INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
Group members' conscientiousness: An investigation of the effect on individuals' performance in a group setting

Brice, Thomas Steven, Ph.D.
The Ohio State University, 1994
GROUP MEMBERS' CONSCIENTIOUSNESS: AN INVESTIGATION OF THE EFFECT ON INDIVIDUALS' PERFORMANCE IN A GROUP SETTING

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the Graduate School of The Ohio State University

By

Thomas S. Brice, B.A., M.A.

The Ohio State University

1994

Dissertation Committee: Richard J. Klimoski
Robert S. Billings
John P. Wanous

Approved by

Richard Klimoski
Advisor
Department of Psychology
To My Parents Who Enabled Me To Start This Process, and
To Marie Who Enabled Me To Finish It
ACKNOWLEDGEMENTS

I would like to thank Dr. Richard Klimoski for his help in guiding me throughout the dissertation process, as well as the entire graduate school process. The process has often been rocky, but I think the product is solid. I would also like to thank Dr. Robert Billings and Dr. John Wanous, the remaining members of my committee. Your suggestions and guidance have helped improve the end product. Finally, I would like to thank my five colleagues, whom I met in Ohio Stadium nearly seven years ago. Scott, Kelly, Emily, Mark, and especially Marie, you all helped make the whole trip worthwhile.
VITA

October 10, 1963 ............... Born, Kansas City, Missouri

1986 ....................................... B.A., Creighton University, Omaha, Nebraska

1987-1989 .............................. Graduate Research Associate, The Ohio State University Poll

1989-1993 .............................. Graduate Teaching Associate, The Ohio State University

1990 ................................. Graduate Administrative Associate The Ohio State University, Department of Physical Facilities

FIELDS OF STUDY

Major Field: Psychology

Minor Fields: Industrial/Organizational Psychology Management and Human Resources Quantitative Psychology
# TABLE OF CONTENTS

DEDICATION ......................................................... ii  
ACKNOWLEDGEMENTS ................................................... iii  
VITA ........................................................................ iv  
LIST OF TABLES ........................................................ vii  
LIST OF FIGURES ....................................................... ix  
ABSTRACT ..................................................................... x  

CHAPTER

I. INTRODUCTION ......................................................... 1  
   Overview ............................................................. 1  
   Review of Personality Literature ............................. 5  
   Review of the Conscientiousness Factor ................. 12  
   Social Loafing - Group Process Losses ................. 24  
   Review of Group Norms ....................................... 33  
   Review of Group Composition ............................. 37  
   Rationale for Hypotheses .................................... 39  
   Analytical Strategy ............................................. 45  

II. METHOD ................................................................. 47  
   Subjects ............................................................. 47  
   Materials ............................................................. 48  
   Personality Measure ........................................... 48  
   Task Selection ..................................................... 49  
   Post-Experiment Questionnaire ............................ 51  
   Procedure ............................................................ 52  
   Independent Variables .................................... 57  
      Conscientiousness .......................................... 57  
      Group Composition ......................................... 57  
      Opportunity for Caucus ................................... 57  
   Dependent Variables ....................................... 59  
      Performance ................................................... 59  
      Norm Formation ............................................. 60  
      Effort ............................................................ 60  
   Manipulation Checks ......................................... 61  
   Ancillary Measures ............................................. 62
LIST OF TABLES

TABLE                                      PAGE

1. Summary Statistics of the Subjects Who Participated in the Pre-Screening ..............65
2. Results of Conscientiousness and Caucus Manipulation Checks.................................66
3. Overall Correlation Matrix for Conscientiousness and Task Performance ..................70
4. Correlation Matrix for Conscientiousness and Task Performance for Caucus Conditions ....71
5. Correlation Matrix for Conscientiousness and Task Performance of No Caucus Conditions...72
6. Overall Correlation Matrix for Group Homogeneity and Group Performance ..................76
7. Regression Analysis with Composition, Opportunity to Caucus and Their Interaction Predicting Performance .................................................................78
8. Regression Analyses with Conscientiousness, Group Composition, Caucus, Interaction, and Performance on Trial 1 Predicting Performance ...........................................83
9. Factor Loadings for 20 Items of Goldberg's Conscientiousness Dimension ................89
10. Correlation Matrix for Facets of Conscientiousness and Performance Measures ...........90
11. Overall Correlation Matrix for the Big Five Personality Factors and Task Performance ....145
12. Correlation Matrix for the Big Five Personality Factors and Task Performance for Caucus Conditions .................................................................146
13. Correlation Matrix for the Big Five Personality Factors and Task Performance for No Caucus ....147
14. Overall Correlation Matrix for Practicality and Flexibility of Uses Generated ..........................149
15. Overall Correlation Matrix for Conscientiousness and Task Performance .................................152
17. Correlation Matrix for Conscientiousness and Task Performance for No Caucus Conditions .............154
18. Overall Correlation Matrix for Composition and Group Task Performance .....................................155
19. Correlation Matrix for Composition and Group Task Performance of Caucus Conditions ..................156
20. Correlation Matrix for Composition and Group Task Performance of No Caucus Conditions .............157
21. Regression with Composition Predicting Performance ..........................................................159
22. Regression Analyses with Composition, Opportunity to Caucus, and Their Interaction Predicting Performance ..................................................160
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Model of Predicted Relationships</td>
<td>44</td>
</tr>
<tr>
<td>2. Graphic Representation of Performance Across the Three Tasks</td>
<td>68</td>
</tr>
<tr>
<td>3. Graphic Representation of the Interaction Between Caucus and Group Composition for Task 2</td>
<td>80</td>
</tr>
<tr>
<td>4. Graphic Representation of the Interaction Between Caucus and Group Composition for Task 3</td>
<td>81</td>
</tr>
<tr>
<td>5. Graphic Representation of the Interaction Between Caucus and Group Composition for Overall Performance</td>
<td>82</td>
</tr>
<tr>
<td>6. Scree Plot of the Eigenvalues Obtained from Principle Factors Method</td>
<td>88</td>
</tr>
<tr>
<td>7. Graphic Representation of the Interaction Between Caucus and Group Composition for Overall Performance</td>
<td>158</td>
</tr>
</tbody>
</table>
GROUP MEMBERS' CONSCIENTIOUSNESS: AN INVESTIGATION OF THE EFFECT ON INDIVIDUALS' PERFORMANCE IN A GROUP SETTING

By

Thomas S. Brice, Ph.D.

The Ohio State University, 1994
Professor Richard J. Klimoski, Adviser

The effects of conscientiousness, group composition, and opportunity to caucus were investigated to determine their effects on performance on brainstorming tasks performed in groups of individuals in a laboratory setting. In groups of three, homogeneously high conscientious subjects, and homogeneously low conscientious subjects completed three trials of the cognitive brainstorming task, "alternate uses", in either a caucus or no caucus condition.

Results of the hypothesis testing indicated no support for the hypothesis that there would be a positive relationship between an individual's conscientiousness level and performance on the brainstorming task. In addition, the second hypothesis, predicting a main effect for group composition, was also not supported. Support was found for the third hypothesis, which predicted a significant interaction between group composition (high/low) and opportunity to caucus (yes/no). However, the support was in
a direction opposite of what was predicted. Analyses indicated that low conscientious groups with an opportunity to caucus, and high conscientious groups without an opportunity to caucus performed better on the second and third trials of the task, while low conscientious groups without an opportunity to caucus, and high conscientious groups with an opportunity to caucus maintained a similar level of performance across all three trials.

Post-hoc analyses indicated that the unexpected high performance from the low conscientious groups with an opportunity to caucus was due to subjects in this condition concentrating on quantity, rather than quality of uses that were generated. In contrast, high conscientious subjects appeared to be concentrating on the quality of the ideas that they generated. Future research ideas, including research with heterogeneous groups, and a more thorough examination of normative development, are discussed.
CHAPTER I
INTRODUCTION

Overview

There has been a renewed interest in personality variables during recent years. A great deal of this research has been generated by meta-analytic reviews (e.g., Barrick & Mount, 1991; Schmidt & Hunter, 1992). The reviews suggest that perhaps researchers have prematurely criticized personality’s usefulness to organizational research. Norman’s (1963) personality description of the "Big Five" dimensions of personality has received considerable attention. Showing particular hope is the conscientiousness dimension, described as that which, "reflects dependability; that is, being careful, thorough, responsible, organized, and planful.....it incorporates volitional variables, such as hardworking, achievement-oriented, and persevering" (Barrick & Mount, 1991, p. 4).

Although conscientiousness might indeed be a trait which illuminates traditional areas of I/O research (e.g., Barrick & Mount, 1993 investigate the relationship between autonomy and the personality variable of conscientiousness), it is not prudent to focus solely on individual trait
explanations of behavior. As Funder and Ozer’s (1983) suggest, focusing exclusively on a trait or situational explanation of behavior is equally dangerous. The best avenue of research would investigate a combination of the trait and situation. A mechanism for explaining how conscientious individuals might affect the situation (in this case individual’s influencing others via their own performance or via formation of group performance norms) is an interesting element for the current research.

The tendency for some individuals to decrease effort in a group setting (that is social loafing), while others do not, is perhaps one area of performance that might be better illuminated by studying individual group member’s conscientiousness levels. The individual difference variable of conscientiousness may explain why some individuals resist the temptation to loaf in group settings (i.e., the persevering, thorough, hardworking nature of an individual may prevent social loafing).

During a ten year period of the late 1970’s to 1980’s, social psychologists completed considerable research attempting to explain why people sometimes perform better in groups, and why at other times, individual performance is better. Latane, Williams, and Harkins (1979) coined the term social loafing and described it as a phenomenon in which, "people exhibit a sizable decrease in individual effort when performing in groups as compared to when they
perform alone" (p. 822). The researchers recognized previous descriptions of the phenomenon (e.g., Dashiell, 1935; Moede, 1927), but sought to renew interest in it, as a result of the apparent conflict between social loafing research and Zajonc's (1965) widely accepted research on social facilitation.

Researchers discovered numerous conditions which eliminated the social loafing phenomenon. These included: identifiability (e.g., Williams, Harkins, & Latane, 1981), competition (e.g., Szymanski & Harkins, 1987), involvement (e.g., Brickner, Harkins, & Ostrom, 1986), task difficulty (e.g., Harkins & Petty, 1982) compensation (e.g., Shepperd & Wright, 1989), accountability (e.g., Weldon & Gargano, 1988), and even punishment (e.g., Miles & Greenberg, 1993). The conditions have centered around events which make the situation more salient (e.g., more interesting, more rewarding, more punishing, etc.). Thus far, little research has looked to how the individual might impact the social loafing phenomenon. The proposed research attempts to do just that, by investigating the personality variable "conscientiousness" and how it might impact social loafing.

However, rather than focusing solely on within person conscientiousness as it affects social loafing, the present study also investigates the mechanisms by which individual differences in conscientiousness affect the social loafing behavior of other group members. In particular, individual
differences in conscientiousness may affect group productivity through the mechanism of group norms.

Katz and Kahn (1978) and Feldman (1984) reminded readers of the power of group norms. Although the authors do not discuss norms within a social loafing framework, the idea that group norms can influence individual effort and persistence is surely recognized. The proposed research will investigate the trait of conscientiousness and the manner in which conscientious individuals might influence group norms to eliminate social loafing in group settings.

The Introduction is divided into six sections. The first reviews the resurgence of interest in personality research, particularly in the Big Five. The second section discusses one of the big five factors - conscientiousness - more thoroughly and provides the rationale for its inclusion in the current research. The third section reviews the social loafing literature, maintaining the connection between the specific facet of social loafing and the more general phenomenon of group process losses. The discussion will include discussions of the types of tasks investigated and the situations which have been found to eliminate social loafing. The fourth section will investigate the group norm literature. This section will be important because it provides a mechanism by which conscientious individuals might influence their "environment", and thereby lessen the tendency to social loaf. The fifth section involves a
discussion of the group composition literature, and provides another avenue in which conscientiousness might influence performance. Finally, the research question and the proposed hypotheses will be presented.

I. Review of the Personality Literature

Although a major review of the vast personality literature is beyond the scope of this paper, a brief review of the past 20 years of research is warranted. Hogan (1991) provides an excellent overview of personality research's recent turbulent past. After many years as a mainstay of psychological research, personality research began receiving major criticism in the late 1960's. Critics were disenchanted with personality's inconsistent ability to predict behavior. The situation, rather than the individual, was seen as the major predictor of behavior. Severe criticisms from Mischel (1968), Ghiselli (1973) and Schmitt, Gooding, Noe, and Kirsch (1984) nearly eliminated personality as a variable in I/O research.

Gradually, personality psychologists began to produce evidence that refuted the criticisms leveled by many social psychologist critics. Researchers began to take a more moderate position on the trait versus situation debate (as will be discussed below). Along with the more moderate position, additional research was conducted on personality variables. Finally, I/O researchers became more willing, once again, to incorporate personality variables in their
Barrick and Mount (1991) described an impressive robustness that makes personality variables attractive to organizational researchers. They described support for personality's robustness across theories, cultures, ratings from different sources, and between genders, and with different rating instruments. Costa, McCrae, and Arenberg (1980) also provided impressive evidence for the stability of personality over six and twelve year periods. They suggest that personality appears to be well formed by early adulthood and remains remarkably stable across a wide range of situations.

Despite numerous studies (e.g., Arvey, Bouchard, Segal, & Abraham, 1989; Bergeman, Chipuer, Plomin, Pedersen, McClearn, Nesselroade, Costa, & McCrae, 1993; Plomin, Chipuer, & Loehlin, 1990) which suggest a strong genetic-personality link, researchers are by no means suggesting that situational variables are not important. On the contrary, the situation and the individual are both viewed as accounting for significant and unique proportions of human behavior. Previous social loafing research has concentrated almost exclusively on the situation. Strong evidence has supported the importance of the situation in predicting the occurrence of social loafing. However, a more complete picture should involve aspects of the individual as well. The proposed research targets the
conscientiousness dimension as one such individual variable.

Increased research from personality researchers has also produced consistent support for Norman's (1963) Five Factor model of personality (e.g., Botwin & Buss, 1989; Digman, 1990; Goldberg, 1993; Hogan, 1983; Hogan, 1991; John, 1990; McCrae & Costa, 1987; McCrae and John, 1992; and Noller, Law, & Comrey, 1987). Of course, this is not to imply that all personality researchers accept the validity of a five factor model (e.g., Eysenck, 1992; Costa & McCrae, 1992). Eysenck (1992) for one, steadfastly refused to expand his model of personality beyond the three factors of psychoticism, extraversion, and neuroticism. He suggested that researchers refrain from adding conscientiousness and agreeableness as major dimensions of personality until a body of research exists to support their inclusion and usefulness. At present, he considers agreeableness and conscientiousness to be secondary level factors. Despite Eysenck's hesitation to include these two factors, a great majority of researchers have jumped on the Big Five bandwagon. Indeed, the body of research which Eysenck is waiting for, seems to be building up, especially with regards to the conscientiousness factor.

Although there remains some disagreement concerning the names for the five factors, there is considerable support for the existence of five factors. Generally accepted labels for the five factors are: extraversion, emotional
stability, agreeableness, conscientiousness, and openness to experience.

The extraversion factor typically refers to individuals who are sociable, active, and talkative. Emotional stability refers to those who are anxious, angry, or insecure. The agreeableness factor refers to those who are courteous, flexible, and cooperative. Openness to experience refers to individuals who are imaginative, original, and intelligent. Finally, the conscientiousness factor refers to individuals who are dependable, hardworking, and persevering.

Costa and McCrae (1992) described four avenues of research supporting the utility of the Big Five model of personality. After conducting an exhaustive review of the personality literature, they suggested that the first level of evidence comes from the overwhelming support for a five factor model across longitudinal studies which investigate behavior (e.g., Conley, 1985; Smith, 1967). Secondly, they suggest that evidence of the Big Five is found in almost every available personality measurement system (e.g., Bernstein, Garbin, & McClellan, 1983 with the California Psychological Inventory; Lorr & Manning, 1978 with the Interpersonal Style Inventory; and Howarth, 1976 with Cattell’s 16 PF), as well as in adjective trait analyses of a variety of languages (e.g., Norman, 1963; Goldberg, 1992; Lei & Skinner, 1982). Third, the five factors are evident
across sex, race, age, and cultural groups, indicating a universality of the five dimensions (e.g., Lei & Skinner 1982; Lorr & Manning, 1978). Finally, studies have shown evidence of the heritability of the five factors, which suggests a biological basis for the Big Five, as well as their universality (e.g., Plomin, Chipuer, & Loehlin, 1990). Indeed, Costa, McCrae, and Dye (1991) provide evidence of their belief in the Big Five, by expanding their NEO-PI (Neuroticism, Extraversion, Openness Personality Inventory) to include scales to measure agreeableness and conscientiousness.

The hardworking, persevering nature of conscientious individuals provides a natural link for studying high levels of individual performance in group situations which typically suppress performance. Such a scenario provides a forum for the trait x situation dynamic. In this case, the trait of conscientiousness, along with the situation of decreased individual performance in a group setting, may provide insight into the social loafing phenomenon. Therefore, the trait and the situation debate will be discussed next.

The trait versus situation debate surrounding personality and social psychology research produced numerous studies in an attempt to determine whether behavior was predicted best by an individual’s traits or the situation. Although a situation explanation of behavior was influential
during much of the 1970's, in the past decade, researchers have taken a more moderate position (e.g., Epstein, 1979; 1980; Funder & Ozer, 1983; Kenrick & Funder, 1988; Weiss & Adler, 1984). Indeed, researchers have begun to recognize the dangers of extreme positions on either side. Funder and Ozer (1983) stated that current research, "... show(s) the extreme dispositional and the extreme situational view to be equally lacking in empirical support" (p. 107).

The typical experiment investigating a trait, situational, or interactional view of behavior typically produces results that suggests that neither the trait nor situation explains more than about 20% of the variance in behavior. Researchers are recognizing the need for multiple points of data collection, involving different behaviors across different situations. Such a research design tends to produce stronger support for both trait and situational explanations of behavior. As Snyder and Ickes (1985) suggested, a strategy for explaining behavior that looks at not only how the situation influences the individual, but also how the individual chooses/influences the situation holds perhaps the most promise. Such an approach appears to be guiding recent personality and social psychology research.

