conditions, wanting to know if the effect was attenuated at all by the presence or absence of hierarchy in the group. Interestingly, among hierarchical groups, there was no statistically significant difference in the collaboration (leader) variables between male and female target leaders – when leaders in hierarchical groups differed by gender, they tended to be evaluated as collaborators similarly. Results are presented in Table 6-7 below.

Table 6-7: Collaboration (Leader) Variables by Gender of Target Leader (Hierarchical Groups Only)

Collaboration (Leader) Variables by Gender of Target Leader - Hierarchical Groups Only								
<u>Independent Sample Comparison of Means</u>								
	<u>Male Target Leader</u>			<u>Female Target Leader</u>			<u>df</u>	<u>t</u>
	<u>N</u> [†]	<u>Mean</u>	<u>Std. Deviation</u>	<u>N</u> [†]	<u>Mean</u>	<u>Std. Deviation</u>		
Collaborative Potential (Post-Exercise)	46	4.457	.6568	32	4.344	.8273	76	.670
Collaborative Potential (Change from Pre to Post-Exercise)	46	.8043	.9802	32	.4063	1.043	76	1.719

[†] Only those members of hierarchical groups who selected leaders more senior in rank than themselves are included in this analysis (members who self-selected as leaders are also excluded)

Among egalitarian groups, on the other hand, the gender effect on attitudes toward emergent leaders as collaborators was quite strong. Results are presented in Table 6-8 below.

Table 6-8: Collaboration (Leader) Variables by Gender of Target Leader (Egalitarian Groups Only)

Collaboration (Leader) Variables by Gender of Target Leader - Egalitarian Groups Only								
<u>Independent Sample Comparison of Means</u>								
	<u>Male Target Leader</u>				<u>Female Target Leader</u>			
	<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>		<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>df</u>
Collaborative Potential (Post-Exercise)	37	4.405	.8963		17	3.529	1.069	52
Collaborative Potential (Change from Pre to Post-Exercise)	37	.9189	1.090		17	-.1176	1.536	52
								<u>t</u>
								2.852**
								2.843**

** $p < .01$ (2-tailed)

Recall that I postulated that participants would tend to resist and resent status moves made by peers and subordinates more than status moves made by superiors. If being named a leader by one of the group members implies that there was some degree of status seeking by the target, then the collaboration (leader) variables can be viewed, in part, as an attitudinal response of the evaluator to the status move.

It is therefore not surprising that a gender effect on attitudes toward status moves occurs in egalitarian groups but not in hierarchical groups. This is because status moves in egalitarian groups are made among equals, and therefore are more

prone to resistance as argued in Chapter Two. This resistance is applied differentially according to the gender of the target, again as would be predicted by status theory (Ridgeway 2001; Ridgeway and Berger 1986). But it is the fact of the greater resistance to status moves in egalitarian groups, and not necessarily the character of the resistance or its differential application across gender, that is relevant to the argument in Chapter Two. I am primarily interested in establishing the fact of increased resistance to status moves in egalitarian groups relative to hierarchical groups, and I propose the gender effect in egalitarian groups (and not in hierarchical groups) strengthens the case for status dynamics as proposed in Chapter Two: namely, that egalitarian groups are more prone to status contests than hierarchical groups.

Organizational Rank as a Status Characteristic. Given the gender effect finding, I am confident that the collaboration (leader) variables are a valid measure of the effects of status differences on attitudes toward emergent leaders for this sample. I next examined the collaboration (leader) variables to detect the effect of hierarchy (that is, differences in rank) as a status characteristic on attitudes toward emergent leadership. In particular, I am interested to see if there is a difference across conditions in the way emergent leaders are treated when things do not go well during the group exercise.

Recall that in my instructions to groups, I state that “research shows that tasks like the one you will shortly undertake are best accomplished when everyone gets involved, and I want your group to do well on the task. Therefore, I encourage you to

get everyone involved in the group discussion and finished product.” In cases where interaction was relatively non-participative, I imagine emergent leaders being held to account by evaluators when members suspected their group was off-track. To check whether this was the case, I partitioned the data to include just quadrant three and four groups – groups that were relatively non-participative – and ran an independent sample comparison of means for the collaboration (leader) variables across conditions. Results are presented below in Table 6-9.

Table 6-9: Collaboration (Leader) Variables by Condition in Non-Participative Groups

Collaboration (Leader) Variables by Condition in Quadrant 3 and 4 Groups - <u>Independent Sample Comparison of Means</u>									
	<u>Hierarchical Groups</u>				<u>Egalitarian Groups</u>				
	<u>N</u> [†]	<u>Mean</u>	<u>Std. Deviation</u>		<u>N</u>	<u>Mean</u>	<u>Std. Deviation</u>	<u>df</u>	<u>t</u>
Collaboration Potential (Post-Exercise)	39	4.333	.8377		25	3.680	1.145	62	2.634*
Collaboration Potential (Change from Pre to Post-Exercise)	39	.5385	1.232		25	.2800	1.487	62	.755

[†] Only those members of hierarchical groups who selected leaders more senior in rank than themselves are included in this analysis (members who self-selected as leaders are also excluded from both hierarchical and egalitarian subsamples)

* $p < .05$ (2-tailed)

As predicted, leaders in hierarchical groups are evaluated as more collaborative after the exercise than leaders in egalitarian groups, when groups are characterized by relatively non-participative interaction. In addition to the statistical

significance of the difference in means, I should also note that in terms of the “meaningfulness” of the difference between scores, hierarchical participants reported greater than one-half response interval (on a 5-point scale) more collaborative with their leaders than egalitarian participants.

This result is even more surprising when you consider that classmates in egalitarian groups have in-group dynamics encouraging them to be more lenient in evaluating their leaders, while out-group dynamics encourage hierarchical participants to be more critical of their leaders (Hogg, Terry, and White 1995). Status dynamics are apparently more powerful than identity dynamics as a conditioner of attitudes about leaders.

The data in Table 6-9 suggests that when “things go awry” in groups, leaders in hierarchical groups are afforded more leniency than leaders in egalitarian groups, just as male leaders are advantaged in their evaluations relative to female leaders. This finding supports the argument that members who seek authority in egalitarian groups are more vulnerable to negative sanction when and if their competence as leaders is questioned. It appears that the absence of hierarchy between leader and evaluator produces the same double standard effect produced by gender.

Given these findings in groups populating the unfavorable (left) quadrants of the leader presence/style matrix, I propose the clustering in quadrant four for egalitarian groups, and the clustering in quadrant three for hierarchical groups, is explained by the following coincident status dynamics: vulnerability to discredit as authority figures of egalitarian leaders; and amnesty for discredit as authority figures of hierarchical leaders, when “things go awry” in groups. Authority seekers in

hierarchical groups tend to be more senior, and therefore appear to enjoy more of a pass for being non-participative in style. When leaders demonstrate non-participative styles, they tend to retain their authority in hierarchical groups while losing it (or never gaining it in the first place) in egalitarian groups. On average, therefore, hierarchical leaders who are non-participative can still emerge to claim endorsement as a group leader from the whole group, while egalitarian leaders who are non-participative do not. There appears to be a double-standard, based on rank, for the evaluation of competence as a leader.

Explaining Effects in Quadrants One and Two. But what if things go well in the group? How do we explain the clustering in quadrant two for hierarchical groups, and the more even distribution of egalitarian groups across quadrants on the right side of the matrix?

Recall that groups on the right side of the matrix are more satisfied with both product and process than groups on the left. We would also expect members of groups on the right side of the matrix to feel better about the emergent leaders than members of groups on the left. Examining the collaboration (leader) variables, we find this is the case. In comparing means for the collaboration (leader) variables between the left and right side of the matrix, we find the raw collaboration (leader) post-exercise variable is statistically significant in the expected direction ($t = 2.555, p < .05$ 2-tailed, $df = 146$). While the collaboration (leader) change variable is in the expected direction, it is not statistically significant ($t = 1.947, p = .053$ 2-tailed, $df = 146$).

We can conclude that members of groups on the right side of the matrix, on average, felt relatively positive about group performance and about emergent leaders' stewardship of the group. Still, there remains the puzzle of why egalitarian groups tended not to cluster in a particular quadrant on the right side of the matrix, and hierarchical groups tended to cluster in quadrant two.

I propose the answer is relatively straightforward: hierarchical leaders who are participative in their style invite others, implicitly or explicitly, to share leadership of the group. Recall that the definition of participative interaction is the degree which members felt equal to their leader. In participative groups, it is likely more junior members felt empowered enough to take (or share) a leadership role in the group, but this has consequences for innovative performance, which is maximized when there is a single group leader guiding the group. I argue that hierarchical groups clustered in quadrant two because their participative ranking members wittingly or unwittingly yielded responsibility to lead the group, ultimately injurious to their group's performance, because no one person took charge.

In egalitarian groups, I envision a different status dynamic. I suspect authority-seekers among peers found ways to consolidate their authority rather than share it, while trying to remain participative, for they knew that a non-participative style discredits them as a leader, yet they have no basis for claiming authority except by demonstrating competence, which in itself is threatening. Some were successful, others were not, but the main effort among authority-seekers in egalitarian groups likely centered on consolidating rather than sharing authority. It is quite plausible

that one or both of the egalitarian groups who ended up in quadrant three were led there by an overzealous authority-seeker who started out leading participatively.

I suspect that egalitarian as well as hierarchical groups that lacked authority seekers – groups with members who were apathetic about the task and came for the free pizza or were otherwise disinclined to engage in status contests – found a welcoming environment in quadrant two for participative and unproductive work.

The net result is clustering in quadrant two for hierarchical groups, and a more even distribution across quadrants for egalitarian groups. Those leaders who manage the dilemma of taking charge while remaining participative have really accomplished something, hence the rarity of quadrant one groups.

The Dilemma of Participative Leadership

To summarize the status argument explaining clustering of experimental groups in Figure 6-2, participants enter into hierarchical group settings with expectations about who will take charge and lead groups. These expectations coincide with rank, as predicted from theories of status, with higher ranked individuals both expecting themselves to lead and expected by others to lead. In egalitarian groups, members expect participative interaction from the outset, given equality of rank among members.

Groups were informed that “research shows that groups perform well on this task when they involve everyone in the group discussion and product.” Whereas groups varied in their ability to operate participatively, it appears that different attitudes about emergent leaders took hold in groups that were successful in operating

participatively, and groups that were not, and these different attitudes were related to the experimental condition.

When “things went awry” with participative interaction in groups, those held responsible for the lack of participative interaction (the emergent leaders) were differentially treated by group members according to the presence or absence of hierarchy in the group. Specifically, emergent leaders were evaluated more leniently as collaborators in hierarchical groups than in egalitarian groups, and this differential evaluation explains why hierarchical leaders who are non-participative retain enough status to be endorsed as the authority figure in the group, while non-participative egalitarian leaders, on average, do not. Thus, hierarchical groups cluster in quadrant three, while egalitarian groups cluster in quadrant four. As it turns out, these dynamics are not particularly relevant to innovative performance – quadrant three and four groups performed about the same.

