A STUDY OF THE RELATIONSHIPS BETWEEN PERSONALITY AS INDICATED BY THE MYERS BRIGGS TYPE INDICATOR AND LEADERSHIP STRENGTHS AND WEAKNESSES AS IDENTIFIED BY SKILLSCOPE

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Dissertation Prepared for the Degree of

DOCTOR OF EDUCATION

UNIVERSITY OF NORTH TEXAS

May, 2001

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Cunnyngham, Hal F., A study of the relationships between personality as indicated by the Myers Briggs Type Indicator and leadership strengths and weaknesses as identified by Skillscope. Doctor of Education (Educational Administration), May 2001, 129 pp, 51 tables, 4 figures, references, 122 titles.

The purpose of this study was to improve the quality of information used in leadership assessment and development programs. The study determined the relationships between personality type, as indicated by the Myers-Briggs Type Indicator (MBTI), and leadership strengths and developmental needs as measured by Skillscope. The study also determined the relationships between personality type and congruence between self-awareness of strengths and developmental needs and ratings by knowledgeable observers.

The discriminate analysis of the Skillscope leadership feedback instrument compared with the selected personality types revealed that personal management was a strength for both ISTJs and ESTJs. The decision-making skill was a strength for ISTJs, and power/influence was determined to be a strength for ESTJs. The high energy/results oriented skill was determined to be a developmental need for ISTJs. There was agreement between ENTJs and other raters as they both saw interpersonal relationships as a strength for that type. INTJs underrated themselves in interpersonal relationships, and ISTJs underrated themselves in decision-making.

Further study is recommended to expand the general body of knowledge of leadership development research. Of particular concern are methods to identify and

explore developmental needs of leaders and how those needs can be addressed in training programs. Three hundred sixty degree feedback instruments should be further analyzed in an effort to explain the differences between raters. Of concern is the high percentage of ISTJ types, which reveals a need to expand research to include significant numbers of other personality types. Consideration should be given to studies that identify the unique contributions of gender to leadership skills and development, and the impact culture has on leadership in organizations.

Although statistically significant research is difficult to obtain in the behavioral sciences, the effort is worthwhile as it provides information that allows leadership development decisions to be made based on dependable data.

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CHAPTER 1

INTRODUCTION

Leadership development is a major concern for organizations across the world as they strive to help leaders keep pace with the constantly changing environment in which they carry out their responsibilities. Faced with the tremendous challenge of ensuring that their organizations remain both efficient and effective, leaders must have a wide-range of leadership skills to succeed. These skills include not only technical expertise in their particular fields, but what has been referred to as the "soft skills" (McGee, 1996, p.110), such as the ability to motivate and work with people.

Definitions of successful leadership are almost as numerous as there are authors. DuBrin (1990) defines leadership as "the process of influencing the activities of an individual or group to achieve certain objectives in a given situation" (p. 257). Winter (1991) states that "successful leaders and managers must use power to influence others, to monitor results, and to sanction performance" (p. 77). Forbes (1991) says, "A leader is successful when the person he or she is trying to influence demonstrates the desired behavior" (p. 70). Kouzes and Posner (1987) state that leadership is "…getting others to want to do something that you are convinced should be done" (p. 2). Guarriello (1996) reflects a position that "leadership deals with getting people to do what needs to be done" (p. 18). Senge (1990) points out that effective leaders can be measured by their ability to motivate stakeholders to be committed to a shared vision. Covey (1990) insists that effectiveness, associated with logistics and bottom line decision-making, and efficiency, the ability to provide vision, direction, motivation and empowerment, are both important

in leadership. Drucker (1996) simply states, "The only definition of a leader is someone who has followers" (p. 104). Hersey and Blanchard (1988) hold a popular definition of leadership that influenced many of the more recent authors by stating that "leadership is the process of influencing the activities of an individual or group in efforts toward goal achievement in a given situation" (p. 86). In his revision of Stogdill's Handbook of Leadership, Bass (1981) proposes that leadership can be stated in terms of the interaction between members of a group, and that "leadership occurs when one group member modifies the motivation or competencies of others in the group" (p.16). This perspective of leadership moves the focus from that of a position one holds to how an individual interacts with other members of the group. Although the many views of leadership result in definitions that will vary according to each author's perspective, most give major importance to the ability to focus resources, specifically human resources, and the ability to influence others to achieve desired outcomes.

A major concern of organizations as they enter a new millenium of exploding technology and an unprecedented rate of change is providing development opportunities to help leaders keep pace. The paradigm of total quality mastered by W. Edwards Deming maintains a central theme of continuous improvement for the organization and the individuals making up the organization (Swift, Ross, and Omachonu, 1998). Bass (1981) holds that maintenance and continuation of leadership are central to any leadership discussion. Additionally, Bass (1981) proposes that leadership is developed through specifically designed training programs as well as experience. Regarding this need for developing leaders Bennis (1976) wrote, "Leadership is as much an art as a

science, and the key tool is the person himself, his ability to learn what his strengths and skills are and to develop them to the hilt" (p. 134). Bennis (1976) also pointed out that a leader should "develop his other, weaker sides" (p. 134). Covey (1990) discussed the need for leaders to adopt the practice of continuous improvement and growth. This need for improvement has also been described as the discipline of "personal mastery" (Senge, 1990, p. 141), which is explained as the discipline of personal growth and learning. Personal mastery is the key first step for any organization to become a learning organization.

In response to the need for leadership development, many organizations and educational institutions have designed research-based leadership development programs. Typically, these programs involve a leadership assessment process that results in recommendations for personal development. A strong trend in leadership development is what has been called the "360-degree" feedback process (Tornow, 1993) . Tornow (1993) describes the 360-degree feedback process as unique when compared to more traditional leadership assessment programs in that it receives input from multiple raters, including self, in the rating of individuals. The multiple raters may include the supervisor, subordinates, co-workers, peers, or customers. The utilization of multirater feedback is not new to leadership evaluation (Lawler, III, 1967). During World War II the Germans gathered performance input from multiple perspectives for their leadership assessment centers (Fleenor and Prince, 1997). The use of 360-degree feedback instruments has gained momentum in recent years as the primary application has focused on leadership development by enhancing managers' awareness of their strengths and

weaknesses (Tornow, 1993). This is based on the premise that information from multiple sources is more comprehensive than information gathered from only one source, as were the traditional hierarchical performance appraisals for leaders (Fleenor and Prince, 1997).

This study examines the assessment instruments utilized in a leadership development program conducted by the Center for Creative Leadership. Founded in Greensboro, North Carolina in 1970 by the Smith Richardson Foundation, The Center for Creative Leadership (CCL) is a nonprofit educational institution devoted to behavioral science research and leadership education. One of the largest institutions of its kind, the Center conducts research, produces publications, and provides a wide range of leadership development programs to both public and private organizations. It conducts research on the nature of leadership, the initial behaviors defining it, and how to increase capacity for greater leadership. The Center's work is practitioner oriented, focusing on practicing managers and client organizations (Center for Creative Leadership, Research, 1997). Each year the Center programs reach more than 27,000 leaders and several thousand organizations worldwide with offices in Greensboro, Colorado Springs, San Diego, and Brussels, Belgium (Center for Creative Leadership, Skillscope, 1997).

One of the leadership educational programs offered by CCL is the Foundations of Leadership (FOL) Program. The FOL program is specifically designed to assist mid-level managers involved in leadership responsibilities that require skills in communication, coaching, feedback, motivation and helping others in their organization succeed (Center for Creative Leadership, 1998). This assessment program is designed to promote self-awareness through a process that includes identifying personality profiles

and a feedback process using evaluations from a leader's self, supervisors and subordinates.

The FOL program utilizes two self-awareness instruments, the Myers Briggs Type Inventory and the Fundamental Interpersonal Relations Orientation-Behavior, to assist participants in understanding their own personal preferences in interacting with those around them (Center for Creative Leadership, 1998). The program utilizes two leadership feedback instruments, Skillscope and the Campbell Leadership Index, to provide feedback from observers familiar with an individual's expressed leadership skills (Center for Creative Leadership, 1998). This process, which provides feedback from self and others, culminates with each participant developing a list of goals to deal appropriately with the information shared, charting the desired course for the future. This study will focus on the relationships between the MBTI and Skillscope, as extensive research on the relationships between these two instruments has not been previously conducted.

Self-awareness is at the beginning of any leadership development process. In referring to this need for self-awareness, Bennis (1976) stated, "To lead others, he must first of all know himself" (p. 140). Self-knowledge can promote inner controls that help leaders learn to be proactive rather than merely reactive, and is the first step in developing positive management skills (Benfari 1991). One area of self-awareness is understanding personality type. Research has demonstrated that all personality types have valuable contributions to make to society and can be effective leaders (Kirby 1997). Therefore, the issue is not which types to promote as leaders, but what are the type

preferences of those in leadership and how do those preferences impact their interaction with others. A number of instruments have proven helpful in accomplishing this task of self-awareness.

The FOL program utilizes the Myers-Briggs Type Indicator (MBTI) to make program participants aware of their personality preferences and appreciate the different personalities of those around them (Kirby, 1997; Myers, 1993). Personality type as identified by the MBTI is useful for increasing self-understanding in individuals and helping them develop an appreciation of personality preference differences. The MBTI is not designed to be used as an evaluative tool (Kirby, 1997).

Organizations and individuals alike rely on specific feedback as a critical factor in developing leadership. The belief is that specific feedback results in a more accurate assessment of leadership effectiveness and ultimately improved performance (Morrison, McCall, Jr., and DeVries, 1978). The use of 360-degree feedback instruments in leadership development has grown in recent years, especially in programs where the primary purpose is assessment for development rather than evaluation (Van Velsor and Fleenor, 1997). These instruments provide feedback from those working closely with the individual leaders -- those in a unique position to report accurately the skills they have observed.

The Center for Creative Leadership has been a leader in the use and development of these instruments. One of the instruments utilized in the FOL and other leadership development programs is Skillscope, a 360-degree degree feedback instrument developed by CCL. Skillscope is uniquely designed to enable people to see their managerial

strengths and their development needs (Center for Creative Leadership, Skillscope Trainer's Guide, 1997). It is a practical guide as individuals receive feedback regarding how they have functioned while carrying out their responsibilities. Much of the theoretical basis for Skillscope is based on Henry Mintzberg's (1973) theory of management. Mintzberg (1973) points out that those serving in management positions do not have the luxury of focusing on one task over the course of the day, but usually must cope with frequent interruptions while handling a variety of issues, all while working at an unrelenting pace. Skillscope was designed with these realities in mind.

Purpose of the Study

The purpose of this study is to improve the quality of information used in leadership assessment and development programs. The study seeks to determine the relationships between two instruments, the Myers-Briggs Type Indicator (MBTI) and Skillscope, and to determine the extent by which self-awareness as measured by MBTI and ratings by knowledgeable observers as measured by Skillscope differ.

This study will contribute to the general body of knowledge of personality types and leadership skills and help developers of leadership assessment programs more accurately communicate results to those being assessed. As relationships between instruments are clarified, this knowledge should increase the effectiveness of leadership development programs as users apply insights gained.

Statement of the Problem

There are three problems to be addressed in this study. The first is to determine if a relationship exists between personality type as measured by the Myers Briggs Type Indicator (MBTI) and leadership strengths identified by Skillscope. The second is to determine if a relationship exists between personality type as measured by the Myers Briggs Type Indicator (MBTI) and developmental needs identified by Skillscope. The third problem is to determine if a relationship exists between personality type as measured by the Myers Briggs Type Indicator (MBTI) and congruence between the assessment of self and others as identified by Skillscope.

Hypotheses

The following hypotheses are included in this study:

1. There will be no significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and strengths identified by Skillscope.

2. There will be no significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and developmental needs identified by Skillscope.

3. The third hypothesis states that there are no relationships between personality type as measured by the Myers-Briggs Type Indicator and congruence between self-awareness of strengths and developmental needs and ratings by knowledgeable observers as identified by Skillscope.

Definition of Terms

The following terms are defined for this study.

Developmental needs are managerial skills identified by Skillscope that raters have observed as weaknesses in the individual being rated.

Myers Briggs Type Indicator is a self-report personality inventory copyrighted and distributed by Consulting Psychologists Press, Inc., in Palo Alto, California.

Skillscope is a 360-degree feedback instrument that identifies skills that are observed as managerial strengths and skill areas that are observed as being in need of development. Skillscope is copyrighted and distributed by the Center for Creative Leadership in Greensboro, North Carolina.

Strengths are those managerial skills identified by Skillscope that raters have observed as clear strengths in the individual being rated.

Psychological Types are an attempt to identify how individuals prefer to interact with their environment based on the Jungian theory of opposites.

360-degree feedback instruments are those that provide detailed feedback on behaviors from self and knowledgeable observers.

Limitations

The number and type of participants in this study is limited to the number provided from the CCL database. Findings and conclusions are not expected to be applicable to the population in general; however, findings and conclusions are expected to be applicable to similar populations. The findings are intended to enhance leadership

development programs and are not intended to be used as an evaluation tool for employment selection or job assignment. The instruments utilized in this study were not necessarily developed for research purposes; however, psychometric data are provided that indicates each instrument lends itself to statistical analysis.

Background and Significance

A concern for those responsible for leadership development is to determine how to design training programs that build upon the strengths of individual leaders and specifically address their developmental needs. The FOL program begins this process by making individuals aware of their personality types, then provides feedback from observers regarding strengths and developmental needs. Finally the program assists participants in goal-setting exercises designed to incorporate this data into their daily lives.

Reflecting on instruments used in leadership development programs (Van Velsor and Fleenor 1997) wrote,

> Feedback consultants or training staff have frequent opportunities to provide background information about the empirical relationship between MBTI preferences and leadership capacities or development needs. Yet these professionals have had little research-based information on which to rely. Although there is a long history of research on personality and job performance, until recently, little research has been done on the relationship between frequently used measures such as the MBTI and instruments that assess leadership capacities

from a variety of perspectives. This kind of research is important to interpreting both the MBTI and leadership skills instruments with managers. (p. 140)

Researchers have conducted many studies of the relationships between MBTI preference and leadership capacities as measured by a number of 360-degree instruments. These studies show some significant relationships between rated leadership skills and personality-based preferences. In their review of this research, Van Velsor and Fleenor (1997) state, "MBTI preferences do not rule out effectiveness as a manager, but the strengths and developmental needs of managers may differ in ways that relate to preference" (p. 158). In a separate article, Fleenor (1997) states that research which relates personality measures and management performance is important because "… it may prevent practitioners from overstating relationships between the MBTI and other measures by contributing data to refine and perhaps correct hypotheses about relationships" (p. 134). However, no research has yet been conducted specifically studying the relationships between the MBTI and Skillscope, two of the instruments utilized in the FOL program.

In order to facilitate the leadership development process in the FOL and other leadership development programs, the relationship between MBTI and Skillscope should be studied to provide trainers with concrete data as they relate MBTI preferences to strengths and developmental needs. Should it be determined that strengths and developmental needs differ in ways that relate to MBTI preference, training methods can be developed that specifically address the unique needs of the various personality types. Strengths can be acknowledged and understood in light of the leader's personality

preferences. Often, the most important feedback a leader can receive relates to areas where development is needed. If personality type is linked to developmental needs, then programs can be designed early in the process to shore up weak areas.

An additional aspect to leadership development is personal awareness of leadership strengths and developmental needs. The FOL program is designed to make participants aware of their strengths and developmental needs from a variety of perspectives. In their review of MBTI and leadership instruments, Van Velsor and Fleenor (1997) noted, "MBTI preference may be related to the likelihood of overrating or underrating self on domains of leadership capacity" (p.158). McCaulley (1994) believes that since all personality types will become leaders, strengths and weaknesses and ratings from multiple sources is a critical area in need of research. When one's self-awareness differs significantly from the perceptions of others, misunderstandings often occur due to these differing perspectives. The Skillscope 360-degree feedback instrument provides important data in this regard. With no studies yet conducted relating the MBTI to Skillscope, trainers lack concrete data as to how personality preference as indicated by the MBTI relates to self-awareness and feedback from others as measured by Skillscope. If personality type is linked to a lack of awareness of either strengths or developmental needs as seen by others, it would be possible to design programs that create this awareness and instill coping skills to address these specific issues early in the leadership training process.

Summary

Improving leadership is a challenge to all organizations. The use of 360-degree feedback instruments can be an effective tool in helping individual leaders identify where they want to invest time and energy to reap the most gain. Although multirater feedback has grown in popularity with all types of organizations, conclusions and recommendations should be based on scholarly research rather than merely the popular trend of the day. This study adds to the body of data available to researchers and feedback facilitators as they utilize 360-degree feedback instruments in leadership development programs.

CHAPTER 2

SURVEY OF THE LITERATURE

The subject of leadership, and specifically leadership development, has been the focus of countless research projects in recent years. Organizations must function successfully in a dynamic environment, and leadership is seen as a key ingredient in achieving that success. Understanding the nature of leadership and how it can be improved has thus become a high priority for behavioral researchers. Psychology is considered an effective tool in understanding the behaviors of leaders. The use of psychological tests in leadership development is therefore considered quite useful. Some of the reasons to use psychological tests cited by Campbell and Van Velsor (1985) that are relevant to this study are listed below:

1. To demonstrate psychological principles,
2. To help the individual better understand his or her specific strengths, stresses, and weaknesses,
3. To help people understand the behavior of others,
4. To help the individual plan a future course of action,
5. To emphasize the wide range of psychological diversity in groups (pp. 23-25).

The MBTI in Leadership Studies

The Myers-Briggs Type Indicator (MBTI) is designed to make psychological types described by Swiss psychiatrist Carl G. Jung understandable and meaningful in

people's lives (Myers and McCaulley, 1985). Jung believed that all people have the capacity to observe and organize, but there are natural differences in ways people prefer to utilize these capacities (Kirby, 1997). The core idea of Jung's theory is that when a person's mind is active it is involved in two mental activities: perceiving, the taking in of information; and judging, the organizing of that information and making conclusions (Myers, 1993). According to Jung's theory there are two opposite ways to perceive: sensing, which is the taking in of information through the senses focusing on practical realities; and intuition, the taking in of information by seeing the big picture and focusing on patterns and new possibilities (Myers, 1993). Jung's theory holds that there are two opposite ways to judge: thinking, which is the preference to look at the logical consequences of a choice or action; and feeling, the preference that considers what is important to them and to other people in decision making (Myers, 1993). These processes are used every day in both the external world, one's interaction with the external environment, and the internal world, the processing of information in one's own mind, and are referred to as differences in orientation and direction of energy. People may focus their energy on the external world of people and events, called extraversion by Jung; or they may focus their energy on the internal world of ideas and experiences, which Jung called introversion (Kirby, 1997).

Jungian psychological type is a psychological construct that is often used to understand leaders. The MBTI has become a popular instrument in research projects because it operationalizes the Jungian constructs into an understandable format that can be easily and readily explained to the layperson (Walck, 1997). Most psychological

instruments involve "traits that approximate normal, bell-shaped distributions," and scores that "represent degrees of the personality trait" (Costa and McCrae, 1992, p.13). The MBTI focuses on type theory which holds that the four basic mental functions -- sensing, intuition, thinking, and feeling -- are used by everyone (Fitzgerald and Kirby, 1997). Each person does not use the functions in the same way. Therefore, type is concerned with preference rather than ability or skill (Walck, 1997). The instrument is called an indicator because it indicates something that is believed to already be present in each person. The MBTI was developed to make the theory of psychological type meaningful and useful in everyday life (Myers and McCalley, 1985). Another reason for the popularity of the MBTI is that all eight preferences, two for each of the four dimensions, are considered normal and all can make a valuable contribution to society (Fitzgerald, 1997). McCaulley (1994) points out that individuals representing all sixteen types can function successfully as leaders, although they do not all lead in the same way and are not necessarily at their best in all situations. The MBTI makes a positive contribution to the integration of many types of people in the workforce as leadership in organizations become more heterogeneous. This integration occurs because the MBTI focuses on valuing differences rather than evaluating differences, which can lead to an appreciation of those who accomplish tasks in a different manner (Fitzgerald, 1997).

The four sets of opposites identified by MBTI result in 16 possible combinations identified by letters: E (Extraversion) or I (Introversion); S (Sensing) or N (Intuition); T (Thinking) or F (Feeling), J (Judging) or P (Perceiving) (Kirby, 1997). MBTI numerical results indicate how clearly a preference was reported. These numerical results are

sometimes converted to continuous scores for analytical research purposes (Myers and McCaulley, 1985).

Because the MBTI indicates type preferences, most studies attempt to associate personality types with various leadership activities. Although each study is unique to itself, most studies will relate the MBTI to one of the following areas of leadership: change processes, decision-making, leadership styles and behaviors, and the organization.