Barrick and Mount (1991), Hogan (1991), Hough, Eaton, Dunnette, Kamp, and McCloy (1990), and Hough (1992) have called for increased usage of personality variables. As
psychology becomes more intra-disciplinary, I expect that I/O researchers will revisit the various subfields of psychology that may enhance I/O theory. In particular, research in social psychology and personality psychology may help to provide a framework for explaining trait-situation interactions in organizational settings.

Guion's (1993) statements concerning the use of personality variables in industrial-organizational psychology provide perhaps the best guidelines. He suggested that both the measurement and application of personality variables to I/O research could use some refinements and advancements, perhaps even new and creative ways of applying the Big Five. However, he was confident that the refinements will take place, and even in its current state, the Big Five can provide "...an excellent point of departure and basis for general discussions of the role of personality at work" (p. 3). It is this view that should guide the current research.

In summary, personality research seems to be alive and well. Much of the renewed interest in personality research can be traced directly to the development of the Big Five theory of personality. Although not all researchers agree regarding the existence of the Big Five, there is a growing body of research which suggests that the Big Five not only exists, but that it is here to stay. Therefore, it seems logical that the next step might involve identifying what
behaviors are predicted by the various factors. Evidence suggests that the conscientiousness factor holds particular promise in predicting performance. Therefore, the conscientiousness factor is discussed next.

II. Review of the Conscientiousness Factor

A number of studies have demonstrated that the conscientiousness factor is useful in I/O research. Over 20 years ago, Smith (1967) conducted an investigation of the utility of a five factor model of personality for predicting academic success. Using peer ratings from a sample of 348 college students enrolled in a special education program at Boston University, Smith found that one of the factors significantly predicted academic success over one year later. His label for the factor was "Strength of Character", and included such items as responsible, quitting, insistently orderly, resourceful, and prone to daydream. Although Smith used a different label for the factor, there is no doubt that his "Strength of Character" factor corresponds almost uniformly with what would now be labeled conscientiousness. In terms of assessing the validity of the "Strength of Character" factor for predicting academic success (i.e., year one grade point average), Smith found a validity coefficient of .43. Strength of character or conscientiousness was a better predictor of success in college than S.A.T. scores, high school G.P.A., and numerous biodata items in predicting
success in college. The utility of conscientiousness in predicting academic success is quite impressive. Indeed, it is surprising that I/O psychologists did not begin to use this variable until Bernardin's (1977) work, nearly ten years later.

In an effort to identify personality variables, which might explain employees' tendency to withdraw from organizations, Bernardin (1977) found support for the utility of the conscientiousness factor. After administering the Sixteen Personality Factor Questionnaire (16PF - Cattell, Eber, & Tatsuoka, 1970) to a sample of 150 telephone sales workers, Bernardin found that two of the factors, conscientiousness and anxiety, accounted for over 66% of the variance in job withdrawal, as operationalized by absenteeism and turnover. Once again, the personality variable of conscientiousness was proven effective in explaining individual performance in an organization.

Although Bernardin (1977) used Cattell's 16PF measure, there is a clear overlap between the conscientiousness dimension found in the 16 PF, and the conscientiousness dimension of the Big Five. Indeed, Howarth (1976) reanalyzed Cattell's original factors, which were derived without the aid of computerized statistical programs. Howarth's reanalyses indicated that Cattell's original 12 factors were represented more adequately by a five factor model. Once again, the robustness of the Big Five model of
personality was demonstrated.

More recently, Barrick and Mount (1991) found significant support for the utility of conscientiousness. The authors conducted a meta-analysis to investigate the usefulness of the Big Five in terms of predicting job performance. The 117 studies included in the meta-analysis resulted in a combined sample of 23,994 subjects. Barrick and Mount divided the subjects into one of five occupational categories: professionals, police, managers, sales, and skilled/semi-skilled. The criterion of job performance was divided into three categories: job proficiency, training proficiency, and personnel data. The results of the meta-analysis indicated that the conscientiousness factor was significantly related to each of the performance criteria for all five occupational groups. The robustness and significance of the findings indicate that the use of conscientiousness for predicting job performance is warranted.

In a second meta-analysis study involving largely military samples, Schmidt and Hunter (1992) found similar support for the robustness of the conscientiousness factor. Their sample included 4,362 Army personnel, and included two measures of conscientiousness: dependability and achievement orientation. They found that both measures had a direct positive impact on job knowledge, which in turn impacted both job performance and supervisory ratings of job
performance. Their conclusions were that those with high conscientiousness levels exerted more effort in acquiring job knowledge, performed better on the work sample job, received fewer disciplinary measures, and received more awards than those with low conscientiousness scores. Schmidt and Hunter go so far as to state, "We believe conscientiousness may eventually come to be viewed as the most important trait motivation variable in the work domain" (p. 91).

A problem with both Barrick and Mount’s (1991) and Bernardin’s (1977) research involves the possibility that the effects located were the result of post hoc logic. These researchers did not hypothesize in advance that conscientiousness, as a particular personality variable, would or would not correlate with the respective dependent variables. Thus, the stability of the results is questionable. Future research should make more specific predictions.

Barrick, Mount, and Strauss (1993) investigated the effects of conscientiousness in a more predictive manner. Using a sample of 91 sales representatives, they discovered that conscientiousness had an effect on job performance through the mediating influence of goal setting. Conscientious individuals were more likely to set sales goals and were more strongly committed to such goals. The goal setting and commitment to goals resulted in better
performance and ratings. This work provides an example of an investigation of the trait of conscientiousness along with a situation (in their case goal setting) to explain individual performance. The current research takes a similar approach in explaining individuals' performance in a group.

A number of more recent studies have found less consistent (although still respectable) results for the conscientiousness dimension. In a recent symposium session on conscientiousness, Hogan and Hogan (1993), Murphy and Lee (1993), and Organ (1993) all discussed limited success with their research involving the conscientiousness dimension. In addition, Tett, Jackson, Rothstein (1991) provided results from a third meta-analysis which generally supports the resurgence of interest in personality variables in I/O research, but is less supportive of the conscientiousness factor than the two meta-analysis studies discussed previously.

Hogan and Hogan (1993) investigated the link between prudence (i.e., their term for the conscientiousness factor) and performance in Holland's (1985) Conventional and Artistic job types. Using data obtained from self-reports of personality and peer-rated performance, they reported a significant positive correlation between prudence and performance in Conventional-type jobs, and a significant negative correlation for prudence and performance in
Artistic jobs. In effect, they provided evidence that although a high level of conscientiousness was beneficial for some jobs, it was detrimental to performance in others. They reminded the reader of the potential negative components of conscientiousness. One can perhaps be too careful or too devoted to a losing effort. Negative consequence of high levels of conscientiousness have rarely been addressed. Based on the research of Hogan and Hogan, conscientiousness appears to have a negative impact on creativity, innovation, and flexibility.

Murphy and Lee (1993) predicted that the correlation between integrity tests and job performance would be moderated by conscientiousness. However, using meta­analysis techniques, they were unable find support for their hypothesis. They discussed the possibility that, although conscientiousness might be the most useful of the Big 5 for predicting job performance, in the bigger picture of all possible predictors, it is not one of our best predictors.

Organ (1993) also discussed disappointing results regarding conscientiousness as a predictor of organizational citizenship behaviors. Citing evidence from eight studies which measured conscientiousness and OCB’s, Organ typically found correlations below .20. Thus, conscientiousness accounted for very little of the variance in the performance of OCB’s. Despite the mixed findings, the authors all contended that there is a place for personality measures
(including conscientiousness) in I/O research.

Tett, Jackson, and Rothstein (1991) again found evidence to support the continued use of personality variables in applied personnel settings. However, results of their meta-analysis indicated greater support for the validity of agreeableness ($r = .33$), openness to experience ($r = .27$), and neuroticism ($r = -.22$) than it did for conscientiousness ($r = .18$). They suggested the possibility that the greatest promise for personality variables as predictors of job performance may be in the creation of "personality syndromes", or combinations of the Big 5. Future research in this area may result in the creation of theoretically based syndromes to better predict job performance.

Ones, Mount, Barrick, and Hunter (1994) and Tett, Jackson, Rothstein, M., and Reddon (1994) provided simultaneous commentaries in an effort to explain the contradictory findings in their meta-analysis studies published in 1991. Ones, et al. (1994) suggest that perhaps Tett, et al. (1991) made technical errors in conducting their meta-analysis. The errors involved problems with computing sampling error and bias corrections. Ones, et al. (1994) suggest that it is perhaps these errors which led to the discrepant findings of Tett, et al. (1991). In their reply, Tett, et al. (1994) recognize that some of their original computations might have been in error. They
remedied this in the current reply, yet still found results that were discrepant to those reported by Barrick and Mount (1991). Other dimensions of the Big Five still did a better job predicting performance than did conscientiousness.

Perhaps there is no definitive right or wrong answer regarding the true usefulness of conscientiousness in predicting performance. Much of the results of the meta-analyses are dependent upon what particular studies are included, and even what type of studies are considered for inclusion in the meta-analysis. There is no technical right or wrong answer for these questions. Therefore, unless authors choose the exact matching criteria for including studies in their meta-analysis, there will continue to be debate concerning whose findings are correct. However, both sets of authors (i.e., Ones, et al., 1994; Tett, et al., 1994) agree that personality dimensions are useful in predicting performance. Tett, et al. (1994) merely suggested that perhaps conscientiousness is not the best of the Big Five. There is a need for additional research to determine situations in which conscientiousness can or cannot predict performance. The current study is designed to provide this additional research, and can provide a test for the utility of the conscientiousness dimension in a laboratory setting. The research takes a positive view of conscientiousness (i.e., more in line with Barrick & Mount and colleagues), but the proof of its usefulness will be
empirically tested with the data collected in the experiment.

Facets of Conscientiousness

An idea currently receiving considerable support is that the conscientiousness factor can be broken down into a number of different facets (e.g., Costa, McCrae, & Dye, 1991; Schmidt & Hunter, 1992; and Hogan & Hogan, 1993). In their meta-analysis, Schmidt and Hunter (1992) investigated two facets of conscientiousness: dependability and achievement orientation. In their study, they found significant results for both facets, but one could envision situations in which one facet might be expected to be a better predictor than others.

In their efforts to develop conscientiousness and agreeableness scales that could be included in their NEO-PI, Costa, McCrae, and Dye (1991) included six potential facets of conscientiousness. The logic for including multiple facets of the dimension were twofold. First, the factor seemed to cover a wide range of potential behaviors, and some behaviors seemed to fit with certain facets of conscientiousness better than others. Second, facets are more suitable for dealing with negative, as well as positive consequences of conscientiousness than is a single factor. The facets they propose are: competence, order, dutifulness, achievement striving, self-discipline, and deliberation.
Costa, McCrae, and Dye (1991) described competence as being capable, sensible, and accomplished. They defined order as referring to the tendency to keep one’s surroundings tidy and well organized. Dutifulness refers to adherence to appropriate standards of conduct. Achievement striving refers to a general pursuit of excellence typified by classic definitions of Type A behavior. The facet of self-discipline is described in terms of persistence, and refers to the ability to continue with a task despite the onset of boredom or distractions. This persistence dimension of conscientiousness seems especially relevant to the tasks and goals of the current study. Finally, deliberation refers to one’s level of caution, planning or thoughtfulness.

Hogan and Hogan (1993) also discussed the idea of facets of conscientiousness. Indeed, they were careful to remind the reader that "conscientiousness is not a monolithic dimension, rather it breaks down into a set of related syndromes that define facets of the overall construct, not all of which are attractive" (p. 3). Like Costa, McCrae, and Dye (1991) they discussed potential negative aspects of conscientiousness. Showing support for the facet theory, they divided their prudence factor of the HPI into two dimensions, social appropriateness and constraint. Further, they break these two facets into the sub-facets of moralistic, mastery, virtuous, non-autonomous,
non-spontaneous, impulse control, and avoidance of trouble.

A review of the current literature suggests growing support for facets of conscientiousness. At this time, the number of facets, as well as appropriate labels for them have yet to be resolved. Undoubtedly, research will continue in this area. It is this type of refinement, which Guion (1993) seems to advocate for the advancement of personality research in I/O settings. However, for purposes of the current study, there will be no prescriptive hypotheses regarding facets of conscientiousness. An investigation of the role of individuals facets of conscientiousness will be reserved for possible post-hoc analyses.

On a final note regarding conscientiousness, current research suggests a significant genetic component for personality variables such as conscientiousness. Indeed, Bergeman, Chipuer, Plomin, Pedersen, McClearn, Nesselroade, Costa, and McCrae (1993) described evidence of a genetic link, which provides support for the utility and stability of using the conscientiousness variable in I/O research. Using the classic twin paradigm of identical and fraternal twins raised apart and together, Bergeman et al. (1993) found that a significant portion of variance in conscientiousness was explainable by genetic influence. In their study of 552 pairs of twins from the Swedish Adoption/Twin Study of Aging (82 pairs of identical twins
reared apart, 132 pairs of identical twins raised together, 171 pairs of fraternal twins raised apart, and 167 pairs of fraternal twins raised together), the researchers found that fully 29% of the variance in conscientiousness was attributable to genetics. For I/O psychologists, this suggests that in the future, selection procedures may become important in identifying individuals for organizations or teams which require employees with high levels of conscientiousness.

In summary, the conscientiousness factor of the Big 5 seems to hold particular promise for predicting performance. However, there remains a debate regarding just how much promise is warranted. One school of research, led by Barrick and Mount and colleagues, suggests that the conscientiousness dimension is the "star" at least in regards to predicting job performance. A second school of thought, led by Tett and Rothstein and colleagues, is supportive of the Big Five in general, but is not nearly as positive regarding the star quality of the conscientiousness dimension. The premise of the current research falls more in line with the research conducted by Barrick and Mount. That is, it is predicted that the individual difference variable of conscientiousness will explain a significant portion of the variance in performance. However, the current research attempts to advance the line of research, by investigating the processes by which conscientious
individuals influence their own performance, as well as influence the performance of others in their group. Additional information regarding this development is presented in the following sections.

III. Social Loafing - Group Process Losses

The term social loafing was coined by Latane, Williams, and Harkins in 1979. However, prior to work by Latane and colleagues, researchers had investigated the phenomenon. The earliest recorded research was that of a French agricultural engineer named Ringelmann (e.g., Kravitz & Martin, 1986). The research was reported by Dashiell (1935) in a review of the developments in social psychology. Ringelmann had subjects pull as hard as possible on a rope either alone or with one, two, or seven others. He found a significant reduction in force exerted when more than one individual pulled. This reduction was more than simply a coordination loss. Rather, it was a motivation problem in which subjects actually exerted less pulling effort as the number of co-pullers increased.

Although this finding was significant, the "Ringelmann effect" had almost no influence on psychological experiments for the next 50 years. It was not until after Zajonc (1965) proposed his theory of social facilitation that researchers sought to explain the contradictory results of the two lines of research. Social facilitation theory predicts that individuals will perform dominant responses, such as rope
pulling, better when in the presence of others than when alone. However, the "Ringelmann effect" provided concrete evidence that the exact opposite actually occurred.

Ingham, Levinger, Graves, and Peckham, (1974) were the first modern researchers to replicate the Ringelmann effect. Perhaps underestimating the scientific rigor of Ringelmann's original research, Ingham et al., replicated his research using the rope pulling task. Their results were surprisingly similar to Ringelmann's, who conducted his research nearly 100 years earlier. The similar findings lend support both to the quality of the research conducted by Ringelmann, as well as the strength of the "Ringelmann effect".

In an effort to resolve the discrepancy between social facilitation and the Ringelmann effect, Latane, Williams, and Harkins (1979) began a series of investigations. Initially they replicated Ringelmann's findings with a group of college students performing the physical tasks of clapping and shouting. They used the term "social loafing" to describe the tendency for individuals to perform more poorly in groups than when alone. Through statistical analysis, the researchers determined that approximately half of the performance loss was due to coordination loss (e.g., subjects not clapping/shouting in unison), while the other half was directly attributed to a motivation loss - social loafing.
Latane et al. (1979) also discussed potential explanations for social loafing. These include: attributional and equity explanations, submaximal goal setting, and a lowered contingency between the input and the outcome. These are addressed by later research and will be discussed in the following section. In addition to the explanations, the authors discussed the potential cultural, economic and productivity consequences that social loafing could have on business. This connection to organizations highlights the importance of social loafing research to industrial-organizational psychologists.

Researchers found identifiability to be a mediator for social loafing (e.g, Harkins & Jackson, 1985; Szymanski & Harkins, 1987; Williams, Harkins, & Latane, 1981). Williams et al. (1981) replicated previous research by showing that subjects exerted less effort when shouting in groups than when shouting alone. However, they added a twist to previous research by telling subjects that their individual effort could be determined both when they shouted alone and in groups. These subjects produced consistently high levels of effort, regardless of whether they were shouting alone or in groups.

Williams et al. (1981) believed that identifiability alone was enough to eliminate social loafing. They specifically state that comparability and competition are not necessary for identifiability to eliminate social
loafing. Harkins and Jackson (1985) and Szymanski and Harkins (1987) conducted research that indicated that this was not true. Comparability and competition did indeed play an important role in identifiability’s mediating relationship to social loafing.

Harkins and Jackson (1985) investigated the importance of output comparison and identifiability. Research with college students completing a brainstorming task, indicated that identifiability alone was not sufficient to eliminate social loafing. Individual output on the brainstorming task must also be comparable to a similar other. Subjects whose output was not comparable to others would loaf regardless of whether they participated alone or in groups. Festinger’s (1954) idea of social comparison placed a clear limitation on the impact of identifiability. Only subjects, who felt that their outputs could be compared, reduced their level of social loafing. The opportunity to compare outputs (either by the self, others, or the experimenter) created an environment of evaluation, and this eliminated the tendency to loaf.