When things went well with participative interaction in groups, those most likely to be credited (again the emergent leaders) were once again differentially treated by group members according to experimental condition, and this time, the dynamics have implications for innovative performance. To maximize likelihood for innovative performance, emergent leaders in either condition needed to take charge while continuing to foster participative interaction – the union of strong group leadership with participative interaction is a powerful predictor of innovative performance. Yet by asserting an authority role, the emergent leader risks sabotaging the participative interaction that is critical for innovation, as participants respond to

the status moves by the leader. This is what I am calling the dilemma of participative leadership.

In egalitarian groups, the dilemma resides on the leader-presence axis. It emerges from the leader's attempts to take charge of the group. Innovation is maximized when someone does so, but particularly in egalitarian groups, power grabs are resented, and the emerging leader risks endorsement as a leader simply by acting like one. The difficulty of resolving this dilemma – that is, of taking charge while making others feel like an equal – explains why egalitarian groups were more likely to appear in quadrant four than in quadrant three.

In hierarchical groups, the dilemma resides on the leader-style axis. The very dynamics that promote participative interaction – that is, more senior members involving more junior members in discussion, decision, and outcomes – also operate to undermine the authority claims of the more senior members, with implications perhaps on their endorsement as the authority figure in the group. Hierarchical leaders are expected to lead, and when they act participatively, there may be a tax to pay in terms of relinquishing some portion of the claim to authority. The difficulty in resolving this dilemma explains why hierarchical groups were more likely to appear in quadrant two than in quadrant one.

The Finding of No Effect - Revisited

I return now to an account of the finding for no apparent effect of the experimental manipulation of hierarchy on innovative performance. I begin by reconsidering plausible explanations in light of the findings just discussed.

First, there is the family of explanations owing to improper research design. My method for capturing innovation has both the merit and curse of being original. I arrived at the procedure only after combing the literature for one I could import or adapt to my needs, and found none that fit the research question. I wanted a group task that was meaningful to the participants, came with a proven solution groups could adopt if they wanted (but not too many – little or no variation in the dependent variable spells disaster), unstructured enough to provide space for creative solutions, and just structured enough to make a comparative evaluation practical for the raters.

It appears that I was fortunate to get what I hoped for from the dependent variable measure. Only two groups out of 46 adopted the template whole, and the remaining groups obliged with solutions spanning the dial from radical change to minor edits, and I got the variation I needed in the dependent variable. My raters cooperated by returning intraclass correlation coefficients (ICCs) above .80 for both components of the dependent variable, so I am confident the variable measures a single coherent phenomenon. Its validity as a measure of innovation appears secure given the expected associations with relational and task conflict. I am confident that I can foreclose the possibility that I failed to observe the hypothesized relationship due to a design failure to capture innovation as it is defined in this project.

Earlier I made my case for why I believe hierarchy was manipulated successfully. Participants revealed clear expectations of authority coincident with rank in hierarchical groups, and participants' self-expression as leaders varied significantly in the expected directions between conditions. Still, doubts linger about whether there was enough interval between ranks to claim differences in status

contest dynamics in hierarchical groups relative to egalitarian groups. It is possible, in other words, that status contests in hierarchical groups and egalitarian groups were similar enough to yield negligible differences in group dynamics across conditions. Perhaps midshipmen do not consider differences in rank among them enough to neutralize status fighting in hierarchical groups as I argued in Chapter Two. I considered including Naval Academy officers in hierarchical groups for this reason – an officer’s presence in the group would certainly make rank a more powerful status characteristic for participants, but I worried that an officer’s presence in hierarchical groups and absence in egalitarian groups would confound the manipulation with issues beyond status. Officers are *othered* by midshipmen – they live beyond the midshipman life-space, and their inclusion in the study would have introduced complexity I wanted to avoid. As it stands, I have a design that I am confident manipulated *just* rank, because participants were otherwise drawn from the same life-space.

We can also imagine the possibility that the manipulation check I conducted, in which I found that participants in hierarchical groups reported group leaders coincident with rank, masks the possibility that participants self-reported leaders by rank because that is their culture, while leaders *in practice* went unreported. If this occurred (I cannot determine whether it did, because I did not observe nor did I record actual group interaction), then my claim for a valid manipulation is an artifact of culture rather than fact, and I can make no claims regarding the causality of the experimental condition on group dynamics, including those related to the leader presence/style matrix. Designs akin to Bales’s classic studies, in which group

interaction was observed and coded by neutral researchers, could have forestalled uncertainty about the veracity of self-reported data by participants.

Yet I believe the data regarding collaboration potential of leaders fielded earlier provides convincing evidence that the theory underpinning the argument in Chapter Two maintains in this project. Specifically, it is apparent that in hierarchical groups, authority figures who treat others less equal in group interaction are more excused for doing so than authority figures in egalitarian groups. This finding fits with theory, because authority figures senior in rank to evaluators in hierarchical groups are by virtue of rank *expected* to treat others as inferiors, whereas authority seekers in egalitarian groups are expected to treat others as equals, and when they do not, it serves as a status violation and invites reproach (Ridgeway and Berger 1986).

I think the finding of no apparent effect of hierarchy on innovative performance has less to do with incorrect theory or with improper measures, and more to do with the failure in my design to account for the critical importance of emergent leadership as a moderating variable. It turns out that attitudes about emergent leadership shape the dynamics in groups, and this has implications for innovative performance. Hierarchy (or lack of it) does not by itself affect innovative performance in the team – both hierarchical and egalitarian groups have the capacity to innovate, and the capacity to stagnate. Much depends on how the leader manages the dilemma to take charge *and* to involve the group in discussion, decision, and outcome; that is, to lead participatively.

My study failed to reveal a direct effect of hierarchy on innovative performance; only the effect of hierarchy on interaction through status processes,

which then shaped the attitudes of group members toward those who would emerge as leaders. These emergent leaders hold the key to innovative performance; if they managed to take charge of the group while retaining a sense of equality vis-à-vis other group members, they likely led their groups to innovative solutions. But these were the exception. The majority of groups did not produce the single group leader that predicted innovative performance. And this was due to status processes that tended to impede leader endorsement in egalitarian groups characterized by non-participative interaction, and in hierarchical groups characterized by participative interaction.

In sum, I found no apparent effect of hierarchy on innovative performance because status processes operate differently in hierarchical as compared to egalitarian groups, and the net effect is a rough leveling of the strength of each group type as an incubator for innovation. Hierarchical groups are advantaged by the non-contested nature of the status (and authority) order, yet this creates expectations among members that leaders will lead, and when leaders are participative, the net effect appears to be ambiguity about who the leader is, and this is consequential for innovative performance. Egalitarian groups, meanwhile, are advantaged by the participative interaction that comes naturally among peers, but when one or more of the members vie for authority, particularly in a way that might feel coercive or unequal, the prevailing response from the group is to withhold endorsement as the group leader, and this again is consequential for innovative performance. Thus, each group type has inherent strengths relating to innovative performance, but each also

carries the seeds of its demise as an innovative unit courtesy of status processes. The net effect across the sample is no apparent effect.

The explanation for no apparent effect offered here is grounded in status theory and supported by data as presented in this chapter. A more comprehensive and precise statistical test of the argument above would require a larger sample, perhaps four times as large, so that the main effect of hierarchy on innovation can be divined from the noise in the design by regression within each matrix subsample, thus controlling for the critical variables of leader presence and style.

Limitations

A few of the project's limitations have already been noted. There are in my view three internal limitations and one external limitation relating to the hypotheses tests, and one internal limitation related to other findings presented in this project. I characterize internal limitations as those which invite skepticism regarding the coherency and validity of the argument explaining the finding(s). External limitations are those which cast doubt on the generalizability, or external validity, of the finding(s) (Lucas 2003a).

First, the internal limitations relating to the hypotheses tests, and among these the most serious is the small sample size. When designing the experiment I did not adequately plan for the finding of "no apparent effect." I anticipated significant findings either supporting or refuting my argument, and therefore considered the sample size adequate to use regression as the method of choice for hypothesis testing across the entire sample. When I found "no apparent effect," I had no choice but to partition the sample as a means to control for the emergent leadership factors I did not

account for in the design. This partitioning was itself injurious to precision in the measurement of participative interaction as a continuous variable, because I was sacrificing variance within each quadrant to obtain categorical distinctions between each quadrant as an analytical device.

The same can be said of the partitioning of the innovative performance variable into quartiles. Precision of the innovative performance measure within each quartile is sacrificed for analysis between quartiles, and more specifically, for chi-squared analysis of the contingency table setting matrix quadrants against innovative performance quartiles. This analysis proved useful for understanding the effect of hierarchy on attitudes toward emergent leadership, but I did not have the sample size to allow a more direct test of the hypotheses while controlling for emergent leadership. I would have preferred to use regression within each quadrant to leverage the increased statistical power of the continuous dependent variable measure. Dividing my sample into four quadrants eliminated regression as a viable analytical procedure within each subsample. Had I the chance to redo the experiment, I would shoot for a sample size on the order of four times the current size.

A related limitation to small sample size is the demographic homogeneity of the sample. The sample was predominantly white male. I believe I had enough diversity along gender lines to permit analysis of gender effects, but there was not enough variance in the race variables for a meaningful examination of race effects on group performance, attitudes, and outcomes.

The third internal limitation is the reliance on self-reported survey data. In their classic studies on group process, Bales and colleagues (1951; 1955) developed a

behavioral coding scheme which made the measurement of group dynamics more precise and less prone to respondent bias. I considered a similar coding procedure, but ruled it out as impractical given my status as a sole researcher and the time constraints imposed by my sponsor for completion of the project within one year. I must accept the possibility that respondents may have behaved one way and reported something else, influenced by any number of known respondent biases (see Fowler 1995 for a concise review). In particular, the participant's propensity given the military culture to attribute leadership to more senior participants in hierarchical groups may have been an artifact of rank rather than the product of actual interaction, and this respondent bias, if widespread, would invalidate my claim that hierarchy was in fact manipulated by the conditions, and by extension, invalidate my claim that the experimental manipulation caused the pattern of attitudes about emergent leadership. I believe the findings consistent with status theory on the collaboration (leader) variables substantiate my claim that hierarchy was manipulated, but a behavioral coding scheme would have strengthened the case for the validity of the group dynamic measures.

I turn now to the internal limitation of findings not related to the hypotheses, but rather to the argument explaining those findings. The limitation centers on conceptual and definitional imprecision in how I treat emergent leadership in the analysis. My findings hinge on the assumption that all participants conceived of group leadership in terms of proactively taking charge of the group and leading it through the task. Other conceptions of leadership exist such that participants may have identified leaders as performing other kinds of roles in the group, such as

providing the best ideas, attending to the socio-emotional needs of group members, or facilitating group discussion. I offered no guidance to participants in specifying the type of leadership provided by the one they identified.

The implications of this imprecision are two-fold. First, the leader presence/style matrix potentially misrepresents group consensus on who emerged as the group leader, and thus calls into question findings resulting from the use of the matrix as an analytical device. Second, implications of the findings for practice in organizations are muddled, because I cannot with precision describe the kind of leadership that led to innovative solutions. Future research should take care to capture a more precise definition of group leadership.