The MBTI and Change Processes in Leadership

Not only is the rate of change in organizations taking place at breathtaking speed, but the demands on those serving in leadership positions have increased proportionally. Walck (1997) notes that leaders of today are expected to respond positively to change and become people of vision to develop strategies for new challenges. Covey (1990) refers to those who possess the ability to prepare their organization to meet the future challenges as "transformational leaders" (p. 282). Van Eron (1991) found Ns and Ps more likely to possess these qualities and be able to lead their organization through times of change. Fleenor (1997) confirmed this data, finding that Ns and Ps were associated with practices that search for new solutions in managing times of change. A study of effective change leaders among high school administrators (McGhee, 1992) found that either NTs or SJs were the most successful in leading their schools through times of change. In a survey of effective change agents, Slocum (1978) found some unique strategies in how different types effectively ushered in change. NTs were unique in using survey feedback and NFs used people oriented techniques including confrontational

meetings. SFs were effective in their use of transactional analysis techniques while STs utilized behavior modification.

Barger and Kirby (1997) have written extensively on psychological type and the change process and reflect that change processes often fail because leaders approach all members of their organizations in the same way. They usually approach change with their employees just as they themselves prefer to approach change. Problems arise when subordinates see life much differently than those who lead them. Barger and Kirby (1997) have found that type functions are important factors in how leaders approach change issues. Recognizing one's own style and how that style tends to approach change is the important first step in recognizing blind spots as leaders relate the change to others in the organization. Barger and Kirby (1997) demonstrate this observation with an example of how two opposites, thinking-feeling, might approach change in their organization. Most leaders in organizations have a preference for thinking. These leaders provide "clear, consistent, and strong leadership for organizations undergoing change" (Barger and Kirby, 1997, p.342). However, thinkers tend to ignore their emotions during times of change and therefore ignore the emotional needs of others, especially the need for emotional support and process time. On the other hand, feelers tend to acknowledge these needs and work to bring people along through consensus and inclusion. They also tend to have a more difficult time making hard choices and tend to get bogged down in consensus building and concern over the needs of others. In conclusion, Barger and Kirby (1997) observe that regardless of type, leaders need to be aware of their own type and understand and acknowledge their natural blind spots. They

can then find effective ways to effective lead their organization through the necessary change.

An MBTI personality type that has been identified as resistant to change is STJ (Isachsen and Berens, 1988; Clancy, 1997). The STJ personality type usually remains focused on the status quo because traditions bring stability to the organization and that stability is very important to them (Clancy, 1997). Until they become convinced of the value in a proposed change, ESTJs will verbalize their resistance, while ISTJs will remain quiet and withdrawn (Kroeger and Thuesen, 1992). Clancy (1997) suggests that helping STJs understand their reactions to change and providing assistance in developing the use of their less-preferred functions -- Intuition, Feeling, Perceiving -- will make the change process less traumatic. Roush (1997) confirmed the findings that ISTJs struggle more than other types with the change process, and recommends counseling to be a possible effective intervention in making major change easier for those of this type. Knowledge of type can be an important first step in learning new ways to take in information and draw conclusions (McCaulley, 1994). In this way, knowledge of type allows STJs to process change much faster and use their strengths to serve as a bridge between the diversity of types functioning in the workplace, helping to insure that change truly addresses the needs of the organization (Clancy, 1997). Lang (1997) describes this as "…using type flexibility -- that is making use of less-preferred functions and attitudes when called for in the situation" (pp.488-489). Lang (1997) goes on to say that the major challenge in many organizations is that a large proportion of leaders are STJ, about 50% of managers in the United States (Macdaid, McCaulley, and Kainz, 1986). He suggests

that the rapid pace of change in organizations may be calling for leaders with strong NFP qualities.

The MBTI and Decision-making

Walck (1997) defines decision-making as involving three basic steps: defining the problem, gathering information, and evaluating information. In the recognition of strategic problems, Hunt (1986) found that N managers were significantly more successful than S managers. Phillips-Danielson (1985) found T managers more likely to be problem-definers. Ginn (1997) found that situational factors had more influence on problem recognition than personality type.

The manner is which data is received has implications on decision-making. Rational factors are usually the primary concern of Ts, while Fs are more concerned about the feelings of others (Atwater and Yammarino, 1993). Ns tend to be less satisfied with what they are told and look to other sources for information (Walck, 1997), including observation and literature sources (Kerlin, 1992). Fs prefer visual information while Ts value tabular data (Ghani, 1981). The leader's decision-making style has an impact on how information impacts the dynamics of a team (van Rooyen, 1994). van Rooyen (1994) holds that unless a team learns to appreciate the various ways in which members receive information, working together becomes a much more difficult task.

Clancy (1997) observes that much of the research relating type to evaluating information and decision-making is inconclusive. However, some studies have shown a few tendencies. The structure and environment in which the decision is made may have

significant impact on decision-making (Haley, 1997). Ns and Ts performed well in open-ended environments, while Ss and Fs did better in structured settings (Hunter and Levy, 1982; Patz, 1992). Clancy (1997) also holds that risk can play a role in how information is evaluated. Nutt (1986) found that STs needed an environment consistent with their type to take risks. NTs, NFs, and SFs were more willing to take risks in uncomfortable environments. Nutt (1986) also found that different personality types make different choices even when given the same information. STs and SFs overemphasize detailed analyses, whether or not it is relevant to the subject. NFs and NTs tend to complicate clear-cut, simple solution tasks.

The MBTI and Leadership Styles and Behaviors

The ability to vary one's leadership style and behavior to meet the needs of the moment is the basic premise of the situational leadership model of Hersey and Blanchard (1988). According to this model, leaders must be directive in certain situations and supportive in others, depending on the relative experience of subordinates and the situation in which they are involved. Based on the contingency theory of leadership, leaders should move from one style to another as the situation merits. This is not an easy task. Walck (1997) defines the challenge for type research as "…whether type predisposes a manager to a certain leadership style and whether type makes it difficult to learn new styles of leadership" (p.79).

Situational leadership styles were compared with MBTI type in a study by Routamaa and Ponto, (1994). Reddin's 3D-model was used along with the Hersey and

Blanchard model of situational leadership. Findings revealed that Es are high contact and action oriented while Is prefer more isolation and autonomy in their activities. Ss are versed at maintaining the status quo. Fs are much more social in their leadership behaviors than Ts. Ns showed to be people oriented. Js are more likely to invest time to develop others, and Ps have trouble with consistency as they are easily distracted by new opportunities. Several studies found no significant relationship between leadership styles and personality types using the Hersey-Blanchard Leadership Effectiveness and Adaptability Description (LEAD) (Wittstruck, 1986; Flores, 1987; Pendley, 1986; and Berg, 1993).

Pearman and Fleenor (1997) examined psychological types in relation to leadership behaviors on two multi-rater instruments, the Leadership Style Indicator and Benchmarks. Results indicated a strong confirmation of type predictions made by Myers and McCaulley (1985). The study revealed behaviors that were observed for each type, and suggests that consideration be given to the development of those behaviors not expressed. Some of the basic conclusions for each MBTI type confirmed by this study are as follows:

ISTJ: achieve by conformance and enjoy conventional responsibilities and traditional power oriented roles

ISFJ: often proud of self-control over impulses in service to nurturing relationships and will serve in conventional ways

INFJ: independent spirits who are exceedingly tolerant of others' differences

ISTP: see themselves as "standard Joes and Janes" without marked differences

from others but are often independent minded with a critical eye to their environment

ISFP: an easygoing style with a desire to nurture and serve others

INFP: flexible, psychologically minded types who achieve by independent efforts

INTP: enjoy independence and abstractions, often exceedingly tolerant and intellectual, resourceful

ESTP: independent minded whose sense of well being leads to enjoying life's events while at the same time being somewhat impatient with life events

ESFP: tolerant in service to helping others in a pressured situation

ENFP: explosive energy, exhibiting empathy, independence of action, and flexible responses

ENTP: high energy, confident, independent, and enjoys abstractions

ESTJ: achieve through conforming to structure, tolerant in order to make a good impression, and often frustrated if specificity left out of conversation

ESFJ: independent minded but within structured setting, likes responsibility and helping others in the moment

ENFJ: often achieve dominance through confidence and nurturing behaviors

ENTJ: dominant in social settings, communicate confidence and achievement orientation in social interactions (pp.192-193).

Fitzgerald (1994) analyzed data taken from a 360-degree instrument called the Management Skills Profile, an instrument based on models of managerial work. Those managers with preference for S, T, and J, received higher scores on planning, organizing,

problem analysis and decision-making, and results orientation. S and J preference scales scored higher on personal organization and time management and delegating and controlling. Those with the highest scores on planning, financial, and quantitative scales were of the thinking type. Managers with a preference for J received high ratings on planning and written communications. This instrument did not measure skills typically associated with Is, Fs, and Ps.

The Survey of Management Practices (SMP) is based on models of what managers need to do to be successful. In research using the SMP instrument, Wilson and Wilson (1994) found that Ss rated high on orderly work planning. Thinkers rated higher on exercising more goal pressure. Intuitive managers rated high on clarification of goals. Feeling managers rated high on delegation and recognition, and perceiving managers scored high on expertise and feedback. Also using the SMP, Johnson and Golden (1994) found that Ts rated higher on control of details and goal pressure, while Js rated higher on making control adjustments and planning. Intuitives rated higher on clarification of goals, orderly work planning, expertise, work facilitation, feedback, and recognizing good performance. Intuitives also rated higher on interpersonal relations scales. Those with a preference for feeling rated high on people-oriented scales.

Sundstrom, Koenings and Huet-Cox (1994) related MBTI scores to the System for Multiple Level Observation of Groups (SYMLOG), a measure of leadership values and behaviors. They reported that managers with preferences for S, T, and J expressed efficiency, authority, and conventional ways of doing things. Those with F preferences rated high in friendly values, and those with I preferences rated high in creativity.

Benchmarks, a leadership instrument that considers skills managers learn from experience and skills of successful leaders (Van Velsor and Fleenor, 1997), did not measure skills that come naturally to Ss, Ts, and Js (Van Velsor and Fleenor, 1994). However, those with a preference for feeling, rated high in leading subordinates, setting a developmental climate, compassion and sensitivity, self-awareness, and putting people at ease. Feeling types were seen less likely to have problems with interpersonal relationships, be able to build and mend relationships, and act with flexibility. Van Velsor and Fleenor (1994) note that leadership skills measured by Benchmarks and type do not vary by gender.

Other studies looking for relationships between personality type and leadership instruments have provided limited results. MBTI type was compared to perceived leadership effectiveness in a study conducted by Lindsley and Day (1994). Effectiveness was based on the raters' response to how effectively the leader was leading their team. The MBTI type of team members was also taken into consideration. The only significant result was that team effectiveness was higher when there was thinking-feeling diversity between the team leader and members.

It should be noted that researchers should be careful when making comparisons of various leadership instruments (Van Velsor and Fleenor, 1997). Although each will measure effective leadership in some way, each may also be quite different depending on the specific design and intent.

The MBTI and the Organization

The organizational climate is of utmost importance to leaders. Type can have an impact on how leaders learn, achieve personal satisfaction, and fit into the organizational culture (Walck, 1997). The ability to learn is an important step to being able to effectively lead others. Relationships have been identified between type and learning in management settings. Ns were found to learn more effectively in laboratory settings (Steele, 1968). Kilmann and Taylor (1974) concluded that I, S, T, and J preferences tended to reject group training experiences. Haber's (1980) research found that those with S, N, T, and F preferences responded well to learning simulations. On the contrary, Blaylock (1983) found that STs and SPs held their interest in simulation activities, while NTs and NFs lost interest.

Personal satisfaction is tied to self-esteem and job fulfillment. Es have reported high levels of job satisfaction (Fitzgerald, 1994). A greater sense of well-being was observed by Shewchudk and O'Connor (1995) in Es, and ETJs were more positive regarding their well-being than other types. Marcic, Aiuppa, and Watson (1989) found that those with a high degree of fitness for their jobs are rewarded more often and exhibit a higher self-esteem as a result. Type preferences have demonstrated how leaders spend their time. Gardner and Martinko (1990) observed Is and Js spending time with paperwork and problem solving, Ts working on staffing activities, and Es socializing. If the organizational culture values the activities that each type enjoys, job fulfillment could be enhanced. Collins (1965) found that Ns favored open organizations and were not

satisfied with closed climates. Ss had high s1atisfaction with either, thus demonstrating a greater amount of flexibility.

Table 1 provides a summary of strengths and weaknesses by MBTI types for each of the leadership areas discussed in this section.

Table 1 – Summary of Strengths and Weaknesses by MBTI Type

	Type	Strengths	Type	Weaknesses
Change Processes	N, T, P	skilled in leading change	STJ	often resistant to change
	NT, SJ	successful in leading schools through change	T	may ignore the needs of others in times of change
	F	effective when others' needs are critical to implement change	F	may get bogged down in consensus building
Decision-making: Defining the problem	N, T	likely problem definers		
Decision-making: Gathering data			All Types	can be a weakness for all types if they do not appreciate various ways others receive data
Decision-making: Evaluating data	N, T	better in open environments	ST, SF	may overemphasize details
	S, F	better in structured settings	NF, NT	tend to complicate simple tasks
	NT, NF, SF	more effective in uncomfortable environments		
Leadership Styles and Behaviors	S	when status quo is necessary	P	distracted by new opportunities
	N, F, J	people oriented, likely to spend time to develop others		
	E	action oriented		
	S, T, J	planning, results oriented		
	S, J	personal organization		
	J	written skills		
	N, T	goal pressure and clarification		
	F	delegation and flexibility		
	P	expertise and feedback		
	N	innovation, creativity		
Organization	S, N, T, F	respond well to learning simulations	NT NF	may lose interest in learning simulations
	N	effective in laboratory settings	I, S, T, J	reject group learning experiences
	E, T, J	more positive about jobs		
	S	demonstrated more flexibility		

Leadership Studies and 360-degree Feedback

The 360-degree feedback process has increased in popularity as organizations look for ways to positively impact leadership. Tornow (1993) notes that 360-degree feedback is unique because it receives feedback from multiple raters rather than only the supervisor, which is the case in most leadership assessment. Focusing on leadership development rather than evaluation, these multi-rater feedback instruments provide leaders with the data necessary to formulate development programs specifically targeting their needs and those of the organization they serve (Hirsch, 1994). Tornow (1993) suggests that multi-rater feedback instruments are especially useful to organizations in need of great change because it targets the changes needed in the leaders themselves. McCauley and Moxley (1996) support the premise that 360-degree feedback can promote change in individual leaders, and adds that self-awareness is the first step in the ongoing process of development. Fleenor and Prince (1997) summarize that 360-degree feedback offers four fundamental advantages when compared with more traditional approaches that involve a single evaluator:

1. The 360-degree assessment offers new perspectives by which an individual's skills, behaviors, abilities, or performance can be judged.
2. The 360-degree assessment alleviates some recognized deficiencies of top-down, single-source assessments such as personal bias and limited knowledge by a single rater.

3. The 360-degree assessment provides the unique opportunity for individuals to rate themselves.
4. The 360-degree assessment can be used to reinforce organizational values and vision. (pp. 52-54).

As the 360-degree feedback method of enhancing leadership grows in popularity, the volume of related research will also grow. Several areas have emerged in the literature as researchers address the use of these instruments. These areas include accuracy, underraters, overraters, accurate raters, and leadership development.

360-degree Feedback Accuracy

In the use of multi-feedback instruments in leadership development, self-scores are compared with the scores from knowledgeable observers. Accuracy is defined as "the degree of agreement between self- and other- ratings" (Yammarino and Atwater, 1993, p. 232). When differences are noted, it is usually assumed that the self-rating is the inaccurate measurement, because the ratings of others are considered more objective (Yammarino and Atwater, 1993). Van Velsor, Taylor, and Leslie (1993) have stated that self-rater agreement serves as an operational definition of self-awareness. Dunnette (1993) holds that this is not always the case and calls for more research to verify this assumption.

It has been mentioned that if self-assessments are considered inaccurate in leadership measures, then a similar concern could be raised regarding self-assessments of personality (Nilsen, 1991: Nilsen and Campbell, 1993). Nilsen and Campbell (1993)

recognized this concern, but still hold to the position that the study of the differences between self and observer ratings offers much to learn about leadership. In conclusion, Nilsen and Campbell (1993) hold that "self-observer discrepancies represent inaccurate self-ratings" (p. 275). Evidence for this conclusion is mentioned in two cases. The first case is the study by Harris and Schaubroeck (1988) which found that when scores are analyzed in the three dimensions -- self, peers, and supervisor -- peers and supervisors agree to a much greater extent than self and peers, or self and supervisors. Secondly, Nilson (1991) showed that observer ratings of personality were more predictive of job performance than were self-ratings of personality. These findings confirmed a study by Mount (1984) that indicated subordinate ratings were much closer to supervisor ratings than to self-ratings.

The enhancement of self-awareness as suggested by McCauley and Moxley (1995) holds that the true value of 360-degree feedback is when leaders are able to compare their self-reports with the reports of others. This activity alone can motivate leaders to take a close look at their own behavior and how it impacts others. Ludeman (1995) proposes 360-degree feedback because it fills a feedback void for upper level managers and can make them aware of misunderstandings occurring in the organization. Tornow (1993) found that differences in self and rater scores motivates managers to alter some of their perceptions and improve performance. Yukl and Lepsinger (1995) address the accuracy issue by suggesting that self-ratings be compared to others' ratings and some other standard of leadership effectiveness such as performance norms. They, as do many of the researchers, call for more studies to address this question.

Another concern related to accuracy has to do with the stability of scores. Nilsen and Campbell (1993) addressed this question in a study that specifically analyzed the stability of self and observer ratings. They found that rater differences tend to remain stable over time, however, self-ratings do change with intervention.

360-degree Feedback and Underraters

One dominion of self-rater discrepancy is that of underraters. Underraters are those whose self-reports are consistently lower than ratings by others. If accuracy is defined as rating self as others would (Yammarino and Atwater, 1993), then those who consistently rate themselves lower than others have a lack of self-awareness. Van Velsor, Taylor, and Leslie (1993) established the operational definition for underraters as being those individuals whose difference scores that are one-half standard deviation below the mean difference.

Research has shown that underraters impact some organizational outcomes in a positive way such as a keen interest in self-improvement and training (Yammarino and Atwater, 1993). However, Bass and Yammarino (1991) found that underraters had mixed results in leadership outcomes, primarily because they are not accurately aware of their strengths and weaknesses, which leads to poor decision-making. They also found that conflicts often result from these misperceptions. Underraters will underachieve because they underestimate their abilities (Bandura, 1982).

An interesting observation made by Van Velsor, Taylor, and Leslie (1993), noted that underraters are usually rated highest by their subordinates and are therefore

perceived as the most effective managers. These researchers are of the opinion that others may believe this type of leader will exert extra effort in order to complete tasks and will be more willing to improve. Underraters have been observed to spend extra time in preparing for a task because they feel inadequately prepared (Nilson and Campbell, 1993); however this can be a problem if it leads to excessive preparation and less time on task. Dweck and Leggett (1988) believe that underachievers will invest this extra time only if they see reasonable goals that are worth the effort.

Leaders with an MBTI preference for feeling were sometimes found to underrate themselves when compared to scores by other raters (Van Velsor and Fleenor, 1997). These researchers concluded that feelers may have impressed others in the organization due to their tendency to have concern and sympathy for those around them.

360-degree Feedback and Overraters

The widely accepted definition of overraters proposed by Van Velsor, Taylor, and Leslie (1993) establishes an individual as an overrater when his difference scores are one-half standard deviation above the mean difference. Overraters tend to produce diminished organizational outcomes such as poor relationships (Yammarino and Atwater, 1993). When people feel they fully understand a task, they will probably spend less time in preparation and learning to complete that task. Nilsen and Campbell (1993) see this as a possible source of problems for overraters as they overestimate their proficiency in a particular task and therefore are not adequately prepared.

Studies by Van Velsor, Taylor, and Leslie (1993) demonstrated that overraters usually had the highest self-ratings in managerial effectiveness, but were rated lowest by others. Others also viewed overraters as having the lowest self-awareness. Therefore, self-perception and accuracy tend to be problem areas for managers who are overraters. Overraters sometimes experience career derailment due to aspirations and expectations that exceeded others' perceptions of their abilities (McCall and Lombardo, 1983).

Van Velsor and Fleenor (1997) confirmed earlier suspicions by reporting that extroverts were consistently overraters, giving themselves high marks in a majority of leadership skills. Others rarely give this group marks as high as they give themselves.