Szymanski and Harkins (1987) investigated the impact of self-evaluation against a social standard and social loafing. Their research with college students indicated that the opportunity to be evaluated against a social standard was a necessary component by which identifiability eliminated social loafing. Similar to Harkins and Jackson’s
(1985) work, Szymanski and Harkins showed that the opportunity for social comparison, even if it was a self-evaluation opportunity, was sufficient to reduce social loafing. Comparison opportunities with previous experience or other subjects was necessary for subjects to reduce their social loafing.

In organizational settings, the standard for performance might be a comparison with one's previous performance or with one's co-worker's performance. In a novel situation however, or in cases of multiple unique trials, self or other comparisons may be impossible because such standards are unavailable. However, group norms may serve as the performance standard, and such norms may eliminate social loafing in novel situations or with multiple unique trials.

Szymanski and Harkins (1987) suggested that self-evaluation alone may not be sufficient to eliminate social loafing when there are multiple trials of a task. They argued that perhaps loafing will occur once subjects have completed one trial, while exerting maximum effort. This maximum effort trial, (rather than future minimal effort trials) would be used as subjects' benchmark for how well they could perform a given task. In effect, they suggested that subjects who know how well they can perform at maximum effort, will not feel the need to always perform at that maximum level. Thus far, this idea has not been tested with
Jackson and Harkins (1985) investigated an equity explanation for social loafing. They conducted an experiment with college subjects in which they used a confederate to manipulate the level of effort expended on a brainstorming task. The confederate stated his/her intention to produce at a high/low level of effort at the beginning of the experiment. Upon hearing this information, subjects began to match their level of effort to the confederate's stated intention. Subjects who initially performed at a low level, increased their effort when the confederate stated that he/she was planning on performing at a high level. While subjects who initially performed at a high level, reduced their level of effort when the confederate stated that he/she was planning on performing at a low level. The idea of group norms influencing behavior received strong support in this situation.

In effect, Jackson and Harkins (1985) not only demonstrated the strong effect that social comparisons had on social loafing (i.e., subjects who received direct comparison information immediately matched their effort to that of the comparison person), but also provided support for the idea that group norms could affect performance in a social loafing setting. The norms could originate with the brief statement of the confederate, or as they suggest, norms might simply originate based on one's past experiences.
in dealing with others in a group setting.

Previous research suggests that social comparison opportunities and group norm development might be two powerful situations which moderate social loafing. Shepperd and Wright (1989) suggested the potential usefulness of individual difference variables in moderating social loafing. Although they do not directly test the individual difference variables of self-monitoring and locus of control, they did make an interesting observation that these variables may be tied to an impression-management view of social loafing.

Although there have been advances in social loafing research, conclusions have been reached based on experiments in unnaturally sterile environments. Researchers moved from studying social loafing with physical tasks (e.g., rope pulling, shouting, or clapping) to cognitive tasks (e.g., brainstorming and evaluations). Unfortunately, this move also decreased the external validity of the research. Subjects no longer participated in repeated trials of the task, nor even in true group interaction. Researchers employed almost exclusively one trial between-subjects research designs.

The early researchers (e.g., Ringelmann; Latane, et al., 1979; Ingham, et al., 1974) tested subjects in actual group settings with repeated measures. Kravitz and Martin (1986) describe Ringelmann’s original research as including
20 subjects participating in various group sizes over a period of 26 performance trials. Latane, et al. (1979) tested subjects in groups numbering 1, 2, 4, and 6 individuals over 36 trials. Each of the subjects performed multiple trials of the task and actually interacted with the other group members. For unknown reasons, when researchers began employing cognitive tasks, they moved from within-subjects repeated measures designs to one trial between-subjects designs.

In all likelihood, the between-subjects designs were initiated for administrative ease. The cognitive tasks typically took 10-15 minutes. The standard hour laboratory experiment did not allow for the 10 plus repeated trials. However, it is unclear why researchers did not use two or three repetitions of the cognitive tasks. The proposed study calls for three trials of a cognitive brainstorming tasks to be described in more detail in the Method Section.

Researchers eliminated the "group interaction" aspect of the research for similar reasons. Allowing actual interaction among the group members would decrease the experimental control. The proposed study remedies this by allowing group members the opportunity to interact during the actual performance phase of the exercise. In addition, the caucus condition (explained more fully later in the paper) involves additional interaction opportunities among the group members. Thus, the proposed research extends the
social loafing literature in a major way by employing repeated measures of a cognitive task, and returns to the original methodology of social loafing research by allowing elements of group interaction. In addition, the conscientiousness levels of group members will be included, thus extending the literature by investigating trait as well as situational explanations for social loafing.

In summary, the propensity for individuals to loaf in a group setting is a firmly established phenomenon. Past research has identified situational constraints which make social loafing more or less likely. However, little research has investigated the characteristics of the individual which might affect social loafing. The current research is designed to test how an individual’s conscientiousness level might affect his or her tendency to loaf in a group setting. In addition, the current research returns aspects of actual group interaction, and the notion of repeated trials of the task, which have been dropped from much of the recent social loafing research.
IV. Review of Group Norms

Feldman (1984), Katz and Kahn (1978), and Gersick and Hackman (1990) provided excellent overviews of the importance and power of group norms. Feldman defined group norms as, "the informal rules that groups adopt to regulate and regularize group members' behavior" (p. 47). Both suggested the important role that norms play in determining a group's productivity. Although neither specifically mentions group norms within a social loafing framework, it is not difficult to see the relationship. However, the relationship between group norms and group productivity may be positive or negative. For example, in group situations, low productivity norms (such as might occur in a social loafing situation) are as likely to develop as norms of high productivity.

Feldman (1984) suggested four ways in which norms might develop. Norm development may occur due to: 1) explicit statements made by supervisors or co-workers; 2) critical events in the group's history; 3) primacy or what takes place during the initial stages of the group; and 4) carry-over behaviors from past situations. One can envision all of these "norm developers" influencing groups in a social loafing environment.

As alluded to in the social loafing section, Jackson and Harkins (1985) demonstrated the strong effect that a co-worker's explicit statements had on subjects' propensity to
social loaf. Co-workers who explicitly stated they were going to exert high/low levels of effort on the task influenced the other group member to do the same. It is also natural for the group to remember critical events which resulted in especially effective or ineffective group performance. The critical event will influence future behavior in similar circumstances. The effects of primacy are also easy to imagine. The initial events serve as the benchmark with which to measure future events. Individuals interpret future events in light of what has already taken place. Cultural studies (e.g., Early, 1989 & 1993) demonstrated the effects for carry-over behaviors in a social loafing environment. Societal culture influences how people are socialized to behave in groups. Individuals from collectivistic backgrounds bring carry-over behaviors to a group setting which encourage individuals’ effort exertion in group settings. Those from an individualistic background bring carry-over behaviors in the opposite direction. Individual effort should be demonstrated in settings in which individual effort can be identified and rewarded. It is not difficult to imagine how group norms might influence the individual’s performance in a group setting.

Social comparisons are also quite evident throughout the phases of norm development. As previously discussed, social comparisons can have a significant impact on group members’ willingness to loaf - in effect a norm for
decreased effort (e.g., Harkins & Jackson, 1985; Szymanski & Harkins, 1987). Harkins and Jackson (1985) demonstrated that subjects whose performance was identifiable would only decrease loafing if their work was directly comparable to a similar other. Szymanski and Harkins (1987) discovered how this comparison does not have to be made by an outsider, but can even involve self-comparisons. The key was that comparable information was available.

The comparisons can be made with statements from others, from early behavior in the group, or to some kind of previous experience from a completely different situation. Mitchell, Rothman, and Liden (1985) demonstrated the powerful effect of primacy in developing norms of high performance in a repetitive production group. Bettenhausen and Murnighan (1985) found the same powerful influence using MBA students' carry-over behaviors from prior experiences. They used actual interacting groups in their research, and found that when group members were presented with novel situations in which they were uncertain of the appropriate behaviors they turned to their past experiences to help clarify what was expected. Thus, research has clearly shown that people will make use of social comparison to assist in the formation of group norms.

Excluding the work of Bettenhausen and Murnighan (1985), there has been little research conducted with actual groups discussing and forming group norms. The actual
discussion and formation of norms in a group setting would be especially applicable to social loafing research. Performance norms could serve as a mechanism by which some (i.e., conscientious) group members work to create the same high standard of performance in other group members. By helping to establish a group norm for high effort and performance, a conscientious group member could avoid the scenario where he/she alone increased effort to meet a group goal. As demonstrated by Kaplan and Miller (1987), individuals seek to conform to the expectations of others, and group norms are one means of providing these expectations. Group norms for low performance would typically result in uniform low performance, while norms for high performance would result in uniformly high performance. Establishing a group norm for high performance would encourage similar effort from all of the group members, and the conscientious worker could avoid falling into the sucker/free-rider trap.

When researchers refer to group norms, groups of at least two individuals, but no more than 10-15, are typically under investigation. However, norms are also investigated in the context of larger groups and are discussed under the headings of organizational culture or even societal culture (Early, 1993; Early, 1989; and Staw, 1984). Small groups of 3-8 individuals are the typical group size employed in laboratory experiments.
In summary, group norms can be a powerful force in determining behavior in groups. Group norms can develop which suggest that decreased performance is alright (e.g., social loafing) or that increased performance is expected (e.g., the idea that the whole is greater than the sum of its parts). The proposed study seeks to investigate whether certain individual characteristics (in this case, conscientiousness) can act to influence the formation of positive or negative norms for performance in groups.

V. Review of Group Composition

Generally, group composition has been found to be important for understanding group level phenomena. Unfortunately, as Guzzo and Shea (1992) suggested, the processes of how composition might affect task performance has not been well researched. Research that has been conducted has shown that groups whose members share similar characteristics (e.g., ability, backgrounds, personalities, etc.) form performance norms both more quickly and strongly. If the similarities are of a positive nature, then the result is often very positive (e.g., increased performance), while if the similarities are negative, then the results can be very negative. Tziner and Eden (1985) demonstrated support for this phenomenon when uniformly high ability three-man tank crews performed even better than predicted, while uniformly low ability crews performed worse than expected. Similarities between group members reduce the
time necessary for coordination efforts. In place of time spent on coordination, groups can spend time on motivation and performance.

Indeed, the entire organizational demography literature (e.g., McCain, O'Reilly, & Pfeffer, 1983; Pfeffer, 1983; Tsui, Egan, & O'Reilly, 1992; Tsui & O'Reilly, 1989; Wiersema & Bird, 1993; and Zenger & Lawrence, 1989) suggests that similarity is a powerful force in predicting behavior in organizations. Tziner and Eden (1983) and Wilson, Aronoff, and Messe, 1975) clearly demonstrated the usefulness of similarity in predicting group behavior.

In addition to reducing coordination loss, similarity among group members can also assist in social comparison processes. Social comparison theory suggests that the best comparison person is a similar other.

George (1989; 1990) applies the similarity framework to the effects of personality. She suggests that the employees, who are matched with co-workers having personality orientations and affective reactions that are similar to their own, tend to demonstrate a stronger personality-affect link. She found a stronger personality-behavior link as well. Absence was predicted from affect better for those who worked with similar others, rather than from those working with dissimilar others.

The current research is designed to test for a personality-behavior link. In this case, conscientiousness
is the personality variable, while evidence of social loafing is the behavior. It also involves aspects of group composition. The frequency of social loafing will, in part, be predicted based on the similarity of group members' conscientiousness levels. Different results will be expected depending upon whether the group is composed of individuals of homogeneously high levels of conscientiousness versus those of homogeneously low levels.

In summary, group composition can have a significant impact on group performance. Groups with similar composition can lead to increased cohesion (e.g., Mullen & Copper, 1994) and performance (Tziner & Eden, 1985). The current study looks at homogenous groups of either low or high conscientious group members. The results will hopefully shed light on the conscientiousness - performance relation. Future investigations along this line of research could investigate heterogeneous groups. Such a line of research would determine if there are differences in performance between homogeneous and heterogeneous groups with regard to conscientiousness. This idea will be discussed in more detail in the Discussion section of this document, after the results of the current study are discussed.

VI. Rationale for Hypotheses

The construct of conscientiousness implies persistent effort. As such, simple, cognitive brainstorming tasks,
which place a premium on high levels of effort and persistence were selected to tap individuals' persistence. In other words, for the task there is a direct effort to performance link, such that individuals who consistently apply a high level of effort should be more successful than those employing sporadic or low effort. Within a trial, conscientious individuals should exert higher levels of effort and subsequent task performance as compared to low conscientious individuals. Thus, the following hypothesis is proposed.

Hypothesis 1: Individual's conscientiousness score will be positively related with the individual's performance on a cognitive brainstorming task.

The effect of group composition on group performance is the focus of the second hypothesis. A reasonable hypothesis, regarding group composition, can be postulated regarding the relationship between level of homogeneity of the group and performance. Homogeneity of the groups (in terms of conscientiousness) will be measured with the coefficient of variation, which Allison (1978) recommends for this type of analysis. The coefficient is computed by dividing the standard deviation of the group by the mean of the group. A lower coefficient score indicates a high level of homogeneity among group members, while higher scores reflect a higher degree of heterogeneity. A review of the literature does not provide a clear rationale for the direction of a relationship between homogeneity and
performance, therefore the second hypothesis predicts only a significant relationship, but does not address the sign of the relationship. Therefore, the second hypothesis reads

Hypothesis 2: There will be a significant correlation between group composition (as measured by the coefficient of variation) and group performance on the brainstorming task.

The power of group norms for performance and composition provide the rationale for the final hypothesis. The proposed research attempts to control for the formation of norms, by allowing half of the groups to caucus, and therefore openly discuss and solidify group norms. The other groups are denied this opportunity to openly discuss group norms. A number of authors have discussed how the opportunity to caucus might increase a group's cohesiveness and formation and acceptance of productive group norms (e.g., Mullen & Copper, 1994). Kaplan and Miller (1987) also demonstrate the impact on norm development and performance that group discussion or caucus can have. Using a sample of undergraduate students, they discovered that when judgmental issues were under investigation (e.g., how should one behave, how much effort should one exert), the group's influence on future performance was most evident when the discussion or caucus involved normative influence attempts. In effect group members' performance was most affected by other group members when the group made specific normative influence attempts. These normative influence attempts were articulated in the group caucus periods.
Van Knippenberg and Wilke (1992) observed a similar phenomenon involving norms when they saw increased acceptance of ingroup norms over repeated trials. The opinions of ingroup members were seen as more similar and were more influential in producing attitude change than were those of outgroup members. Thus, providing subjects with an opportunity to caucus should result not only in increased normative influence attempts made by group members, but also increased norm acceptance.

An opportunity to caucus will allow group members to discover each other's past effort and performance on the brainstorming task and to discuss future effort. This type of information directly relates to what Feldman (1984) described when he discussed how norms are formed. Therefore, a group composed of homogeneous high conscientious individuals will "discover" this similarity during the caucus, and will be adjust their behavior accordingly for future trials of the task. The average group response of high effort will be even more extreme in future trials of the same group, much as Tziner and Eden (1985) discovered with their tank crews. Groups composed of homogeneous low conscientious individuals will result in the more extreme response of even lower effort expended on future trials. Thus, the following hypothesis is proposed:

Hypothesis 3: The opportunity to caucus and group composition will interact in their effects on performance such that:
For the caucus condition, groups composed of three high conscientious individuals will produce more alternate uses than groups composed of three low conscientious individuals.

For the no caucus condition, groups composed of three high conscientious individuals will perform at a consistently high level, while groups composed of three low conscientious individuals will perform decreasingly lower levels.

A model representing the dynamics of what is proposed to occur in the group situation is presented in Figure 1.
Figure 1

Model of Predicted Relationships
VII. Analytical Strategy

The first hypothesis, regarding the positive relationship between conscientiousness and performance, will be tested by means of correlational analysis. A conscientiousness score will be computed based on the subjects' responses in completing Goldberg's (1992) 100 Adjective Checklist. A performance score will be computed based upon the total number of alternate uses a subject writes down for the second and third trials of the brainstorming task.

The second hypothesis, regarding a relationship between group composition and group performance, will be tested by means of a correlation analysis. The homogeneity/heterogeneity of group composition will be measured by computing the coefficient of variation (group standard deviation/group mean). The dependent variable, group performance on the three trials, will be computed by summing the number of uses generated by the three group members.

Hypothesis 3 will be tested by means of multiple regression analyses. The dummy coded opportunity to caucus and group composition variables, along with a variable describing their interaction (caucus*composition) will be entered into a regression equation to predict performance. Performance will be computed as described above. In addition, performance on the first trial of the brainstorming task will be entered into the regression
equation as a covariate measure. By entering previous performance as a covariate, the effects of individual differences in ability on this type of task can be controlled. Once again, the alternate uses task was chosen in part due to the effort-persistence link to performance. However, there remains an ability component for the task, which will be controlled by entering performance on the first task (which due to identifiability of performance, is intended as a maximum performance trial) as a covariate in explaining variance in performance on the second and third trials of the task.
CHAPTER II

METHOD

Subjects

One hundred and twenty-six students from a metropolitan Midwestern university participated as subjects. In exchange for participation, the subjects received credit for a laboratory component of an Introductory Psychology class. Participation in the experiment was on a voluntary basis, and the subjects were treated in accordance with Principle 9 of the American Psychological Association’s Ethical Standards for Research with Human Participants. Sixty-three of the subjects were female, and sixty-three were male. An ancillary measure taken at the conclusion of the experiment indicated that generally the students were not well acquainted with one another. The average response to the question pertaining to level of acquaintance with other group members was 1.45 on a 7-point agree-disagree scale, with low numbers corresponding to a low level of acquaintance. A test to determine if there were differences in level of acquaintance across conditions indicated nonsignificant levels for all conditions.
Materials

The materials necessary for this experiment fall into three different categories: 1) a personality measure necessary to obtain a conscientiousness score; 2) three equivalent brainstorming stimuli; and 3) a questionnaire to serve as a manipulation check to insure that the necessary conditions were met.