Turning to the external limitation for findings related to the hypotheses, I invoke Lucas's argument (2003a) to set the parameters of discussion of external validity. Lucas makes clear that experimental design grounded in theory is well suited as a method for questions of external validity. He points out that questions of external validity are fundamentally theoretical questions – so long as the experiment is conducted within the bounds of the scope conditions specified by the theory under test, then findings supporting the hypotheses derived from the theory are by definition externally valid, and therefore generalizable to populations beyond the research sample. This is so because the very nature of theory is generalized knowledge, proposed as true across time and situations specified within the scope conditions.

The empirical approach to theory in the social sciences is never to prove the veracity of theory, but rather to endeavor to falsify theory across time and situations, and thereby feel incrementally convinced about the theory's veracity with each failure

to falsify. By this standard, unfortunately, my project can make no contribution to theory based on tests of the hypotheses. The findings relating to the hypotheses are inconclusive, and therefore I have failed in my design both to falsify the theory under test, and *not to* falsify the theory under test.

My project was an attempt to apply Expectation States theory, the broader research program that includes Status Characteristics theory (Berger et al. 1977), to task group situations in which I manipulate the *a priori* status order within the group, and test whether this manipulation has the effect on innovation that theory suggests it might have. My findings show that the predicted effect does not hold, and because my findings relating to the hypotheses are inconclusive, I have no basis for claiming whether the failure to find the effect was a product of poor theory, a product of inappropriate application of theory to innovation as a group process, or (more likely) a product of an imperfect experimental design. Without results either supporting or refuting theory, the question of external validity of the findings relating to the hypotheses becomes mute.

My project made other discoveries beyond the scope of the hypotheses, and these deserve comment regarding their external validity. I found, consistent with status theory, that the gender of target leaders conditions their evaluation as a leader. This finding qualifies as a failure to falsify, and therefore makes an incremental contribution to Status Characteristics theory, the validity of which has been extended empirically to include the population represented by the research sample.

I also found, again consistent with status theory, that military rank has a double-standard effect on leader evaluation akin to the gender effect, but only when

the group underperforms. This finding amounts to a theoretical advance as an empirical demonstration that military rank is a status characteristic as defined in the theory.

Perhaps the most meaningful finding from the perspective of theory-building is the finding that the gender effect noted earlier applies only to egalitarian groups, and not to hierarchical groups. This finding advances theory in two ways. First, it suggests a hierarchy among status characteristics, in which gender is subordinate to (and thus less potent as a status marker than) military rank. Women of higher military rank apparently enjoy more legitimacy as leaders than women of equal military rank. This is consistent with findings that institutionalization of women leaders increased their legitimacy as leaders (Lucas, 2003b).

Secondly, the finding suggests that status processes are more acute in groups marked by equal rank, than in groups marked by unequal rank. This was the main proposition underpinning the argument for the superiority of hierarchical groups as innovators relative to egalitarian groups. The findings ultimately did not support the prediction regarding innovation, but the logic of the argument appears to have support. If women are subject to a higher standard of competence as leaders than men, but only when they are of equal rank with their evaluators, this is strong evidence that status contests are playing a larger role in interaction than in situations where women are subject to the same standard of competence, as is the case in hierarchical groups. The fact that this discontinuity in status processes across conditions did not result in greater (or lesser) innovation does not devalue its

importance as a theoretical advance. Military rank appears to de-fuse status processes involving gender in groups within the scope condition of the theory.

And finally, I must note the external limitation of my findings imposed by the problem of level-of-analysis. I found that hierarchy does not necessarily impede innovation at the level of the group, but this tells us nothing about the effect (or lack of effect) of hierarchy on innovative performance at the organizational level. Care must be taken to remember that the theories employed to both derive the hypotheses and to explain the findings had scope conditions specifying group-level situations. The insights that follow from this project can be used to suggest further research using theories scoped for organizational levels, but no conclusions should be drawn from these findings to organizational level questions.

Avenues for Future Research. The findings above illuminate three promising avenues for future research. The first are studies that seek to replicate the neutralizing effect of military rank on status processes relating to gender, and expanding to other status characteristics, such as age, socio-economic status, education, and race. If the finding holds across multiple studies and across other status characteristics, an empirical case can be made for the advantage of military hierarchy as a more general leveler of social inequality, an idea proposed but not pursued empirically by Moskos and Butler (1996).

The second regards group process theory-building; that is, empirical tests of the external validity of the theory beyond the present research sample. Whether status processes in work groups specified by status theory are similarly defused by

organizational rank other than military rank (such as academic rank, or corporate rank) is an empirical question, but the answer has implications for theory. On the one hand, findings in support of the proposition beyond military settings suggest that organizational rank has generalized effects on status processes in groups. On the other hand, findings that falsify the general effect of organizational rank impose constraints on the scope condition for the effect. In either case, group process theory is advanced.

This study highlights a knowledge gap in the literature relating to the concept of strategic leniency (Marcus and House 1973), in which superiors exercise restraint with their power over subordinates in order to win or preserve influence. The question remains whether superiors also sacrifice some degree of authority in the process. This study suggests that hierarchical leaders do in fact give up some degree of authority when they lead participatively among group members lower in organizational rank, though a more direct test is warranted, and this test is particularly suited to experimental method. The third avenue for future research involves adjusting the research design for more precise applications of theory to practice. From the outset in this project, I endeavored to apply theory as a solution to a problem of practice – the problem of innovation in work groups. While I was unsuccessful connecting the dots between theory and practice in this project, I believe the design has promise in future research that accounts for the critical importance of emergent leadership. Designs that control for the identity and participativeness of the group leader will better test the causal link between hierarchy and innovation. Alternatively or in addition, designs that increase the sample size will allow

regression analysis within quadrants specified in the Leader Style/Presence matrix above, thus allowing for statistical control of emergent leadership phenomena, and greater statistical leverage and precision with continuous variables.

Chapter 7 – Conclusion

Implications for Practice

I turn now to implications of the findings for practice in organizations. This project took aim at a basic assumption at the root of theory and practice involving the institutional logic of innovation teams embedded in organizations. Conventional wisdom and the logic of innovation teams suggest that groups structured by organizational rank are by nature less innovative and creative than groups composed of status equals. It turns out, for this research sample, that the hierarchical structure of the group appears not to affect how innovative the group performs, nor does it affect how much conflict and participative interaction ensues during group work. Instead, the hierarchical structure affects attitudes about emergent leadership as described earlier.

Perhaps more meaningful for practice is the clear evidence that the combination of presence and style of emergent leadership is highly predictive of innovation in task groups. Groups are more innovative when they are led by a single and participative leader than when they are not, and both conditions must obtain in combination to achieve the advantage. Other combinations of style and presence have the capacity to innovate, but none are more likely to innovate.

Organizations seeking innovation from teams are therefore well served to promote the conditions that will best result in a single and participative leader emerging to lead the group. This is, of course, easier written than done. Emergent

leaders only emerge during interaction, and perhaps those who do emerge as participative leaders do so only (or in part) *because* they are not identified as the leader by someone outside the group. Any attempt to identify the leader prior to group interaction could well disrupt the natural emergence of the leader who will engender the kind of interaction that leads to innovative solutions.

This poses a problem for organizations hoping to set the conditions for the right kind of emergent leadership to promote innovation in teams. I suggest setting up the exercise as described in this project as a beta test for candidate groups, or as a beta test for participative leaders. There is no need to actually measure innovative performance, and there is flexibility to tailor the task as appropriate so that it is both meaningful and interesting to organizational members. Those groups that emerge from the task in quadrant one are strong candidates for innovative performance, and their leaders have proved themselves capable of negotiating the dilemma of participative leadership – no easy feat. It is worth noting again that these outcomes are discernible solely from post-exercise surveys.

Additionally, the strength of both egalitarian structure (participative interaction) and hierarchical structure (clear leadership) can be leveraged in innovation team design. In my sample, when hierarchical groups reached consensus on the identity of the group leader, in 11 of 12 cases the leader named was the highest ranking member of the group. When designing a team charged with innovation, organizations might consider carefully selecting one member from among the more senior ranks in the organization, then selecting the rest of the team from more junior ranks. The group will naturally turn to the senior ranking member for leadership,

though it is important that his leadership role not be overtly assigned. This confederate group member could be incentivized and trained to foster an egalitarian climate within the group while leading the group through to solution. I am careful not to offer this as a solution to the dilemma of participative leadership – the process does not guarantee innovative performance, particularly over the course of a long-term project. But it does have the advantage of setting the initial vector for group interaction that promotes innovation.

For research in the leadership literature that focuses on the antecedents and consequences of single versus multiple leaders in groups (Avolio et al. 1996; Carson, Tesluk, and Marrone 2007), this project offers clear evidence that groups led by a single leader are more innovative than groups led by multiple leaders.

Consider one of the corporate principles broadcast on the website of McKinsey and Company, perhaps the world's leading management consulting firm. The principle reads, "We are problem solvers with a passion for excellence. We are intellectually curious and highly collaborative. We minimize hierarchy."

This principal is emblematic of the conventional wisdom regarding hierarchy. McKinsey and Company seems to be saying that hierarchy interferes with intellectual curiosity, collaboration, and problem-solving. My project demonstrates that on average, and at the group level, hierarchical groups do no better and no worse than egalitarian groups. Rather, hierarchy provides advantages relating to innovative performance by conditioning interaction that is less prone to conflict arising from status fighting, and by providing the group an institutional path for reaching consensus on who takes charge of group work. While the group's ultimate fate

depends on how well the leader negotiates the dilemma of participative leadership, hierarchy does not by itself appear to threaten innovation. Rather, non-participative leaders and participative non-leaders appear to threaten innovation.

Findings in Context

One rightly asks, “what do these findings look like in the real world.” It is useful to consider historical cases that bring some of my findings to life. What historical figure, for example, embodies my conception of the participative leader, who inspires a group toward innovative solutions by successfully negotiating the dilemma of leading while making others feel like his equal?

The Reverend Martin Luther King is perhaps a model historical figure for the participative leader who achieves innovative solutions, though he is perhaps better known for his organizational-level than for his group-level innovations. In his “Letter from a Birmingham Jail,” Dr. King eloquently takes responsibility for the “creative tension” he is sowing through non-violent protest against segregation in Birmingham. Yet his description of the movement, which he admits to being “suddenly catapulted into the leadership” of, suggests he does not see himself leading at all, but rather being carried along (King 1963).

Something within [the American Negro] has reminded him of his birthright of freedom; something without has reminded him that he can gain it. Consciously and unconsciously, he has been swept in by what the Germans call the *zeitgeist*, and with his black brothers of Africa, and his brown and yellow brothers of Asia, South America and the Caribbean, he is moving with a sense of cosmic urgency toward the promised land of racial justice.

At least through the prism of his letter, Dr. King appears to have managed the dilemma of participative leadership beautifully – he held himself accountable as the movement’s leader, appeared to accept both the task and socio-emotional responsibilities of the leadership mantle, and considered himself not really in charge. His humility of expression likely endeared him to his followers, who appreciated both his strong leadership and his sense of being just another “American Negro”, “swept in” with “cosmic urgency.” I am tempted to say that the innovation of nonviolent resistance sprang from Dr. King’s participative leadership; but this would of course be overreaching. It seems fair to say that Dr. King created the environment for innovation with his particular brand of leadership, and we ought not be surprised that the movement enjoyed innovative solutions to vexing problems.