360-degree Feedback and Accurate Raters

Similar to the operational definition for underraters and overraters, self raters are considered accurate if their difference scores are in agreement with the ratings of others and are therefore within one-half standard deviation from the mean in either direction (Van Velsor, Taylor, and Leslie, 1993). Yammarino and Atwater (1993) observed desired organizational outcomes in relation to accurate raters. A similar observation was made in regard to individual outcomes. Bass and Yammarino (1991) found that successful performance, measured by subordinate and supervisor ratings, was observed from leaders whose self-ratings were similar to the ratings of others. The researchers credit this success to more effective decision-making and the development of realistic expectations in light of achievement potential. Ashford (1989) determined that accurate self-raters dealt more constructively with information and feedback regarding their

performance and abilities, then changed behavior in a positive way as a result. Accurate raters had a more realistic understanding of their superior's desires and expectations and therefore were more likely to be promoted (Bass and Yammarino, 1991). Those managers whose self-perception matched others' perceptions of them also tend to receive high ratings in interpersonal relationships (Van Velsor, Ruderman, and Young, 1991). Roush and Atwater (1992) found a relationship between MBTI type and accuracy of self-perception, with Is and Ss tending to have more accurate self-perceptions when self-ratings were compared with the ratings of others.

360-degree Feedback and Leadership Development

Ashford (1989) suggests that accurate self-raters will be more likely to use feedback for positive change. Ashford goes on to say that recognition of strengths, weaknesses, and overall effectiveness is important before any individual can make adequate decisions to change behavior. A later study (Atwater, Roush, and Fischthal, 1992) found that feedback can change the self-perception of underraters, and change both the self-perception and performance of over-raters. Van Velsor, Ruderman, and Young (1991) reported that when managers modified their self-ratings it was primarily in the area of interpersonal skills.

Yammarino and Atwater (1993) recognize the growth potential for development when using multirater feedback approaches. However, they express a caution in regard to possible unintended consequences. Sometimes overraters respond with hostility and resentment when faced with feedback that differs from self-ratings. A lower self-worth

could be the result for underraters. These pitfalls can be avoided, suggest the researchers, by utilizing trained professionals to interpret the results and help individuals process the information. Vinson (1996) warns that multirater feedback can be painful, especially if it is perceived that differences are based on conflicting opinions. Finally, Yammarino and Atwater (1993) suggest that a declining difference in the ratings of self versus others could be a good indication of an increasingly accurate self-perception.

Tornow (1993) offers a somewhat different perspective on the prevailing opinion of 360-degree feedback and development. In his viewpoint, the psychometric study perspective focuses on the idea that there is only "one objective reality" (p.228), that is the reports of others. He suggests that in looking at multirater feedback from the leadership development perspective, a better assumption might be that the value is in understanding the many different perceptions of reality and that each perception may be accurate to some degree. Tornow (1993) does recognize that multi-source feedback is useful for designing development programs, and seeing the differences between self and others' ratings provides motivation for change.

Many organizations using 360-degree leadership development programs make little effort to incorporate the training into the daily life of the organization (Kaplan, 1993). Multirater feedback and development programs should directly relate to the overall philosophy and strategy of the organization (London and Beatty, 1993). Yukl and Lepsinger (1995) suggest that organization support is very important, and the support necessary to get the program underway might be as simple as providing opportunities for participation. The employee must decide for himself how to use the information learned

from the feedback experience (Vinson, 1996), but the organization may set some minimum expectations such as establishing a development plan and setting specific goals (Yukl and Lepsinger, 1995).

Moses, Hollenbeck, and Sorcher (1993) argue that the overall simplicity of the information received in 360-degree feedback limits its usefulness. Their criticisms include a limited frame of reference upon which to base accurate feedback, too much of a reliance on generalized traits, and incomplete recollections of past performance and behavior by raters. This research team holds that the quality and usefulness of feedback will improve as the situational aspect of leadership is incorporated. Others (Jones and Bearley, 1996) warn that although 360-degree instruments have much promise in leadership development programs, the potential for misuse and error is still quite high and will remain so until more data becomes available upon which to draw conclusions. Dalton (1996) and Edwards (1995) suggest that raters are more honest when 360-degree instruments are used for development rather than formal appraisal.

Although the research on 360-degree instruments is growing, little has been done concerning relationships between personality type, as indicated by the MBTI, and leadership strengths and weaknesses, as indicated by Skillscope. This study is designed to add to the general body of knowledge of 360-degree feedback instruments, and provide feedback specialists with concrete data in interpreting instruments to leadership development program participants.

CHAPTER 3

PROCEDURES FOR COLLECTION AND ANALYSIS OF DATA

This chapter identifies and explains the psychometrics of this study. Statistical analysis in behavioral research is a challenging issue, as the activity of human beings is not easily measured. This chapter identifies and explains the psychometrics of the study. The validity and reliability of the instruments used are discussed, and the reasons for their selection are explained. Additionally, the statistical measures are identified and the justification for their selection is discussed.

Statement of the Problem

There are three problems addressed in this study. The first was to determine if a relationship exists between personality type as measured by the Myers Briggs Type Indicator (MBTI) and leadership strengths identified by Skillscope. The second was to determine if a relationship exists between personality type as measured by the Myers Briggs Type Indicator (MBTI) and developmental needs identified by Skillscope. The third problem was to determine if a relationship exists between personality type as measured by the Myers Briggs Type Indicator (MBTI) and congruence between the assessment of self and others as identified by Skillscope.

Population

The population selected for this study consists of experienced, mid-level leaders who have participated in leadership development programs at the Center for Creative Leadership in Greensboro, North Carolina. These leaders work in a variety of business, industry, educational, and non-profit enterprises. Although the sample has representatives of both genders and a number of races, due to the nature of the CCL population, most are white male.

Selection of Sample

The sample utilized for this study was a random sample drawn from the database of the Center for Creative Leadership. CCL staff generated a random sample of just over 500 leadership program participants who had taken both the Myers-Briggs Type Indicator and Skillscope.

Instrumentation

The Myers-Briggs Type Indicator

The Myers-Briggs Type Indicator (MBTI) was developed by Katharine Briggs and Isabel Myers to provide a structure for "…understanding both similarities and differences among human beings" (Myers and Myers, 1980, p. ix). It was based on Carl Jung's theory of psychological type. The MBTI indicates the preferences in which individuals interact with their environment. The instrument is not designed to indicate the presence of pathological conditions, as are many psychological instruments. It is

designed to acknowledge and value differences rather than evaluate differences, so that people can better appreciate and understand each other (Fitzgerald, 1997). It is for this reason that the MBTI is popular in leadership studies.

MBTI Validity

Construct validity, which determines if the instrument measures what it says it measures (Kerlinger, 1986), has been established by correlations reported for the eight MBTI preferences with over twenty different personality measures. Type theory as stated by Jung states that people have a preference for one of two opposites on each of the four MBTI scales (Myers, 1993). Because of these opposite relationships instrument developers indicate that, "The conventional notation for MBTI correlations is followed, such that positive correlations are associated with I, N, F, or P, and negative correlations are with E, S, T, or J" (Myers and McCaulley, 1985, p. 176). Myers and McCaulley (1985) list validity studies relating MBTI continuous scores with over twenty different scales of personality, interest, and academic tests. The significant validity correlation coefficients for extraversion ranged from -.77 to -.40. These include extraversion as measured by other instruments as a sense of comfort in functioning in the environment, quick response to energy from the environment, assertiveness, freedom of expression, and an openness in relating to others, just to mention a few. Significant validity correlation coefficients for introversion ranged from .75 to .40. These include measures of social and occupational introversion, lack of comfort in the environment, autonomy, quiet and solitary, and interest in privacy. Scales significantly correlated with sensing

ranged from -.67 to -.40. Practical outlook, orientation toward reality, a proper rule-bound attitude, and self-control are items from other instruments related to the sensing category. Significant intuition validity correlation coefficients ranged from .62 to .40. These characteristics include flexibility, artistic ability, creativity, self-actualization, and independence. Personality characteristics correlated with thinking ranged from -57 to -.40. Characteristics correlating with thinking include dominance, autonomy, achievement, assertive, and aggression. Scales significantly associated with feeling ranged from .55 to .40. These scales indicate a correlation with characteristics such as concern for others, sociability, deference, avoidance of the unpleasant, and blame avoidance. Scales correlating significantly with judging ranged from -.59 to -.40. Characteristics include an achiever personality, order, endurance, self-control, and assertiveness. Scales of personality characteristics correlating with perception ranged from .57 to .40. Characteristics correlating with perception include complexity, intellectual quality, imaginative, aesthetic, and sees change as challenge.

Other research supports the construct validity of the MBTI. Utilizing factor analysis, the results obtained by Thompson and Borrello (1986) strongly support the construct validity of the MBTI. Johnson and Saunders (1990) conducted a factor analysis study of the Myers-Briggs Type Indicator which resulted in a favorable conclusion regarding the construct validity of the test. The researchers concluded, "In general, factor loadings were all sufficiently strong to regard all four factors as distinct, well-defined constructs" (Johnson and Saunders, 1990, p. 561).

Myers and McCaulley (1985) argue that construct validity is the most appropriate measure of the validity of the MBTI since it was constructed to implement Jung's theory of psychological types. Thus "…its validity is determined by its ability to demonstrate relationships and outcomes predicted by theory" (Myers and McCaulley, 1985, p.175). This perspective of validity is supported by Kerlinger (1986) who states that in behavioral research, "…we put the greatest emphasis on construct validity, since it is probably the most important form of validity from the scientific research point of view" (p.417). Van Velsor, Fleenor, and Leslie (1997) argue, "the different 'types' of validity are actually aspects of a single concept -- construct validity." Regarding the validity of the MBTI, Kirby (1997) states, "Correlations of MBTI preferences with other reliable instruments are in the direction that would be predicted by psychological type theory. Observer reports of behavior by type are consistent with the underlying theory" (p. 14).

Although there is significant support for the validity studies reported by Myers and McCauley (1985), there are other interpretations. Pittenger (1993) believes that the approach of focusing on a single validation procedure such as construct validity calls into question the utility of the test due to what he believes is insufficient evidence to support the claims of proponents. Pittenger holds to a unified view of validation which requires that validity will have many sources of corroboration. He challenges previous MBTI validity studies stating, "Indeed, that the MBTI correlates highly with measures of personality with much different theoretical and empirical origins suggests that the unique assessment qualities of the MBTI cannot be maintained" (p. 483). Kline (1993) expresses concern regarding the validity of the MBTI. According to Kline (1993), the

key in validation studies is not the MBTI continuous scores, but whether the test actually classified individuals into distinct types as described by Jung's theory. From Kline's (1993) perspective, research conducted some years ago by Stricker and Ross (1964) indicates that the continuous scores of MBTI provide no evidence of the existence of the typologies. Kline (1993) also holds that correlation studies with the MBTI are very difficult to accept due to the nature of some of the force-choice items that result in scales he considers to be artificial. Kline (1993) concludes that the validity of the MBTI is thus unproven. Carlson (1985) questions the validity of the MBTI because much of the data was collected from university students. He calls for more research utilizing a variety of populations.

Sipps and Alexander (1987) question the theoretical assumptions upon which the MBTI is based. They found that the MBTI extraversion-introversion (EI) and the judging-perceiving (JP) scales correspond with sociability and impulsiveness, respectively. A later study (Sipps and Alexander, 1988) confirmed these results. They hold that this conflicts with the traditional definition of these scales as stated by Myers (1962). In Myers' (1962) definition, extraversion-introversion relates to how one focuses on "things" (p.1), and judging-perceiving is the process of "becoming aware" (p.1). This led Sipps and DiCaudo (1988) to question the validity of the MBTI, concluding that "although the MBTI scales are internally consistent and independent, the identity of the measured constructs bears further examination" (p.446).

MBTI Reliability

For test-retest reliabilities, the practical concern is if the results will be the same for an individual on all four MBTI scales on retest. Myers and McCaulley (1985) report that when correlated for continuous scores, test-retest reliability coefficients at intervals of 12 months or less for TF are the lowest of the four scales, ranging from .91 to .48. This was predicted by Myers and McCaulley (1985), since good judgement is the most difficult to develop. Test-retest correlations for the other scales (EI, SN, and JP) were in the .7 or above range with most populations. The authors conclude that when subjects report a change in type, it is most likely to occur in only one preference and in scales where the original preference was low.

Myers and McCaulley (1985) report tests of internal consistency reliabilities utilizing split-half scores selected by logical split-half procedures calculating the Pearson product-moment correlation coefficients. Internal consistency reliabilities as determined by coefficient alpha are roughly the same as those computed with Pearson's r. Coefficients were as follows for each of the MBTI scales: EI (.74 to .83), SN (.77 to .85), TF (.64 to .82), and JP (.78 to .84). Myers and McCaulley (1985) summarize that the internal consistency reliabilities for the continuous scores of the four MBTI scales are most acceptable for adults, although they do acknowledge that results are somewhat lower for samples of low achievers and those with low type preference scores. Kirby (1997) believes that the reliability coefficients for educated U.S. adults taking the MBTI are excellent, consistently .80, thus making it a good instrument for use with leaders because most would fall into this category.

Other researchers give positive results in reliability studies. Carlson (1985) summarized two-dozen studies that examine the reliability of the MBTI. His findings conclude that the split-half reliability coefficients reported in the MBTI Manual, generally exceeding .80 (Myers, 1962), have been confirmed by similar studies and are therefore satisfactory. Kline (1993) holds that test-retest reliability should be at the .7 level as a minimum for personality tests and therefore concludes that MBTI scales are reasonably reliable. Lewis (1993) also supported the reliability of the MBTI.

As with validity, there are different interpretations of the reliability data. Although Pittenger agrees that MBTI test-retest reliabilities are consistently high, he disagrees with the interpretation of those results by suggesting that types have the potential of changing at each testing. Myers and McCaulley (1985) point out reliability research indicates that changes are more likely to occur when preference scores are low; however, Pittenger (1993) feels this indicates that the four-letter code is not a stable personality characteristic. He goes on to say that because the MBTI utilizes an absolute classification scheme, people with similar scores can have very different personality type profiles.

MBTI Psychometrics -- Conclusion

The very nature of behavioral research is an attempt to understand abstract ideas and concepts. Many interpretations have been made of the current data regarding the MBTI. Pittenger (1993) holds, "No test of personality measures underlying constructs with great precision" (p.481). As Van Velsor, Leslie, and Fleenor (1997) point out, the

major factor in instrument selection is its intended use, "…the use for which it was intended and the use you plan to make of it" (p.14). As one who has stated many concerns about the MBTI, Pittenger (1993) recognizes that it is up to the test user to strike a balance between the risks and benefits of a particular test. Much of the concern regarding the use of personality tests has to do with the misuse of the instruments. Kirby (1997) reflects that the purpose of the MBTI is to help people understand their own preferences and appreciate the differences in those around them. It is not designed to be used in "…hiring, firing, or promotions" (Kirby, 1997, p.15). It is the view of this researcher that the use of the MBTI in leadership development can be positive as long as scores are not used as a basis for employment decisions and test results are interpreted by a competent professional.

Skillscope

Skillscope is a 360-degree feedback instrument developed by the Center for Creative Leadership (CCL) that targets middle and upper level managers. It is designed to be used for development rather than evaluative purposes and enables people to see their managerial strengths and developmental needs (Center for Creative Leadership, Skillscope Trainer's Guide, 1997). It can be used by itself or with other assessment tools. In the Foundations of Leadership Program (FOL), the results from Skillscope are used with results from the Myers-Briggs Personality Indicator, the Fundamental Interpersonal Relations Orientation-Behavior, and the Campbell Leadership Index.

Skillscope is based on Mintzberg's (1973) descriptive research on managers. Mintzberg (1973) found that managerial work involves informational skills, interpersonal skills, and decisional skills. In addition to Mintzberg's three skill areas, developers of Skillscope added two more, personal resources and motivation to make effective use of these resources (Kaplan and Ohlott, 1988), resulting in five skill areas addressed by the instrument. Skillscope consists of 98 descriptive statements that are positive characterizations of effective management behaviors from the five skill areas. Fifteen clusters were developed from the five skill areas to group the 98 items into categories (Kaplan and Ohlott, 1988). The five skill areas and the corresponding clusters with the number of items in each cluster are listed below.

1. Informational Skills: Getting Information and Making Sense of It (7 items), Conveying Information (5 items)
2. Interpersonal Skills: Relationships (10 items); Selecting, Developing and Accepting People (7 items); Influencing, Leadership and Power (9 items); Openness to Influence, Flexibility (9 items)
3. Decisional Skills: Taking action, Making Decisions, Follow Through (5 items); Risk-taking and Innovation (5 items); Administrative/Organizational Ability (9 items); Managing Conflict, Negotiation (3 items)
4. Personal Resources: Energy, Drive, and Ambition (4 items); Knowledge of the Job and Business (6 items)

5. Use of Self: Time Management (4 items); Coping with Pressure and Adversity; Integrity (8 items); Self-management, Self-insight, Self-development (7 items)

For each of the 98 items, respondents indicate whether each item is a strength or a developmental need. If the respondent feels that the item is neither a strength or a developmental need, the item is to be left blank. The item is also to be left blank if the respondent feels it does not apply to the person being rated (Kaplan, 1997). Respondents are first asked to indicate areas of strength, resulting in a two-point scale that indicates the presence or absence of a strength. Raters are then instructed to choose a few items as developmental needs. Test developers do not consider the second process a scale since raters were only asked to consider items previously left blank (Center for Creative Leadership, Skillscope Trainer's Guide, 1997).

Skillscope Validity

The validity study reported by test developers was designed to determine the extent Skillscope rater data on 154 managers was related to performance evaluation ratings by the managers' bosses on nine competencies and an overall effectiveness rating (Center for Creative Leadership, Skillscope Trainer's Guide, 1997; Kaplan, 1997). The study showed that each of the 15 clusters was significantly related to one or more of the performance evaluation competencies. Correlation coefficients ranged from .16 to .36, with a median of .23 (Hough and Fisher, 1997). Five of the 15 clusters (Getting Information; Taking Action; Administrative/organizational ability; Influencing,

Leadership, Power; Knowledge of Job) were significantly correlated with the overall effectiveness ratings, with all correlation coefficients falling in the low to moderate range of .16 to .36. The results can only be considered moderately good, although not all clusters on Skillscope were expected to correlate with the performance evaluation competencies because the performance evaluation covered some areas not covered by Skillscope.

Skillscope Reliability

A test-retest reliability study of Skillscope determined the stability of scores over time (Center for Creative Leadership, Skillscope Trainer's Guide, 1997). A group of 76 managers completed the instrument a second time, six-weeks following the first administration. Test-retest reliabilities for the 15 clusters range from .66 to .81. Test-retest reliabilities for single rater, single items range from .27 to .81. Three individual items did not remain stable over time, but since they are embedded in stable clusters the items have been retained in the instrument until further data becomes available.

Internal consistency, the extent to which the items under a given cluster correlate, was determined by evaluating a sample including 4,953 observers and 2,364 self-reports (Center for Creative Leadership, Skillscope Trainer's Guide, 1997). The analysis utilized a technique called alpha factor extraction. This method of analysis is primarily concerned with the reliability of the common factors instead of the reliability of group differences. The analysis results in an alpha coefficient which is a measure derived for the reliability of a score taken in a variety of situations (Tabachnick and Fidell, 1996).

The analysis only included strengths due to the nature of the response scale. Coefficients for the 15 clusters range from .66 to .83, indicating a homogeneity of content within a cluster (Kaplan, 1997). Developers recognize that psychometric precision may seem sacrificed for conceptual clarity because intercorrelations between clusters are also high. However, they also point out that managerial activities usually occur in an environment that requires a blending of skills and talents (Center for Creative Leadership, Skillscope Trainer's Guide, 1997). This perspective is consistent with the underlying theory of Mintzberg's (1973) approach to management.

Hough and Fisher (1997) conducted a factor analysis of the 98 items making up the 15 Skillscope clusters in order to determine the underlying structure of the strength measures. Utilizing a sample size of 186, significance was established at .41, which ensures a power of .80 at an alpha of .05. Communalities, defined by Tabachnick and Fidell (1996) as the variance accounted for by the factors, ranged from .29 to .82. This indicates that the factor solution had extracted an adequate amount of variance in each variable. Loadings on 19 items were nonsignificant and 76 items had only one significant loading. Two significant loadings were found for the three remaining items with the highest loadings being used for factor assignment. Factor analysis resulted in 54% of the variance being explained by seven factors. Those factors were given the following names based on a comparison of the original items with the factor loading: Relationships, Vision and Innovation, Information Management, Performance Management, Action Orientation, Communication and Presentation of Ideas, and Time Management.

The psychometrics of Skillscope compare favorably with similar multi-rater feedback instruments widely utilized in leadership development. The Leader Behavior Description Questionnaire -- Form XII (LBDQ-XII), developed by the Bureau of Business Research at The Ohio State University, boasts internal consistency reliabilities ranging from .30 to .91, with most coefficients at least .75 (Morrison, McCall, Jr., and Devries, 1978). The same source reports a test-retest reliability range from .57 to .72 for Structure and .71 to .79 for Consideration. Construct validity is limited as some scales report intercorrelations averaging around .55, and content validity studies have been inconclusive (Morrison, McCall, Jr., and Devries, 1978). In a later study reporting on the psychometric of self-assessment instruments, Lewis (1993) gave LBDQ a fair to good reliability rating and a fair validity rating.