Personality Measurement

When selecting a personality measure to assess the Big 5, Briggs (1992) suggests using either of two types of measures. The two types are either an adjective-based measure (e.g., Goldberg, 1992, 100 Adjective Checklist) or a phrase-based measure (e.g., Hogan & Hogan, 1992, Hogan Personality Inventory). Naturally there are both advantages and disadvantages to both types of measure. The adjective-based measures tend to take less time to administer, are available in the public domain, and often have more clear connections to Big Five theory. The phrase-based measures typically have computer scoring and profiling available, often are tailored to specific audiences (e.g., normal business populations, military, etc.), and finally, in accord with their development, they are often validated on very heterogeneous populations.

Reviewing the literature on different types of instruments did not provide a clear favorite. Therefore both types were piloted on 214 college student subjects who
were typical of the subjects participating in this research. The pilot work indicated that a major disadvantage with the phrase-based measures is that the phrase-based measures yield much less variability on conscientiousness. The grouping of subjects based on high and low levels of conscientiousness is essential to the success of the present experiment. Thus, the choice was made to use Goldberg’s 100 Adjective Checklist (Appendix A).

Task Selection

The actual selection of tasks was important for two reasons. First, it was necessary that there be three versions of the task, and that none of the versions would be inherently more interesting than the others. A strength of the current research over much of the recent research using the social loafing paradigm was that the subjects were required to complete multiple trials of a task. Having the subjects complete three trials should strengthen the likelihood of finding a significant effect for the persistence and effort inherent in high conscientious individuals.

Second, success or performance on the tasks should be most directly related to effort, rather than creativity. Hogan and Hogan (1993) provide evidence that high levels of conscientiousness might be inversely related to creativity. Therefore tasks which placed a premium on creativity (such as suggesting names for a new product or discussing
consequences of a suddenly changed world described by Klimoski & Karol, 1976) were avoided. The chosen task could certainly have some aspects of creativity. However, a persistence component was the key element driving the current selection. Therefore, appropriate tasks would be those which placed a premium on persistence.

The task selected was a brainstorming task, which calls for naming alternate uses for an everyday object. Effort is directly related to performance on the task, and inherent interest in the task itself is at a minimal level for the majority of subjects. The method has been employed in numerous studies in the past (e.g., Harkins & Jackson, 1985; Szymanski & Harkins, 1987), typically using knife as the target word. A difference between past research and the present study is that subjects will be asked to complete multiple trials of the brainstorming task. Therefore, three target objects, eliciting approximately the same number of alternate uses, were necessary.

The target objects of knife, wire coat hanger, brick, large plastic trash bag, and pair of pantyhose were piloted with over 150 student subjects. There were no statistical differences in the number of uses generated for the following target objects: knife, brick, and large plastic bag. Therefore, the objects were deemed acceptable as the target stimuli for this experiment.

A final note regarding the stimulus objects is related
to the identifiability issue. The experiment was set up in such a way that the subjects were led to believe that their performance on the first trial was identifiable to the experimenter, while their performance on the second and third trials was not identifiable to the experimenter. In reality of course, it was necessary that the individuals' performance on all of the trials be identifiable to the experimenter. Therefore, the subjects were asked to sign their names on the first trial (i.e., in hopes of making it very clear that their performance on this task was identifiable), and not signing their names on the second and third trial. Unbeknownst to the subjects, there were actually three versions of each of the stimulus sheets (e.g., a version A, B, and C). The three different versions were coded by means of three different endings for directions on how much time was available for the task. The last line of Version A ended with "Write down as many uses as you can in the time allotted (ten min.).", while the last line in Version B ended with (10 minutes)., and the last line in Version C ended with (10 minutes.). Examples of the stimulus materials and target objects are provided in Appendix C, in order of Version A, B, and C.

Post-Experiment Questionnaire

Finally, a questionnaire, similar to those used in previous research, was designed to serve as measure of effort, group norms, and as a manipulation check for
identifiability and norm development sessions. This questionnaire is presented in Appendix D.

Procedure

The subjects participated in a pre-screening session at the beginning of the academic term. The personality measure was administered during the pre-screening session. Students were told that the adjective checklist was for part of an experiment that would be conducted later in the term. In order to be eligible for the experiment, a student had to turn in a complete, signed copy of the checklist. Students were assigned to groups based on the results of their conscientiousness scores on the screening instrument. Individuals were identified as high conscientious if they were in the top 30% of the conscientiousness distribution. Low conscientious individuals came from the lowest 30% of the distribution. This high/low identification system is suggested by Hogan and Hogan (1992) when grouping subjects into high and low levels of a Big Five dimension.

After compiling a list of eligible subjects, students were called by the experimenter, asking if they were interested in participating in an experiment to determine factors that might affect individuals' performance in groups. They were told that they would be working with two other students, and that the experiment would take approximately 55 minutes to complete. If the students indicated they were interested, the experimenter next
determined time slots when they were available to participate. Students were assigned a time slot based upon their availability, conscientiousness score, and their gender, as it was predetermined that the groups would consist of either homogeneously high or low conscientious members, and homogeneously male or female groups.

The experiment was set up in such a way that it required three students for each session. In order to alleviate the possibility of "losing" subjects if one or more of the students did not show up for the experiment, an effort was made to schedule four students for each session. This way, the "fourth" student could fill in if one of the other students did not arrive in time for the experiment. If all four students did show up for the experiment, the student who arrived last was taken to a separate room, and asked to anonymously complete one trial of the brainstorming task (the knife was always the stimulus object for this fourth subject), and to complete the Hogan Personality Inventory. The results of these sessions were used in a secondary experiment. In situations in which only one or two students showed up for the experiment, the students were asked to complete the same exercises as the fourth person.

During the course of the initial telephone contact, students were told they were eligible to participate in the experiment based on their responses to the original questionnaire. However, no mention was made of any of the
individual facets of the personality questionnaire, what their score was on any of the facets, or in what condition they would be participating.

Once settled in the experiment, the three subjects were told to sit at a rectangular table, and were read the following instructions.

Please take a seat at the table in the middle of the room. Today, we are interested in investigating people's performance on cognitive brainstorming tasks in group settings. You probably all understand how frequently people at work (and school) are asked to work in group settings. Therefore, it is important that we learn as much as possible about groups.

You will be asked to complete a series of three brainstorming tasks and to complete a brief questionnaire at the conclusion of the experiment. The experiment will take approximately one hour to complete.

In front of each of you is a folder and a matching name tag. We ask that you do not take anything out of the folder until you are told to do so. Please put the name tag on [NAME TAGS WERE PRE-MARKED WITH AN "A", "B", OR "C", AND STUDENTS WERE TOLD TO BE SURE AND REFER TO THE APPROPRIATE PERSON WHEN THEY WERE COMPLETING THE POST EXPERIMENT QUESTIONNAIRE].

Next, please open the folder and take out the top form. This is an experimental consent form. Please complete the form. This experiment is worth 1 hour of credit.

Now, take out the blank sheet of paper in your folder and the sheet directly underneath it. On the sheet of paper are directions for the brainstorming task. We will read the directions together. On this first task, I would like for everyone to put their names on the worksheet. This way we will know who showed up for the experiment, and we can identify how you performed on the first task.

We are interested in studying the performance of groups and individuals on what is called a "brainstorming" task. You will be given the name of an object and your task will be to come up with as many uses for this object as you can. Don't be concerned about the
quality of the uses you come up with. The uses can be ordinary or unusual. It is, however, important that you write down as many uses as you can in the time allotted.

While you are seated around the table with the other group members, we would like for you to state uses for the item. Since we don’t want one individual to spend all of their time recording the uses, we would like for the individual who states a particular use, to write the use down on his/her worksheet. When you are finished with the task, you will sign the worksheet and drop it in the box labeled "Signed Forms". The other group members will do the same thing. Do not repeat uses that another group member has written down.

A complete copy of the script, as it was presented to the subjects is provided in Appendix B.

The directions for the second and third trials were identical, with the exception that the subjects were told not to sign their sheets. The script read as follows.

Now, please open your folder and remove the blank sheet of paper and the brainstorming task immediately below the blank piece of paper.

Once again, the directions for the task itself are identical. However, on this task and the next, please do not sign your worksheet. We do not want to be able to identify which sheet is yours. To help us with this, I would like for everyone to use one of the number two pencils on the table. When you are finished with this task, you will fold the worksheet and drop it in the box labeled "Unsigned Sheets". That way, we can be assured that the uses are anonymous.

If there are no questions, you will have ten minutes to complete the second brainstorming task.

The directions for the third trial were identical to those presented for the second trial. Upon completion of the final trial, subjects were read the following instruction.
Please return to the tables at the sides of the room.

Finally, I would like for you to complete a questionnaire. Please remove your questionnaire from the folder. Be sure to refer to the appropriate person when completing the questionnaire. When the questionnaires are completed, I will review the experiment with you and sign your experiment cards.

After completing the group tasks, the subjects were told to move to separate tables surrounding the experiment room. This was to ensure that the subjects would not feel inhibited about providing ratings for their own and other’s performance. Piloting indicated that the subjects felt they could be more honest about their ratings, if the other group members were not sitting next to them where they might observe their ratings.

While sitting at separate tables, subjects were asked to complete the Post-Experiment Questionnaire. The questionnaire addressed such topics as the level of effort the subject and the other group members expended on the brainstorming tasks, assessments of the conscientiousness levels of all group members, and Likert-type items addressing such topics as norm development, identifiability of performance, and level of acquaintance with other group members. When estimating effort, subjects were told to think about how much effort they would exert on this task if their life depended on it, and compare that to how hard they worked on these trials.
Independent Variables

High and low conscientious subjects were randomly assigned in the 2x2 repeated measures factorial design (i.e., hi/lo composition and caucus/no caucus). The independent variables for the experiment include conscientiousness, which was used to form the group composition variable, and opportunity for group caucus. Next, each of these variables will be discussed in further detail.

Conscientiousness

Subjects' conscientiousness levels were measured with Goldberg's 100 Adjective Checklist. Twenty of the 100 items pertained to conscientiousness and are identified in bold print in the listing in Appendix A. The subjects were formed into groups of high and low conscientiousness as described previously.

Group Composition

Group composition involved the subjects' conscientiousness scores and consisted of two different combinations of subjects. There were two homogeneous groups. The first consisted of three high conscientious individuals, and the second consisted of three low conscientious individuals.

Opportunity for Caucus

The opportunity to caucus was present for half of the groups, and absent for the other half. The group caucus
provides an opportunity to establish group performance norms. The caucus period includes aspects of group interaction, and allows the subjects to attempt to influence each other's performance. The instructions for the caucus were as follows.

Now, let's take a break for something different. We find it useful for group members to take five minutes to discuss their performance on the previous task. You might discuss specific strategies for thinking of new uses, how much effort you exerted for completing the task, or how much effort you plan on exerting in future trials. However, please do not discuss particular uses that you wrote down. We will have a similar second break between the second and third tasks.

For the "No Caucus" conditions, subjects also had a break for a five minute period. However for this break, subjects were asked to complete one of two word search tasks. The tasks (taken from Cunliffe, 1993) involved circling words that were "hidden" in a word maze. This task was selected because it easily occupied the full five minute period, and was deemed sufficiently different from the experimental task that it would not affect performance on the experimental task itself. The directions read to those subjects in the "No Caucus" condition were as follows.

There will be a five minute delay in the experiment while I prepare materials for the next sections. During the delay you will work on a word search puzzle that I will hand out to you now.

Subjects in the "No Caucus" condition were given a different word search task during each of the two 5 minute breaks, which corresponded to the 5 minute caucus period in the "Caucus" condition. Copies of the two word search tasks are
Dependent Variables

The dependent variables included the actual number of uses identified by the subjects, the self-assessed level of effort exerted on the brainstorming tasks, as well as the other group members' assessment of level of effort exerted.

Performance

Performance on the brainstorming tasks directly corresponded to the number of uses generated for the stimulus objects. The number of uses generated was determined by arranging a subject's three stimulus sheets in order of completion and counting the number of alternate uses that were listed. Each separate and unique use was counted as one use. For example, a subject who wrote down as the alternate uses "cut things" and "slice fruit", would be credited with a performance score of two uses. A second subject could have used the first subject's uses to trigger her own unique uses such as "cut rope", "cut paper", "slice bananas", and "slice an orange". This subject would be credited with a performance score of four uses.

The number of uses generated for the first trial (i.e., the trial on which subjects signed their names, and were therefore identifiable) was determined for each subject. Due to the fact that the first trial was confounded with the identifiability issue, the Trial 1 performance score was not intended to be used to directly test any of the hypotheses.
Instead, the Trial 1 performance score was to entered as a covariate in the regression analyses for testing the second and third hypotheses. Finally, an overall performance score was computed by summing the number of uses generated on the second and third trials.

**Norms**

The level of norm development that occurred with each group was assessed by determining subjects' responses to six questions (#1, #2, #6, #7, #8, and #10) in the post-experiment questionnaire. The questions had a seven-point Likert type response continuum, and assessed such issues as the group reaching a level of understanding regarding how much effort to expend, confidence in rating other group members, confidence in knowing the number of uses self and others generated, and being influenced by the group discussions.

**Effort**

Subjects were asked to rate the level of effort that they personally, as well as the other group members, expended on each trial of the brainstorming task. Similarly to previous social loafing researchers, the subjects were asked to rate their level of effort compared to how much effort they would put into the task if their life depended on performance on the task. The ten point response scale ranged from 10% to 100% effort.

If the hypotheses hold, conscientious individuals, as
well as individuals in groups who establish norms for high level of effort will produce more uses. Effort was assessed in a questionnaire administered at the conclusion of the experiment (see Appendix D). Effort was measured both by self-assessments and peer-assessment. The hypotheses do not directly involve the role of effort. However, for the particular tasks that were chosen, there should be a clear effort to performance relationship. Effort was assessed as a precautionary measure, as a potential tool for explaining or investigating any unusual results which might have occurred. Again, in spirit with the hypotheses regarding performance, it is assumed that conscientious individuals, as well as individuals in groups who establish norms for high level of effort would report higher levels of effort expended.

Manipulation Checks

Manipulations of the independent variables were checked with a post-experiment questionnaire (see Appendix D). Subjects were asked to assess their own, as well as the other group members' conscientiousness levels. Their self-assessments, as well as their perceived similarity to other group members were used to check perceived conscientiousness levels, as well as assess perceptions of group composition. Opportunity to caucus was addressed by a number of the items in the questionnaire (e.g., my group had an opportunity to discuss our performance).
Ancillary Measures

In addition, there were a number of questions designed to provide process information. These questions include items to determine whether subjects felt their work was identifiable, whether they were able to compare their performance to the performance of other group members, whether group performance norms were established, the extent to which they felt influenced by the other group members, who spoke the most during the group discussions, and who was most often the focal person of group discussion.
Manipulation Checks

The independent variables for this investigation are the assignment of high and low conscientious individuals to homogenous groups, and the assignment to caucus versus no caucus conditions. Subjects were assigned to high or low conscientiousness groups based on their scores on Goldberg’s (1992) adjective checklist. Twenty of the 100 items of the checklist pertained to the conscientiousness factor. The reliability of the conscientiousness measure was quite acceptable (alpha = .91). The checklist was administered to 670 students enrolled in one of two introductory psychology courses. Students, whose conscientiousness scores placed them in the top 30% of the distribution were eligible to participate in the high conscientiousness conditions, while those scoring in the bottom 30% of the distribution were eligible to participate in the low conscientiousness conditions.

During the course of the investigation, it became necessary to delete the data obtained from two groups of subjects (i.e., total of six subjects). Data from one group was eliminated when it was learned that the three group
members all wrote down the same uses for the first brainstorming task. Data from a second group was eliminated when it was learned that two of the three group members were not native English speakers, and had difficulty comprehending the directions of the task and responding appropriately. Overall, the subjects indicated that they were not well acquainted with the other members of their group (x = 1.5), and acquaintance was not reliably different across the conditions of the experiment. Table 1 provides a statistical summary of the sample of 120 subjects that was retained.

Due to the manner in which the subjects were classified, there was of course a significant difference (t = 22.00 p < .001) between the conscientiousness scores of those in the high conditions versus those in the low conditions. Results of a T-Test comparing the mean scores of the two groups are provided in Table 2.

The effectiveness of the caucus/no caucus manipulation was assessed on the basis of three questions administered in
Table 1

**Summary Statistics of the Subjects Who Participated in the Pre-screening**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students Completing Pre-screening Measure</td>
<td>670</td>
</tr>
<tr>
<td>Range of Conscientiousness Scores</td>
<td>71-180</td>
</tr>
<tr>
<td>Mean &amp; Standard Deviation of Conscientiousness</td>
<td>X = 133.04, SD = 18.03</td>
</tr>
<tr>
<td>Range of High Conscientiousness Groups</td>
<td>142-180</td>
</tr>
<tr>
<td>Range of Low Conscientious Groups</td>
<td>79-125</td>
</tr>
<tr>
<td>Mean and Standard Deviation of High C Groups</td>
<td>X = 151.33, SD = 7.17</td>
</tr>
<tr>
<td>Mean and Standard Deviation of Low C Groups</td>
<td>X = 112.82, SD = 11.51</td>
</tr>
</tbody>
</table>
## Table 2

**Results of Conscientiousness and Caucus Manipulation Checks**

### Conscientiousness

<table>
<thead>
<tr>
<th>Group</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Conscientious</td>
<td>151.33</td>
<td>7.17</td>
</tr>
<tr>
<td>Low Conscientious</td>
<td>112.82</td>
<td>11.51</td>
</tr>
</tbody>
</table>

\[ t = 22.00 \quad p < .001 \]

### Caucus

<table>
<thead>
<tr>
<th>Group</th>
<th>Caucus Group</th>
<th>No Caucus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion of Performance</td>
<td>X = 6.16</td>
<td>X = 3.13</td>
</tr>
<tr>
<td></td>
<td>SD = 1.50</td>
<td>SD = 1.89</td>
</tr>
</tbody>
</table>

\[ t = 9.58 \quad p < .001 \]

<table>
<thead>
<tr>
<th>Discussion of Effort Exertion</th>
<th>X = 3.57</th>
<th>X = 1.97</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD = 1.85</td>
<td>SD = 1.53</td>
</tr>
</tbody>
</table>

\[ t = 5.16 \quad p < .001 \]

<table>
<thead>
<tr>
<th>Discussion of Strategies</th>
<th>X = 5.10</th>
<th>X = 2.80</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD = 1.94</td>
<td>SD = 2.05</td>
</tr>
</tbody>
</table>

\[ t = 6.32 \quad p < .001 \]
the post-experiment questionnaire. Subjects were asked to rate the extent to which they agreed with the following statements: 1) I had an opportunity to discuss performance on the tasks with the other group members; 2) My group discussed how much effort should be expended on the brainstorming tasks; and 3) My group discussed strategies for generating alternate uses for the brainstorming tasks. Results of t-tests analyses indicated significant differences between the caucus and no caucus groups for each of the three items (t = 9.58 p < .001; t = 5.16 p < .001; and t = 6.32 p < .001). Although only half of the subjects participated in the actual "caucus" condition, it is important to remind the reader that those not participating in the "caucus" condition, also had opportunities to discuss performance on the tasks. Due to the interaction of the group members, subjects had an opportunity to "discuss" or influence performance of other group members while completing the task itself. There was no need for a formal caucus period for this opportunity to be provided. Also, the caucus manipulation had the desired effect of increasing the strength of norms that developed in the groups. Those subjects participating in the caucus condition, reported a significantly higher amount of norm development (F = 3.31 p < .05).