Thinking about Dr. King as an exemplar of successful participative leadership, I am reminded that I make a key presumption about how my research participants oriented themselves to the group task. Dr. King was not likely thinking about innovating for the sake of it – he was likely not seeking a legacy as an innovator per se. He and his staff were engaged in critical problem solving in crisis. Their problem was how to mobilize a largely apathetic and spiritually defeated black citizenry to meaningful action, without resort to violence that would alienate the moderate whites who were crucial for legitimacy of the movement. They defined success in their work as realizing the dream of equal treatment under the law. Innovation occurred as a byproduct of their problem solving.

In the same way, I did not explicitly define success for my research participants. I did not ask them explicitly to innovate – note that the root word

“innovate” nor “innovative performance” appears in the exercise script. I gave them a task that required critical problem solving, and in the course of their problem solving, some of the groups performed innovatively as measured by their output. The research participants were oriented to the task as an exercise in problem solving, not an exercise in innovation. It is perhaps the case that if I had made “innovation” the desired endpoint for the task, my results would have looked much different.

This is an important point for practice. My results provide insight for teams engaged in problem solving, where innovative performances of the groups are the possible outcomes, if not the desired end-states. Innovative performance, in this project, is a byproduct of problem solving. Practitioners applying these findings in organizational and group settings will do well to remember that getting to innovative performance means charging the group with a vexing problem, not (necessarily) asking them to innovate.

I conclude with a nod to the enduring dialectic between structure and process. In this project, it seems clear that group dynamics (conflict) emerge from the interplay between structure (hierarchy) and process (status, emergent leadership), each shaping the other, none prevailing, with consequences for outcomes. Perhaps I was naïve to imagine isolating the main effect of group structure on group performance with such a straightforward experimental design. I now suspect that structure and process are not so easily disentangled.

Appendices

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Appendix A – Intranet Survey Screen Shots

Group Process Experiment - Respondent Survey -

<https://intranet.usna.edu/IR/surveys/Group-Experiment/>



Group Process Experiment - Respondent Survey

USNA

Dear Prospective Participant:

This research project is part of a doctoral dissertation for the principal investigator (PI), Wesley S. Huey, at the University of Maryland College Park. The study examines the dynamics of decision-making and debate in small groups tasked to collaborate to achieve a group goal under conditions of uncertainty. The PI is inviting you to participate because you are a midshipman at the U.S. Naval Academy – all research subjects in the study are current midshipmen from all four class years. There will be approximately 150 midshipmen participating.

Why is this research being done? The PI's main interest in this project is to observe and record interactions between people in small groups who must work together to solve a problem under conditions of uncertainty. The PI will measure the attitudes of group members about their interactions, attitudes about the process of producing a joint product, and attitudes about the joint product itself.

Results of the study will contribute to the body of scholarship in sociology and organizational psychology seeking to understand and explain the dynamics of decision-making teams embedded in larger organizations.

What will you be asked to do? There are two phases in the study. Phase One is an online survey that will take approximately 15 minutes to complete. If you agree to participate in this research, you will be directed to the survey instrument at the end of these instructions. Phase Two is a group exercise, to be completed in Room 308, Luce Hall. For Phase Two, you will be assigned to a small group of five midshipmen. You will be notified by email of the time and date to report with your group to Luce Hall for the group exercise. The total time spent in the group exercise is no more than 1.5 hours.

Your participation in this research is completely voluntary. If you decide to participate in this research, you may stop participating at any time by simply contacting the PI in person, by phone, or by email at the following contact information:

Wesley S. Huey
Student Investigator
Department of Sociology
University of Maryland College Park
Email: whuey@socy.umd.edu
Phone: (410) 571-5508 (H)

Appendix A – Intranet Survey Screen Shots

Group Process Experiment - Respondent Survey -

<https://intranet.usna.edu/IR/surveys/Group-Experiment/login.php>



Group Process Experiment - Respondent Survey

USNA

Login here to proceed to the Group Process Experiment - Respondent Survey:

Enter your NADN Login Identifier:
Enter your NADN server password:

-- OR --

~ admin: lou cox, cox@usna.edu ~



**Group Process
Experiment -
Respondent Survey**

USNA

NOTE: This portion of the survey is NOT timed - take as much time as you need.)

Instructions: For each statement, please select the answer which best completes the sentence to describe you.

	Never or almost never	Less than half the time	About half the time	More than half the time	Always or almost always
1. I _____ evaluate an idea before putting it into practice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I _____ tend to reset the goals and objectives of my work regularly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I _____ look forward to taking part in brainstorming sessions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I _____ believe it is better to ask for forgiveness than to seek permission.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I would _____ describe myself as a risk-taker in the way I do my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I _____ find it difficult to cope with shifting work goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I _____ find it easy to generate enthusiasm to complete tasks at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I would _____ try out new ideas without proper authority.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I _____ suggest new ways of doing things if they are really necessary to get the job done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I _____ follow a strict system in the way I do my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Never	Less	About	More	Always

Appendix A – Intranet Survey Screen Shots

USNA Group Process Experiment - Respondent Survey -

<https://intranet.usna.edu/IR/surveys/Group-Experiment/update2.php>



Group Process Experiment - Respondent Survey

USNA

Thank you for your participation in this important research. You will receive an email shortly with instructions for attending the group process experiment.

~ admin: lou cox, cox@usna.edu ~

Appendix B – Exercise Script

FOR ALL GROUPS:

Please help yourselves to pizza and beverage while I explain the experiment.

Has anyone NOT completed the survey on the USNA intranet?

Good afternoon. My name is Wes Huey, and I am a naval officer and doctoral candidate in Sociology at the University of Maryland College Park. I want to thank you for participating in this study, which is part of my dissertation research. In a few minutes, you will engage in an exercise as a group that is designed to stimulate group discussion, consensus building, decision-making, and goal achievement. I am interested in how you interact with each other as your group manages the task and achieves the group goal I will describe in a moment.

The laptop on the table will be used as a word processor to produce the output for the group exercise, which will be roughly a paragraph of text. Decide as a group who will do the word processing, but please remember whomever you choose is expected to fully participate in the group exercise, despite his or her collateral duty at the laptop.

You must complete the task by 1245 (1300) on the computer clock – please pace yourselves accordingly so that your finished product is displayed on the computer screen no later than 1245 (1300). You are encouraged to use all of the allotted time to complete the exercise. At 1245 (1300), I will return to administer a brief questionnaire. You will be complete with the experiment in time for fifth period class.

At this time, please turn off all cell phones, PDAs, and pagers. Once the exercise begins, I must insist that you work until the task is complete, without interruption, and without consulting with me or anyone else outside the group.

FOR DISPLAYED-AUTHORITY GROUPS:

Research shows that tasks like the one you will shortly undertake are best accomplished when everyone gets involved, and I want your group to do well on the task. Therefore, I encourage you to get everyone involved in the group discussion and finished product.

FOR NON-DISPLAYED-AUTHORITY GROUPS:

Research shows that tasks like the one you will shortly undertake are best accomplished when everyone gets involved, and I want your group to do well on the task. Therefore, I encourage you to get everyone involved in the discussion and finished product. So that you will keep this advice in mind while you work, please humor me now by removing your collar devices and placing them in the cup in front of you.

FOR EGALITARIAN GROUPS:

Research shows that tasks like the one you will shortly undertake are best accomplished when everyone gets involved, and I want your group to do well on the task. Therefore, I encourage you to get everyone involved in the group discussion and finished product.

Appendix B – Exercise Script

FOR ALL GROUPS:

Are there any questions before I describe the task? OK, to begin the exercise, I would like you to complete a short survey to describe how well you know the people in your group today. You will only answer the first three questions of the survey, then return the surveys to me. You will answer the remaining questions after the group exercise.

HAND OUT SURVEYS. COLLECT SURVEYS.

Now, on to the group exercise. The task has two parts. Part One is a kind of brainstorming session, in which I want you to discuss as a group what life in America will be like in the year 2034, 25 years from now. In particular, do your best to consider social, economic, technological, and political changes that may affect the relationship between American society and its armed forces. You have 5 minutes for discussion. You may not use the computer for this part of the exercise, but you may use the scratch paper provided for notetaking. I will return after the 5 minutes and describe Part Two of the exercise. Good luck.

AFTER 5 MINUTES, FOR ALL GROUPS:

Part Two is a group exercise. Remember, you must have your finished product typed into the computer no later than 1245 (1300).

Keeping in mind the group discussion you just completed, your group task is to work together to author a mission statement for an institution (like the Naval Academy) responsible for preparing young people for officer service in the US Navy and Marine Corps in the year 2034. Consider some of the ideas you discussed earlier – your finished mission statement should reflect your collective vision of the future, just as the current mission statement reflects today’s environment.

To assist you in your task, I am providing the current USNA mission statement as a reference for your work.

REMOVE SCREEN SAVER TO REVEAL TEXT OF CURRENT MISSION STATEMENT.

I want to point out a few things about the current mission statement that might help organize your group discussion during the exercise. The current mission statement can be broken down into six components

- The first component is the Processes used by the institution to accomplish its mission. These are the action verbs – Develop, Imbue, Graduate.
- The second component is the Object – to whom are institutional processes directed. Midshipmen.
- The third component is How objects (midshipmen) are influenced by processes – Morally, Mentally, Physically.
- The fourth component is the Core Values that are to be instilled and promoted by processes – Duty, Honor, Loyalty.
- The fifth component is the Product of institutional processes – Leaders. You might recall this was the component recently changed in March – from “Graduates” to “Leaders”

Appendix B – Exercise Script

- The sixth component is the “So What” – why the institution is important to the Navy (and Marine Corps) and the nation. “career of service” with “potential for future development...to assume the highest responsibilities of command, citizenship, and government.”

I'll see you at 1245 (1300).

LEAVE ROOM. RETURN AT 1245 (1300).

Please complete the questionnaires.

REDISTRIBUTE QUESTIONNAIRES. COLLECT QUESTIONNAIRES.

ALL GROUPS:

It is vital to my research that you not discuss the content of your experience here with anyone, including each other, when you leave the room today. Other midshipmen will participate in future experiments, and for the sake of the scientific integrity of the study, future participants must not have prior knowledge of what they will experience – otherwise, the experiment is compromised and the findings are invalidated. Please **DO NOT DISCUSS THIS EXPERIMENT** when you leave today.

I want to thank you again for your participation. Please contact me by email should you have any questions about the experiment. Have a great day, and beat _____!