The Leader Effectiveness and Adaptability Description (LEAD) developed by Paul Hersey and Kenneth Blanchard is a popular leadership feedback instrument. Reliability studies indicate high correlation coefficients ranging from .75 to .80, but validity studies have not been conclusive (Morrison, McCall, Jr., and Devries, 1978).

The Supervisory Behavior Description Questionnaire (SBD), developed by Edwin A. Fleishman, has been in use since 1953. Researchers report internal consistencies of usually .75 or better, but occasionally dropping as low as .60 (Schriesheim and Kerr, 1977). Schriesheim and Kerr (1977) report test-retest reliability coefficients of .63 to .87. Morrison, McCall, Jr., and Devries (1978) report that there is evidence that the SBD has reasonable construct validity, and Schriesheim and Kerr (1974) report adequate concurrent validity.

Skillscope Psychometrics -- Conclusion

Because of the relatively short time that Skillscope has been in use, there is limited psychometric data available to evaluate. However, the data that is available compares favorably with similar data from other multi-rater feedback instruments. Since Skillscope has become a popular instrument in leadership development programs, more research is needed to add to the current body of psychometric data. As in other behavioral research, an important factor is the intended use of the test results. This researcher holds that the current body of data is adequate to justify the utilization of the instrument in leadership development programs. However, caution should be taken whenever the instrument is recommended for use in formal employee evaluations.

Procedures for the Analysis of Data

The first hypothesis states that there are no significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and strengths identified by Skillscope.

The second hypothesis states that there are no significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and developmental needs identified by Skillscope.

Because of the unique nature of the instruments used in this study several assumptions are made in regard to the handling of the data for statistical analysis. MBTI scores for the sample were charted according to their distribution across the 16 MBTI types. Four of the MBTI types were selected as variables in the analysis. The major

consideration in the selection of the types was adequate frequency for the statistical analysis. In order to remain true to the founding theory that personality types represent preferences like left- or right-handedness (Van Velsor and Fleenor, 1994), each preference pair was treated as dichotomous factors rather than continuous scores. Therefore, MBTI type was a discrete variable.

Since Skillscope is basically an instrument with dichotomous responses, it presents a challenge to analyze statistically. A factor analysis was conducted on the Skillscope clusters and the results compared to previous Skillscope factor analysis studies (Hough and Fisher, 1997). This determined the relationship between the 98 items and the validity of the 15 skill clusters in Skillscope.

Using a method similar to previous Skillscope research (Hough and Fisher, 1997), the analysis for hypothesis number one was conducted for each test subject by calculating the proportion of raters that indicated the items within a cluster represented a strength. This resulted in a measure of strength ranging from 0 (not perceived as a strength) to 1 (definitely perceived as a strength) for each cluster. Hypothesis number two, concerned with developmental needs, was calculated in the same fashion. This resulted in each test subject having a single strength score for each cluster and a single developmental need score for each cluster. Each of these was treated as continuous data in the statistical analysis. For the purposes of this study, this method was deemed the most appropriate in that it allowed each response to have a weight in the analysis and helps to address the fact that test subjects did not have the same number of raters in every case. Additionally,

using methodology consistent with previous research results in data more conducive to the comparison of findings.

For the statistical analysis, selected MBTI types were treated as discrete variables. Skillscope scores on each cluster were multiple continuous variables. Therefore, hypotheses numbers one and two were tested by discriminate functional analysis. This method of multivariate statistics specifically lends itself to studies of this nature because it is designed to predict group membership (Tabachnick and Fidell, 1996), such as if certain leadership strengths and developmental needs are related directly to particular MBTI types. This statistical technique allows the researcher to study the interaction of variables in various combinations as they influence group membership. The discriminate analysis technique is essentially a multivariate analysis of variance (MANOVA) turned around (Tabachnick and Fidell, 1996). The advantage of the discriminate analysis over MANOVA is "…actually putting cases into groups called classification" (Tabachnick and Fidell, 1996, p. 507).

The third hypothesis states that there are no relationships between personality type as measured by the Myers-Briggs Type Indicator and congruence between self-awareness of strengths and developmental needs and ratings by knowledgeable observers as identified by Skillscope.

For each of the selected MBTI types, the responses on Skillscope of the self-ratings and the responses of the ratings by knowledgeable observers were examined. Self-ratings were determined by calculating the proportion of items each subject indicated as a strength on each cluster. This method resulted in each subject having a

strength score ranging from 0 (not perceived as a strength) to 1 (perceived as strength) on each of the Skillscope clusters. Developmental needs scores were calculated in the same fashion.

For knowledgeable observers this analysis was determined by calculating the proportion of raters indicating the items within a cluster represented a strength, with rater feedback resulting in a score between 0 and 1 on each cluster. Developmental needs scores were determined in the same fashion.

For the statistical analysis, MBTI type was discrete data and the strength and developmental needs scores for self and other raters for each cluster were continuous data. The hypothesis was tested by discriminate functional analysis as this method provides a number of analysis techniques useful in determining the contributions various combinations of variables make to group membership (Tabachnick and Fidell, 1996). The researcher compared the results of the self-ratings with those of the other raters to determine the congruence between the contributions of the various factors to group membership.

Due to the nature of the Skillscope instrument, data was exported into Microsoft Excel in order to calculate the ratio calculations for each hypothesis. For hypotheses one and two, the ratios for both strengths and developmental needs were calculated using all feedback responses for each participant. For hypothesis three the self-ratings were extracted, providing separate ratios for the self-ratings and the ratings of others. Once ratios were determined for each hypothesis, data was analyzed using the Statistical Packages for the Social Sciences (SPSS).

CHAPTER 4

ANALYSIS OF DATA

The purpose of this chapter is to discuss the data selected for this study, and to provide a rationale for the statistical techniques utilized to analyze that data. The analysis of data centers on the selection of the MBTI types that will serve as the groups in the analysis. Factor analysis is utilized to combine the 98 items on the Skillscope instrument into a defined set of leadership skills, called predictors in the discussion of statistical findings. Finally, discriminate analysis is the statistic of choice in the analysis of the three hypotheses.

Selection of MBTI Types

The sample utilized for this study was a random sample drawn from the database of the Center for Creative Leadership. CCL staff generated a random sample of 530 leadership program participants who had taken both the Myers-Briggs Type Indicator and Skillscope. The population selected for this study consists of experienced, mid-level leaders who have participated in leadership development programs at the Center for Creative Leadership in Greensboro, North Carolina. These leaders work in a variety of business, industrial, educational, and non-profit enterprises. Of the 530 participants, 360 were men. Therefore men outnumber women in the sample by 67.9% to 32.1% (Table 2). Although participant ages ranged from 23 to 74, 82.3% were within the range of 30 to 50 years old. Table 3 documents the age distribution for the study participants.

Table 2 lists the distribution of MBTI types of the 530 participants. ISTJ, ESTJ, ENTJ, and INTJ totaled 305, or 57.4% of the total. Considering the limited numbers of the other MBTI types, these four were chosen as the focus types for the statistical analysis.

Table 2 – MBTI Type Frequency

Type	Freq.	Percent of Total	Percent Male by Type	Percent Female by Type
ISTJ	121	22.8	81.0	19.0
ESTJ	66	12.5	65.2	34.8
ENTJ	64	12.0	80.2	19.8
INTJ	54	10.1	66.7	33.3
ENTP	42	7.9	41.3	58.7
INTP	31	6.0	37.6	62.4
ISFJ	25	4.8	72.2	27.8
ESTP	24	4.7	31.0	69.0
ISTP	21	4.0	43.7	56.3
ENFP	17	3.2	80.4	19.6
ESFJ	17	3.2	49.0	51.0
ENFJ	15	2.8	34.8	65.2
ESFP	11	2.0	84.5	15.5
INFP	10	1.8	73.7	26.3
INFJ	6	1.1	70.4	29.6
ISFP	6	1.1	30.9	69.1
Totals	530	100.0	67.9	32.1

Table 3 – Participant Frequency by Age

Age	Frequency	Percent	Age	Frequency	Percent
23	1	0.2	44	18	3.3
24	3	0.6	45	17	3.2
25	5	1.0	46	10	1.8
26	3	0.5	47	12	2.3
27	6	1.2	48	13	2.4
28	16	2.9	49	8	1.6
29	19	3.6	50	8	1.6
30	17	3.2	51	10	1.8
31	25	4.7	52	6	1.2
32	33	6.1	53	3	0.6
33	26	4.9	54	4	0.8
34	20	3.8	55	2	0.3
35	21	3.9	56	4	0.8
36	35	6.4	57	3	0.6
37	24	4.6	58	1	0.2
38	36	6.7	59	1	0.2
39	26	4.9	60	3	0.6
40	24	4.6	61	1	0.2
41	25	4.7	63	1	0.2
42	22	4.2	65	1	0.2
43	16	2.9	74	1	0.2
			Total	530	100.0

Factor Analysis of Skillscope

Skillscope consists of 98 descriptive statements of effective management behaviors from five skill areas. Skillscope authors had developed fifteen clusters from five skill areas to group the 98 items into categories (Kaplan and Ohlott, 1988). For the purpose of this study, the 98 items of Skillscope were analyzed to determine their

underlying structure in relation to the fifteen clusters developed by the authors. The factor analysis was performed using the Statistical Packages for the Social Sciences (SPSS). The principle component extraction method was utilized, along with oblique rotation and Kaiser Normalization. Consistent with another factor analysis conducted on Skillscope (Hough and Fisher, 1997), loadings of .41 and greater were considered significant. Seven factors accounted for 38% of the variance and were therefore selected as the independent variables, or predictors, for the analysis. Sixteen of the 98 items did not load for any of the seven factors and were therefore eliminated from the study.

A comparison between the original skill areas and cluster arrangement led to the following names to be assigned to the seven factors: Interpersonal relationships, with twenty-two items assigned; vision/innovation (change agent), with sixteen items assigned; decision-making, with eleven items assigned; personal management, with seven items assigned; flexibility/adaptability, with ten items assigned; high energy/results oriented, with nine items assigned; and power/influence, with seven items assigned. Factor loadings of the 98 Skillscope items are found in Appendix B.

Discriminate Analysis

Discriminate Functional Analysis was the method utilized to study hypotheses one through three. This method of multivariate statistical analysis is useful in this type of study because it is designed to predict group membership (Tabachnick and Fidell, 1996). In a discriminate analysis, the question is whether predictors, the independent variables, can reliably predict group membership, the dependent variables.

A discriminate analysis allows the researcher to determine what predictors separate groups from each other. These combinations of predictors that can be used to define group membership are referred to as discriminate functions (Tabachnick and Fidell, 1996). The advantage to this form of analysis is that one discriminate function that is determined to separate groups in a particular way is unrelated to another discriminate function that is determined to separate groups (Stevens, 1996). This allows the researcher to study the interaction of variables in various combinations as they influence group membership. The number of discriminate functions is usually one less that the number of groups being studied (Stevens, 1996). Tabachnick and Fidell (1996) point out that in most cases only the first one or two discriminate functions discriminate between groups to any degree of reliability. Any contribution of a third discriminate function to the determination of group membership must be confirmed by a test of significance, otherwise it should be ignored.

In a discriminate analysis adequate sample size is necessary to insure robust results. Tabachnick and Fidell (1996) indicate that robustness can be expected when there are least 20 cases with the smallest group, as long as there are only five or fewer predictors. Taksuoka (1970) prefers a sample size of three times the number of variables, while Stevens (1996) holds a much higher standard and indicates a ratio of 20 cases per variable for insuring the reproducibility of results. If there is high confidence that the sample is considered to be a normal distribution of the target population, fewer cases can be tolerated (Tabachnick and Fidell, 1996).

An important aspect of any discriminate analysis study is the determination of the homogeneity of variance-covariance matrices (SPSS, 1998). Especially when classification is a goal of the analysis, and when sample sizes are unequal and relatively small, results may not be reliable if the variance-covariance matrices are heterogeneous Tabachnick and Fidell (1996). Tabachnick and Fidell (1996) go on to define to this as the "assumption of normality" (p. 80), meaning that the variability in the scores of continuous variables are essentially the same. Manly (1986) supports the premise that the reliability of discriminate analysis depends on the assumption that the variance-covariance matrix is the same for all groups. However, he also points out that even when this is not established it "…does not necessarily mean the discriminate analysis is a waste of time. It may well turn out that excellent discrimination is possible on non-normal populations" (Manly, 1986, page 90). Tabachnick and Fidell (1996) also allow for this possibility by stating that the strength of the discriminate analysis might be weakened when variance-covariance homogeneity is not firmly established, but not necessarily invalidated.

Stevens (1996, p.262) emphasizes that discriminate analysis is a "mathematical maximization procedure." This means that before any discriminate functions are classified as contributing to group membership, it must be determined that the contribution is more likely to occur that it would by chance. Stevens (1996) also emphasizes that the usefulness of discriminate functions depends on the researcher being able to assign meaning to the groupings of predictors. Interpreting the results of the discriminate analysis in regard to the combination of predictors making up the

discriminate functions is a primary goal of this statistical technique (Tabachnick and Fidell, 1996). Tabachnick and Fidell (1996) summarize that a discriminate analysis provides two procedures that aid the researcher in drawing data analysis conclusions. The first is the correlation between predictors and discriminate functions. The second is to evaluate predictors and the extent they separate groups.

Hypothesis Number One

Hypothesis number one states that there are no significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and strengths identified by Skillscope.

A discriminate functional analysis was performed using seven independent variables as predictors of membership in four groups, the dependent variables. The seven predictors were interpersonal relationships, vision/innovation, decision-making, personal management, flexibility/adaptability, high energy/results oriented, and power/influence. The groups, or dependent variables, were the four selected MBTI types: ISTJ, INTJ, ESTJ, and ENTJ.

The 305 cases included 121 that belonged to the ISTJ group, 54 that were INTJ, 66 that were ESTJ, and 64 were identified as ENTJ. These respective sample sizes for each of the MBTI groups were deemed acceptable by this researcher as per previously established standards (Tabachnick and Fidell, 1996: Taksuoka, 1970).

Homogeneity of variance-covariance was established by the utilization of the Box's M statistic based on the F transformation. With the significance at the .056 level

(Table 4), the null hypothesis of equal group covariance matrices is not rejected. Tabachnick and Fidell (1996) hold that a Box's M test that is significant at $p < .001$ will bring robustness into question if the sample sizes are unequal. The results in this study meet this criteria. Another indication of homogeneity of variance-covariance is the log determinants data (Table 5). When log determinants reveal a wide variation between groups, homogeneity is brought into question (SPSS, 1998). In this case, the log determinant values are very similar, further supporting the assumption of homogeneity.

Table 4 – Box's M Test of Significance for Strengths

Box's M		110.591
F Statistic	Approx.	1.256
	df1	84
	df2	128786
	Sig.	0.056

Tests null hypothesis of equal population covariance matrices.

Table 5 – Log Determinants for Strengths

TYPE	Rank	Log Determinant
ISTJ	7	-29.687
INTJ	7	-29.971
ESTJ	7	-30.854
ENTJ	7	-29.163
Pooled within-groups	7	-29.512

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

A study of the group statistics contributes to the assumption of equal variances. SPSS (1998) states that standard deviations that do not vary greatly across the groups support the assumption of equal variances. Table 45, found in Appendix C, shows the group mean standard deviations for this sample. In the tests of equality of group means

(Table 6), Wilks' Lambda demonstrates significant values close to 1.0 for interpersonal relationships, decision-making, personal management, and power/influence, indicating minimal differences between group means for those variables. Pooled within-group matrices, calculated from covariances and variances, show no correlations over .750 (Table 7), the level SPSS (1998) suggests as the benchmark for strong correlations. There were three variables that demonstrated moderate correlations with results of .600 or higher, indicating there could be subsets of variables interacting or performing together. Those exhibiting a moderate level of interaction were interpersonal relationships, flexibility/adaptability, and power/influence.

Table 6 – Test of Equality of Group Means for Strengths

Predictors	Wilks' Lambda	F	df1	df2	Sig.
Interpersonal relationships	0.960	4.204	3	301	0.006
Vision/Innovation	0.993	0.660	3	301	0.577
Decision-making	0.950	5.297	3	301	0.001
Personal Management	0.939	6.563	3	301	0.000
Flexibility/Adaptability	0.998	0.202	3	301	0.895
High Energy/Results Oriented	0.988	1.172	3	301	0.320
Power/Influence	0.961	4.048	3	301	0.008

Table 7 – Pooled Within-Groups Matrices for Strengths

Correlation	F1	F2	F3	F4	F5	F6	F7
F1: Interpersonal relationships	1.000	0.412	0.441	0.531	0.734	0.155	0.627
F2: Vision/Innovation	0.412	1.000	0.571	0.436	0.422	0.553	0.578
F3: Decision-making	0.441	0.571	1.000	0.425	0.387	0.438	0.577
F4: Personal Management	0.531	0.436	0.425	1.000	0.486	0.221	0.516
F5: Flexibility/Adaptability	0.734	0.422	0.387	0.486	1.000	0.131	0.633
F6: High Energy/Results Oriented	0.155	0.553	0.438	0.221	0.131	1.000	0.353
F7: Power/Influence	0.627	0.578	0.577	0.516	0.633	0.353	1.000

Two significant discriminate functions were calculated as significant. A third discriminate function was not significant and was therefore rejected (Table 8). The associated eigenvalues for the first two discriminate functions, helpful in measuring the spread of the group centroids, accounted for 94.3 percent of the variance (Table 9). Both discriminate functions indicated significance of at least .001 on Wilks' Lambda and Chi-square (Table 8). As shown in the territorial map of discriminate functions (Figure 1), the first discriminate function separates for the ISTJ group from the ENTJ group, with the INTJ and ESTJ groups falling in-between. The second discriminate function separates the INTJ group from the ESTJ group, with the ISTJ and ENTJ groups falling between these two groups. These functions at group centroids are listed in Table 10.

Table 8 – Wilks' Lambda for Strengths

Test of Functions	Wilks' Lambda	Chi-square	df	Sig.
1 through 3	0.769	78.261	21	0.000
2 through 3	0.891	34.365	12	0.001
3	0.984	4.709	5	0.452

Table 9 – Eigenvalues for Strengths

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	0.158	56.8	56.8	0.370
2	0.104	37.5	94.3	0.308
3	0.016	5.7	100.0	0.125

First 3 canonical discriminate functions were used in the analysis

Figure 1 – Plots for Strengths

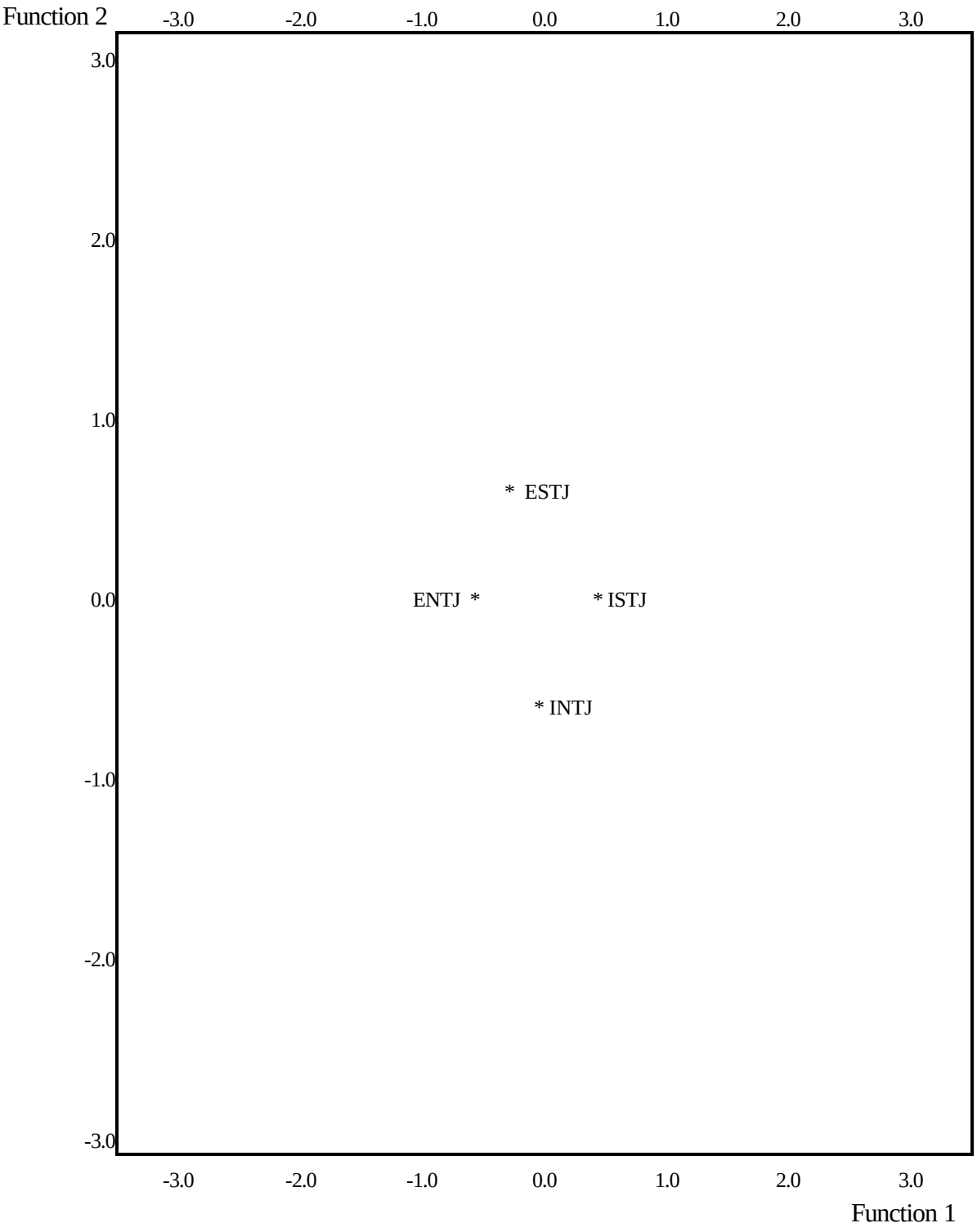


Table 10 – Functions at Group Centroids for Strengths

	Function		
TYPE	1	2	3
ISTJ	0.461	5.927E-02	-4.449E-02
INTJ	-8.870E-02	-0.585	0.142
ESTJ	-0.287	0.432	0.142
ENTJ	-0.502	-6.405E-02	-0.182

Unstandardized canonical discriminate functions evaluated at group means

The discriminate analysis produces a structure matrix (Table 11) that helps determine the usefulness of the seven variables in interpreting the meaning of each discriminate function. As mentioned previously, the association of one variable with a discriminate function does not preclude the association of that variable with another discriminate function. In this case, those variables with the greatest association with the first discriminate function were decision-making and personal management, although the correlations may not be considered strong. Three variables had relatively high correlations with the second discriminate function: personal management, interpersonal relationships, and power/influence.