Figure 2 provides a graphic representation of the four groups of subjects across the three trials of the
Figure 2

Graphic Representation of Performance Across the Three Tasks
brainstorming tasks. Performance on the first trial of the task ranged from 10.13 to 13.63 alternate uses generated. Results of a oneway analysis of variance indicated no significant difference in performance among the four groups on this first task (F = 2.28, ns). However, on the second and third trials, the groups seemed to take divergent paths. As one can see from the graph, performance seemed to best mirror one of two possible paths. The first path involves the moderate performance on the first trial, followed by a significant increase in performance on the second and third trials. The low conscientious groups with an opportunity to caucus and the high conscientious groups without an opportunity to caucus seem to reflect this path of performance. The second path generally involves a moderate level of performance on the first task, followed an insignificant increase on the second and third trials of the task. The low conscientious groups without an opportunity to caucus, and the high conscientious groups with an opportunity to caucus seem to parallel this path.

Results of the Hypotheses Tests

The first hypothesis states that an individual’s conscientiousness score will be positively related with the individual’s performance on a cognitive brainstorming task. The correlation matrices intended to test this hypothesis are presented in Tables 3, 4, and 5. Table 3 provides correlations between conscientiousness and performance on
Table 3

Overall Correlation Matrix for Conscientiousness and Task Performance

<table>
<thead>
<tr>
<th></th>
<th>Cscore</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cscore</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>-.08</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.19)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>-.15</td>
<td>.73</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.05)</td>
<td></td>
<td>(p&lt;.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>-.09</td>
<td>.75</td>
<td>.88</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.16)</td>
<td></td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
</tr>
<tr>
<td>Perform</td>
<td>-.12</td>
<td>.76</td>
<td>.96</td>
<td>.98</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(p&lt;.09)</td>
<td></td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
</tr>
</tbody>
</table>
Table 4

Correlation Matrix for Conscientiousness and Task Performance for Caucus Conditions

<table>
<thead>
<tr>
<th></th>
<th>Cscore</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cscore</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>-.27 (p&lt;.05)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>-.45 (p&lt;.001)</td>
<td>.71 (p&lt;.001)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>-.34 (p&lt;.01)</td>
<td>.76 (p&lt;.001)</td>
<td>.85 (p&lt;.001)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Perform</td>
<td>-.41 (p&lt;.01)</td>
<td>.76 (p&lt;.001)</td>
<td>.95 (p&lt;.001)</td>
<td>.97 (p&lt;.001)</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Table 5

Correlation Matrix for Conscientiousness and Task Performance for No Caucus Conditions

<table>
<thead>
<tr>
<th></th>
<th>Cscore</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cscore</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>.11</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>.15</td>
<td>.75</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>.16</td>
<td>.73</td>
<td>.91</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Perform</td>
<td>.16</td>
<td>.76</td>
<td>.97</td>
<td>.98</td>
<td>1.00</td>
</tr>
</tbody>
</table>

(p<.20) (p<.13) (p<.001) (p<.001) (p<.001)
the three tasks for the overall sample. Table 4 provides the correlations for the subjects who participated in the "Caucus" condition, while Table 5 provides correlations for those participating in the "No Caucus" condition.

Investigation of Table 3 indicates one significant correlation - the correlation between conscientiousness and performance on the second task \( r = -0.15, p < 0.05 \). For the overall sample, the data indicate one significant negative correlation between conscientiousness and performance. Data presented in Table 4 indicate three significant correlations, all of which are again negative. Conscientiousness is significantly related to performance on the first task \( r = -0.27, p < 0.01 \), the second task \( r = -0.45, p < 0.001 \) and the third task \( r = -0.34, p < 0.01 \).

Investigation of the correlation between conscientiousness score and the overall sample, and conscientiousness and those subjects in the "Caucus" condition indicate significant results in the opposite direction of what was predicted.

Data presented in Table 5 for those subjects participating in the "No Caucus" condition indicate results more in line with the prediction of the first hypothesis. Although, none of the correlations are statistically significant, the correlation coefficients for conscientiousness and performance on the second task \( r = 0.15, p < 0.13 \) and performance on the third task \( r = 0.16, p \)
< .11) approach a marginal level of significance. The correlations are quite different than those presented in Table 3 and Table 4, and appear to be moving towards the hypothesized positive direction. The data presented in Tables 4 and 5 also suggest a significant interaction between conscientiousness/composition and opportunity to caucus, which will be investigated more thoroughly when the third hypothesis is tested.

One must look to both previous research and the predictions of the current research to determine which table to use to test the first hypothesis. Previous research in social loafing has indicated the moderating influence that identifiability has on task performance (e.g., Williams, Harkins, & Latane, 1981; Harkins & Jackson, 1985). Therefore, the first task, which included the subjects signing their names to the task sheet does not provide the cleanest test of the effects of conscientiousness on task performance. Performance on the first task is confounded with the identifiability issue, and therefore served more as a baseline measure for the current research, rather than as a task for testing hypotheses.

In much the same way, data presented in Tables 3 and 4 are confounded by the opportunity to caucus. The current research predicts that the opportunity to caucus will indeed have an effect on performance on the cognitive brainstorming task. However, by including the influence of caucus, data
presented in Tables 3 and 4 do not provide a clean correlational test of the conscientiousness-performance relationship. Only in Table 5 are data presented which provide an unconfounded opportunity for correlational hypothesis testing. However, investigation of Table 5 does not statistically support the first hypothesis.

The second hypothesis states that there will be a significant relationship between group composition and group performance on the brainstorming tasks. As this hypothesis deals directly with group variables, the dependent variable used in testing this hypothesis will be the total number of uses generated by the group members on each of the trials, while the coefficient of variation will reflect the group composition variable. Table 6 provides the correlation matrix intended to test this hypothesis. Table 6 provides correlations between group composition (homogeneity of group composition is reflected by a low coefficient of variation, while heterogeneity of group composition is reflected by a high coefficient) and group performance on the three tasks for the overall sample. The data presented in Table 6 indicate no significant correlations between group composition and group performance. Thus, there was no support for the second hypothesis, which predicted the existence of such a relationship.
Table 6  
**Overall Correlation Matrix for Group Homogeneity and Group Performance**

<table>
<thead>
<tr>
<th></th>
<th>Co-Var</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coefficient of Variation</strong></td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trial 1</strong></td>
<td></td>
<td>.02</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(p&lt;.42)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trial 2</strong></td>
<td>-.06</td>
<td>.76</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(p&lt;.26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trial 3</strong></td>
<td>-.13</td>
<td>.77</td>
<td>.93</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(p&lt;.08)</td>
<td></td>
<td></td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-.10</td>
<td>.78</td>
<td>.98</td>
<td>.99</td>
<td>1.00</td>
</tr>
<tr>
<td>(p&lt;.14)</td>
<td></td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
</tr>
</tbody>
</table>
Thus, the results seem to indicate that neither conscientiousness nor composition, by themselves explain a significant portion of the variance in performance on the brainstorming tasks. The next step was to investigate whether an interaction between the two variables, composition and opportunity to caucus, was accounting for variance in performance, as predicted in the third hypothesis.

The third hypothesis states that the opportunity to caucus and group composition will interact in their effects on performance. In order to test this hypothesis, an interaction variable (e.g., caucus * composition) was computed from the dummy coded variables of opportunity to caucus and group composition. Data presented in Table 7 indicate the results of the regression analyses to test the significance of the interaction for the second and third trials of the brainstorming task, as well as for the combined "Performance" score. As is evident from the table, the interaction term explains a significant portion of the variance in performance for trial 2, trial 3, and Performance. The F statistic for the interaction term for the second trial is $F = 5.51$, $p<.001$, while the F statistic for the interaction term on the third trial is $F = 4.48$, $p<.01$, and the F for Performance is $F = 5.26$, $p<.01$.

The data indicate a significant interaction between group composition and the opportunity to caucus. A graphic
Table 7
Regression Analysis, with Composition, Opportunity to Caucus, and Their Interaction Predicting Performance

<table>
<thead>
<tr>
<th>Trial 2</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>.21</td>
<td>1.71</td>
<td>p&lt;.19</td>
<td>.01</td>
</tr>
<tr>
<td>Caucus</td>
<td>.30</td>
<td>.89</td>
<td>p&lt;.41</td>
<td>.01</td>
</tr>
<tr>
<td>Interaction</td>
<td>-.57</td>
<td>5.51</td>
<td>p&lt;.001</td>
<td>.12</td>
</tr>
</tbody>
</table>

\[ y = .21 \text{ (comp)} + .30 \text{ (caucus)} - .57 \text{ (comp*caucus)} + 13.07 \]

<table>
<thead>
<tr>
<th>Trial 3</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>.22</td>
<td>.94</td>
<td>p&lt;.33</td>
<td>.01</td>
</tr>
<tr>
<td>Caucus</td>
<td>.25</td>
<td>.63</td>
<td>p&lt;.53</td>
<td>.01</td>
</tr>
<tr>
<td>Interaction</td>
<td>-.53</td>
<td>4.48</td>
<td>p&lt;.01</td>
<td>.10</td>
</tr>
</tbody>
</table>

\[ y = .22 \text{ (comp)} + .25 \text{ (caucus)} - .53 \text{ (comp*caucus)} + 13.63 \]

<table>
<thead>
<tr>
<th>Performance</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>.22</td>
<td>1.34</td>
<td>p&lt;.25</td>
<td>.01</td>
</tr>
<tr>
<td>Caucus</td>
<td>.28</td>
<td>.77</td>
<td>p&lt;.46</td>
<td>.01</td>
</tr>
<tr>
<td>Interaction</td>
<td>-.57</td>
<td>5.26</td>
<td>p&lt;.01</td>
<td>.12</td>
</tr>
</tbody>
</table>

\[ y = .22 \text{ (comp)} + .28 \text{ (caucus)} - .57 \text{ (comp*caucus)} + 26.7 \]
representation of the interaction for the second trial is provided in Figure 3, while Figure 4 provides the same for the interaction for the third trial, and Figure 5 provides a plot of the interaction for the overall performance.

Investigation of the figures indicates consistent results, which are opposite of what was predicted. On all three of the performance measures, after being provided with an opportunity to caucus, groups composed of low conscientious individuals significantly outperformed those groups composed of high conscientious individuals. Furthermore, analyses indicate that groups composed of low conscientious individuals performed significantly better with rather than without an opportunity to caucus, while groups composed of high conscientious individuals performed significantly better without rather than with an opportunity to caucus. Thus, results contrary to what were predicted in Hypothesis 3 are obtained.

In an effort to account for a greater percentage of variance of the performance on the brainstorming task, more detailed regression analyses were run. These analyses, explaining performance on the second and third trials of the brainstorming task as well as a combined "Performance" measure, which combined performance on the second and third trials are detailed in Table 8. The variables that were entered into the regression equation are conscientiousness score, group composition, opportunity to caucus, the
Figure 3

Graphic Representation of the Interaction Between Caucus and Group Composition for Task 2
Figure 4

Graphic Representation of the Interaction Between Caucus and Group Composition for Task 3
Figure 5

Graphic Representation of the Interaction Between Caucus and Group Composition for Overall Performance
Table 8
Regression Analyses with Conscientiousness, Group Composition, Caucus, Interaction Between Composition and Caucus, and Performance on Trial 1 Predicting Performance on Trials 2 and 3 and Overall Performance

<table>
<thead>
<tr>
<th>Trial 2</th>
<th>Multiple R</th>
<th>F = 30.81 p &lt; .001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.76</td>
<td>.57</td>
</tr>
<tr>
<td></td>
<td>y = -.17 (Conscientious) + .28 (Composition) + .22 (Caucus) + .69 (Task1) - .32 (Comp*Caucus) + 9.14</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial 3</th>
<th>Multiple R</th>
<th>F = 31.77 p &lt; .001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.76</td>
<td>.58</td>
</tr>
<tr>
<td></td>
<td>y = -.03 (Conscientious) + .17 (Composition) + .17 (Caucus) + .71 (Task1) - .28 (Comp*Caucus) + 1.07</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance</th>
<th>Multiple R</th>
<th>F = 36.04 p &lt; .001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.78</td>
<td>.61</td>
</tr>
<tr>
<td></td>
<td>y = -.10 (Conscientious) + .23 (Composition) + .20 (Caucus) + .72 (Task1) - .31 (Comp*Caucus) + 10.21</td>
<td></td>
</tr>
</tbody>
</table>
interaction between opportunity to caucus and composition, and performance on Trial 1. Performance on Trial 1 was entered as a covariate.

Investigation of Table 8 indicates a highly significant F value for the overall equation (F = 30.81, p < .001) for performance on the second trial, as well as for performance on the third trial and overall performance (F = 31.77, p < .001; and F = 36.04, p < .001). Including performance on Trial 1 as a covariate, helps increase the amount of variance that can be accounted for to 57%, 58%, and 61% respectively for the three performance dimensions.

The rationale for the model presented in Figure 1 was based in part on a significant role played by group norms for performance. The model suggested that group composition, as moderated by the opportunity to caucus would lead to group performance norms. It was assumed that when presented with an opportunity to caucus, groups composed of high conscientious individuals would form performance norms suggestive of high effort and performance, while groups composed of low conscientious individuals would form norms suggestive of low effort and performance. Data were collected in the post-experiment questionnaire which allowed for testing for the development of group norms. Results of a oneway analysis of variance indicated that those groups presented with an opportunity to caucus did indeed report a higher level of norm development (F = 3.31, p < .05).
Unfortunately, it is not clear from the data that were collected just what types of norms did develop. This problem will be discussed in more detail in the Discussion section of the paper.

Post-Hoc Analysis

Investigation of the effort ratings indicated similar ratings across all of the conditions of the experiment for all three trials. The average for the ratings of effort were 70% for the first trial, 74% for the second trial, and 70% for the final trial. Tests conducted to determine if there were significant differences across the conditions of the experiment produced non-significant results ($F = 1.47; F = 1.18; \text{ and } F = 2.05$ for each of the trials).

Tests were also run to determine if the group members could accurately rate their own, as well as other group members' level of conscientiousness. Results of the analyses were not significant ($F = 1.54, \text{ ns}$). The ratings for all of the subjects (i.e. those in the High and Low conscientiousness groups) averaged around the 70 percentile mark. In general, subjects in all of the conditions felt that the group was typically more conscientious than 70% of the population. Of course, in the case of the high conscientious subjects, the ratings were correct, while they were incorrect for the low conscientious subjects. Rather than say one group was more accurate than the other, a more parsimonious explanation might be that the subjects were
responding to a general positive leniency rating trend.

Although this investigation is primarily focused on the conscientiousness dimension of the Big Five, it is perhaps prudent that some attention be given to the other four factors as well. Therefore, a correlation matrix for the five personality factors and the four performance measures is presented in Appendix F in Tables 11, 12, and 13. Table 11 lists the correlations for the overall sample, Table 12 lists the correlations for those subjects in the Caucus condition, and Table 13 lists the correlations for those in the No Caucus condition. Mean correlations for the various measures for the Big Five variables are: \( r = .12 \) for openness to experience; \( r = -.11 \) for conscientiousness; \( r = .15 \) for extraversion; \( r = -.13 \) for agreeableness; and \( r = .06 \) for neuroticism. The results do not exactly fall in line with the results of either Barrick and Mount (1991), or Tett, et al. (1991), but they are in the observed range.

In addition, in an effort to explore what about conscientiousness was responsible for these findings, a principle components factor analysis was run in order to determine the facets which best represent the conscientiousness dimension. I sought to determine if one or two aspects of conscientiousness could be isolated to better account for the results of the current investigation. Results of the Scree Plot of the principle components analysis is represented in Figure 6. Careful investigation
of the plot indicated that the conscientiousness factor, as measured by Goldberg's (1992) 100 Adjective Checklist was best represented by four facets. After identifying the appropriateness of a four facet model of conscientiousness, a varimax rotation was carried out, the results of which are presented in Table 9. Six of the adjectives loaded on the first factor, five loaded on the second factor, five adjectives loaded on both the third and four adjectives loaded on the fourth factor.