Appendix C – Exercise Questionnaire

GROUP PROCESS QUESTIONNAIRE

YOUR ALPHA CODE _____

YOUR ID LETTER _____

1.	For each group member listed below, please choose the box that BEST DESCRIBES your relationship with him or her BEFORE TODAY?
	<p>Group Member A</p> <p>Self Total stranger Knew him/her by name Acquaintance (don't have his/her cell #) Friend (have his/her cell #) Close friend</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄ <input type="checkbox"/>₅</p>
	<p>Group Member B</p> <p>Self Total stranger Knew him/her by name Acquaintance (don't have his/her cell #) Friend (have his/her cell #) Close friend</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄ <input type="checkbox"/>₅</p>
	<p>Group Member C</p> <p>Self Total stranger Knew him/her by name Acquaintance (don't have his/her cell #) Friend (have his/her cell #) Close friend</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄ <input type="checkbox"/>₅</p>
	<p>Group Member D</p> <p>Self Total stranger Knew him/her by name Acquaintance (don't have his/her cell #) Friend (have his/her cell #) Close friend</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄ <input type="checkbox"/>₅</p>
	<p>Group Member E</p> <p>Self Total stranger Knew him/her by name Acquaintance (don't have his/her cell #) Friend (have his/her cell #) Close friend</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄ <input type="checkbox"/>₅</p>
2.	For each group member listed below, please indicate whether or not you knew the group member BY SIGHT, BEFORE TODAY?
	<p>Group Member A</p> <p>Self Knew By Sight Did Not Know By Sight</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂</p>

Appendix C – Exercise Questionnaire

	<p>Group Member B</p> <p>Self Knew By Sight Did Not Know By Sight</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂</p>
	<p>Group Member C</p> <p>Self Knew By Sight Did Not Know By Sight</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂</p>
	<p>Group Member D</p> <p>Self Knew By Sight Did Not Know By Sight</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂</p>
	<p>Group Member E</p> <p>Self Knew By Sight Did Not Know By Sight</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂</p>
3.	<p>For each group member listed below, please choose the box that BEST DESCRIBES how you perceive this group member’s potential as a collaborator with you on a group task?</p>
	<p>Group Member A</p> <p>Self Very Unfavorably Unfavorably Neutral Favorably Very Favorably</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
	<p>Group Member B</p> <p>Self Very Unfavorably Unfavorably Neutral Favorably Very Favorably</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
	<p>Group Member C</p> <p>Self Very Unfavorably Unfavorably Neutral Favorably Very Favorably</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
	<p>Group Member D</p> <p>Self Very Unfavorably Unfavorably Neutral Favorably Very Favorably</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>

Group Member E					
Self	Very Unfavorably	Unfavorably	Neutral	Favorably	Very Favorably
<input type="checkbox"/> ₀	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

STOP! You have completed Part One of the Questionnaire. Please return your questionnaire to the researcher.

Please proceed to Part Two of the Questionnaire only when directed by the researcher.

Part Two

4.	For each group member listed below, please choose the box that BEST DESCRIBES how you evaluate this group member’s potential as a collaborator with you on a group task, AFTER TODAY’S EXERCISE?				
Group Member A					
Self	Very Unfavorably	Unfavorably	Neutral	Favorably	Very Favorably
<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Group Member B					
Self	Very Unfavorably	Unfavorably	Neutral	Favorably	Very Favorably
<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Group Member C					
Self	Very Unfavorably	Unfavorably	Neutral	Favorably	Very Favorably
<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Group Member D					
Self	Very Unfavorably	Unfavorably	Neutral	Favorably	Very Favorably
<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

Appendix C – Exercise Questionnaire

	<p>Group Member E</p> <p>Self Very Unfavorably Unfavorably Neutral Favorably Very Favorably</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄ <input type="checkbox"/>₅</p>
5.	<p>During the group exercise, if you had to choose just one person, which group member most stood out as the group leader for the task? (Check only one box)</p> <p>A B C D E Self</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> → <i>If “Self”, skip to question 9</i></p>
6.	<p>During the group exercise, to what extent did you feel like you could influence the decisions of the group leader (identified in Question 5) on matters relating to the group task?</p> <p>No influence Slight influence Moderate influence Great influence</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
7.	<p>In group discussions relating to the group task, to what extent did the group leader (identified in Question 5) make you feel like his or her equal?</p> <p>I never felt equal I sometimes felt equal I usually felt equal I always felt equal</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
8.	<p>During the group exercise, to what extent did you feel like you had as much input as the group leader (identified in Question 5) in completing the group task?</p> <p>Never Sometimes Usually Always</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
9.	<p>During the group exercise, to what extent did you feel like you could exert influence over how the group should accomplish the task?</p> <p>No influence Slight influence Moderate influence Great influence</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
10.	<p>During the group exercise, if you had to choose someone (and that someone cannot be you), with which group member did you have the most conflict? (Check only one box)</p> <p>A B C D E</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>
11.	<p>Please rate the degree of conflict you had with the group member identified in Question 10.</p> <p>None or Almost None Minimal Moderate Severe</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>

Appendix C – Exercise Questionnaire

<p>12.</p>	<p>During the group exercise, to what extent did you feel like your contributions were, on the whole, valued by the group?</p> <p>Were not at all valued Slightly valued Moderately valued Greatly valued</p> <p><input type="checkbox"/>₄ <input type="checkbox"/>₃ <input type="checkbox"/>₂ <input type="checkbox"/>₁</p>
<p>13.</p>	<p>During the group exercise, to what extent did you, on the whole, value the contributions of other group members?</p> <p>Did not at all value Slightly valued Moderately valued Greatly valued</p> <p><input type="checkbox"/>₄ <input type="checkbox"/>₃ <input type="checkbox"/>₂ <input type="checkbox"/>₁</p>
<p>14.</p>	<p>Which group members made contributions you felt were treated more valuably by the group than your contributions? Mark all that apply.</p> <p>A B C D E N/A (My contributions were treated equally or of greater value by the group)</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> → If “N/A”, skip to question 16</p>
<p>15.</p>	<p>On the whole, to what extent did you resent having your contributions treated less valuably by the group than the contributions of other member(s)?</p> <p>Was not at all resentful Slightly resentful Moderately resentful Greatly resentful</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
<p>16.</p>	<p>On the whole, how much did you trust that other group members would take your contributions seriously, no matter how radical or unconventional?</p> <p>Did not at all trust Slightly trusted Moderately trusted Greatly trusted</p> <p><input type="checkbox"/>₄ <input type="checkbox"/>₃ <input type="checkbox"/>₂ <input type="checkbox"/>₁</p>
<p>17.</p>	<p>How often did you self-censor your contributions to avoid having them rejected by the group?</p> <p>Rarely or Never Seldomly Occasionally Regularly Often or always</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄ <input type="checkbox"/>₅</p>
<p>18.</p>	<p>On the whole, did you think of your interaction with other group members as cooperation with teammates, or as competition with rivals?</p> <p>Competition with rivals More competitive than cooperative About equally competitive & cooperative More cooperative than competitive Cooperation with teammates</p> <p><input type="checkbox"/>₅ <input type="checkbox"/>₄ <input type="checkbox"/>₃ <input type="checkbox"/>₂ <input type="checkbox"/>₁</p>
<p>19.</p>	<p>During the group task, how often did people disagree about opinions regarding the task?</p> <p>Never or almost never Occasional disagreement Regular disagreement Always or almost always</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>

Appendix C – Exercise Questionnaire

<p>20.</p>	<p>How much conflict <i>about the task</i> was there among the group members?</p> <p>None or almost none A little conflict A moderate amount of conflict A great deal of conflict</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
<p>21.</p>	<p>How frequently were there conflicts <i>about ideas</i> among the group members?</p> <p>Never or almost never Occasional conflict Regular conflict Always or almost always conflict</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
<p>22.</p>	<p>To what extent were there <i>differences of opinion</i> among the group members.</p> <p>Never or almost never Occasional differences Regular differences Always or almost always differences</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
<p>23.</p>	<p>Did you perform the typing duty for the group during the group exercise?</p> <p>Yes No</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁ → If “No”, skip to question 26</p>
<p>24.</p>	<p>If you performed the typing duty during the group exercise, please check the box that best describes how you came to perform that duty?</p> <p>I volunteered I was asked to do it and agreed I was told to do it</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃</p>
<p>25.</p>	<p>To what extent did you resent having to perform the typing duty for the group?</p> <p>Was not at all resentful Slightly resentful Moderately resentful Greatly resentful</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
<p>26.</p>	<p>Did your group, at any time during the exercise, access the Microsoft Word thesaurus tool to help construct the final mission statement (even if the thesaurus word wasn’t ultimately used)?</p> <p>Yes No</p> <p><input type="checkbox"/>₀ <input type="checkbox"/>₁</p>
<p>27.</p>	<p>Overall, how satisfied are you with the manner in which your group accomplished the group task?</p> <p>Not at all satisfied Somewhat satisfied Mostly satisfied Completely satisfied</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>
<p>28.</p>	<p>Overall, how satisfied are you with the final mission statement constructed by your group?</p> <p>Not at all satisfied Somewhat satisfied Mostly satisfied Completely satisfied</p> <p><input type="checkbox"/>₁ <input type="checkbox"/>₂ <input type="checkbox"/>₃ <input type="checkbox"/>₄</p>

29.	<p>If you marked anything other than “completely satisfied” for questions 27 and/or 28 above, please use the space below to briefly describe why you were not “completely satisfied” with the manner in which your group accomplished the task and/or with the final mission statement constructed by your group. (If additional space is required, please use the back of this page)</p>
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This concludes the questionnaire. Please return your questionnaire to the researcher. Thank you.

Appendix D - Newness Rating Worksheet

Group Process Experiment
“Newness” Rating Guidance

Wesley S. Huey
Student Investigator
Department of Sociology
University of Maryland College Park

Dear Rater:

Thank you for your assistance! This study is designed to test the effect of rank structure in small (4-5 person) groups on the innovative performance of those groups assigned a task. Subjects are U.S. Naval Academy midshipmen randomly assigned to three experimental conditions: 1) Non-suppressed Authority groups, in which group members are stratified by rank; 2) Egalitarian groups, in which group members are equal in rank; and Suppressed Authority groups, in which group members are stratified by rank, but are asked to remove their rank insignia during the exercise.

As a preliminary exercise, groups were instructed to brainstorm for five minutes about the social, economic, technological, and political changes they envision as having an effect on the relationship between American society and its armed forces.

Following this brainstorming session, groups were given 30 minutes to author a mission statement for an institution, like the Naval Academy, responsible for preparing young people for officer service in the US Navy and Marine Corps in the year 2034.

Groups were provided a copy of the current Naval Academy mission statement (revised in March 2009) as a reference for their work. The degree to which the group’s mission statement differs from the current mission statement is a measure of “newness”, one of the components of innovation identified in the literature, and the focus of this rating assignment.

Your task is to rate the “newness” of each mission statement. To do this, you will compare each mission statement constructed by the groups against the current Naval Academy mission statement. Please use the rating instrument provided to calculate a numerical value for the “newness” of each group’s mission statement.

You will receive \$200 as compensation for your labor. Expect payment after the rating assignment is returned to me. Please do your best to complete the assignment NLT Friday, 18 December, 2009.

I thank you again for your important contribution to this research project. Should any questions arise, or to report a problem with the rating instrument, please contact me using the information in the upper right corner of this page – preference is cell phone, then email.

Good luck and happy rating!

Best regards,

“NEWNESS” RATING INSTRUCTIONS

Please read the pre-exercise script provided on pp. 3-4 – these were the verbatim instructions read to each experimental group during the exercise. While questions were fielded from some of the groups for clarification, in every case the experimenter simply re-read the relevant portion of the instructions, so that no group received qualitatively different instructions than others.