Table 11 – Structure Matrix of Discriminate Functions for Strengths

	Function		
	1	2	3
F4: Personal Management	*0.390	*0.620	0.272
F1: Interpersonal Relationships	0.175	*0.590	-0.205
F5: Flexibility/Adaptability	0.066	0.108	0.078
F3: Decision-making	*0.531	0.165	0.578
F7: Power/Influence	-0.166	*0.546	0.552
F2: Vision/Innovation	-0.076	0.163	0.426
F6: High Energy/Results Oriented	-0.200	0.166	0.396

Pooled within-groups correlations between discriminating variables and standardized canonical discriminate functions

The classification function coefficients (Table 12) provides information as to how the predictors contribute to the separation of one group from another, with the coefficients maximizing the distance between groups (SPSS, 1998). Essentially, each predictor is considered a member of the group where it scores the largest. It is interesting to point out that three of the predictors scored the largest for the ISTJ type: vision/innovation, decision-making, and personal management. Two predictors, interpersonal relationships and flexibility/adaptability, scored the highest for INTJ. Power/influence was the only predictor scoring the highest for ESTJ, and high energy/results oriented was the only predictor scoring highest for ENTJ.

Table 12 – Classification Function Coefficients for Strengths

	TYPE			
Predictors	ISTJ	INTJ	ESTJ	ENTJ
F1: Interpersonal Relationships	-2.284	*-6.893	-2.213	-2.724
F2: Vision/Innovation	*-12.019	-9.961	-11.260	-10.105
F3: Decision-making	*24.138	22.073	17.835	16.243
F4: Personal Management	*7.243	3.286	6.310	3.382
F5: Flexibility/Adaptability	7.141	*11.099	4.911	7.706
F6: High Energy/Results Oriented	11.098	11.781	12.700	*12.798
F7: Power/Influence	11.369	12.751	*19.162	16.060
(Constant)	-14.613	-14.276	-15.698	-13.544

Fisher's linear discriminate functions

For the contribution of a predictor to group membership to be significant, it must be demonstrated to occur more than if by chance (Stevens, 1996). Table 13 demonstrates the likelihood of a case being assigned to one of the MBTI types by chance, allowing for the impact unequal sample size has on the probabilities. Therefore, predictors contributing to the ISTJ type classification higher than 39.7% of the time would be considered greater than by mere chance. Predictors contributing to INTJ higher than

17.7% would be considered greater than chance. Those contributing greater than 21.6% for ESTJ, and 21.0% for ENTJ, would both be considered greater than by chance. The classification results (Table 14) indicate that group membership predicted by the discriminate analysis was correct just over 50% of the time. Most of this was associated with the ISTJ type, accounting for 81% of the accuracy. The INTJ group classified correctly only 14.8% of the time, while the ESTJ and ENTJ groups corrected classified 39.4% and 32.8 % respectively. When compared with the random probabilities for each group (Table 12), this would be considered an improvement for all but the INTJ group.

Table 13 – Prior Probabilities for Groups -- Strengths

		Cases Used in Analysis	
TYPE	Prior	Unweighted	Weighted
ISTJ	39.7%	121	121
INTJ	17.7%	54	54
ESTJ	21.6%	66	66
ENTJ	21.0%	64	64
Total	100%	305	305

Table 14 – Classification Results for Strengths

			Predicted Group Membership				Total
		TYPE	ISTJ	INTJ	ESTJ	ENTJ	
Original	Count	ISTJ	98	5	9	9	121
		INTJ	28	8	4	14	54
		ESTJ	32	2	26	6	66
		ENTJ	29	5	9	21	64
	%	ISTJ	*81.0	4.1	7.4	7.4	100
		INTJ	51.9	*14.8	7.4	25.9	100
		ESTJ	48.5	3.0	*39.4	9.1	100
		ENTJ	45.3	7.8	14.1	*32.8	100

50.2% of original grouped cases correctly classified.

Summary of Hypothesis Number One Data Analysis

The purpose of the discriminate analysis is to allow the researcher to determine the extent by which a set of predictors contributes to group membership. In testing hypothesis number one, the results of the discriminate analysis were analyzed to determine the extent that strengths, as measured by Skillscope, contribute to membership in one of the MBTI groups. The results of two procedures are analyzed to draw these conclusions: the correlation between predictors and the discriminate functions and the extent that predictors separate groups.

The first of these procedures that requires careful analysis is the correlation between predictors and the discriminate functions, as demonstrated in the structure matrix (Table 11). The variables associated with the first discriminate function were decision-making and personal management. The variables associated with the second discriminate function were personal management, interpersonal relationships, and power/influence.

The second procedure evaluates the extent that predictors separate groups, as reflected in the classification function coefficients found in Table 12. The predictors determined to contribute most to the ISTJ group membership were vision/innovation, decision-making, and personal management. Because vision/innovation did not meet the test of homogeneity of variance and covariance, it was no longer considered. Although two predictors, interpersonal relationships and flexibility/adaptability, were shown to have contributed to INTJ group membership, this contribution must be considered insignificant since the predicted membership in the INTJ group was determined to be less

than by chance. Power/influence was the only predictor scoring the highest for ESTJ, and high energy/results oriented was the only predictor scoring the highest for ENTJ.

As demonstrated in the territorial map of discriminate functions (Figure 1), the first discriminate function separates the ISTJ group from the ENTJ group. Although the predictability of the ENTJ group was better than chance, 32.8% versus 21.0% respectively, the only predictor scoring high for this group was high energy/results oriented. However, this predictor did not score high for the first discriminate function and did not meet the test of homogeneity of variance covariance. Therefore it cannot be considered to be a significant strength. Predictability was the highest for the ISTJ group at 81%; much higher than the chance probability of 39.7%. The predictors most contributing to the first discriminate function were decision-making and personal management. Decision-making and personal management were also determined to contribute to membership in the ISTJ group. Therefore, there is strong evidence that the strengths of decision-making and personal management are characteristic strengths of the ISTJ type, as evidenced by scores on Skillscope.

The territorial map (Figure 1) demonstrates that the second discriminate function separates the INTJ group from the ESTJ group. Since the predictability of the INTJ group showed to be less than by chance, 14.8% versus 17.7% respectively, the contribution of any predictors to that grouping is considered insignificant. The predictability of the ESTJ group was much better than by chance, 39.4% versus 21.6%. Three predictors showed significance for the second discriminate function, interpersonal relationships, personal management, and power/influence. Power/influence was the only

predictor scoring highest for ESTJ, but personal management skills demonstrated a relatively strong coefficient (Table 12) for the ESTJ group, although it primarily predicted for ISTJ. Considering that discriminate functions can demonstrate contributions from a number of predictors, this researcher concludes that both power/influence and personal management skills are significant strengths of the ESTJ type as measured by Skillscope.

Hypothesis number one was therefore rejected as data analysis revealed some significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and strengths identified by Skillscope. Decision-making and personal management skills were found to be significant strengths of the ISTJ type. Power/influence and personal management skills were determined to be significant strengths of the ESTJ type.

Hypothesis Number Two

Hypothesis number two states that there are no significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and developmental needs identified by Skillscope.

A discriminate functional analysis was performed using seven independent variables as predictors of membership in four groups, the dependent variables. The seven predictors were interpersonal relationships, vision/innovation, decision-making, personal management, flexibility/adaptability, high energy/results oriented, and power/influence.

The groups, or dependent variables, were the four selected MBTI types: ISTJ, INTJ, ESTJ, and ENTJ.

The 305 cases included 121 that belonged to the ISTJ group, 54 that were INTJ, 66 that were ESTJ, and 64 that were ENTJ. These respective sample sizes for each of the MBTI groups were deemed acceptable as they met previously established standards for sample size (Tabachnick and Fidel, 1996: Taksuoka, 1970).

A Box's M statistic based on the F transformation was performed to determine homogeneity of variance-covariance. With a significance of less than .001, as shown in Table 15, the null hypothesis was rejected, thus bringing the robustness of the sample into question (Tabachnick and Fidell, 1996), although these authors do point out that sometimes Box's M results are over sensitive. Another test of homogeneity of variance-covariance, the log determinants (Table 16), indicate relative similarity except for a slight difference with the INTJ group.

Table 15 – Box's M Test of Significance for Developmental Needs

Box's M		175.640
F Statistic	Approx.	1.9950
	df1	84
	df2	128786
	Sig.	0.000

Tests null hypothesis of equal population covariance matrices.

Table 16 – Log Determinants for Developmental Needs

TYPE	Rank	Log Determinant
ISTJ	7	-32.589
INTJ	7	-34.784
ESTJ	7	-33.200
ENTJ	7	-32.743
Pooled within-groups	7	-32.556

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

The group statistics indicate a wide variation in standard deviations across the predictor variable means (Table 46 in Appendix C). The test of equality of group means (Table 17) indicates a significant Wilks' Lambda only with the following predictors: personal management and high risk/results oriented. The pooled within-groups matrices (Table 18) indicate moderate correlation between only two predictors, interpersonal relationships and flexibility/adaptability.

Table 17 – Tests of Equality of Group Means for Developmental Needs

Predictors	Wilks' Lambda	F	df1	df2	Sig.
Interpersonal relationships	0.991	.946	3	301	0.418
Vision/Innovation	0.984	1.643	3	301	0.180
Decision-making	0.982	1.820	3	301	0.143
Personal Management	0.976	2.497	3	301	0.060
Flexibility/Adaptability	0.991	.867	3	301	0.459
High Energy/Results Oriented	0.968	3.287	3	301	0.021
Power/Influence	0.994	.635	3	301	0.593

Table 18 – Pooled Within-Groups Matrices for Developmental Needs

Correlation	F1	F2	F3	F4	F5	F6	F7
F1: Interpersonal relationships	1.000	0.368	0.364	0.365	0.681	0.120	0.464
F2: Vision/Innovation	0.368	1.000	0.471	0.355	0.286	0.461	0.475
F3: Decision-making	0.364	0.471	1.000	0.458	0.338	0.369	0.509
F4: Personal Management	0.365	0.355	0.458	1.000	0.429	0.157	0.359
F5: Flexibility/Adaptability	0.681	0.286	0.338	0.429	1.000	0.107	0.463
F6: High Energy/Results Oriented	0.120	0.461	0.369	0.157	0.107	1.000	0.294
F7: Power/Influence	0.464	0.475	0.509	0.359	0.463	0.294	1.000

The first discriminate function accounted for 55.9% of the variance, at a significance of .002 on Wilks' Lambda and Chi-square. Although the second discriminate function was only significant at the .076 level, it was accepted as it accounted for an additional 30.6% of the variance (Tables 19 and 20). Together these two discriminate functions accounted for a total of 86.5% of the variance. A third discriminate function was rejected as lacking significance.

Table 19 – Wilks' Lambda for Developmental Needs

Test of Functions	Wilks' Lambda	Chi-square	df	Sig.
1 through 3	0.864	43.778	21	0.002
2 through 3	0.937	19.532	12	0.076
3	0.980	6.023	5	0.304

Table 20 – Eigenvalues for Developmental Needs

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	0.085	55.9	55.9	0.279
2	0.046	30.6	86.5	0.210
3	0.020	13.5	100.0	0.141

First 3 canonical discriminate functions were used in the analysis

The first discriminate function separates for the ISTJ group, with the other three groups falling in-between as demonstrated by the territorial map (Figure 2). The second discriminate function separates for both the INTJ and ESTJ groups, with the ISTJ and ENTJ groups falling in-between. Each function at group centroids is listed in Table 21.

Table 21 – Functions at Group Centroids

	Function		
TYPE	1	2	3
ISTJ	.351	-4.334E-02	6.646E-02
INTJ	-.138	.389	-.150
ESTJ	-.292	-.286	-.128
ENTJ	-.246	4.894E-02	.245

Unstandardized canonical discriminate functions evaluated at group means

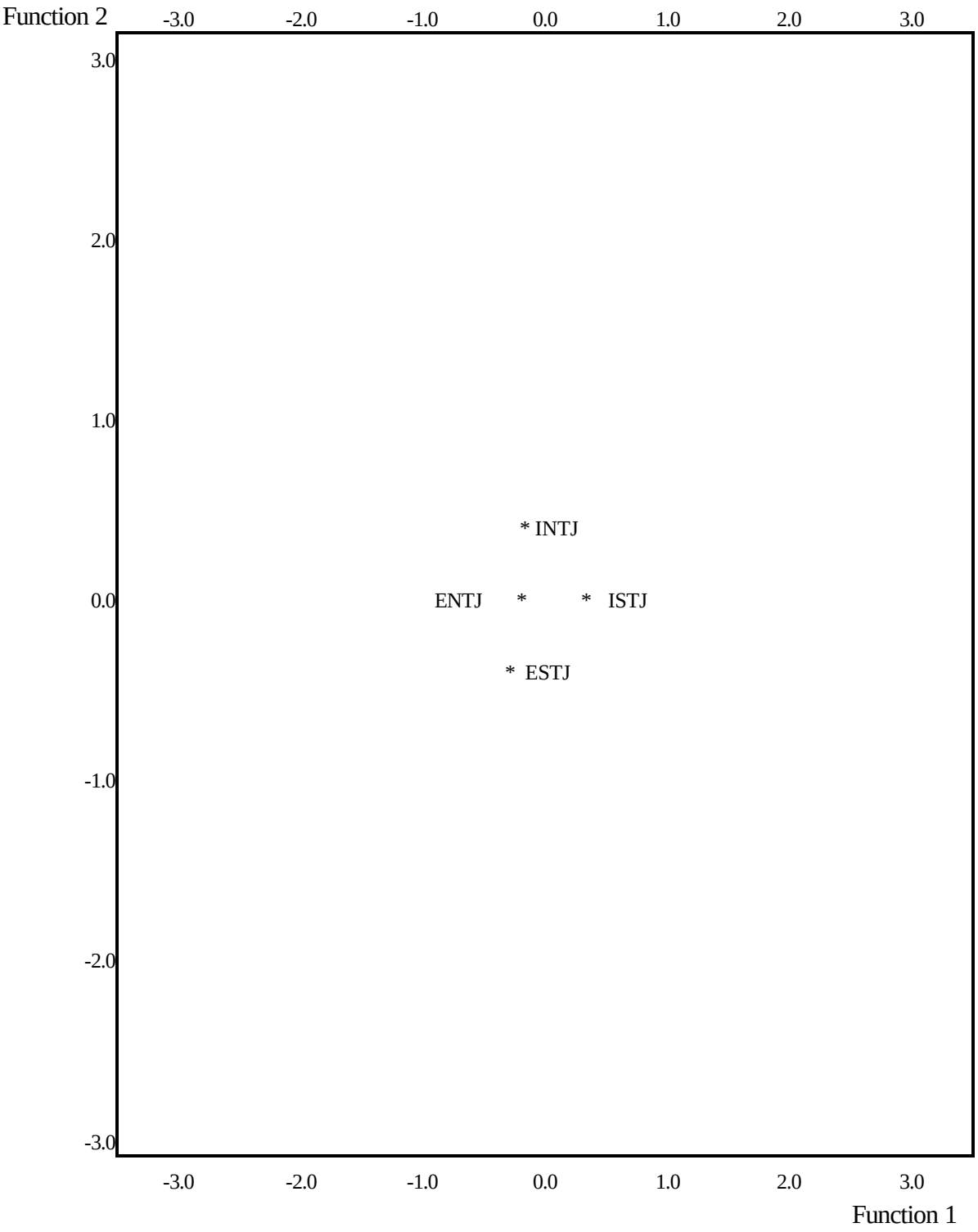
The structure matrix (Table 22) indicates that the predictors for high energy/results oriented and decision-making contribute to the first discriminate function. Interpersonal relationships and personal management were the predictors having the most influence on the second discriminate function.

Table 22 – Structure Matrix of Discriminate Functions for Developmental Needs

	Function		
	1	2	3
F6: High Energy/Results Oriented	*0.616	-0.112	0.071
F1: Interpersonal Relationships	0.019	*0.402	0.307
F4: Personal Management	0.155	*0.375	0.896
F3: Decision-making	*-0.370	-0.009	0.567
F5: Flexibility/Adaptability	0.034	-0.209	0.565
F7: Power/Influence	0.073	-0.076	0.525
F6: High Energy/Results Oriented	0.336	-0.182	0.508

Pooled within-groups correlations between discriminating variables and standardized canonical discriminate functions

Figure 2 – Plots for Developmental Needs



The classification function coefficients (Table 23) indicate that three predictors most influenced the ISTJ group: vision/innovation, high risk/results oriented, and power/influence. Personal management did not score the highest on ISTJ, although the score was very close to the highest for that predictor. Interpersonal relationships was the only predictor scoring highest for the INTJ group, although personal management also had a relatively high score. Decision-making and flexibility/adaptability were the predictors scoring highest for the ESTJ group and personal management scored the highest for the ENTJ group.

Table 23 – Classification Function Coefficients

	TYPE			
Predictors	ISTJ	INTJ	ESTJ	ENTJ
F1: Interpersonal Relationships	2.198	*5.861	.650	2.224
F2: Vision/Innovation	*9.817	6.077	8.749	8.390
F3: Decision-making	-1.964	1.858	*4.099	3.817
F4: Personal Management	6.349	6.353	2.791	*6.479
F5: Flexibility/Adaptability	2.606	-1.502	*4.203	2.448
F6: High Energy/Results Oriented	*3.546	.787	-.515	-.925
F7: Power/Influence	*7.635	6.480	6.993	7.406
(Constant)	-3.729	-4.106	-3.759	-4.505

Fisher's linear discriminate functions

The classification results provided in Table 24 indicate that group membership predicted by the discriminate analysis was correct 43.9% of the time. The ISTJ group classified correctly 81% of the time, while the INTJ group classified correctly 18.5% of the time. The ESTJ group classified correctly 27.3% of the time, and the ENTJ group classified correctly only 12.5% of the time. When compared with the random probabilities for each group (Table 25), the discriminate analysis was considered an improvement over random chance for only the ISTJ and ESTJ groups.

Table 24 – Classification Results for Developmental Needs

			Predicted Group Membership				Total
		TYPE	ISTJ	INTJ	ESTJ	ENTJ	
Original	Count	ISTJ	98	5	11	7	121
		INTJ	35	10	4	5	54
		ESTJ	36	9	18	3	66
		ENTJ	39	8	9	8	64
	%	ISTJ	*81.0	4.1	9.1	5.8	100
		INTJ	64.8	*18.5	7.4	9.3	100
		ESTJ	54.5	13.6	*27.3	4.5	100
		ENTJ	60.9	12.5	14.1	*12.5	100

43.9% of original grouped cases correctly classified.