The four facets seem indicative of four qualities often associated with conscientious individuals. Labels for the four facets might include organization, rule abidance, predictability, and caution. Those scoring highly on the first facet indicated that they were organized, efficient and neat. Those scoring highly on the second described themselves steady, thorough, and systematic. Those scoring highly on the third facet were practical, efficient and consistent. Finally, those scoring highly on the fourth factor described themselves as careful and attentive to details. After obtaining the results of the factor analysis, scales were computed for each of the four facets of conscientiousness. Table 10 provides a correlation matrix for the four facets and the performance measures.
Figure 6

Scree Plot of Eigenvalues Obtained from Principle Factors Method
Table 9

Factor Loadings for 20 Items of Goldberg’s Conscientiousness

<table>
<thead>
<tr>
<th>Item</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>disorganized</td>
<td>79</td>
<td>13</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>efficient</td>
<td>50</td>
<td>25</td>
<td>45</td>
<td>24</td>
</tr>
<tr>
<td>neat</td>
<td>80</td>
<td>22</td>
<td>-03</td>
<td>11</td>
</tr>
<tr>
<td>organized</td>
<td>85</td>
<td>26</td>
<td>16</td>
<td>07</td>
</tr>
<tr>
<td>prompt</td>
<td>35</td>
<td>30</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>sloppy</td>
<td>67</td>
<td>10</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>conscientious</td>
<td>03</td>
<td>54</td>
<td>02</td>
<td>19</td>
</tr>
<tr>
<td>steady</td>
<td>10</td>
<td>44</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>systematic</td>
<td>23</td>
<td>62</td>
<td>17</td>
<td>-03</td>
</tr>
<tr>
<td>thorough</td>
<td>26</td>
<td>63</td>
<td>07</td>
<td>08</td>
</tr>
<tr>
<td>unsystematic</td>
<td>23</td>
<td>34</td>
<td>25</td>
<td>06</td>
</tr>
<tr>
<td>impractical</td>
<td>-03</td>
<td>01</td>
<td>69</td>
<td>06</td>
</tr>
<tr>
<td>inconsistent</td>
<td>17</td>
<td>22</td>
<td>62</td>
<td>20</td>
</tr>
<tr>
<td>inefficient</td>
<td>35</td>
<td>19</td>
<td>61</td>
<td>28</td>
</tr>
<tr>
<td>practical</td>
<td>13</td>
<td>32</td>
<td>45</td>
<td>15</td>
</tr>
<tr>
<td>undependable</td>
<td>13</td>
<td>32</td>
<td>33</td>
<td>21</td>
</tr>
<tr>
<td>careful</td>
<td>17</td>
<td>39</td>
<td>-03</td>
<td>59</td>
</tr>
<tr>
<td>careless</td>
<td>17</td>
<td>20</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>haphazard</td>
<td>06</td>
<td>09</td>
<td>23</td>
<td>43</td>
</tr>
<tr>
<td>negligent</td>
<td>21</td>
<td>19</td>
<td>26</td>
<td>52</td>
</tr>
</tbody>
</table>

These are varimax-rotated principal components. Decimal points are omitted.
Table 10

**Correlation Matrix for Facets of Conscientiousness and Performance Measures**

<table>
<thead>
<tr>
<th></th>
<th>Consc</th>
<th>Fact 1</th>
<th>Fact 2</th>
<th>Fact 3</th>
<th>Fact 4</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consc</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 1</td>
<td>.89</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 2</td>
<td>.82</td>
<td>.61</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 3</td>
<td>.79</td>
<td>.56</td>
<td>.63</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 4</td>
<td>.76</td>
<td>.56</td>
<td>.55</td>
<td>.52</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>-.08</td>
<td>.00</td>
<td>-.15</td>
<td>-.14</td>
<td>-.08</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>-.15</td>
<td>-.04</td>
<td>-.20</td>
<td>-.23</td>
<td>-.16</td>
<td>.73</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>-.09</td>
<td>-.03</td>
<td>-.17</td>
<td>-.19</td>
<td>-.07</td>
<td>.75</td>
<td>.88</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Perform</td>
<td>-.12</td>
<td>-.04</td>
<td>-.18</td>
<td>-.21</td>
<td>-.11</td>
<td>.76</td>
<td>.96</td>
<td>.98</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Correlations greater than .15 are significant at the .05 level. Correlations greater than .21 are significant at the .01 level.*
The second and third facet seem to be largely responsible for the significant correlations that are evident between aspects of conscientiousness and performance on the brainstorming task. It seems as if aspects of subjects' systematic, practical, and consistent nature was negatively related to performance on this particular task. The high conscientious subjects tended to have high levels of these traits which apparently were detrimental to performance. These findings perhaps have implications for the appropriateness of the task that was chosen for this investigation, and will be addressed further in the discussion section.
CHAPTER IV
DISCUSSION

The first hypothesis predicts that an individual’s conscientiousness level will be positively related to performance on a cognitive brainstorming task. There are a number of correlation coefficients one could use to test this hypothesis. Indeed, Tables 3, 4, and 5 provide three different cuts at the conscientiousness-performance relationship. Table 3 lists the correlation matrix for conscientiousness and performance on the three brainstorming tasks for the entire sample. The data in the table indicate a significant negative correlation between conscientiousness and performance on the second brainstorming task, and a marginally significant negative relationship for performance on the second and third brainstorming task combined score. Conclusions based on the data presented in Table 3 suggests that there is indeed evidence of a significant relationship between conscientiousness and performance, but in the opposite direction of what was hypothesized. That is, higher conscientiousness scores resulted in lower performance on the brainstorming task.

Investigation of the data presented in Table 5, a correlation matrix for those not participating in the caucus
condition, indicates correlation coefficients heading in a significant positive direction. Although none of the correlation coefficients presented in the table are significant, a larger sample size, with correlations of a similar magnitude, would provide satisfactory power such that correlations of the same size would be statistically, if not practically significant.

Although, the correlation coefficients for conscientiousness and performance on Task 2 (r = .15) and Task 3 (r = .16) are not statistically significant (thus not statistically supporting Hypothesis 1), they are certainly similar to the coefficients found for conscientiousness and performance in previous research (e.g., the average r = .13 found by Murphy and Lee, 1993). Therefore, the present research seems to support the conclusion that although conscientiousness shows a consistent positive significant relationship with performance, by itself, it does not account for a practically significant amount of variance in performance.

The second hypothesis predicts a significant relationship between group composition and group performance. Results of the correlation analysis testing for the existence of a significant relationship indicated nonsignificant results for all of the performance measures. Therefore, there does not appear to be support for the second hypothesis suggesting a significant correlation
between group composition and performance. However, results thus far seem to indicate a significant interaction between composition and opportunity to caucus, which was the focus of the third hypothesis.

The third hypothesis predicted that there would be a significant interaction between the opportunity to caucus and group composition, such that when presented with the opportunity to caucus, high conscientious groups would significantly outperform low conscientious groups. Regression analyses were used to test this hypothesis. In order to test the hypothesis, an interaction variable was computed (i.e., caucus*composition), and tested in the regression equations.

Results of the multiple regression analyses testing for a significant interaction between composition and caucus are presented in Table 7, and indicate a significant interaction for all three of the performance measures. The interaction alone accounted for a significant portion of the variance in individual’s performance on the brainstorming tasks. In an effort to explain an increased amount of the variance in performance, additional variables were entered into the multiple regression analyses. The data presented in Table 8 list the results of the regression analyses with conscientiousness, composition, opportunity to caucus, performance on the first trial of the task, and the interaction between composition and caucus entered into the
regression equation. Once again, the full regression equation explained a significant portion of variance (57%, 58%, and 61% respectively) in individual performance on the brainstorming tasks. Taking into account the information presented in Tables 7 and 8, one can conclude that there is a significant interaction between group composition and the opportunity to caucus, but in the opposite direction of what was predicted. This idea will be explored in greater detail, after the planned post-hoc analyses are discussed.

Investigation of the Big Five Dimensions

After testing for the hypotheses, two sets of post-hoc analyses were conducted. The first set looked at the four other dimensions of the Big Five, while the second looked at identifying facets of the conscientious factor and looking at them. In addition to the scale for conscientiousness, Goldberg's 100 Adjective Checklist also includes scales for openness to experience, extraversion, agreeableness, and neuroticism. Data summarized in Appendix F in Tables 11, 12, and 13 show significant correlation coefficients between a number of the Big Five dimensions and performance. Investigation of the tables suggests that four of the big five factors (extraversion, agreeableness, openness to experience, and conscientiousness) appear to be related to performance at a similar magnitude. The neuroticism dimension appears to be related at a somewhat lower magnitude. However, despite a number of statistically
significant correlations, none of the correlation coefficients appear to account for a substantive portion of variance in performance on this particular task.

Investigation of Facets of Conscientiousness

A second post-hoc analysis involved identifying facets of conscientiousness. As discussed previously, there is a current trend in identifying facets of conscientiousness. At the upper estimate regarding number of facets are Costa, McCrae, and Dye (1991) who have suggested six facets, while at the lower end are Schmidt and Hunter (1992), who have suggested two facets of conscientiousness. At the present time, Goldberg (1992) has yet to include definitions of facets of conscientiousness in his adjective checklist. Therefore, a factor analysis was conducted with the completed conscientiousness scales in hopes of identifying individual facets of conscientiousness. Figure 6 provides a list of the scree plot for the 20 conscientiousness items on Goldberg's (1992) checklist. Investigation of the scree plot suggests evidence of four factors or facets present in the conscientiousness scale. Therefore, a principle components factor analysis, with a varimax rotation was completed. The data presented in Table 9 provide a listing of the four factors, and the adjectives that loaded on each factor.

Six adjectives loaded on the first factor, which seems to highlight aspects of organization or order. This facet
corresponds well to Costa, McCrae, and Dye’s (1991) facet of order. Five adjectives loaded on the second factor, which seems to highlight aspects of discipline or rule abidance. This particular facet seems to correspond with Costa, et al.’s facet of self-discipline, or with Hogan and Hogan’s (1992) facet of constraint or spontaneity. Five adjectives load on the third facet, which seems to highlight aspects of predictability or reliability. Four adjectives load on the fourth facet, which seems to highlight aspects of caution.

After having identified four facets of conscientiousness, correlation coefficients for the facets and performance on the brainstorming task were computed. Table 10 provides a listing of the coefficients. As can be seen from the table, both the second and third facets seem to be the most directly related to performance. The more predictable or likely one was to follow rules, the worse that individual performed on this particular cognitive brainstorming task.

Explanations for the Current Findings

Something about the opportunity to caucus was affecting performance on the brainstorming tasks. Evidently, high conscientious groups were using the caucus period to negatively influence each other’s performance, while the low conscientious groups were using the caucus period to positively influence performance. The concept of group norms could possibly explain these influence attempts.
Based on listening to the groups' caucus periods, it became evident that the high conscientious group members were in effect inhibiting each other's performance. Individuals would make specific comments regarding uses that were generated. These comments were typically negative in nature, such as "you couldn't really use a brick for that", or "I've already said I could cut things with a knife, so don't list any other uses involving cutting things". The high conscientious group members were policing each other's (as well as their own) uses. It appeared as if they could have formed a norm suggesting "A good alternate use must be clearly feasible, and unique from any other use that was previously given".

The low conscientious groups experienced quite a different reaction to the opportunity to caucus. Rather than having an inhibitory effect, the caucus period seemed to free the low conscientious group members, and led them to relax standards for naming alternate uses. The low conscientious group members might say something similar to "some of those uses you came up with for trashbag were really odd, I'm going to just start saying whatever pops into my mind", or "you kept repeating similar uses for a knife like cut fruit, cut pizza, or cut vegetables, I'm going to start doing that next time". The low conscientious group members seemed as if they developed performance norms which suggested that anything goes. Perhaps the high
conscientious groups concentrated more on the quality of the uses that were generated, while the low conscientious groups concentrated more on the quantity of uses that were generated (which coincidentally was included in the directions of the brainstorming task).

Research in creativity and problem solving provides some insight into the observed findings. Two distinct types of creativity that have been documented (e.g., Hocevar, 1979; Milgram, 1983; and Milgram & Arad, 1981) include ideational fluency (i.e., in this case the raw number of ideas generated) and ideational flexibility (i.e., in this case the number of different types of uses generated such as cutting uses for a knife as one type of use, and hammering or pounding uses as a second type). It appears as if the two groups who provided the greatest number of alternate uses were responding more to the ideational fluency aspect of creativity, while the other groups might have been concentrating on ideational flexibility. In addition, there is research evidence to suggest that practicality, or quality of the uses generated is significantly related to both ideational fluency and flexibility. Typically, the more uses that one generates, as well the flexibility one displays in generating different types of uses, results in a greater number of high quality uses. However, with the high quality uses, there are often times many resulting poor quality uses as well.
In order to test for this possibility, the uses that were generated by each subject, for each trial were typed on index cards and scored by an independent rater in terms of an overall practicality of the uses score and an overall ideational flexibility score. Results of the ratings, as well a copy of the directions and the rating scales, are presented in Appendix G. In general, there appeared to be a negative relationship between performance on the brainstorming task and practicality and flexibility. The higher the overall number of uses that were generated, the lower the overall practicality and flexibility of the uses tended to be. In addition, the caucus*composition interaction accounted for a significant portion of variance in practicality (F = 12.56, p<.001), but not flexibility (F = .009, ns). Finally, there was evidence to suggest that the more conscientious an individual was, the less flexible that individual was in naming alternate uses.

Research suggest two potential reasons for the negative relationship between conscientiousness and flexibility. First, Tegano and Moran (1989) discussed how the number of ideas generated in a brainstorming task was related to one's willingness to take risks or chances. They suggested that risk-taking was inversely related to desire for conformity. The definition of conscientiousness implies a low-level of risk taking. Conscientious individuals prefer things to be orderly, consistent, and systematic, three qualities which
lend themselves much more to conformity rather than risk taking. In addition, Kabanoff and Bottger (1991) found that performance in a creativity project among MBA students was negatively related to preferences for achievement. Conscientiousness has frequently been described as including aspects of drive or achievement orientation. Therefore, evidence suggests that the high conscientious group members were doomed to low performance on the brainstorming task due to their desire for order and achievement orientation.

Thus, the selection of task for the current research might not have been the most opportune. There had been little previous evidence to suggest that the brainstorming task contained such a large creativity component. In part, this might have been due to the fact that the majority of the previous research using the task involved non-interactive groups. Previous tasks involved subjects being led to believe they were interacting with other group members, but in reality, they did not actually do so. There was no danger or penalty for self-disclosure or risk-taking in the non-interactive groups, while that possibility was certainly present in the current study. However, according to Klimoski and Karol (1976), interacting groups initially assume a high level of trust with other group members. The high level of trust acts as a functional tool, which keeps subjects from inhibiting each others' idea generation. There was no reason to expect a priori that this would not
have been so in the current study. However, post-hoc investigation suggests that there were differences across the conditions of the experiment.

In order to eliminate the concern regarding trust, disclosure, and risk-taking that were present in the current task, future research could employ a more neutral type of task. Petty, Harkins, and Williams (1980) employed such a task when they used subjects' rating of a videotape of a therapist-client session, as did Weldon and Gargano, when they used subjects' evaluations of a variety of job descriptions. Such tasks could result in a "weaker" situation environment, which could very well produce results which are in line with the hypotheses of this study.

Exploration of a Strong Versus Weak Situation Explanation

The idea of a strong versus weak situation influencing the effect of personality variables in predicting performance could also be considered for explaining the current results. Kenrick and Funder (1988) recognize that, "traits are expressed more easily in some situations than others....have more influence when situations are low in constraint" (p. 30). The strong-versus-weak situation framework provides a guide for determining when a situation is low in constraint. In other words, situations in which conscientiousness will best predict behavior.

In cases involving strong situations, the situation will play a greater role in the determination of behavior.
In weak situations, as well as in aggregated samples over time, the trait (conscientiousness) would do a better job of predicting the behavior. Mischel (1977) describes strong situations as having the following characteristics: lead everyone to perceive the situation similarly; trigger similar evaluations of the appropriate responses; provides incentive for the appropriate responses; and requires behavior that everyone typically can perform. Weak situations allow for more freedom for expression of individual differences. Mischel describes weak situations as being: not uniformly perceived by individuals; not triggering similar evaluations of the appropriate responses; not offering incentives; and not providing the conditions for learning similar response patterns. One could envision see how the caucus conditions in the current study might have led to what could be considered a strong situation. The caucus helped solidify norms, and allowed group members to set standards for appropriate behavior. On the other hand, the no caucus conditions could be viewed as a weak situation. In the weak situation, the trait is more clearly linked to performance (i.e., high conscientious individuals without a caucus outperformed low conscientious individuals without a caucus).

Clearly in weak situations, individuals do not have guidelines or socialization standards to fall back on to assist in their determination of how to behave. Lacking
outside assistance, an individual would be more apt to behave naturally, or as his/her personality dictates. Thus, conscientiousness should predict performance better in weak situations. In strong situations, behavior is best explained by some interaction of the personality and the situation. As the situation gets stronger, personality would account for less variance in performance.

Data collected to test the ability of conscientiousness to explain performance in a weaker situation than the one presented in this investigation is detailed in Appendix H. In many ways, the weaker situation was similar to the current study (i.e., 36 subjects participated in 12 homogenous groups of three, participated in three trials of the same brainstorming tasks, etc.,). The only difference was that the group members did not actually interact during the brainstorming tasks. Following each of the tasks, just as in the current study, half of the subjects were given the opportunity to caucus, while the other half completed the word search tasks.

The results of this test of the effectiveness of conscientiousness in this much weaker situation are quite different than those obtained in the current study. The correlations between conscientiousness and performance were on average of greater magnitude and significant in the hypothesized direction. The average correlation coefficient for conscientiousness and performance in the weak situation
was a significant +.35. In addition, there was a higher correlation between group composition and group performance, with an average significant correlation of +.53. Results of regression analyses indicated a significant main effect for composition (in the direction predicted in the second hypothesis), with composition accounting for on average 21% of the variance in performance. Finally, inspection of Figure 7 details the interaction between composition and the opportunity to caucus, with caucus apparently having a more positive impact on performance of the high conscientious groups, as was predicted in the third hypothesis. There is not enough data from this post-hoc analysis to detect the presence of a significant interaction between composition and opportunity to caucus for all of the performance measures. However, there does appear to be ample evidence to suggest significant main effects for both composition and opportunity to caucus. With the collection of additional data, one could be more confident in detecting a significant interaction between the two variables.