WHAT YOU ARE RATING

You are rating the degree to which the group’s mission statement differs from the existing mission statement in terms of *content*. I am defining “content” as “ideas and forms of expression,” where “forms of expression” include qualifying words and phrases used to convey subtleties of meaning. When groups depart in terms of ideas and/or forms of expression from the existing mission statement, I want you in this rating task to capture the degree of that departure.

WHAT YOU ARE NOT RATING

You will not be rating the difference in *structure* between the group’s mission statement and the existing mission statement. I have decided that this type of qualitative analysis is too fraught with subjectivity for this measure, which I am designing as an objective measure of difference. To help you eliminate consideration of structure, I have deconstructed each mission statement into structural elements, which are presented in table format and will form the basis of your comparison. Please know that while deconstructing mission statements into structural elements, I was blind to the group’s experimental condition, so that I do not bias the data to support (or not support) my hypotheses.

Also, you will not be rating what you perceive as the quality or value of ideas or forms of expression you find in the mission statements (these are important, but will be judged by a different pair of raters). Please do your best not to be swayed either way by the quality of the writing, or by your personal views about ideas expressed in the mission statements.

SCORING PHILOSOPHY

I have designed the point system in this rating instrument as follows:

- Ideas in the group’s mission statement that are entirely new (that is, are not present in the existing mission statement) score the most points (2 points).
- Ideas in the group’s mission statement that are modified slightly or synonymous with those from the existing mission statement, or ideas from the existing mission statement that are eliminated, are scored equally (1 point).
- Ideas and/or forms of expression in the group’s mission statement that are borrowed verbatim from the existing mission statement score zero points.

SPLITTING HAIRS

I anticipate your greatest challenge will be determining whether ideas found in the group’s mission statement are entirely new, or rather the same ideas from the existing mission statement packaged differently. This is an important distinction, since the former earns two points, and the latter one point. One tool I will ask you to use in making this determination is the “Look Up” tool in MS Word. Please access the tool by typing the relevant word into MS Word from the existing mission statement, select “Look Up”, scroll down to “Thesaurus: English (U.S.)”, and scan the list provided for synonyms used by the group.

Group Process Exercise Script

[Exercise script provided here]

“NEWNESS” RATING INSTRUCTIONS (CONTINUED)

CURRENT US NAVAL ACADEMY MISSION STATEMENT (REVISED MARCH 2009):

“To develop Midshipmen morally, mentally and physically and to imbue them with the highest ideals of duty, honor and loyalty in order to graduate leaders who are dedicated to a career of naval service and have potential for future development in mind and character to assume the highest responsibilities of command, citizenship and government.”

MISSION STATEMENT COMPONENTS

In order to standardize (as best I can) your comparison between the current mission statement and mission statements submitted by the groups, I have deconstructed the mission statements into six components:

1. **PROCESS.** What is to be pursued by the institution as **PROCESS**. These are action verbs defining organizational process(es): *Develop, Imbue, Graduate.*
2. **OBJECT.** To what **OBJECT** are institutional processes directed. Subject noun defining the object of organizational process(es): *Midshipmen.*
3. **HOW INFLUENCED.** **HOW** objects are to be **INFLUENCED** by process(es). Adjectives defining the realm(s) of process influence: *Morally, Mentally, and Physically.*
4. **CORE VALUES.** The **CORE VALUES** to which institutional processes are oriented. Nouns defining the minimum value-set of institutional products: *Duty, Honor, Loyalty.*
5. **PRODUCT.** The institutional **PRODUCT**. Subject noun(s) defining the output of organizational processes: *Leaders.*
6. **BENEFITS TO NAVAL SERVICE, NATION, AND SOCIETY.** What **BENEFITS** accrue from institutional processes and products to the naval service, the nation, and society. Qualifying phrases describing why the institution is of value to service, nation, and society: *Career of naval service; potential for future development in mind and character; assume the highest responsibilities of [military] command, citizenship and government.*

TO BEGIN, A FEW PRACTICE COMPARISONS

Next you will find two practice comparisons to get you familiar with the rating instrument. These mission statements were submitted by groups of midshipmen engaged in the pre-test over the summer, and will not be included in the analysis. The instrument has six sections, one for each component described above.

“NEWNESS” RATING WORKSHEET – PRACTICE COMPARISON ONE

GROUP NUMBER X1

Current Mission Statement

“To develop Midshipmen morally, mentally, and physically and to imbue them with the highest ideals of duty, honor, and loyalty in order to graduate leaders who are dedicated to a career of naval service and have potential for future development in mind and character to assume the highest responsibilities of command, citizenship, and government.”

Group X1 Mission Statement

“To develop Midshipmen morally, mentally, and technically and to imbue them with the highest ideals of duty, honor, and commitment in order to graduate systems experts who are dedicated to a career of service and have the ability to manage and support ongoing operations.”

THE TABLE BELOW JUXTAPOSES THE COMPONENTS OF THE CURRENT NAVAL ACADEMY MISSION STATEMENT AGAINST THE COMPONENTS OF THE GROUP’S MISSION STATEMENT. PLEASE REFER TO THIS TABLE WHILE COMPLETING THE RATING SCALE THAT FOLLOWS.

	PROCESS	OBJECT	HOW INFLUENCED	CORE VALUES	PRODUCT	BENEFITS
CURRENT MISSION STATEMENT	1) Develop 2) Imbue 3) Graduate	Midshipmen	1) Morally 2) Mentally 3) Physically	Highest ideals of: 1) Duty 2) Honor 3) Loyalty	Leaders	1) Dedicated to a career of naval service 2) Potential for future development in mind and character 3) Assume the highest responsibilities of: a. Command b. Citizenship c. Government
GROUP X1 MISSION STATEMENT	1) Develop 2) Imbue 3) Graduate	Midshipmen	1) Morally 2) Mentally 3) Physically	Highest ideals of: 1) Duty 2) Honor 3) Commitment	Systems experts	1) Dedicated to a career of service 2) Have the ability to manage and support ongoing operations

Appendix D – Newness Rating Worksheet

Section One. Compare the PROCESS cells.	
1a.	<p>Are they identical?</p> <p><input type="checkbox"/> Yes <i>If “Yes”, Skip to 1g</i></p> <p><input type="checkbox"/> No</p>
1b.	<p>In the group’s PROCESS cell, does the root word “Develop” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Develop” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Develop” appears, but the root word “Develop” appears with additional qualifiers, such as “Consistently develop”</p> <p><input type="checkbox"/> 1 Yes, the root word “Develop” appears, and there is an additional word/phrase SYNONYMOUS with “Develop” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Develop”)</p> <p><input type="checkbox"/> 1 No, the root word “Develop” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Develop” does not appear, but there is a word/phrase SYNONYMOUS with “Develop” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Develop”)</p>
1c.	<p>In the group’s PROCESS cell, does the root word “Imbue” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Imbue” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Imbue” appears, but the root word “Imbue” appears with additional qualifiers, such as “Faithfully imbue”</p> <p><input type="checkbox"/> 1 Yes, the root word “Imbue” appears, and there is an additional word/phrase SYNONYMOUS with “Imbue” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Imbue”)</p> <p><input type="checkbox"/> 1 No, the root word “Imbue” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Imbue” does not appear, but there is a word/phrase SYNONYMOUS with “Imbue” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Imbue”)</p>
1d.	<p>In the group’s PROCESS cell, does the root word “Graduate” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Graduate” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Graduate” appears, but the root word “Graduate” appears with additional qualifiers, such as “Perpetually graduate”</p> <p><input type="checkbox"/> 1 Yes, the root word “Graduate” appears, and there is an additional word/phrase SYNONYMOUS with “Graduate” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Graduate”)</p> <p><input type="checkbox"/> 1 No, the root word “Graduate” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Graduate” does not appear, but there is a word/phrase SYNONYMOUS with “Graduate” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Graduate”)</p>
1e.	<p>In the group’s PROCESS cell, are there additional terms not yet scored?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No <i>If “No”, Skip to 1g</i></p>
1f.	<p>How many discrete terms are present in the group’s PROCESS cell that have not yet been scored? Write the number of discrete terms not yet scored in the space provided, then multiply that value by 2.</p> <p>_____ X 2 = _____</p>

Appendix D – Newness Rating Worksheet

1g.	<p>Section One Newness Score</p> <p>Sum the numbers corresponding to each box checked in Section One, and add that sum to the product written in 1f (zero if blank). Write the resulting sum in the space provided. (Write “zero” if you checked “Yes” for 1a.)</p> <p>_____</p>
Section Two. Compare the OBJECT cells.	
2a.	<p>Are they identical?</p> <p><input type="checkbox"/> 0 Yes <i>If “Yes”, Skip to 2c</i></p> <p><input type="checkbox"/> 1 No</p>
2b.	<p>How many discrete terms, other than “Midshipmen”, are present in the group’s OBJECT cell? Write the number of discrete terms other than “Midshipmen” in the space provided, then multiply that value by 2.</p> <p>_____ X 2 = _____</p>
2c.	<p>Section Two Newness Score</p> <p>Add the number corresponding to the box checked in 2a to the product written in 2b (zero if blank). Write the resulting sum in the space provided.</p> <p>_____</p>
Section Three. Compare the HOW INFLUENCED cells.	
3a.	<p>Are they identical?</p> <p><input type="checkbox"/> Yes <i>If “Yes”, Skip to 3g</i></p> <p><input type="checkbox"/> No</p>
3b.	<p>In the group’s HOW INFLUENCED cell, does the root word “Moral” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Moral” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Moral” appears, but the root word “Moral” appears with additional qualifiers, such as “Morally stimulating”</p> <p><input type="checkbox"/> 1 Yes, the root word “Moral” appears, and there is an additional word/phrase <i>SYNONYMOUS</i> with “Moral” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Moral”)</p> <p><input type="checkbox"/> 1 No, the root word “Moral” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Moral” does not appear, but there is a word/phrase <i>SYNONYMOUS</i> with “Moral” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Moral”)</p>

Appendix D – Newness Rating Worksheet

<p>3c.</p>	<p>In the group’s HOW INFLUENCED cell, does the root word “Mental” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Mental” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Mental” appears, but the root word “Mental” appears with additional qualifiers, such as “Mentally stimulating”</p> <p><input type="checkbox"/> 1 Yes, the root word “Mental” appears, and there is an additional word/phrase SYNONYMOUS with “Mental” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Mental”)</p> <p><input type="checkbox"/> 1 No, the root word “Mental” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Mental” does not appear, but there is a word/phrase SYNONYMOUS with “Mental” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Mental”)</p>
<p>3d.</p>	<p>In the group’s HOW INFLUENCED cell, does the root word “Physical” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Physical” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Physical” appears, but the root word “Physical” appears with additional qualifiers, such as “Physically challenging”</p> <p><input type="checkbox"/> 1 Yes, the root word “Physical” appears, and there is an additional word/phrase SYNONYMOUS with “Physical” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Physical”)</p> <p><input type="checkbox"/> 1 No, the root word “Physical” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Physical” does not appear, but there is a word/phrase SYNONYMOUS with “Physical” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Physical”)</p>
<p>3e.</p>	<p>In the group’s HOW INFLUENCED cell, are there additional terms not yet scored?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No <i>If “No”, Skip to 3g</i></p>
<p>3f.</p>	<p>How many discrete terms are present in the group’s HOW INFLUENCED cell that have not yet been scored? Write the number of discrete terms not yet scored in the space provided, then multiply that value by 2.</p> <p>_____ X 2 = _____</p>
<p>3g.</p>	<p>Section Three Newness Score</p> <p>Sum the numbers corresponding to each box checked in Section Three, and add that sum to the product written in 3f (zero if blank). Write the resulting sum in the space provided. (Write “zero” if you checked “Yes” for 3a.)</p> <p>_____</p>
<p>Section Four. Compare the CORE VALUES cells.</p>	
<p>4a.</p>	<p>Are they identical?</p> <p><input type="checkbox"/> Yes <i>If “Yes”, Skip to 4g</i></p> <p><input type="checkbox"/> No</p>