Table 25 – Prior Probabilities for Groups – Developmental Needs

		Cases Used in Analysis	
TYPE	Prior	Unweighted	Weighted
ISTJ	39.7%	121	121
INTJ	17.7%	54	54
ESTJ	21.6%	66	66
ENTJ	21.0%	64	64
Total	100%	305	305

Summary of Hypothesis Number Two Data Analysis

The discriminate analysis allows the researcher to determine how predictors contribute to group membership. For hypothesis number two, the results were studied to determine the extent that developmental needs, as measured by Skillscope, contribute to membership in one of the selected MBTI groups. The results of two procedures, the correlation between predictors and the discriminate functions and the extent predictors separate groups, were analyzed to determine the contribution a set of predictors makes to group membership.

The structure matrix (Table 22) demonstrates that three variables are associated with the first discriminate function: high energy/results oriented, vision/innovation, and decision-making. The value of vision/innovation and decision-making as predictors is in question because they did not meet the test of homogeneity of variance-covariance as demonstrated by a significance of .180 and .143 respectively on Wilks' Lambda (Table 17). Two variables were associated with the second discriminate function: interpersonal relationships and personal management. With a significance of .418 on Wilks' Lambda, this researcher determined that interpersonal skills did not meet the test of homogeneity of variance-covariance, so its contribution to the second discriminate function was not considered.

The classification function coefficients help the researcher to evaluate the extent predictors separate groups (Table 23). The predictors most associated with the ISTJ group were vision/innovation, personal management, high energy/results oriented, and power/influence. Personal management and high energy/results oriented are the only predictors meeting the homogeneity of variance-covariance criteria. Although decision-making and flexibility/adaptability were associated with the ESTJ group, neither of those predictors met the test of homogeneity of variance-covariance. Although the INTJ group classified a little better than by mere chance, 18.5% compared with 17.7%, less than a one percent improvement was not considered to be adequate for the purposes of this study. Therefore, the predictability of both the INTJ and ENTJ groups did not fall above chance as shown in Tables 24 and 25.

As demonstrated in the territorial map of discriminate functions (Figure 2), the first discriminate function separates for the ISTJ group. With the discriminate analysis predictability of this group at 81%, that is a much improvement over chance. The significant predictors contributing to the ISTJ grouping were personal management and high energy/results oriented. However, since personal management did not factor for the first discriminate function, only high energy/results oriented is considered a significant developmental need for the ISTJ group.

The territorial map demonstrates that the second discriminate function separates for the INTJ and ESTJ groups. As mentioned previously, since the prediction of the discriminate analysis for the INTJ group is barely an improvement over chance, 18.5% versus 17.7% respectively, it is concluded that these results are not significant. However, the discriminate analysis does predict for the ESTJ group at 27.3%, a slight improvement over chance at 21.0%. The only predictors contributing to the ESTJ group were decision-making and flexibility/adaptability. However, since neither of these predictors met the homogeneity of variance-covariance criteria, these results are deemed inconclusive.

Hypothesis number two is therefore rejected because one significant relationship was found between personality type as indicated by the Myers-Briggs Type Indicator and developmental needs identified by Skillscope. High energy/results oriented was determined to be a developmental need for the ISTJ group.

Hypothesis Three

The third hypothesis states that there are no relationships between personality type as measured by the Myers-Briggs Type Indicator and congruence between self-awareness of strengths and developmental needs and ratings by knowledgeable observers as identified by Skillscope. A discriminate analysis was performed for both strengths and development needs, with self-ratings separated from the ratings of others. The seven predictors were interpersonal relationships, vision/innovation, decision-making, personal management, flexibility/adaptability, high energy/results oriented, and power/influence. The groups, or dependent variables, were the four selected MBTI types: ISTJ, INTJ, ESTJ, and ENTJ.

In order to compare between self ratings and the ratings of others, only those characteristics demonstrating significant results were considered. In order to facilitate the comparisons, strengths will first be analyzed.

According to the Box's M test of significance and the log determinant results, the test for homogeneity of variance covariance matrices was met by both the self and other raters (Tables 26, 27, 28, and 29). Two predictors proved significant for the self-raters: interpersonal skills and high energy/results oriented. Five predictors met the test for other raters: interpersonal relationships, decision-making, personal management, high energy/results oriented, and power/influence (Tables 30 and 31).

As to whether the discriminate functions would predict for particular groups any better than by chance, only the ESTJ group had a higher likelihood of grouping by chance for both the self-raters and the ratings of others (Table 32).

Table 26 – Box's M Test of Significance for Self-Raters

Box's M		88.148
F Statistic	Approx.	1.001
	df1	84
	df2	128786
	Sig.	0.476

Tests null hypothesis of equal population covariance matrices.

Table 27 – Box's M Test of Significance for Other Raters

Box's M		93.934
F Statistic	Approx.	1.067
	df1	84
	df2	128786
	Sig.	0.317

Tests null hypothesis of equal population covariance matrices.

Table 28 – Log Determinants for Self-Raters

TYPE	Rank	Log Determinant
ISTJ	7	-22.472
INTJ	7	-22.772
ESTJ	7	-30.854
ENTJ	7	-29.163
Pooled within-groups	7	-29.512

Table 29 – Log Determinants for Other Raters

TYPE	Rank	Log Determinant
ISTJ	7	-29.687
INTJ	7	-29.971
ESTJ	7	-30.854
ENTJ	7	-29.163
Pooled within-groups	7	-29.512

Table 30 – Tests of Equality of Group Means for Self-Raters

Predictors	Wilks' Lambda	F	df1	df2	Sig.
Interpersonal relationships	0.952	5.090	3	301	0.002
Vision/Innovation	0.981	1.941	3	301	0.123
Decision-making	0.990	0.991	3	301	0.397
Personal Management	0.987	1.285	3	301	0.280
Flexibility/Adaptability	0.992	0.818	3	301	0.485
High Energy/Results Oriented	0.946	5.687	3	301	0.001
Power/Influence	0.989	1.107	3	301	0.346

Table 31 – Tests of Equality of Group Means for Other Raters

Predictors	Wilks' Lambda	F	df1	df2	Sig.
Interpersonal relationships	0.968	3.337	3	301	0.020
Vision/Innovation	0.993	0.676	3	301	0.567
Decision-making	0.951	5.147	3	301	0.002
Personal Management	0.949	5.355	3	301	0.001
Flexibility/Adaptability	0.995	.544	3	301	0.653
High Energy/Results Oriented	0.974	2.682	3	301	0.047
Power/Influence	0.969	3.237	3	301	0.023

Table 32 – Group Membership Probability Comparisons

TYPE	Prior Probabilities	Self-Raters Predicted Membership	Other Raters Predicted Membership
ISTJ	39.70%	78.50%	86.00%
INTJ	17.70%	29.60%	29.60%
ESTJ	21.60%	19.70%	19.70%
ENTJ	21.00%	29.70%	34.40%

The classification function coefficients, as indicated in Tables 33 and 34, indicate that self and other raters do not agree in every case. Both agree on the association of four predictors, vision/innovation, flexibility/adaptability, high energy/results oriented, and

power/influence. However, they disagree on the associations for the following predictors: interpersonal relationships, decision-making, and personal management.

Table 33 – Classification Function Coefficients for Self-Raters

	TYPE			
Predictors	ISTJ	INTJ	ESTJ	ENTJ
F1: Interpersonal Relationships	4.858	2.109	6.586	7.054
F2: Vision/Innovation	-5.429	-3.587	-5.612	-4.292
F3: Decision-making	8.193	8.751	6.828	5.657
F4: Personal Management	-.251	-2.222	-1.144	-2.077
F5: Flexibility/Adaptability	-.040	1.474	-1.196	-.060
F6: High Energy/Results Oriented	3.389	5.160	6.187	6.076
F7: Power/Influence	5.229	3.839	5.503	4.228
(Constant)	-6.067	-7.109	-7.662	-7.331

Fisher's linear discriminate functions

Table 34 – Classification Function Coefficients for Other Raters

	TYPE			
Predictors	ISTJ	INTJ	ESTJ	ENTJ
F1: Interpersonal Relationships	-4.725	-9.816	-2.897	-2.206
F2: Vision/Innovation	-15.586	-12.817	-15.678	-14.559
F3: Decision-making	16.729	15.590	10.513	9.338
F4: Personal Management	9.585	6.632	9.946	7.188
F5: Flexibility/Adaptability	6.900	12.773	4.395	5.924
F6: High Energy/Results Oriented	13.055	12.769	16.738	16.749
F7: Power/Influence	15.401	13.519	18.847	15.549
(Constant)	-13.220	-12.561	-14.342	-12.317

Fisher's linear discriminate functions

Both self and other raters indicate two strong discriminate functions as demonstrated in Tables 35, 36, 37 and 38. For the self-raters the two discriminate functions account for 92.8% of the variance (Table 37), while for the other ratings the two discriminate functions account for 94.7% of the variance (Table 38).

Table 35 – Wilks' Lambda for Self-Raters

Test of Functions	Wilks' Lambda	Chi-square	df	Sig.
1 through 3	0.795	68.447	21	0.000
2 through 3	0.895	33.177	12	0.001
3	0.983	5.121	5	0.401

Table 36 – Wilks' Lambda for Other Raters

Test of Functions	Wilks' Lambda	Chi-square	df	Sig.
1 through 3	0.771	77.564	21	0.000
2 through 3	0.890	34.755	12	0.001
3	0.986	4.319	5	0.504

Table 37 – Eigenvalues for Self-Raters

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	0.125	52.0	52.0	0.334
2	0.099	40.8	92.8	0.300
3	0.017	7.2	100.0	0.130

First 3 canonical discriminate functions were used in the analysis

Table 38 – Eigenvalues for Other Raters

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	0.154	55.8	55.8	0.366
2	0.107	38.9	94.7	0.311
3	0.015	5.3	100.0	0.120

First 3 canonical discriminate functions were used in the analysis

The respective structure matrices indicate differences in which predictors correlate with each discriminate function (Tables 39 and 40). With the self-ratings, interpersonal relationships and high energy/results oriented are closely associated with the first discriminate function. Four predictors associate with the second discriminate

function: interpersonal relationships, personal management, vision/innovation, and high energy/results oriented. In regard to the others ratings, decision-making and high energy/results oriented associated with the first discriminate function, while personal management, decision-making, interpersonal relationships, and power/influence associated with the second discriminate function.

Table 39 – Structure Matrix of Discriminate Functions for Self-Raters

	Function		
	1	2	3
F1: Interpersonal Relationships	*0.541	*0.372	-0.131
F4: Personal Management	0.040	*0.337	0.286
F2: Vision/Innovation	0.269	*-0.322	0.072
F6: High Energy/Results Oriented	*0.513	*-0.438	0.520
F3: Decision-making	-0.182	-0.159	0.433
F7: Power/Influence	0.250	0.100	0.357
F5: Flexibility/Adaptability	0.230	-0.046	-0.273

Pooled within-groups correlations between discriminating variables and standardized canonical discriminate functions

Table 40 – Structure Matrix of Discriminate Functions for Other Raters

	Function		
	1	2	3
F4: Personal Management	-0.010	*0.689	0.404
F3: Decision-making	*-0.334	*0.553	0.291
F1: Interpersonal Relationships	0.155	*0.523	-0.105
F7: Power/Influence	0.136	*0.484	0.539
F2: Vision/Innovation	0.098	0.110	0.520
F6: High Energy/Results Oriented	*0.385	0.006	0.515
F5: Flexibility/Adaptability	-0.103	0.166	0.236

Pooled within-groups correlations between discriminating variables and standardized canonical discriminate functions

Figure 3 demonstrates that the first discriminate function for the self-raters separates ESTJ and ENTJ from ISTJ and INTJ. The second discriminate function for the self-raters separates the ISTJ group from the INTJ group. Figure 4 shows a pattern for the other raters in which the first discriminate function separates ESTJ and ENTJ from ISTJ and INTJ. The second discriminate function separates ISTJ and ESTJ from INTJ and ENTJ.

A discriminate analysis was conducted on the self and other rater's scores for developmental needs portion of Skillscope. Although the other raters yielded significant results, the self-rater scores did not meet the tests of homogeneity of variance covariance as indicated by the Box's M test of significance (Table 47 in Appendix D) and the Tests of Equality of Group Means (Table 48 in Appendix D). The results for the other raters recorded in Tables 49 and 50, found in Appendix D.

Summary of Hypothesis Number Three Data Analysis

The third hypothesis was rejected as there were significant relationships found between personality type as measured by the Myers-Briggs Type Indicator and congruence between self-awareness of strengths and developmental needs and ratings by knowledgeable observers as identified by Skillscope. ENTJs saw themselves as having the strength of interpersonal relationships. This self-rating was confirmed by other raters. INTJs underrated themselves on the strength of interpersonal relationships, and ISTJs underrated themselves on the strength of decision-making.

Figure 3 – Plots for Self-Raters

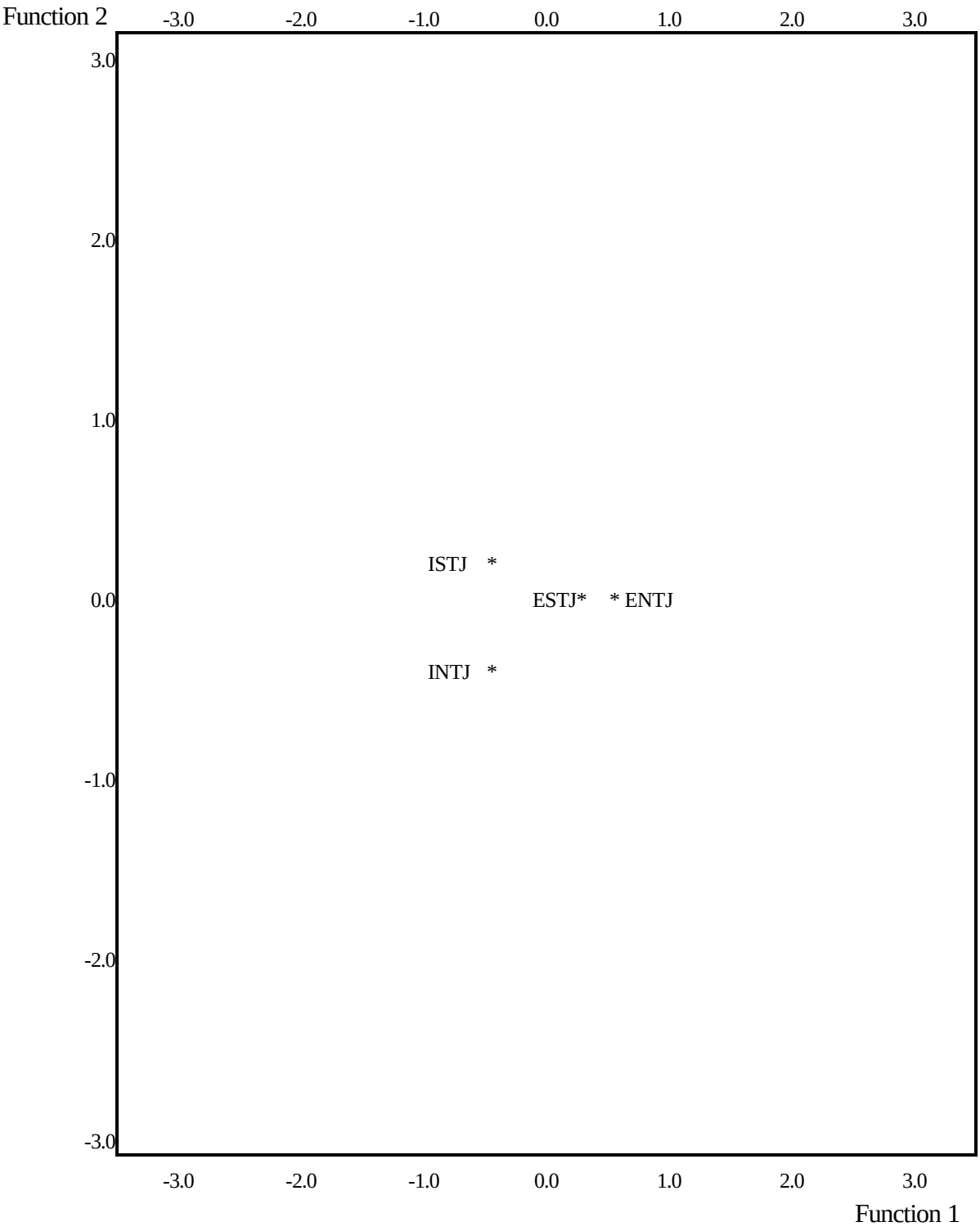
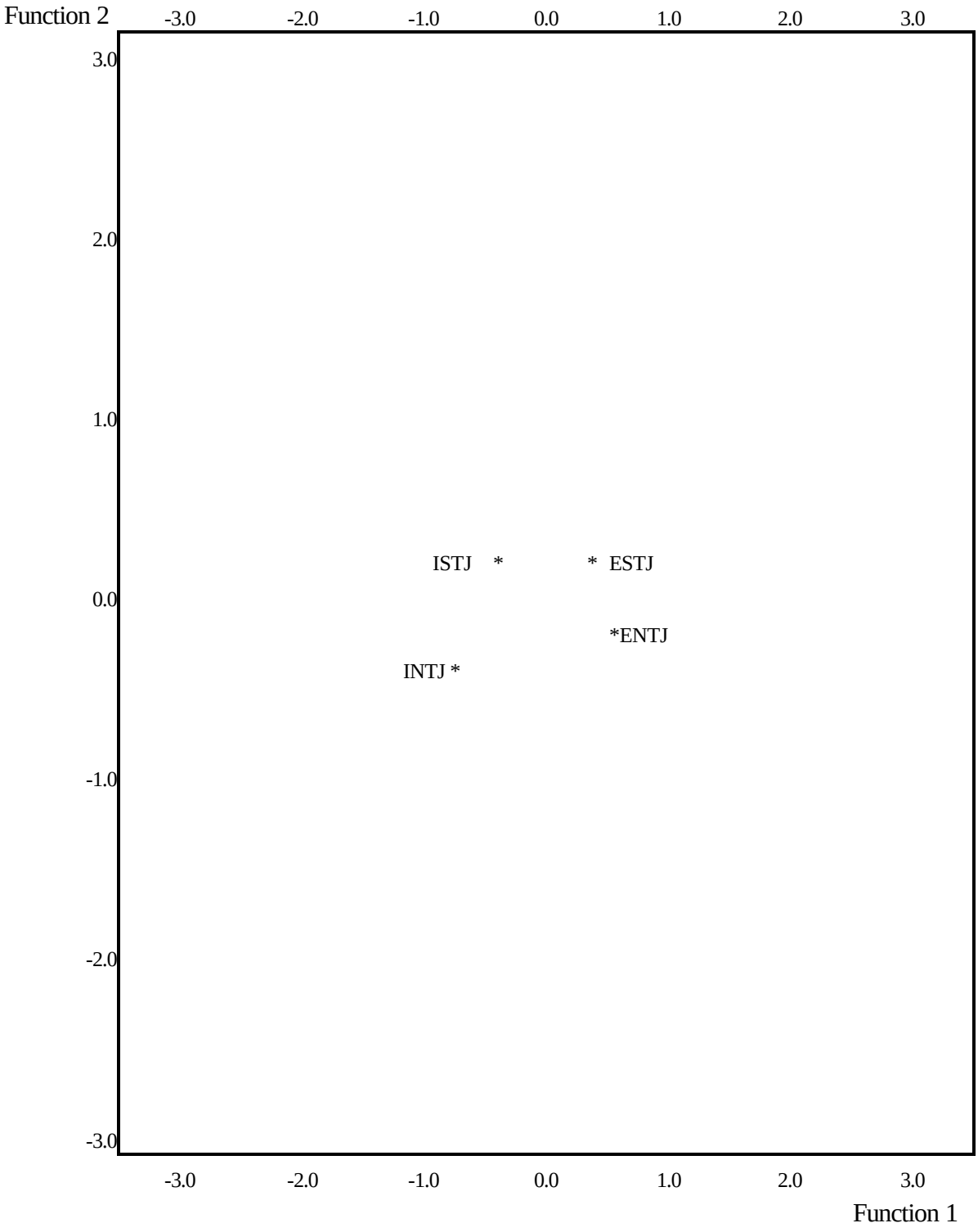


Figure 4 – Plots for Other Raters



As discussed in chapter 3, the discriminate analysis technique was selected over the MANOVA statistical analysis technique. Discriminate analysis is essentially a MANOVA turned around (Tabachnick and Fidell, 1996). The advantage of the discriminate analysis over MANOVA is "…actually putting cases into groups called classification" (Tabachnick and Fidell, 1996, p. 507). Additionally, utilizing the discriminate analysis technique allowed results to be readily comparable with data in which the self-rater scores had not been separated. For reference purposes, the MANOVA data calculated for the hypothesis three segment considering the strength results of self-raters and knowledgeable observers is found on Table 51 in Appendix E.