As mentioned previously, a problem with much of the research that investigates the effects of traits is that it typically involves artificial (and often strong) situations or a cross-sectional view of behavior. Such situations would often overestimate the effects of the situation and underestimate the ability of traits to account for the phenomenon in question. The main study reported here
appears to have fallen into domain of this "artificially strong" situation. When investigating conscientiousness to explain behavior in groups, one must be aware of this problem, and I would suggest it playing a greater role in future research in this area. An extended data collection period involving both strong and weak situations and a full range of behaviors would increase the likelihood of finding support for a trait explanation of individuals behavior in groups. This would be the recommended strategy for future research in this area.

Implications of the Current Research

The current research has extended the growing body of research on conscientiousness in a number of ways. For the first time, conditions have been identified in which high levels can harm performance, as well as benefit it. High conscientious group members, when presented with an opportunity to caucus policed and thus hindered their own performance. High conscientious group members not presented with the opportunity to caucus did maintain high levels of performance, and performed similarly to the low conscientious groups, who performed better with caucus, than without.

In addition, it appears as if this difference in performance might be due to performance norms which perhaps developed during performance of the actual task, and were solidified by the group caucus. The norms do not appear to
involve effort distinctions (there were no meaningful differences in reported effort levels across the conditions of the experiment), but rather appear related to more of a quantity issue - that is more is better. During the caucus periods, high conscientious groups appeared to have set and monitored norms suggesting the alternate uses of the brainstorming tasks should concentrate more on quality or practicality than quantity. Both the high conscientious groups who did not have the opportunity to caucus, and the low conscientious groups with an opportunity to caucus seemed to concentrate on quantity above all other factors. The directions of the brainstorming tasks did indeed emphasize quantity rather than quality of uses (e.g., "The uses can be ordinary or unusual"). Therefore, it appears as if the high conscientious groups without an opportunity to caucus, and the low conscientious groups with an opportunity to caucus seemed to more closely follow the directions of the experiment. Evidently, there is a certain liability of conscientiousness, in which too much conscientiousness can harm performance, rather than benefit it. The restraint or achievement orientation of high conscientious individuals suppressed performance on the current task. Unlike previous researchers, who have suggested that this "liability" might only occur with those in the very top percentiles of conscientiousness (e.g., Hogan & Hogan, 1992), the current research suggests that it is not only extreme levels of
conscientiousness that can hinder performance, but also how conscientiousness might interact with the situation.

Therefore, the current research supports the more moderate stand of many personality psychologists who state that personality variables can best predict behavior in combination with situational variables. The interaction between conscientiousness and the opportunity to caucus did a much better job explaining group members' performance, than either conscientiousness or caucus alone.

Contemporary research provides ample evidence of the potential effectiveness of conscientiousness. Unfortunately, the magnitude of the relationship between conscientiousness and performance is rarely large. In addition, previous research has shown that conscientiousness is more strongly related to performance, when performance is measured subjectively rather than objectively (e.g., Barrick & Mount, 1991; Tett, et al., 1991). In the current study, the number of alternate uses generated was an objective rating, while ratings of the quality or practicality of the uses was more subjective. With regards to practicality of uses, post-hoc analyses indicated significant negative correlations for practicality and performance on the brainstorming tasks. The more practical one's uses that were generated, the worse the individual performed on the brainstorming tasks. The goal of future research on conscientiousness should be to identify boundary conditions
or situations in which high levels of conscientiousness are beneficial or detrimental to performance.

*Future Research Suggested by the Current Study*

There are a number of possible suggestions for future research in this area. First, it would be beneficial to look at heterogenous, as well as homogeneous groups regarding their conscientiousness levels. It would certainly be a worthy research project to investigate whether groups composed of two high conscientious individuals and one low conscientious individual respond more similarly to the homogeneously high or low conscientious groups, or would they fall between the two extremes. Also, would a heterogeneous group with two high conscientious members and one low respond differently than a group with two low conscientious members and one high. Future research could determine if the inhibitory nature or liability of high levels of conscientiousness is moderated by the presence of similar high conscientious group members, or if one high conscientious individual could "police" the entire group. These are empirical questions which will only be definitively answered with future research.

A second line of research involves looking more closely at the uses that were generated by the different groups. The current research indicated that high conscientious groups did generate more practical uses than did the low conscientious groups. Future research should investigate
whether or not these were conscious decisions made by the groups. That is, did the high conscientious groups knowingly regulate performance so that high quality uses were produced, and did the low conscientious groups knowingly concentrate on quantity at the expense of quality.

A third line of research would involve investigating more thoroughly the norms that developed in the groups. The current research did not ask group members to identify norms that developed. They were merely asked to rate whether or not they thought norms developed. Future research should involve the group members trying to articulate any norms which they felt developed as a result of the opportunity to caucus. Future research should also involve taping the group caucus periods. The recorded caucuses could be used to identify specific statements that were made (highlighting one of Feldman’s 1984 means of norm development), and more clearly identify the types of norms that developed, and the processes by which norms have an effect.

Finally, after some of the previous suggested research has been conducted, I believe that it would be both interesting and beneficial to study the impact of group members’ conscientiousness on performance in group settings with intact groups. George (1992) and Price and Harrison (1993) have demonstrated that it is possible to examine social loafing in existing groups, and Kanungo and Conger (1993) discuss how it might be in organization’s best
interest to lessen loafing through aspects of altruism. It would be interesting to determine what type of impact conscientiousness might have on groups, who have a past and prospects of a future together. Conscientious group members could have very different means of influencing performance in intact group settings versus in laboratory settings.

Overall, the current research yielded some surprising, yet explainable results. It provides an opportunity to open a line of research concerning the situational constraints of conscientiousness, as well as investigating more thoroughly the liability that can be present in conscientiousness. It highlights the fact that although personality variables alone might account for a statistically significant amount of performance, they rarely account for a practically significant amount without including aspects of the situation. In the current study, conscientiousness alone did not account for a significant portion of performance on the brainstorming tasks. However, combined with the moderating influence of opportunity to caucus and initial performance, conscientiousness did help account for a statistically as well as practically significant amount of performance.
LIST OF REFERENCES


Digman, J. M. (1990). Personality structure: Emergence of


Ghiselli, E. E. (1973). The validity of aptitude tests in
personnel selection. Personnel Psychology, 26, 461-477.


selection. Symposium conducted at the meeting of the
Society for Industrial and Organizational Psychology,
San Francisco.


Hough, L. M. (1992). The "big five" personality variables-
construct confusion: Description versus prediction.
Human Performance, 5, 139-155.

Hough, L. M., Eaton, N. K., Dunnette, M. D., Kamp, J. D.,
of personality constructs and the effect of response
distortion on those validities. Journal of Applied
Psychology, 75, 581-595.

Howarth, E. (1976). Were Cattell’s ‘personality sphere’
factors correctly identified in the first instance?

Ingham, A. G., Levinger, G., Graves, J., and Peckham,
size and group performance. Journal of Experimental

effort: An explanation of the social loafing effect.
Journal of Personality and Social Psychology, 49,
1199-1206.

John, O. P. (1990). The "big five" factor taxonomy:
Dimensions of personality in the natural language and
in questionnaires. In L. Pervin (Ed.), Handbook of
personality: Theory and research. New York: The
Guilford Press.

creativity training and its relation to selected
personality factors. Journal of Organizational
Behavior, 12, 235-248.

making and normative versus informational influence:
Effects of type of issue and assigned decision rule.
Journal of Personality and Social Psychology, 53,
306-313.

Katz, D., & Kahn, R. L. (1978). The social psychology
of organizations (2nd ed.). New York: Wiley.

Kenrick, D. T., & Funder, D. C. (1988). Profiting from
controversy: Lessons from the person-situation debate. 
American Psychologist, 43, 23-34.

social dilemma analysis. Journal of Personality and 
Social Psychology, 45, 819-828.

Kerr, N. L., & Bruun, S. E. (1983). Dispensibility of 
member effort and group motivation losses: Free-rider 
effects. Journal of Personality and Social Psychology, 
44, 78-94.

to withhold effort: A conceptual model to intersect 
three avenues of research. Academy of Management 
Review, 18, 429-456.

Klimoski, R. J., & Karol, B. L. (1975). The impact of trust 
on creative problem solving groups. Journal of Applied 
Psychology, 61, 630-633.

as a corporate goal. Academy of Management Executive, 7, 
37-48.

Kravitz, D. A., & Martin, B. (1986). Ringelmann 
rediscovered: The original article. Journal of 
Personality and Social Psychology, 50, 936-941.

Latane, B., Williams, K., & Harkins, S. (1979). Many 
hands make light the work: The causes and consequences 
of social loafing. Journal of Personality and Social 
Psychology, 37, 822-832.

language make? Structural analysis of the personality 
research form. Multivariate Behavioral Research, 17, 
33-46.

factors of the ISI. Multivariate Behavioral Research, 13, 
3-7

McCain, B. E., O'Reilly, C., & Pfeffer, J. (1983). The 
effects of departmental demography on turnover: The 
case of a university. Academy of Management Journal, 
26, 626-641.

five factor model of personality across instruments 
and observers. Journal of Personality and Social 
Psychology, 52, 81-90.


Ones, D. S., Mount, M. K., Barrick, M. R., and Hunter,


Appendix A

Goldberg’s 100 Adjective Checklist
How Accurately Can You Describe Yourself?

Please use this list of common human traits to describe yourself as accurately as possible. Describe yourself as you see yourself at the present time, not as you wish to be in the future. Describe yourself as you are generally or typically, as compared with other persons you know of the same sex and of roughly your same age.

Before each trait, please write a number indicating how accurately that trait describes you, using the following rating scale.

1 = Extremely Inaccurate  6 = Slightly Accurate
2 = Very Inaccurate      7 = Quite Accurate
3 = Quite Inaccurate     8 = Very Accurate
4 = Slightly Inaccurate  9 = Extremely Accurate
5 = Neither

___ Active      ___ Demanding   ___ Impractical
___ Agreeable  ___ Disorganized ___ Inconsistent
___ Anxious    ___ Distrustful  ___ Inefficient
___ Artistic   ___ Efficient   ___ Inhibited
___ Assertive  ___ Emotional   ___ Innovative
___ Bashful    ___ Energetic   ___ Insecure
___ Bold       ___ Envious     ___ Intellectual
___ Bright     ___ Extraverted ___ Introverted
___ Careful    ___ Fearful     ___ Irritable
___ Careless   ___ Fretful     ___ Jealous
___ Cold       ___ Generful    ___ Kind
___ Complex    ___ Haphazard   ___ Moody
___ Conscientious ___ Harsh     ___ Neat
___ Considerate ___ Helpful    ___ Negligent
___ Cooperative ___ High-strung ___ Nervous
___ Creative    ___ Imaginative ___ Organized
___ Daring     ___ Imperceptive ___ Philosophical
___ Deep       ___ Imperturbable ___
1 = Extremely Inaccurate
2 = Very Inaccurate
3 = Quite Inaccurate
4 = Slightly Inaccurate
5 = Neither
6 = Slightly Accurate
7 = Quite Accurate
8 = Very Accurate
9 = Extremely Accurate

<table>
<thead>
<tr>
<th>Trait</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasant</td>
<td></td>
</tr>
<tr>
<td>Practical</td>
<td></td>
</tr>
<tr>
<td>Prompt</td>
<td></td>
</tr>
<tr>
<td>Quiet</td>
<td></td>
</tr>
<tr>
<td>Relaxed</td>
<td></td>
</tr>
<tr>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>Rude</td>
<td></td>
</tr>
<tr>
<td>Self-pitying</td>
<td></td>
</tr>
<tr>
<td>Selfish</td>
<td></td>
</tr>
<tr>
<td>Shallow</td>
<td></td>
</tr>
<tr>
<td>Shy</td>
<td></td>
</tr>
<tr>
<td>Simple</td>
<td></td>
</tr>
<tr>
<td>Sloppy</td>
<td></td>
</tr>
<tr>
<td>Steady</td>
<td></td>
</tr>
<tr>
<td>Sympathetic</td>
<td></td>
</tr>
<tr>
<td>Systematic</td>
<td></td>
</tr>
<tr>
<td>Talkative</td>
<td></td>
</tr>
<tr>
<td>Temperamental</td>
<td></td>
</tr>
<tr>
<td>Thorough</td>
<td></td>
</tr>
<tr>
<td>Timid</td>
<td></td>
</tr>
<tr>
<td>Touchy</td>
<td></td>
</tr>
<tr>
<td>Trustful</td>
<td></td>
</tr>
<tr>
<td>Unadventurous</td>
<td></td>
</tr>
<tr>
<td>Uncharitable</td>
<td></td>
</tr>
<tr>
<td>Uncooperative</td>
<td></td>
</tr>
<tr>
<td>Uncreative</td>
<td></td>
</tr>
<tr>
<td>Undemanding</td>
<td></td>
</tr>
<tr>
<td>Undependable</td>
<td></td>
</tr>
<tr>
<td>Unemotional</td>
<td></td>
</tr>
<tr>
<td>Unenvious</td>
<td></td>
</tr>
<tr>
<td>Unexcitable</td>
<td></td>
</tr>
<tr>
<td>Unimaginative</td>
<td></td>
</tr>
<tr>
<td>Uninquisitive</td>
<td></td>
</tr>
<tr>
<td>Unintellectual</td>
<td></td>
</tr>
<tr>
<td>Unkind</td>
<td></td>
</tr>
<tr>
<td>Unreflective</td>
<td></td>
</tr>
<tr>
<td>Unrestrained</td>
<td></td>
</tr>
<tr>
<td>Unsophistic</td>
<td></td>
</tr>
<tr>
<td>Unsympathetic</td>
<td></td>
</tr>
<tr>
<td>Unsystematic</td>
<td></td>
</tr>
<tr>
<td>Untalkative</td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>Vigorous</td>
<td></td>
</tr>
<tr>
<td>Warm</td>
<td></td>
</tr>
<tr>
<td>Withdrawn</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Script of Procedure
Protocol Script to be Read to Subjects

Upon entering the lab in groups of three, subjects will be read the following instructions.

Please take a seat at the table in the middle of the room. Today, we are interested in investigating people's performance on cognitive brainstorming tasks in group settings. You probably all understand how frequently people at work (and school) are asked to work in group settings. Therefore, it is important that we learn as much as possible about groups.

You will be asked to complete a series of three brainstorming tasks and to complete a brief questionnaire at the conclusion of the experiment. The experiment will take approximately one hour to complete.

In front of each of you is a folder and a matching name tag. We ask that you do not take anything out of the folder until you are told to do so. Please put the name tag on.

Next, please open the folder and take out the top form. This is an experimental consent form. Please complete the form. This experiment is worth 1 hour of credit.

Now, take out the blank sheet of paper in your folder and the sheet directly underneath it. On the sheet of paper are directions for the brainstorming task. We will read the directions together. On this first task, I would like for everyone to put their names on the worksheet. This way we will know who showed up for the experiment, and we can identify how you performed on the first task.

We are interested in studying the performance of groups and individuals on what is called a "brainstorming" task. You will be given the name of an object and your task will be to come up with as many uses for this object as you can. Don't be concerned about the quality of the uses you come up with. The uses can be ordinary or unusual. It is, however, important that you write down as many uses as you can in the time allotted.
While you are seated around the table with the other group members, we would like for you to state uses for the item. Since we don’t want one individual to spend all of their time recording the uses, we would like for the individual who states a particular use, to write the use down on his/her worksheet. When you are finished with the task, you will sign the worksheet and drop it in the box labeled "Signed Forms". The other group members will do the same thing. Do not repeat uses that another group member has written down.

If there are no questions, you will have ten minutes to complete the first brainstorming task.

-10 MINUTES-

Please make sure you have signed your worksheet, folded it, and drop it in the box marked "Signed Forms".
FOR THE CAUCUS CONDITION THE FOLLOWING DIRECTIONS WILL BE READ TO SUBJECTS:

Now, lets take a break for something different. We find it useful for group members to take five minutes to discuss their performance on the previous task. You might discuss specific strategies for thinking of new uses, how much effort you exerted for completing the task, or how much effort you plan on exerting in future trials. However, please do not discuss particular uses that you wrote down. We will have a similar second break between the second and third tasks.

-5 MINUTES-

Now, please open your folder and remove the blank sheet of paper and the brainstorming task immediately below the blank piece of paper.

Once again, the directions for the task itself are identical. However, on this task and the next, please do not sign your worksheet. We do not want to be able to identify which sheet is yours. To help us with this, I would like for everyone to use one of the number two pencils on the table. When you are finished with this task, you will fold the worksheet and drop it in the box labeled "Unsigned Sheets". That way, we can be assured that the uses are anonymous.

If there are no questions, you will have ten minutes to complete the second brainstorming task.

-10 MINUTES-

Please make sure your worksheet is folded and drop it in the box marked "Unsigned Forms".

Again, lets take a break for some discussion concerning the group's performance on the second task. You might discuss specific strategies for thinking of new uses, how much effort you exerted for completing the task, or how much effort you plan on exerting in future trials. However, please do not discuss particular uses that you wrote down.

-5 MINUTES-
Now please open your folder and remove the blank sheet of paper and the brainstorming task immediately below the blank piece of paper.

The directions for this task are identical to those used for the previous tasks. Remember, please do not sign your worksheet. We do not want to be able to identify which sheet is yours. To help us with this, I again would like for everyone to use one of the number two pencils on the table. When you are finished with this task, you will fold the worksheet and drop it in the box labeled "Unsigned Forms". That way, we can be assured that the uses are anonymous.

If there are no questions, you will have ten minutes to complete the third brainstorming task.

-10 MINUTES-

Please make sure to fold your worksheet and drop it in the box marked "Unsigned Forms".

Please return to the tables at the sides of the room.

Finally, I would like for you to complete a questionnaire. Please remove your questionnaire from the folder. Be sure to refer to the appropriate person when completing the questionnaire. When the questionnaires are completed, I will review the experiment with you and sign your experiment cards.
FOR THE "NO CAUCUS" (WORD SEARCH) CONDITION THE FOLLOWING DIRECTIONS WILL BE READ TO SUBJECTS:

There will be a five minute delay in the experiment while I prepare materials for the next sections. During the delay you will work on a word search puzzle that I will hand out to you now.