Appendix D – Newness Rating Worksheet

<p>4b.</p>	<p>In the group’s CORE VALUES cell, does the root word “Duty” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Duty” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Duty” appears, but the root word “Duty” appears with additional qualifiers, such as “Devotion to duty”</p> <p><input type="checkbox"/> 1 Yes, the root word “Duty” appears, and there is an additional word/phrase <i>SYNONYMOUS</i> with “Duty” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Duty”)</p> <p><input type="checkbox"/> 1 No, the root word “Duty” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Duty” does not appear, but there is a word/phrase <i>SYNONYMOUS</i> with “Duty” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Duty”)</p>
<p>4c.</p>	<p>In the group’s CORE VALUES cell, does the root word “Honor” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Honor” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Honor” appears, but the root word “Honor” appears with additional qualifiers, such as “Personal honor”</p> <p><input type="checkbox"/> 1 Yes, the root word “Honor” appears, and there is an additional word/phrase <i>SYNONYMOUS</i> with “Honor” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Honor”)</p> <p><input type="checkbox"/> 1 No, the root word “Honor” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Honor” does not appear, but there is a word/phrase <i>SYNONYMOUS</i> with “Honor” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Honor”)</p>
<p>4d.</p>	<p>In the group’s CORE VALUES cell, does the root word “Loyalty” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the root word “Loyalty” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the root word “Loyalty” appears, but the root word “Loyalty” appears with additional qualifiers, such as “Steadfast loyalty”</p> <p><input type="checkbox"/> 1 Yes, the root word “Loyalty” appears, and there is an additional word/phrase <i>SYNONYMOUS</i> with “Loyalty” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Loyalty”)</p> <p><input type="checkbox"/> 1 No, the root word “Loyalty” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the root word “Loyalty” does not appear, but there is a word/phrase <i>SYNONYMOUS</i> with “Loyalty” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Loyalty”)</p>
<p>4e.</p>	<p>In the group’s CORE VALUES cell, are there additional terms not yet scored?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No <i>If “No”, Skip to 4g</i></p>
<p>4f.</p>	<p>How many discrete terms are present in the group’s CORE VALUES cell that have not yet been scored? Write the number of discrete terms not yet scored in the space provided, then multiply that value by 2.</p> <p>_____ X 2 = _____</p>
<p>4g.</p>	<p>Section Four Newness Score</p> <p>Sum the numbers corresponding to each box checked in Section Four, and add that sum to the product written in 4f (zero if blank). Write the resulting sum in the space provided. (Write “zero” if you checked “Yes” for 4a.)</p> <p>_____</p>

Appendix D – Newness Rating Worksheet

Section Five. Compare the PRODUCT cells.	
5a.	<p>Are they identical?</p> <p><input type="checkbox"/> <i>Yes If “Yes”, Skip to 5d</i></p> <p><input type="checkbox"/> <i>No</i></p>
5b.	<p>In the group’s PRODUCT cell, does the root word “Leader” appear? (Select all that apply)</p> <p><input type="checkbox"/> <i>0 Yes, the root word “Leader” appears without additional qualifiers</i></p> <p><input type="checkbox"/> <i>1 Yes, the root word “Leader” appears, but the root word “Leader” appears with additional qualifiers, such as “Ethical leaders”</i></p> <p><input type="checkbox"/> <i>1 Yes, the root word “Leader” appears, and there is an additional word/phrase SYNONYMOUS with “Leaders” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Leaders”)</i></p> <p><input type="checkbox"/> <i>1 No, the root word “Leader” does not appear, nor does a synonym appear</i></p> <p><input type="checkbox"/> <i>1 No, the root word “Leader” does not appear, but there is a word/phrase SYNONYMOUS with “Leader” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Leader”)</i></p>
5c.	<p>How many discrete terms are present in the group’s PRODUCT cell that have not yet been scored? Write the number of discrete terms not yet scored in the space provided, then multiply that value by 2.</p> <p>_____ X 2 = _____</p>
5d.	<p>Section Five Newness Score</p> <p>Sum the numbers corresponding to each box checked in Section Five, and add that sum to the product written in 5c (zero if blank). Write the resulting sum in the space provided. (Write “zero” if you checked “Yes” for 5a.)</p> <p>_____</p>
Section Six. Compare the BENEFITS cells.	
6a.	<p>Are they identical?</p> <p><input type="checkbox"/> <i>Yes If “Yes”, Skip to 6k</i></p> <p><input type="checkbox"/> <i>No</i></p>

Appendix D – Newness Rating Worksheet

<p>6b.</p>	<p>In the group’s BENEFITS cell, does the phrase “Dedicated to a career of naval service” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the phrase “Dedicated to a career of naval service” appears verbatim</p> <p><input type="checkbox"/> 1 Yes, the phrase “Dedicated to a career of naval service” appears, but the phrase “Dedicated to a career of naval service” appears with additional qualifiers, such as “Dedicated to a career of naval service to the nation”</p> <p><input type="checkbox"/> 1 Yes, the phrase “Dedicated to a career of naval service” appears, and there is an additional phrase SYNONYMOUS with “Dedicated to a career of naval service” (this is the case if the group’s additional phrase refers more generally to long-term service in the military while using synonymous words)</p> <p><input type="checkbox"/> 1 No, the phrase “Dedicated to a career of naval service” does not appear, nor does a synonymous nor slightly modified phrase appear</p> <p><input type="checkbox"/> 1 No, the phrase “Dedicated to a career of naval service” does not appear, but the phrase “Dedicated to a career of naval service” appears slightly modified, such as “Dedicated to a career of service”</p> <p><input type="checkbox"/> 1 No, the phrase “Dedicated to a career of naval service” does not appear, nor does a slightly modified phrase appear, but there is a phrase SYNONYMOUS with “Dedicated to a career of naval service” (this is the case if the group’s phrase refers more generally to long-term service in the military while using synonymous words)</p>
<p>6c.</p>	<p>In the group’s BENEFITS cell, does the phrase “Potential for future development in mind and character” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the phrase “Potential for future development in mind and character” appears verbatim</p> <p><input type="checkbox"/> 1 Yes, the phrase “Potential for future development in mind and character” appears, but the phrase “Potential for future development in mind and character” appears with additional qualifiers, such as “Potential for future development in mind, body, and character”</p> <p><input type="checkbox"/> 1 Yes, the phrase “Potential for future development in mind and character” appears, and there is an additional phrase SYNONYMOUS with “Potential for future development in mind and character” (this is the case if the group’s phrase refers more generally to development of intellect and character)</p> <p><input type="checkbox"/> 1 No, the phrase “Potential for future development in mind and character” does not appear, nor does a synonymous nor slightly modified phrase appear</p> <p><input type="checkbox"/> 1 No, the phrase “Potential for future development in mind and character” does not appear, but the phrase “Potential for future development in mind and character” appears slightly modified, such as “Potential for development in character ”</p> <p><input type="checkbox"/> 1 No, the phrase “Potential for future development in mind and character” does not appear, nor does a slightly modified phrase appear, but there is a phrase SYNONYMOUS with “Potential for future development in mind and character” (this is the case if the group’s phrase refers more generally to development of intellect and character while using synonymous words)</p>

Appendix D – Newness Rating Worksheet

<p>6d.</p>	<p>In the group’s BENEFITS cell, does the phrase “Assume the highest responsibilities of” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the phrase “Assume the highest responsibilities of” appears verbatim</p> <p><input type="checkbox"/> 1 Yes, the phrase “Assume the highest responsibilities of” appears, but the phrase “Assume the highest responsibilities of” appears with additional qualifiers, such as “Prepared to assume the highest responsibilities of”</p> <p><input type="checkbox"/> 1 Yes, the phrase “Assume the highest responsibilities of” appears, and there is an additional phrase SYNONYMOUS with “Assume the highest responsibilities of” (this is the case if the group’s phrase replaces words in the original phrase with synonyms, such as “Embody the time-honored traditions of”)</p> <p><input type="checkbox"/> 1 No, the phrase “Assume the highest responsibilities of” does not appear, nor does a synonymous nor slightly modified phrase appear</p> <p><input type="checkbox"/> 1 No, the phrase “Assume the highest responsibilities of” does not appear, but the phrase “Assume the highest responsibilities of” appears slightly modified, such as “Assume responsibility for”</p> <p><input type="checkbox"/> 1 No, the phrase “Assume the highest responsibilities of” does not appear, nor does a slightly modified phrase appear, but there is a phrase SYNONYMOUS with “Assume the highest responsibilities of” (this is the case if the group’s phrase replaces words in the original phrase with synonyms, such as “Embody the time-honored traditions of”)</p>
<p>6e.</p>	<p>In the group’s BENEFITS cell, are there sub-bullets below or qualifiers for the phrase scored in 6d?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No <i>If “No”, Skip to 6k</i></p>
<p>6f.</p>	<p>Among the sub-bullets or qualifiers identified in 6e, does the word “Command” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the word “Command” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the word “Command” appears, but the word “Command” appears with additional qualifiers, such as “Military command”</p> <p><input type="checkbox"/> 1 Yes, the word “Command” appears, and there is an additional word/phrase SYNONYMOUS with “Command”, such as “Leadership position”</p> <p><input type="checkbox"/> 1 No, the word “Command” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the word “Command” does not appear, but there is a word/phrase SYNONYMOUS with “Command”, such as “Leadership position”</p>
<p>6g.</p>	<p>Among the sub-bullets or qualifiers identified in 6e, does the word “Citizenship” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the word “Citizenship” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the word “Citizenship” appears, but the word “Citizenship” appears with additional qualifiers, such as “Model citizenship”</p> <p><input type="checkbox"/> 1 Yes, the word “Citizenship” appears, and there is an additional word/phrase SYNONYMOUS with “Citizenship” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Citizenship”)</p> <p><input type="checkbox"/> 1 No, the word “Citizenship” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the word “Citizenship” does not appear, but there is a word/phrase SYNONYMOUS with “Citizenship” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Citizenship”)</p>