Summary of Data Analysis

The statistical analysis indicated that all three hypotheses were rejected. In regard to the significant relationships between strengths and the selected MBTI types, decision-making and personal management skills were found to be significant strengths of the ISTJ type and power/influence and personal management skills were determined to be significant strengths of the ESTJ type. A significant relationship was determined between developmental needs and the selected MBTI types as high energy/results oriented was found to be a developmental need for the ISTJ group. When considering the question of congruence between the scores of self-raters and the scores of knowledgeable observers, ENTJ self and other raters agreed that interpersonal relationships were a strength. INTJs and ISTJs underrated themselves on the strengths of interpersonal relationships and decision-making respectively.

CHAPTER 5

CONCLUSIONS

Each of the hypotheses were rejected as significant relationships were found in regard to MBTI types and strengths, developmental needs, and congruence between self-ratings and other raters. This chapter draws conclusions from that data and makes recommendations for further study related to leadership and personality type.

Hypothesis number one is rejected as data analysis revealed some significant relationships between personality type as indicated by the Myers-Briggs Type Indicator and strengths identified by Skillscope. Study results indicated that decision-making and personal management were both strengths of those individuals of the ISTJ type. Personal management and power/influence were two significant strengths of the ESTJ type. A summary of these relationships as identified by the analysis is provided in Table 41.

Table 41 – Strengths Summary

	Significant Predictors	Conclusions
Discriminate Function 1	*Decision-making *Personal Management	Decision-making and personal management are leadership strengths for the ISTJ type.
ISTJ	*Decision-making *Personal Management	
ENTJ	None	
Discriminate Function 2	Interpersonal Skills *Personal Management *Power/Influence	Personal management and power/ influence are leadership strengths for the ESTJ type.
ESTJ	*Personal Management *Power/Influence	
INTJ	None	

Note: * indicates where a predictor matches with a group

Since these two MBTI types are identical except for the introvert/extrovert preference, the Skillscope instrument indicates that introverts who are STJs are different from extroverts who are also STJs by two basic strengths. Introverts were observed to be strong decision-makers while extroverts tend to have power/influence as a strength. All STJs, whether introverts or extroverts, were observed to have mastered the skill of personal management.

Although it is challenging to make comparisons of the strengths identified by one instrument with those cited in other research (Van Velsor and Fleenor, 1997), the results of this analysis of Skillscope do confirm some of the traditional assumptions of the MBTI types cited previously. These results especially confirm previous findings regarding the planning and organizational skills of STJs (Fitzgerald, 1994: Wilson and Wilson, 1994: Johnson and Golden, 1994). It is interesting to note that the results of this study indicated decision-making as a strength for STJs, however, other studies caution (Nutt 1986) that the characteristic might not be a strength in some circumstances.

In order to better understand the scope of the leadership characteristics found to be significantly related to specific MBTI types, a brief discussion follows of the items that contribute to each skill. For more comprehensive information one may refer to Appendix B for the list of items that make up the seven skills as determined by the factor analysis.

Of the 98 items making up Skillscope, eleven were identified with the decision-making skill by the factor analysis. This skill is associated with problem definition, gathering data, and evaluating data. This skill also includes the ability to digest large

amounts of data and handle jobs with a big scope. A good decision-maker is also one who can spot trends, and is logical, databased, and rational. In the Skillscope definition, a good decision-maker not only manages the decision-making process, but also implements the decision and follows through on what needs to be done.

Seven of the Skillscope items factored for the personal management predictor. This skill is characterized by the ability to appropriately structure the work of others and delegate and prioritize well. This skill also includes the ability to strike a balance between work and private life, take care of self, and find proper outlets for tensions and frustrations.

The power/influence skill includes seven of the Skillscope items. One with a strength in power/influence demonstrates a sense of the politics of the organization and makes good use of the people around him. This skill also reflects one who is good making presentations in front of others, but is also seen as trustworthy. When the power/influence skill is considered a strength it means one has the ability to influence others, but without being conceited.

Hypothesis number two is rejected because one significant relationship was found between personality type as indicated by the Myers-Briggs Type Indicator and developmental needs identified by Skillscope. High energy/results oriented was determined to be a developmental need for the ISTJ group (Table 42).

Table 42 – Developmental Needs Summary

	Significant Predictors	Conclusions
Discriminate Function 1	*High Energy/Results Oriented	High energy/results oriented is a developmental need for the ISTJ type.
ISTJ	*High Energy/Results Oriented Personal Management	
Discriminate Function 2	Personal Management	Data is inconclusive.
ESTJ	None	
INTJ	None	

Note: * indicates where a predictor matches with a group and a discriminate function

Nine of the Skillscope items contributed to the high energy/results oriented leadership skill. In this case, it was identified as a developmental need for ISTJs, meaning that their observed leadership traits do not demonstrate these characteristics. They were observed as not having high energy and not ambitious to advance their career. They are not seen as action oriented, nor are they seen as leaders who seek new information energetically. They are not driven, and tend not to respond well to new situations that could positively impact personal growth.

One might note that there does seem to be an appearance of conflict between the results. ISTJs were found to have a strength in the skill of decision-making. However, high/energy results oriented was determined to be a developmental need for ISTJs. Because ISTJs prefer the status quo (Clancy, 1997), they may be seen as lacking energy and initiative in some situations. However, they are strong leaders of change when

convinced change is necessary (Barger and Kirby, 1997). They also tend to remain quiet and withdrawn (Barger and Kirby, 1997: Kroeger and Thuesen, 1992), a trait that those around them who prefer more personal interaction during the decision-making process might interpret as indecisiveness. One possible explanation is that since ISTJs can get bogged down in details at the expense of other responsibilities (Nutt 1986), they are observed as slow in getting results. It is also noted that ISTJs sometimes avoid group learning experiences (Kilmann and Taylor, 1974), which could contribute to the observations that others don't see them as being ambitious or willing to grow.

The third hypothesis is rejected as there were significant relationships found between personality type as measured by the Myers-Briggs Type Indicator and congruence between self-awareness of strengths and developmental needs and ratings by knowledgeable observers as identified by Skillscope.

ENTJs saw themselves as having the strength of interpersonal relationships (Table 43). This self-rating was confirmed by other raters (Table 44). Previous studies have noted that accuracy can be associated with those scoring high in interpersonal relationships (Van Velsor, Ruderman, and Young, 1991). However, accuracy has been more associated with Is and Ss (Roush and Atwater, 1992) rather than Es and Ns as was the result in this study. Van Velsor and Fleenor (1997) reported that extroverts were consistently overraters, also contrary to the results shown here.

INTJs underrated themselves on the skill of interpersonal relationships and ISTJs underrated themselves on the skill of decision-making. This study did not show any of the selected MBTI types to be overraters.

Table 43 – Self-Raters Strength Summary

	Significant Predictors	Conclusions
Discriminate Function 1	*Interpersonal Relationships High Energy/Results oriented	ENTJs rate themselves as exhibiting the strength of interpersonal relationships.
ENTJ	*Interpersonal Relationships	
ISTJ/INTJ	None	
Discriminate Function 2	Interpersonal Relationships High Energy/Results Oriented	Data is inconclusive
INTJ	None	

Note: * indicates where a predictor matches with a group and a discriminate function

Table 44 – Other Raters Strength Summary

	Significant Predictors	Conclusions
Discriminate Function 1	Decision-making High Energy/Results oriented	Data is inconclusive
ESTJ/ENTJ	None	
ISTJ/INTJ	None	
Discriminate Function 2	*Interpersonal Relationships *Decision-making Personal Management Power/Influence	Other raters indicate that decision making is a leadership strength for the ISTJ type.
ISTJ	*Decision-making	Other raters indicate that interpersonal relationships are a leadership strength for the INTJ and ENTJ types.
INTJ/ENTJ	*Interpersonal Relationships High Energy/Results Oriented	

Note: * indicates where a predictor matches with a group and a discriminate function

Previous research tends to support the premise that the observer ratings are more stable over time (Nilson and Campbell, 1993), and are more predictive of job performance (Nilson, 1991). Yukl and Lepsinger (1995) suggest that it is fruitful for self-

ratings to be compared with the ratings of others. The general consensus is that the observer ratings are considered the more accurate of the two.

The skill of interpersonal relationships was made up of twenty-two items from the Skillscope instrument. One having this skill as a strength is a keen observer of all that goes on around him, and is an effective communicator with the ability to bring people together. He has good relationships with peers, subordinates, and supervisors alike, and is known for his willingness to share responsibility as well as credit. He is observed to bring out the best in people, listens well, and successfully manages conflict and negotiation. Those seen with the skill of interpersonal relationships are considerate of the feelings of others and tend to develop warm, cooperative relationships.

Summary

The discriminate analysis of the Skillscope leadership feedback instrument as compared with the four MBTI types revealed that personal management was a strength for both the ISTJs and ESTJs types. Decision-making was a strength for ISTJs, and power/influence was a strength for ESTJs.

The high energy/results oriented skill was determined to be a developmental need for the ISTJ type. Although the research model does not include an explanation of why ISTJs were perceived in this manner, this developmental need is a matter worth addressing in leadership development programs and in need of further research to add to our understanding as to why observers feel this way.

ENTJs saw themselves with the strength of interpersonal skills. Other raters agreed. INTJs underrated themselves on the skill of interpersonal skills and ISTJs underrated themselves on the skill of decision-making.

These results indicated that there are some definitive relationships between MBTI type and strengths and developmental needs as measured by Skillscope. This information can be useful to both leadership development program facilitators and participants as they attempt to make sense of the information received from the MBTI, and the Skillscope 360 degree leadership feedback instrument.

The difficulty in achieving significant results in this study should serve as a reminder that the interpretation of the data produced by leadership development programs must be carefully monitored by organizations that commission their use. Not only should facilitators be cautioned, but it must be emphasized to program participants that the benefit comes from the perspective of understanding rather than evaluating. Self-awareness and feedback from knowledgeable observers can be useful tools in identifying where one is in relation to where one would like to be. In summary, 360 degree feedback is beneficial because it provides information that can enable one to make conscious decisions about change they would like to see in there own leadership practices in order to achieve desired outcomes.

The disproportionate number of ISTJs in the sample can be a cause of concern if it truly represents the population of leaders. If implementing change is an important element in effective leadership today, why do the majority of our leaders not exhibit innovation and change as a strength? Considering the sample of this study, it could be

that since the majority of participants were mid-level managers, the innovation and change is instituted by upper level managers. The strengths of the ISTJ type make them valuable to organizations that need personnel who are dependable, reliable, consistent, and get things done with regularity. However, in organizations with flat hierarchies and distributed leadership these individuals could require development to be effective.

It is the opinion of this researcher that honest, reliable information in the hands of committed leaders will result in behavioral changes that benefit the organizations they serve. Although statistically significant research is difficult to obtain in the behavioral sciences, the effort is worthwhile as it provides information that allows leadership development decisions to be made based on reliable data rather than the impressions of individuals that are often inaccurate, even though well-meaning.

RECOMMENDATIONS

As has been previously noted (Van Velsor, Leslie, and Fleenor, 1997), the key in the use of any measurement instrument is its intended use. As shown in this study, the advantage of Skillscope is that it can measure specific strengths of certain MBTI types. However, feedback facilitators should be cautioned against suggesting relationships between MBTI types and either strengths or developmental needs that are not substantiated by research.

The nature of the Skillscope instrument makes it difficult to study, although the techniques utilized in this study proved adequate in the analysis of strengths. The factor analysis of the 98 items resulted in groupings quite different from the fifteen clusters

found in the instrument. These results also differed somewhat from a previously reported factor analysis of the instrument (Hough and Fisher, 1997). This grouping of the 98 items should be studied with a larger population. Another concern is the analysis of developmental needs. These results are suspect psychometrically due to the fundamental structure of the Skillscope instrument. Further techniques need to be developed to assign meaning to feedback data. Considering the popularity of this leadership feedback instrument, this research is certainly warranted if true meaning is to be derived from the feedback results. If organizations are to be successful in proactive leadership development programs, training in potential areas of weakness will need to be based on accurate data.

This study revealed some interesting results when the self-ratings were removed and the remaining feedback data analyzed. The concept of accuracy in 360 degree feedback leadership development needs to be further studied, as well as the reasons for the differences between self-ratings and the ratings of others. Since the self-ratings tend to be the unstable factor, it would be valuable to explore how the information learned in 360 feedback programs can be utilized to implement the desired change. Research would also be useful to determine the extent the desired changes were successfully implemented and what support leaders need to maintain the momentum that was begun. Interesting studies could be proposed to analyze the differences between the feedback of superiors, peers, and subordinates, and how each of these view the importance of the skills measured.

The results of this study emphasize the need for specific research that expands the sample beyond the majority ISTJ type. It is noted in this study (Table 2) that the majority MBTI type, ISTJ, is predominately male. Of great value would be studies that separate data by gender in addition to MBTI type. This could be accomplished by expanding the test subjects beyond those advancing to mid-management level in most organizational structures, who tend to be male and ISTJ, to others areas where leadership is practiced but not necessarily in the traditional setting. One possible area would be selecting a sample from the educational profession. Samples of the other MBTI types need to be studied in significant numbers in order to develop more accurate profiles of their strengths and developmental needs. One step beyond the type preferences of the leaders being evaluated is the preferences of those being led. Understanding the personality make-up of the organization one is leading could prove to be valuable information when it comes to motivating and empowering personnel and implementing organizational change.

In regard to MBTI type, answering the question of why so many managers belong to the ISTJ personality type would be helpful. Research could determine if the reasons are related to some sort of employment bias, gender, required skills, or job preferences.

The ratios of male to female were recorded in Table 2. It would be of value for studies to be designed that analyze the reasons for the disproportional number of females associated with various MBTI types, especially in regard to leadership development.

As leadership development programs expand, cultural sensitivity will be a major consideration in understanding the needs of leaders from various cultural backgrounds.

A worthwhile study would be to analyze leadership skills and personality types across different cultures. Of interest would also be the value that different cultures place on the various leadership skills.

APPENDIX A

LETTER FROM THE CENTER FOR CREATIVE LEADERSHIP

CENTER FOR CREATIVE LEADERSHIP GREENSBORO • BRUSSELS • COLORADO SPRINGS • SAN DIEGO
One Leadership Place • Post Office Box 26300 • Greensboro, North Carolina 27438-6300 • Telephone 336-288-7210 • Fax 336-288-3999

April 27, 1998

Mr. Hal Cunningham
Educational Administration Department
University of North Texas
PO Box 311337
Denton, TX 76203-1337

Dear Mr. Cunningham:

This is to let you know that your request for use of the CCL databases for your doctoral research has been approved. Jean Leslie will be working to get the data you requested copied to disk and in the mail to you shortly. If you have any questions, please contact Jean at 336 286-4417.

Thanks for your interest in the Center for Creative Leadership and best of luck with your research.

Sincerely,

Ellen Van Velsor

Ellen Van Velsor, Ph.D.
Research Scientist

Brussels Branch: Avenue Molière 219, B-1050, Brussels, Belgium, (32-2) 340-02-10, Fax (32-2) 346-41-37
Colorado Springs Branch: 850 Leader Way, Colorado Springs, Colorado 80906-1353, 719-633-3891, Fax 719-633-2236
San Diego Branch: 8910 University Center Lane, Tenth Floor, San Diego, California 92122-1029, 619-638-8000, Fax 619-638-8008

APPENDIX B

SKILLSCOPE FACTOR LOADINGS

SKILLSCOPE FACTOR LOADINGS

Factor 1: Interpersonal Skills – 22 Items

Loading	Item Number
.422	4. Keen observer of people, events, things.
.432	8. Adept at disseminating information to others.
.686	24. A team builder: brings people together successfully around tasks.
.539	28. Recognizes and rewards people for their work.
.516	32. Effective at managing conflict.
.625	33. Confronts others skillfully.
.526	34. Negotiates adeptly with individuals and groups over roles and resources.
.797	35. Builds warm, cooperative relationships.
.651	36. Isn't abrasive; doesn't usually antagonize people.
.670	38. Has good relationships with subordinates.
.581	40. Has good relationships with peers.
.426	41. Has good relationships with outsiders.
.665	42. Skilled at relating to many different types of people.
.722	44. Competent at dealing with people's feelings.
.631	47. Considers personalities when dealing with people.
.630	49. Good coach, counselor, mentor; patient with people as they learn.
.679	50. Brings out the best in people.
.574	60. Works effectively with other people over whom he/she has no direct authority.
.431	61. Listens well.
.426	64. A participative manager; shares responsibility and influence with subordinates.
.584	65. Collaborates well with others.
.504	68. Creates good give-and-take with others in conversations; meetings.

Factor 2: Vision/Innovation Skills (Change Agent) – 16 Items

Loading	Item Number
.610	18. Has vision; often brings up ideas about potentials and possibilities for the future.
.601	19. Entrepreneurial; seizes new opportunities.
.575	20. Consistently generates new ideas.
.613	21. Creates significant organizational change.

.585	22. Introduces needed change even in the face of opposition.
.416	26. Resourceful; can marshal people, funds, space required for projects.
.439	30. Can easily handle situations where there is no pat answer, no prescribed method of proceeding.
.462	31. Can translate strategy into action over the long haul.
.475	45. Sizes up people well; has a nose for talent.
.568	46. Attracts talented people.
.521	51. Gives subordinates appropriately challenging assignments and the opportunity to grow.
.480	52. Inspirational; helps people to see the importance of what they are doing.
.554	53. Good at promoting an idea or vision; persuading.
.526	56. Able to inspire, motivate people; sparks others to take action.
.445	57. Comfortable with power of the managerial role.
.462	71. A good general manager.

Factor 3: Decision-making Skills – 11 Items

Loading	Item Number
.518	2. Probes, digs beneath the surface, tests the validity of information.
.590	3. Creates order out of large quantities of information.
.598	5. Defines problems effectively; gets to the heart of the problem.
.440	6. Spots problems, opportunities, threats, trends early.
.501	7. Logical, data-based, rational.
.438	16. Implements decisions, follows through, follows up well; an expediter.
.411	17. Carefully weighs consequences of contemplated action.
.567	27. Can organize and manage big, long-term projects; good shepherding skills.
.464	29. Manages the process of decision-making effectively; knows who to involve on what issue.
.527	70. Shows mastery of job content, excels at his/her function or professional specialty.
.546	72. Effective in job with a big scope.

Factor 4: Personal Management Skills – 7 Items

Loading	Item Number
.494	25. Structures subordinates work appropriately.
.626	59. Delegates effectively.

.515	80. Sets priorities well, distinguishes clearly between important and unimportant tasks.
.597	82. Deals with interruptions appropriately; knows when to admit interruptions and when to screen them out.
.655	83. Avoids spreading self too thin.
.563	91. Strikes a reasonable balance between his/her work life and private life.
.547	96. Takes good care of self; uses constructive outlets for tension and frustrations.

Factor 5: Flexibility/Adaptability -- 10 Items

Loading	Item Number
.549	48. Tolerant of foibles, idiosyncrasies of others.
.577	62. Takes ideas different from own seriously, and from time to time changes mind.
.611	63. Accepts criticism well; easy to give feedback on his/her performance.
.572	66. Flexible; good at varying his/her approach with the situation.
.542	67. Thinks in terms of trade-offs; doesn't assume a single best way.
.463	84. Capable, cool in high pressure situations.
.518	85. Can deal well with setbacks; resilient; bounces back from failure, defeat.
.512	86. Willing to admit ignorance.
.593	95. Learns from own experience; not set in his/her ways.
.463	97. Makes needed adjustments in own behavior.

Factor 6: High Energy/Results Oriented – 9 Items

Loading	Item Number
.521	1. Seeks information energetically.
.633	13. Action-oriented; presses for immediate results.
.496	14. Decisive; doesn't procrastinate on decisions.
.723	76. Good initiative; continually reaches for more responsibility.
.676	77. High level of energy.
.651	78. Ambitious; highly motivated to advance his/her career.
.607	79. Goal-directed, persistent; driven to achieve objectives.
.507	81. Makes the most of the time available; extremely productive.
.452	94. Responds well to new situations that require him/her to stretch and grow.

Factor 7: Power/Influence – 7 Items

Loading	Item Number
.441	10. Good public speaker; skilled at performing, being on stage.
.458	37. Makes good use of people, doesn't exploit.
.505	55. Astute sense of politics.
.441	58. Skilled at selling upward, influencing superiors.
.471	69. Doesn't let power or status go to his/her head.
.434	88. Doesn't hide mistakes.
.427	89. Has integrity, trustworthy.