HAND OUT WORD SEARCH TASK

-5 MINUTES-

Now please open your folder and remove the blank sheet of paper and the brainstorming task immediately below the blank piece of paper.

Once again, the directions for the task itself are identical. However, on this task and the next, please do not sign your worksheet. We do not want to be able to identify which worksheet is yours. To help us with this, I would like for everyone to use one of the number two pencils on the table. When you are finished with this task, you will fold the work sheet and drop it in the box labeled "Unsigned Forms". That way, we can be assured that the uses are anonymous.

If there are no questions, you will have ten minutes to complete the second brainstorming task.

-10 MINUTES-

Please make sure your worksheet is folded and drop it in the box marked "Unsigned Forms".

Again, there will be another five minute delay in the experiment while I prepare materials for the next sections. During the delay you will work on a word search puzzle that I will hand out to you now.

HAND OUT WORD SEARCH TASK

-5 MINUTES-

Now please open your folder and remove the blank sheet of paper and the brainstorming task immediately below the blank piece of paper.
The directions for this task are identical to those used for the previous tasks. Remember, please do not sign your worksheet. We do not want to be able to identify which sheet is yours. To help us with this, I again would like for everyone to use one of the number two pencils on the table. When you are finished with this task, you will fold the work sheet and drop it in the box labeled "Unsigned Forms". That way, we can be assured that the uses are anonymous.

If there are no questions, you will have ten minutes to complete the third brainstorming task.

-10 MINUTES-

Please make sure your worksheet is folded and drop it in the box marked "Unsigned Forms".

Please return to the tables at the sides of the room.

Finally, I would like for you to complete a questionnaire. Please remove your questionnaire from the folder. Be sure to refer to the appropriate person when completing the questionnaire. When the questionnaires are completed, I will review the experiment with you and sign your experiment cards.
Debriefing

This experiment was about how people perform in groups. Our work today will help determine how different types of people perform together, and what circumstances might affect their performance. Your name will not be associated with any of the data collected today.

Does anyone have any questions?

If yes, try to answer them. If the subjects are not satisfied with answer, or would like more information, have them contact Dr. Waung at 593-5143 or in office 1127 University Mall.

When there are no more questions say:

Thank you for participating in our experiment today. In order us to obtain the best results for the experiment, we would like for you not to discuss what you did today with other students who might sign up for the experiment.
Appendix C

Example of Brainstorming Stimuli
We are interested in studying the performance of groups and individuals on what is called a "brainstorming" task. You will be given the name of an object and your task will be to come up with as many uses for this object as you can. Don't be concerned about the quality of the uses you come up with. The uses can be ordinary or unusual. It is, however, important that you write down as many uses as you can in the time allotted (ten min.).

The object you are to generate uses for is a **knife**.
We are interested in studying the performance of groups and individuals on what is called a "brainstorming" task. You will be given the name of an object and your task will be to come up with as many uses for this object as you can. Don’t be concerned about the quality of the uses you come up with. The uses can be ordinary or unusual. It is, however, important that you write down as many uses as you can in the time allotted (10 minutes).

The object you are to generate uses for is a brick.
We are interested in studying the performance of groups and individuals on what is called a "brainstorming" task. You will be given the name of an object and your task will be to come up with as many uses for this object as you can. Don't be concerned about the quality of the uses you come up with. The uses can be ordinary or unusual. It is, however, important that you write down as many uses as you can in the time allotted (10 minutes.).

The object you are to generate uses for is a large plastic bag.
Appendix D

Post-Experiment Questionnaire
Name: ____________________________

Please answer the following questions honestly and quickly. Think about how much effort a person would exert on this task if his/her life depended on it (100% effort), and compare that to how hard you worked on these tasks. You may find some of the items easier to answer than others, but please try and answer all of them.

1. The percentage that best describes the level of effort that person A expended on listing alternative uses for the first item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

2. The percentage that best describes the level of effort that person A expended on listing alternative uses for the second item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

3. The percentage that best describes the level of effort that person A expended on listing alternative uses for the third item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

4. The percentage that best describes the level of effort that person B expended on listing alternative uses for the first item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

5. The percentage that best describes the level of effort that person B expended on listing alternative uses for the second item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

6. The percentage that best describes the level of effort that person B expended on listing alternative uses for the third item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

7. The percentage that best describes the level of effort that person C expended on listing alternative uses for the first item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

8. The percentage that best describes the level of effort that person C expended on listing alternative uses for the second item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

9. The percentage that best describes the level of effort that person C expended on listing alternative uses for the third item is
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%
Miscellaneous

For the following questions, please use the following scale to indicate your level of agreement with the item.

1 = Strongly Disagree  
2 = Moderately Disagree  
3 = Slightly Disagree  
4 = Neither Disagree Nor Agree  
5 = Slightly Agree  
6 = Moderately Agree  
7 = Strongly Agree

1. I believe that our group was able to reach some type of understanding about how much effort we were to put into the brainstorming tasks.

2. I felt confident in my ability to rate the effort expended by the other group members.

3. I felt I had an opportunity to discuss performance on the tasks with the other group members.

4. I believe the experimenter could easily identify my sheet from the first brainstorming task (the sheet on which I signed my name).

5. I believe the experimenter could easily identify my sheet from the second and third brainstorming tasks (the sheets on which I did not sign my name).

6. My teammates discussed how much effort we should expend on the brainstorming tasks.

7. I had a good idea of approximately how many uses I generated for the brainstorming tasks.

8. I had a good idea of approximately how many uses the other group members generated for the brainstorming tasks.

9. My group discussed strategies for generating alternate uses for the brainstorming tasks.

10. The group discussions influenced my performance on the brainstorming tasks.

11. I was well acquainted with the other group members prior to participating in the experiment.
A Conscientious person is someone who is dependable, careful, thorough, responsible, organized, and planful. Such a person is typically hardworking, achievement-oriented, and persevering.

Please use the following scale to rate yourself and the other group members in terms of conscientiousness. Circle the percentage that best corresponds to the rating.

1. Person A is more conscientious than ______ percent of the population.
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

2. Person B is more conscientious than ______ percent of the population.
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

3. Person C is more conscientious than ______ percent of the population.
   10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

Write in the letter of the individual (A, B, C) that in your mind best completes the following items.

4. I would estimate that person ______ spoke the most often during the group discussion periods.

5. I would estimate that person ______ was the target of discussion most often during the discussion periods.
Appendix E

Word Search Filler Task
Appendix F

Correlation Matrices for Big Five and Performance
Table 11

Overall Correlation Matrix for the Big Five Personality Factors and Task Performance

<table>
<thead>
<tr>
<th></th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Consc</th>
<th>Agree</th>
<th>Neurot.</th>
<th>Extra.</th>
<th>Open.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>.73</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>.75</td>
<td>.88</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consc.</td>
<td>-.08</td>
<td>-.15</td>
<td>-.09</td>
<td>.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree.</td>
<td>-.13</td>
<td>-.12</td>
<td>-.15</td>
<td>.30</td>
<td>.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurot.</td>
<td>.01</td>
<td>.07</td>
<td>.09</td>
<td>.22</td>
<td>.34</td>
<td>.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra.</td>
<td>.22</td>
<td>.12</td>
<td>.10</td>
<td>.17</td>
<td>.07</td>
<td>.25</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>.17</td>
<td>.11</td>
<td>.09</td>
<td>.23</td>
<td>.35</td>
<td>.31</td>
<td>.35</td>
<td>.86</td>
</tr>
</tbody>
</table>

*Correlations greater than .15 are significant at the .05 level. Correlations greater than .21 are significant at the .01 level. Coefficient alpha for each scale is listed on the diagonal.
Table 12

Correlation Matrix for the Big Five Personality Factors and Task Performance for Caucus Condition

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>.71</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>.76</td>
<td>.85</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consc.</td>
<td>-.27</td>
<td>-.45</td>
<td>-.34</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree.</td>
<td>-.21</td>
<td>-.19</td>
<td>-.26</td>
<td>.26</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurot.</td>
<td>-.14</td>
<td>-.14</td>
<td>-.13</td>
<td>.27</td>
<td>.32</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra.</td>
<td>.19</td>
<td>.11</td>
<td>.11</td>
<td>.19</td>
<td>.09</td>
<td>.33</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>.18</td>
<td>.14</td>
<td>.06</td>
<td>.12</td>
<td>.48</td>
<td>.45</td>
<td>.33</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Correlations greater than .21 are significant at the .05 level. Correlations greater than .28 are significant at the .01 level.
Table 13

Correlation Matrix for the Big Five Personality Factors and Task Performance for No Caucus Condition

<table>
<thead>
<tr>
<th></th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Consc</th>
<th>Agree</th>
<th>Neurot.</th>
<th>Extra.</th>
<th>Open.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>.75</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>.73</td>
<td>.91</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consc.</td>
<td>.11</td>
<td>.15</td>
<td>.16</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree.</td>
<td>-.04</td>
<td>-.05</td>
<td>.00</td>
<td>.37</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurot.</td>
<td>.18</td>
<td>.27</td>
<td>.33</td>
<td>.16</td>
<td>.39</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra.</td>
<td>.30</td>
<td>.14</td>
<td>.11</td>
<td>.15</td>
<td>.03</td>
<td>.16</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>.16</td>
<td>.07</td>
<td>.10</td>
<td>.32</td>
<td>.22</td>
<td>.19</td>
<td>.41</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Correlations greater than .21 are significant at the .05 level. Correlations greater than .28 are significant at the .01 level.
Appendix G

Correlation Matrix for Practicality and Flexibility of Uses
Table 14

Overall Correlation Matrix for Practicality and Flexibility of Uses Generated

<table>
<thead>
<tr>
<th></th>
<th>Consc.</th>
<th>P1</th>
<th>F1</th>
<th>P2</th>
<th>F2</th>
<th>P3</th>
<th>F3</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consc.</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pract.</td>
<td>-.11</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flex.</td>
<td>.01</td>
<td>.28</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pract.</td>
<td>-.04</td>
<td>.55</td>
<td>.24</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flex.</td>
<td>-.20</td>
<td>.13</td>
<td>.49</td>
<td>.24</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pract.</td>
<td>.12</td>
<td>.54</td>
<td>.06</td>
<td>.58</td>
<td>.13</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flex.</td>
<td>-.17</td>
<td>.31</td>
<td>.60</td>
<td>.25</td>
<td>.57</td>
<td>.20</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>-.08</td>
<td>-.47</td>
<td>-.23</td>
<td>-.43</td>
<td>-.22</td>
<td>-.55</td>
<td>-.31</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>-.15</td>
<td>-.40</td>
<td>-.20</td>
<td>-.55</td>
<td>-.26</td>
<td>-.64</td>
<td>-.33</td>
<td>.73</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>-.09</td>
<td>-.43</td>
<td>-.19</td>
<td>-.49</td>
<td>-.15</td>
<td>-.60</td>
<td>-.37</td>
<td>.75</td>
<td>.88</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Correlations greater than .15 are significant at .05 level, while those greater than .20 are significant at .01 level.
Quality - Practicality

This dimension refers to how practical the alternate uses are. Practical uses should be of a quality that they could easily be implemented, and it would make some sense to actually do so. An example of a low practical use for a brick might be to "puke on it". You could do this, but it wouldn’t actually make sense to do so. On the other hand, "puking in a trash bag" would be an example of a practical use for a trash bag.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Quality</td>
<td>About 50% of Uses</td>
<td>High Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predominate</td>
<td>High &amp; 50% Low</td>
<td>Predominate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flexibility

Flexibility is an aspect of creativity. This dimension refers to the uniqueness of the uses that are generated. A unique use would not follow directly from a previous use. For example, using a knife to cut fruit, cut meat, and cut vegetables, would not be rated high in terms of flexibility. Uses such as using a knife to perform surgery, play darts, and use as a spatula, would be rated highly in terms of flexibility.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Flexibility</td>
<td>About 50% of Uses</td>
<td>High Flexibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predominate</td>
<td>High &amp; 50% Low</td>
<td>Predominate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in Flexibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix H

Results For Non-Interacting Groups
Table 15

**Overall Correlation Matrix for Conscientiousness and Task Performance**

<table>
<thead>
<tr>
<th></th>
<th>Csore</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Csore</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>.26 (p&lt;.07)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>.33 (p&lt;.02)</td>
<td>.59 (p&lt;.001)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>.31 (p&lt;.03)</td>
<td>.60 (p&lt;.001)</td>
<td>.87 (p&lt;.001)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Perform</td>
<td>.33 (p&lt;.02)</td>
<td>.62 (p&lt;.001)</td>
<td>.97 (p&lt;.001)</td>
<td>.97 (p&lt;.001)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Thirty-six subjects took part in this phase of the research. The subjects were equally divided among the four cells.*
Table 16

Correlation Matrix for Conscientiousness and Task Performance for Caucus Conditions

<table>
<thead>
<tr>
<th></th>
<th>Cscore</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cscore</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>.37 (p&lt;.07)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>.55 (p&lt;.01)</td>
<td>.40 (p&lt;.05)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>.40 (p&lt;.05)</td>
<td>.38 (p&lt;.06)</td>
<td>.86 (p&lt;.001)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Perform</td>
<td>.49 (p&lt;.02)</td>
<td>.41 (p&lt;.05)</td>
<td>.96 (p&lt;.001)</td>
<td>.97 (p&lt;.01)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Eighteen subjects took part in the cells of this phase of the research.
Table 17

**Correlation Matrix for Conscientiousness and Task Performance for No Caucus Conditions**

<table>
<thead>
<tr>
<th></th>
<th>Cscore</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cscore</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>.38</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.06)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td>.19</td>
<td>.73</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.22)</td>
<td>(p&lt;.001)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td>.29</td>
<td>.87</td>
<td>.86</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.12)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform</td>
<td>.25</td>
<td>.83</td>
<td>.96</td>
<td>.97</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(p&lt;.16)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
</tr>
</tbody>
</table>

*Eighteen subjects took part in the cells of this phase of the research.*
Table 18

Overall Correlation Matrix for Composition and Group Task Performance

<table>
<thead>
<tr>
<th></th>
<th>Comp</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td>.34 (p&lt;.02)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>.47 (p&lt;.01)</td>
<td>.70 (p&lt;.001)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>.43 (p&lt;.01)</td>
<td>.63 (p&lt;.001)</td>
<td>.93 (p&lt;.001)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>.46 (p&lt;.01)</td>
<td>.68 (p&lt;.001)</td>
<td>.98 (p&lt;.001)</td>
<td>.98 (p&lt;.001)</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Table 19

Correlation Matrix for Composition and Group Task Performance for Caucus Conditions

<table>
<thead>
<tr>
<th></th>
<th>Comp</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td>.57</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.01)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>.62</td>
<td>.55</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.01)</td>
<td>(p&lt;.01)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>.47</td>
<td>.30</td>
<td>.94</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.02)</td>
<td>(p&lt;.11)</td>
<td>(p&lt;.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>.56</td>
<td>.45</td>
<td>.99</td>
<td>.98</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(p&lt;.01)</td>
<td>(p&lt;.03)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
</tr>
</tbody>
</table>
Table 20

**Correlation Matrix for Composition and Group Task Performance for No Caucus Conditions**

<table>
<thead>
<tr>
<th></th>
<th>Comp</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Perf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td>.63</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.01)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>.64</td>
<td>.95</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.01)</td>
<td>(p&lt;.001)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>.58</td>
<td>.99</td>
<td>.97</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(p&lt;.01)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>.61</td>
<td>.98</td>
<td>.99</td>
<td>.99</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(p&lt;.01)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td>(p&lt;.001)</td>
<td></td>
</tr>
</tbody>
</table>
Figure 7

Graphic Representation of the Interaction Between Caucus and Group Composition for Overall Group Performance
Table 21

**Regression with Composition Predicting Performance**

<table>
<thead>
<tr>
<th>Trial 2</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>0.48</td>
<td>10.06</td>
<td>p&lt;.01</td>
<td>0.23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial 3</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>0.42</td>
<td>7.28</td>
<td>p&lt;.01</td>
<td>0.18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>0.46</td>
<td>9.36</td>
<td>p&lt;.01</td>
<td>0.22</td>
</tr>
</tbody>
</table>
Table 22

Regression Analysis, with Composition, Opportunity to Caucus, and Their Interaction Predicting Performance

<table>
<thead>
<tr>
<th>Trial 2</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>.48</td>
<td>10.06</td>
<td>p&lt;.01</td>
<td>.23</td>
</tr>
<tr>
<td>Caucus</td>
<td>.32</td>
<td>8.08</td>
<td>p&lt;.01</td>
<td>.33</td>
</tr>
<tr>
<td>Interaction</td>
<td>.37</td>
<td>6.38</td>
<td>p&lt;.01</td>
<td>.37</td>
</tr>
<tr>
<td>y = .48 (comp) + .32 (caucus) + .37 (comp*caucus) + 13.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial 3</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>.42</td>
<td>7.28</td>
<td>p&lt;.01</td>
<td>.18</td>
</tr>
<tr>
<td>Caucus</td>
<td>.21</td>
<td>4.69</td>
<td>p&lt;.05</td>
<td>.22</td>
</tr>
<tr>
<td>Interaction</td>
<td>.16</td>
<td>3.17</td>
<td>p&lt;.05</td>
<td>.23</td>
</tr>
<tr>
<td>y = .42 (comp) + .21 (caucus) + .16 (comp*caucus) + 15.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance</th>
<th>Standardized Weight</th>
<th>F</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>.46</td>
<td>9.36</td>
<td>p&lt;.01</td>
<td>.22</td>
</tr>
<tr>
<td>Caucus</td>
<td>.27</td>
<td>6.77</td>
<td>p&lt;.01</td>
<td>.29</td>
</tr>
<tr>
<td>Interaction</td>
<td>.27</td>
<td>4.91</td>
<td>p&lt;.01</td>
<td>.32</td>
</tr>
<tr>
<td>y = .46 (comp) + .27 (caucus) + .27 (comp*caucus) + 29.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>