Appendix D – Newness Rating Worksheet

<p>6h.</p>	<p>Among the sub-bullets or qualifiers identified in 6e, does the word “Government” appear? (Select all that apply)</p> <p><input type="checkbox"/> 0 Yes, the word “Government” appears without additional qualifiers</p> <p><input type="checkbox"/> 1 Yes, the word “Government” appears, but the word “Government” appears with additional qualifiers, such as “Global government”</p> <p><input type="checkbox"/> 1 Yes, the word “Government” appears, and there is an additional word/phrase SYNONYMOUS with “Government” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Government”)</p> <p><input type="checkbox"/> 1 No, the word “Government” does not appear, nor does a synonym appear</p> <p><input type="checkbox"/> 1 No, the word “Government” does not appear, but there is a word/phrase SYNONYMOUS with “Government” (this is the case if the group’s term appears in the MS Word Thesaurus list for “Government”)</p>
<p>6i.</p>	<p>In the group’s BENEFITS cell, are there additional phrases not yet scored?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No <i>If “No”, Skip to 6k</i></p>
<p>6j.</p>	<p>How many discrete phrases are present in the group’s BENEFITS cell that have not yet been scored? Write the number of discrete phrases not yet scored in the space provided, then multiply that value by 2.</p> <p>_____ X 2 = _____</p>
<p>6k.</p>	<p>Section Six Newness Score</p> <p>Sum the numbers corresponding to each box checked in Section Six, and add that sum to the product written in 6j (zero if blank). Write the resulting sum in the space provided. (Write “zero” if you checked “Yes” for 6a.)</p> <p>_____</p>
<p>Section Seven. Calculate and transcribe the Total Newness Score.</p>	
<p>7a.</p>	<p>Sum the values from:</p> <p>1g _____</p> <p>2c _____</p> <p>3g _____</p> <p>4g _____</p> <p>5d _____</p> <p>6k _____</p> <p>Enter the sum in the space provided below.</p> <p>Group X1 Total Newness Score:</p> <p>_____</p>
<p>7b.</p>	<p>Transcribe the total score from 7a into the matrix cell for the group being scored.</p>

PROCEED TO THE NEXT PRACTICE EXERCISE.

Appendix E – Usefulness Rating Worksheet

Group Process Experiment
“Usefulness” Rating Guidance

Wesley S. Huey
Student Investigator
Department of Sociology
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Dear Rater:

Thank you for your assistance! This study is designed to test the effect of rank structure in small (4-5 person) groups on the innovative performance of those groups assigned a task. Subjects are U.S. Naval Academy midshipmen randomly assigned to three experimental conditions: 1) Non-suppressed Authority groups, in which group members are stratified by rank; 2) Egalitarian groups, in which group members are equal in rank; and Suppressed Authority groups, in which group members are stratified by rank, but are asked to remove their rank insignia during the exercise.

As a preliminary exercise, groups were instructed to brainstorm for five minutes about the social, economic, technological, and political changes they envision as having an effect on the relationship between American society and its armed forces in the next 25 years.

Following this brainstorming session, groups were given 30 minutes to author a mission statement for an institution, like the Naval Academy, responsible for preparing young people for officer service in the US Navy and Marine Corps in the year 2034.

The degree to which the group’s mission statement, relative to those of other groups, is more valued by the “consumer” is a measure of its “usefulness,” one of the components of innovation identified in the literature, and the focus of your rating assignment.

Your assignment is to rate your perception of the “usefulness” of each mission statement from the perspective of a “responsible American citizen” living in the U.S. in the year 2034. To do this, you will conduct a series of pairwise comparisons of each mission statement constructed by the groups against each of the other mission statements, and determine which of the two in the comparison has more promise to deliver value to the consumer in the year 2034.

You will receive \$600 as compensation for your labor, and you will earn it – there are 1035 comparisons ahead! Expect payment after the rating assignment is returned to me. Please do your best to complete the assignment NLT Friday, 18 December, 2009.

I thank you again for your important contribution to this research project. Should any questions arise, or to report a problem with the rating assignment, please contact me using the information in the upper right corner of this page – preference is email, then cell phone.

Good luck and happy comparing!

Appendix E – Usefulness Rating Worksheet

“USEFULNESS” RATING INSTRUCTIONS (PLEASE READ CAREFULLY)

To begin, please read the exercise script provided on pp. 4-5 – these were the verbatim instructions read by the experimenter (myself in every case) to each experimental group during the group exercise. While questions were fielded from some of the groups for clarification, in every case the experimenter simply re-read the relevant portion of the instructions, so that no group received qualitatively different instructions than others. When you have finished reading the exercise script, you may continue with the instructions in the next paragraph.

COMPARISON PROCEDURE, RATER MINDSET, AND “USEFULNESS” DEFINED

Using a pairwise comparison procedure, you will conduct a series of 1,035 comparisons, in which each of the 46 mission statements in the sample are compared against each of the other 45 mission statements. During the comparison, you will judge which of the two mission statements has the greater promise to deliver value to the consumer.

For the purposes of this project, I am defining the “consumer” as the “responsible American citizen,” who through her representatives in Congress holds the military accountable for providing a service to the nation. **In this rating task, you should think about the mission statements as the group’s articulation of the nature of the service provided, and it is up to you, as “the responsible American citizen,” to determine the value of the group’s articulation relative to the value of the comparison group’s articulation – it’s relative “usefulness” to the consumer. This is the definition of “usefulness” I want you to keep in mind while you conduct your comparisons.**

Regarding your perspective as a rater, while you conduct your comparisons, I ask you to locate yourself as a “responsible American citizen” in the year 2034, with a moderate interest in the U.S. military’s role in domestic and international affairs of the day, consistent with your rights and obligations of citizenship in a mature democracy. Importantly, whatever personal feelings you have about U.S. military affairs in the present, I want you to approach this rating assignment from the proverbial middle ground – you are neither radical nor aloof in your approach to military affairs. As the consumer of the product articulated in the mission statements, you are (as near as you can be) John AND Jane Q. Public in the year 2034.

This mindset will help minimize idiosyncrasies in your rating. I realize, of course, that this rating task is ultimately qualitative and subjective, but your cooperation on this point will dampen some of the error inherent in the design.

RATING MECHANICS

This binder contains the set of 46 mission statements authored by the 46 groups in the sample. They are presented in ascending numerical order – Groups 1 through 46. Group numbers have no connection to the experimental conditions – numbers were randomly assigned by one of my associates so that I (and you) are blind to the experimental condition of the groups.

Please conduct your pairwise comparisons by removing the page with the first mission statement (Group 1) from the binder, then compare it to each of the other 45 mission statements in the numerical order in which they appear in the binder (Group 1 and Group 2, then Group 1 and Group 3, and so on, up to Group 1 and Group 46). Then, replace Group 1’s mission statement at the END of the binder (behind Group 46). Next, remove the page with Group 2’s mission statement, and compare it to each of the other 44 mission statements (Group 1 excluded because you’ve already done that comparison), again using ascending numerical order (Group 2 and Group 3, Group 2 and Group 4, and so on, up to Group 2 and Group 46). Replace Group 2’s mission statement behind Group 1 in the binder, then repeat the process for Group 3’s mission statement, and so on. Your rating task is complete when you’ve compared Group 45 and Group 46.

“USEFULNESS” RATING INSTRUCTIONS (CONTINUED)

RATING “DON’TS” – THINGS TO AVOID

When you discover there are mission statements in the sample that are identical, you will be tempted to simply transpose the ratings derived from the “twin” mission statement rated earlier. PLEASE AVOID THIS TEMPTATION. I prefer that you re-rate the twin mission statement against the others as if you were seeing it for the first time. Doing this provides a measure of test-retest reliability for the instrument. Though it requires extra effort (and considerable discipline), please remain faithful to the pairwise comparison procedure when you discover twin (identical) mission statements.

Also, PLEASE AVOID THE TEMPTATION TO “CHECK YOUR LOGIC” IN THE MATRIX. We can all agree that if you rated Group 1 more useful than Group 2, and you rated Group 2 more useful than Group 3, then it follows that you should rate Group 1 more useful than Group 3. I ask that you NOT attempt to resolve these logical discontinuities in the matrix. Logical discontinuities in the matrix are a rich indicator of the psychometric properties of the instrument, and I would prefer that you leave them be. Put another way, please apply the appropriate rigor to each comparison, make a judgment, then let that judgment stand without checking its logic in the matrix.

The pairwise structure of the rating task is purposeful. You are evaluating the usefulness of each mission statement relative only to the comparison mission statement, rather than relative to the set of all other mission statements. Please avoid the temptation to mentally rank the mission statements as a group, as this may prejudice your individual comparisons. You must do your very best to apply the appropriate rigor to each individual comparison, make your best judgment on the merits of the two mission statements, then move on.

It is crucial that you pace yourself in this assignment so that you give equal shrift to the mission statements you remove from the binder to compare against the others. In other words, I want you to be as focused on the comparisons when you have Group 27 out of the binder as you were when you had Group 1 out of the binder. Please take breaks as required to sustain an equal level of effort across all comparisons.

Lastly, please do not discuss this assignment with the other “usefulness” rater until after you both have turned in the assignment. For the sake of the inter-rater reliability check I will conduct later, your scoring must be independent of the other rater’s scoring.

MISSION STATEMENT PRESENTATION

The mission statements you will find presented in this binder were typed by the groups into the computer provided during the exercise exactly as you find them in this binder, including any special formatting (bold, underline, font, shading, etc.). You are free to consider (or not to consider) the use of such special formatting when conducting your comparison.

“USEFULNESS” RATING INSTRUCTIONS (CONTINUED)

In addition, to help facilitate your comparison, I have deconstructed each mission statement into six structural elements, consistent with the priming instructions delivered to each group during the exercise (you will recall from the exercise script). These elements are presented in table format below the text of the mission statement, and are offered as an additional resource for comparison purposes. Please know that while deconstructing mission statements into structural elements, I was blind to the group’s experimental condition, so that I do not bias your ratings to support (or not support) my hypotheses. Please find the description of each component below:

1. **PROCESS.** What is to be pursued by the institution as **PROCESS**. These are action verbs defining organizational process(es).
2. **OBJECT.** To what **OBJECT** are institutional processes directed. Subject noun defining the object of organizational process(es).
3. **HOW INFLUENCED.** **HOW** objects are to be **INFLUENCED** by process(es). Adjectives defining the realm(s) of process influence.
4. **CORE VALUES.** The **CORE VALUES** to which institutional processes are oriented. Nouns defining the minimum value-set of institutional products.
5. **PRODUCT.** The institutional **PRODUCT**. Subject noun(s) defining the output of organizational processes.
6. **BENEFITS TO NAVAL SERVICE, NATION, AND SOCIETY.** What **BENEFITS** accrue from institutional processes and products to the naval service, the nation, and society. Qualifying phrases describing why the institution is of value to service, nation, and society.

Appendix E – Usefulness Rating Worksheet

Group Process Exercise Script

[Group exercise script provided here]

USEFULNESS SCORING MATRIX (*portion of matrix omitted for formatting reasons)

FOR EACH PAIRWISE COMPARISON, WRITE THE GROUP NUMBER OF THE “MORE USEFUL” MISSION STATEMENT IN THE NON-SHADED INTERSECTING CELL

		GROUP NUMBER																																																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40													
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