No Significant Loadings – 16 Items

9. Crisp, clear, articulate.
11. Makes his or her point effectively to a resistant audience.
12. Strong communicator on paper, good writing skills.
15. Troubleshooter; enjoys solving problems.
23. Establishes and conveys a sense of purpose.
39. Has good relationships with superiors.
43. Readily available to others.
54. Possesses extensive network of contacts necessary to do the job.
73. In a new assignment, picks up knowledge and expertise easily; a quick study.
74. At home with graphs, charts, statistics, budgets.
75. Understands cash flows, financial charts, corporate annual reports.
87. Optimistic; takes the attitude that most problems can be solved.
90. Doesn't put own ambitions ahead of the organization's objectives.
92. Compensates for own weaknesses.
93. Capitalizes on own strengths.
98. Aware of his/her feelings.

Extraction Method: Principal Component Analysis
Rotation Method: Oblimin (Oblique) with Kaiser Normalization.

APPENDIX C

GROUP MEANS AND STANDARD DEVIATIONS FOR STRENGTHS

GROUP MEANS AND STANDARD DEVIATIONS FOR DEVELOPMENTAL NEEDS

Table 45 – Group Means and Standard Deviations for Strengths

TYPE	Predictors	Mean	Standard Deviation	Valid N (listwise)	
				Unweighted	Weighted
ISTJ	F1: Interpersonal relationships	0.50221	0.16911	121	121
	F2: Vision/Innovation	0.41901	0.15133	121	121
	F3: Decision-making	0.59373	0.12565	121	121
	F4: Personal Management	0.46239	0.14415	121	121
	F5: Flexibility/Adaptability	0.47161	0.15380	121	121
	F6: High Energy/Results Oriented	0.59802	0.17932	121	121
	F7: Power/Influence	0.51665	0.11845	121	121
INTJ	F1: Interpersonal relationships	0.41191	0.18808	54	54
	F2: Vision/Innovation	0.42152	0.17378	54	54
	F3: Decision-making	0.55580	0.15027	54	54
	F4: Personal Management	0.37956	0.15765	54	54
	F5: Flexibility/Adaptability	0.45720	0.17497	54	54
	F6: High Energy/Results Oriented	0.61219	0.19360	54	54
	F7: Power/Influence	0.49606	0.14642	54	54
ESTJ	F1: Interpersonal relationships	0.51112	0.15933	66	66
	F2: Vision/Innovation	0.44967	0.15411	66	66
	F3: Decision-making	0.56403	0.11342	66	66
	F4: Personal Management	0.46095	0.13131	66	66
	F5: Flexibility/Adaptability	0.47252	0.14331	66	66
	F6: High Energy/Results Oriented	0.65061	0.18620	66	66
	F7: Power/Influence	0.57285	0.12850	66	66
ENTJ	F1: Interpersonal relationships	0.46481	0.19193	64	64
	F2: Vision/Innovation	0.41817	0.14821	64	64
	F3: Decision-making	0.51398	0.13798	64	64
	F4: Personal Management	0.39039	0.15871	64	64
	F5: Flexibility/Adaptability	0.45780	0.16394	64	64
	F6: High Energy/Results Oriented	0.61963	0.18474	64	64
	F7: Power/Influence	0.51875	0.14038	64	64
Total	F1: Interpersonal relationships	0.48030	0.17832	305	305
	F2: Vision/Innovation	0.42591	0.15522	305	305
	F3: Decision-making	0.56385	0.13325	305	305
	F4: Personal Management	0.43230	0.15114	305	305
	F5: Flexibility/Adaptability	0.46636	0.15712	305	305
	F6: High Energy/Results Oriented	0.61644	0.18468	305	305
	F7: Power/Influence	0.52561	0.13256	305	305

Table 46 – Group Statistics and Standard Deviations for Developmental Needs

TYPE	Predictors	Mean	Standard Deviation	Valid N (listwise) Unweighted	Weighted
ISTJ	F1: Interpersonal relationships	0.22017	0.16132	121	121
	F2: Vision/Innovation	0.18912	0.09921	121	121
	F3: Decision-making	0.14607	0.09813	121	121
	F4: Personal Management	0.22490	0.15040	121	121
	F5: Flexibility/Adaptability	0.18424	0.13663	121	121
	F6: High Energy/Results Oriented	0.13817	0.13557	121	121
	F7: Power/Influence	0.15150	0.08533	121	121
INTJ	F1: Interpersonal relationships	0.23728	0.13707	54	54
	F2: Vision/Innovation	0.15698	0.09732	54	54
	F3: Decision-making	0.15559	0.10612	54	54
	F4: Personal Management	0.21763	0.10859	54	54
	F5: Flexibility/Adaptability	0.15976	0.09680	54	54
	F6: High Energy/Results Oriented	0.09619	0.09770	54	54
	F7: Power/Influence	0.13848	0.08091	54	54
ESTJ	F1: Interpersonal relationships	0.19798	0.11161	66	66
	F2: Vision/Innovation	0.16518	0.10297	66	66
	F3: Decision-making	0.16373	0.11304	66	66
	F4: Personal Management	0.18297	0.09956	66	66
	F5: Flexibility/Adaptability	0.17833	0.10563	66	66
	F6: High Energy/Results Oriented	0.09415	0.12031	66	66
	F7: Power/Influence	0.14294	0.08905	66	66
ENTJ	F1: Interpersonal relationships	0.23475	0.15834	64	64
	F2: Vision/Innovation	0.17953	0.09867	64	64
	F3: Decision-making	0.18428	0.11924	64	64
	F4: Personal Management	0.24592	0.15406	64	64
	F5: Flexibility/Adaptability	0.19613	0.14103	64	64
	F6: High Energy/Results Oriented	0.09617	0.08157	64	64
	F7: Power/Influence	0.15798	0.09116	64	64
Total	F1: Interpersonal relationships	0.22146	0.14700	305	305
	F2: Vision/Innovation	0.17624	0.09991	305	305
	F3: Decision-making	0.15960	0.10794	305	305
	F4: Personal Management	0.21895	0.13591	305	305
	F5: Flexibility/Adaptability	0.18112	0.12508	305	305
	F6: High Energy/Results Oriented	0.11240	0.11761	305	305
	F7: Power/Influence	0.14870	0.08649	305	305

APPENDIX D

BOX'S M TEST OF SIGNFICIANCE FOR SELF-RATERS – DEVELOPMENTAL NEEDS

TEST OF EQUALITY OF GROUP MEANS SELF-RATERS – DEVELOPMENTAL NEEDS

BOX'S M TEST OF SIGNFICIANCE OTHER RATERS – DEVELOPMENTAL NEEDS

TEST OF EQUALITY OF GROUP MEANS OTHER RATERS— DEVELOPMENTAL NEEDS

Table 47 – Box's M Test of Significance for Self-Raters – Developmental Needs

Box's M		88.148
F Statistic	Approx.	1.001
	df1	84
	df2	128786
	Sig.	0.476

Table 48 – Tests of Equality of Group Means for Self-Raters – Developmental Needs

Predictors	Wilks' Lambda	F	df1	df2	Sig.
Interpersonal relationships	0.952	5.090	3	301	0.002
Vision/Innovation	0.981	1.941	3	301	0.123
Decision-making	0.990	0.991	3	301	0.397
Personal Management	0.987	1.285	3	301	0.280
Flexibility/Adaptability	0.992	0.818	3	301	0.485
High Energy/Results Oriented	0.946	5.687	3	301	0.001
Power/Influence	0.989	1.107	3	301	0.346

Table 49 – Box's M Test of Significance for Other Raters – Developmental Needs

Box's M		88.148
F Statistic	Approx.	1.001
	df1	84
	df2	128786
	Sig.	0.476

Table 50 – Tests of Equality of Group Means for Other Raters – Developmental Needs

Predictors	Wilks' Lambda	F	df1	df2	Sig.
Interpersonal relationships	0.952	5.090	3	301	0.002
Vision/Innovation	0.981	1.941	3	301	0.123
Decision-making	0.990	0.991	3	301	0.397
Personal Management	0.987	1.285	3	301	0.280
Flexibility/Adaptability	0.992	0.818	3	301	0.485
High Energy/Results Oriented	0.946	5.687	3	301	0.001
Power/Influence	0.989	1.107	3	301	0.346

APPENDIX E

MULTIVARIATE ANALYSIS OF VARIANCE
MULTIPLE COMPARISONS

Table 51 -- MANOVA

Multiple Comparisons F1-7 Predictors 1-ISTJ 2-INTJ 2-ESTJ 3-ENTJ

Scheffe

			Mean Difference	Std. Error	Sig.	95% Confidence Interval	
Dep. Variable	TYPE#	TYPE#				Lower Bound	Upper Bound
F1SELF	1	2	0.0816	0.0397	0.2410	-0.0301	0.1933
		3	-0.0557	0.0371	0.5226	-0.1602	0.0487
		4	-0.0786	0.0375	0.2243	-0.1841	0.0268
	2	1	-0.0816	0.0397	0.2410	-0.1933	0.0301
		3	-0.1373	0.0445	0.0247	-0.2625	-0.0121
		4	-0.1602	0.0448	0.0058	-0.2863	-0.0341
	3	1	0.0557	0.0371	0.5226	-0.0487	0.1602
		2	0.1373	0.0445	0.0247	0.0121	0.2625
		4	-0.0229	0.0426	0.9620	-0.1426	0.0968
	4	1	0.0786	0.0375	0.2243	-0.0268	0.1841
		2	0.1602	0.0448	0.0058	0.0341	0.2863
		3	0.0229	0.0426	0.9620	-0.0968	0.1426
F1OTHERS	1	2	0.0855	0.0299	0.0441	0.0015	0.1694
		3	-0.0051	0.0279	0.9984	-0.0836	0.0734
		4	0.0338	0.0282	0.6967	-0.0455	0.1131
	2	1	-0.0855	0.0299	0.0441	-0.1694	-0.0015
		3	-0.0906	0.0335	0.0645	-0.1847	0.0035
		4	-0.0516	0.0337	0.5049	-0.1464	0.0432
	3	1	0.0051	0.0279	0.9984	-0.0734	0.0836
		2	0.0906	0.0335	0.0645	-0.0035	0.1847
		4	0.0389	0.0320	0.6871	-0.0510	0.1289
	4	1	-0.0338	0.0282	0.6967	-0.1131	0.0455
		2	0.0516	0.0337	0.5049	-0.0432	0.1464
		3	-0.0389	0.0320	0.6871	-0.1289	0.0510
F2SELF	1	2	-0.0762	0.0434	0.3811	-0.1983	0.0459
		3	-0.0645	0.0406	0.4726	-0.1786	0.0497
		4	-0.0819	0.0410	0.2645	-0.1973	0.0334
	2	1	0.0762	0.0434	0.3811	-0.0459	0.1983
		3	0.0117	0.0487	0.9963	-0.1252	0.1486
		4	-0.0057	0.0490	0.9996	-0.1436	0.1321
	3	1	0.0645	0.0406	0.4726	-0.0497	0.1786
		2	-0.0117	0.0487	0.9963	-0.1486	0.1252
		4	-0.0175	0.0466	0.9865	-0.1484	0.1134
	4	1	0.0819	0.0410	0.2645	-0.0334	0.1973
		2	0.0057	0.0490	0.9996	-0.1321	0.1436
		3	0.0175	0.0466	0.9865	-0.1134	0.1484
F2OTHERS	1	2	0.0040	0.0270	0.9991	-0.0718	0.0798
		3	-0.0293	0.0252	0.7182	-0.1001	0.0416
			Mean Difference	Std. Error	Sig.	95% Confidence	

						Interval	
	2	1	-0.0040	0.0270	0.9991	-0.0798	0.0718
		3	-0.0333	0.0302	0.7502	-0.1183	0.0517
		4	0.0028	0.0304	0.9998	-0.0827	0.0884
	3	1	0.0293	0.0252	0.7182	-0.0416	0.1001
		2	0.0333	0.0302	0.7502	-0.0517	0.1183
		4	0.0361	0.0289	0.6682	-0.0451	0.1174
	4	1	-0.0069	0.0255	0.9949	-0.0785	0.0647
		2	-0.0028	0.0304	0.9998	-0.0884	0.0827
		3	-0.0361	0.0289	0.6682	-0.1174	0.0451
F3SELF	1	2	-0.0391	0.0389	0.7989	-0.1484	0.0702
		3	-0.0065	0.0364	0.9985	-0.1087	0.0957
		4	0.0360	0.0367	0.8110	-0.0673	0.1392
	2	1	0.0391	0.0389	0.7989	-0.0702	0.1484
		3	0.0325	0.0436	0.9061	-0.0900	0.1551
		4	0.0750	0.0439	0.4053	-0.0484	0.1984
	3	1	0.0065	0.0364	0.9985	-0.0957	0.1087
		2	-0.0325	0.0436	0.9061	-0.1551	0.0900
		4	0.0425	0.0417	0.7916	-0.0747	0.1597
	4	1	-0.0360	0.0367	0.8110	-0.1392	0.0673
		2	-0.0750	0.0439	0.4053	-0.1984	0.0484
		3	-0.0425	0.0417	0.7916	-0.1597	0.0747
F3OTHERS	1	2	0.0475	0.0233	0.2465	-0.0180	0.1131
		3	0.0331	0.0218	0.5119	-0.0282	0.0944
		4	0.0845	0.0220	0.0024	0.0226	0.1464
	2	1	-0.0475	0.0233	0.2465	-0.1131	0.0180
		3	-0.0144	0.0261	0.9589	-0.0879	0.0590
		4	0.0370	0.0263	0.5784	-0.0370	0.1109
	3	1	-0.0331	0.0218	0.5119	-0.0944	0.0282
		2	0.0144	0.0261	0.9589	-0.0590	0.0879
		4	0.0514	0.0250	0.2392	-0.0188	0.1216
	4	1	-0.0845	0.0220	0.0024	-0.1464	-0.0226
		2	-0.0370	0.0263	0.5784	-0.1109	0.0370
		3	-0.0514	0.0250	0.2392	-0.1216	0.0188
F4SELF	1	2	0.0773	0.0450	0.4020	-0.0494	0.2039
		3	-0.0093	0.0421	0.9971	-0.1277	0.1091
		4	0.0327	0.0425	0.8984	-0.0869	0.1523
	2	1	-0.0773	0.0450	0.4020	-0.2039	0.0494
		3	-0.0866	0.0505	0.4023	-0.2286	0.0554
		4	-0.0446	0.0509	0.8571	-0.1875	0.0984
	3	1	0.0093	0.0421	0.9971	-0.1091	0.1277
		2	0.0866	0.0505	0.4023	-0.0554	0.2286
		4	0.0420	0.0483	0.8594	-0.0937	0.1778
	4	1	-0.0327	0.0425	0.8984	-0.1523	0.0869
			Mean Difference	Std. Error	Sig.	95% Confidence Interval	

		3	-0.0420	0.0483	0.8594	-0.1778	0.0937
F4OTHERS	1	2	0.0747	0.0250	0.0322	0.0043	0.1451
		3	-0.0015	0.0234	0.9999	-0.0673	0.0643
		4	0.0687	0.0236	0.0394	0.0022	0.1352
	2	1	-0.0747	0.0250	0.0322	-0.1451	-0.0043
		3	-0.0762	0.0281	0.0633	-0.1551	0.0027
		4	-0.0060	0.0283	0.9975	-0.0854	0.0735
	3	1	0.0015	0.0234	0.9999	-0.0643	0.0673
		2	0.0762	0.0281	0.0633	-0.0027	0.1551
		4	0.0702	0.0268	0.0795	-0.0053	0.1456
	4	1	-0.0687	0.0236	0.0394	-0.1352	-0.0022
		2	0.0060	0.0283	0.9975	-0.0735	0.0854
		3	-0.0702	0.0268	0.0795	-0.1456	0.0053
F5SELF	1	2	-0.0068	0.0452	0.9991	-0.1339	0.1202
		3	-0.0223	0.0423	0.9639	-0.1411	0.0965
		4	-0.0649	0.0427	0.5109	-0.1849	0.0551
	2	1	0.0068	0.0452	0.9991	-0.1202	0.1339
		3	-0.0155	0.0507	0.9926	-0.1580	0.1270
		4	-0.0581	0.0510	0.7302	-0.2016	0.0854
	3	1	0.0223	0.0423	0.9639	-0.0965	0.1411
		2	0.0155	0.0507	0.9926	-0.1270	0.1580
		4	-0.0426	0.0485	0.8557	-0.1788	0.0936
	4	1	0.0649	0.0427	0.5109	-0.0551	0.1849
		2	0.0581	0.0510	0.7302	-0.0854	0.2016
		3	0.0426	0.0485	0.8557	-0.0936	0.1788
F5OTHERS	1	2	0.0122	0.0263	0.9747	-0.0616	0.0861
		3	0.0060	0.0246	0.9962	-0.0630	0.0750
		4	0.0311	0.0248	0.6653	-0.0386	0.1009
	2	1	-0.0122	0.0263	0.9747	-0.0861	0.0616
		3	-0.0062	0.0294	0.9975	-0.0890	0.0766
		4	0.0189	0.0297	0.9389	-0.0645	0.1023
	3	1	-0.0060	0.0246	0.9962	-0.0750	0.0630
		2	0.0062	0.0294	0.9975	-0.0766	0.0890
		4	0.0251	0.0282	0.8503	-0.0540	0.1043
	4	1	-0.0311	0.0248	0.6653	-0.1009	0.0386
		2	-0.0189	0.0297	0.9389	-0.1023	0.0645
		3	-0.0251	0.0282	0.8503	-0.1043	0.0540
F6SELF	1	2	-0.1177	0.0464	0.0949	-0.2483	0.0128
		3	-0.1499	0.0434	0.0085	-0.2719	-0.0278
		4	-0.1361	0.0439	0.0234	-0.2594	-0.0128
	2	1	0.1177	0.0464	0.0949	-0.0128	0.2483
		3	-0.0321	0.0521	0.9441	-0.1785	0.1142
		4	-0.0183	0.0524	0.9890	-0.1657	0.1291
			Mean Difference	Std. Error	Sig.	95% Confidence Interval	
		2	0.0321	0.0521	0.9441	-0.1142	0.1785

		4	0.0138	0.0498	0.9944	-0.1261	0.1538
	4	1	0.1361	0.0439	0.0234	0.0128	0.2594
		2	0.0183	0.0524	0.9890	-0.1291	0.1657
		3	-0.0138	0.0498	0.9944	-0.1538	0.1261
F6OTHERS	1	2	-0.0007	0.0300	1.0000	-0.0849	0.0836
		3	-0.0718	0.0280	0.0894	-0.1506	0.0070
		4	-0.0417	0.0283	0.5392	-0.1213	0.0379
	2	1	0.0007	0.0300	1.0000	-0.0836	0.0849
		3	-0.0711	0.0336	0.2164	-0.1656	0.0233
		4	-0.0410	0.0338	0.6900	-0.1361	0.0541
	3	1	0.0718	0.0280	0.0894	-0.0070	0.1506
		2	0.0711	0.0336	0.2164	-0.0233	0.1656
		4	0.0301	0.0321	0.8302	-0.0602	0.1205
	4	1	0.0417	0.0283	0.5392	-0.0379	0.1213
		2	0.0410	0.0338	0.6900	-0.0541	0.1361
		3	-0.0301	0.0321	0.8302	-0.1205	0.0602
F7SELF	1	2	0.0158	0.0378	0.9816	-0.0905	0.1221
		3	-0.0520	0.0354	0.5405	-0.1514	0.0474
		4	-0.0268	0.0357	0.9044	-0.1272	0.0736
	2	1	-0.0158	0.0378	0.9816	-0.1221	0.0905
		3	-0.0678	0.0424	0.4668	-0.1869	0.0514
		4	-0.0426	0.0427	0.8022	-0.1626	0.0774
	3	1	0.0520	0.0354	0.5405	-0.0474	0.1514
		2	0.0678	0.0424	0.4668	-0.0514	0.1869
		4	0.0251	0.0405	0.9433	-0.0888	0.1391
	4	1	0.0268	0.0357	0.9044	-0.0736	0.1272
		2	0.0426	0.0427	0.8022	-0.0774	0.1626
		3	-0.0251	0.0405	0.9433	-0.1391	0.0888
F7OTHERS	1	2	0.0455	0.0226	0.2568	-0.0180	0.1090
		3	-0.0230	0.0211	0.7556	-0.0824	0.0363
		4	0.0326	0.0213	0.5068	-0.0274	0.0925
	2	1	-0.0455	0.0226	0.2568	-0.1090	0.0180
		3	-0.0685	0.0253	0.0642	-0.1397	0.0026
		4	-0.0129	0.0255	0.9678	-0.0846	0.0587
	3	1	0.0230	0.0211	0.7556	-0.0363	0.0824
		2	0.0685	0.0253	0.0642	-0.0026	0.1397
		4	0.0556	0.0242	0.1549	-0.0124	0.1236
	4	1	-0.0326	0.0213	0.5068	-0.0925	0.0274
		2	0.0129	0.0255	0.9678	-0.0587	0.0846
		3	-0.0556	0.0242	0.1549	-0.1236	0.0124
Based on observed means.							
Significant at .05 level							

1

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