Leader Effectiveness among Patterns of Personality Types and Creativity Styles

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(ABSTRACT)

In the current study, a person-centered approach was taken to the examination of the relation between leader effectiveness and personality preferences. Type Theory and Adaption-Innovation Theory precepts were examined in tandem using cluster analytic techniques in order to discover whether past variable-centered findings relating these two theories would generalize to a person-centered examination. Eight patterns were hypothesized to emerge from the cluster analysis based on past correlational research, and three of these patterns were present in the seven-cluster solution.

Leader effectiveness was measured in terms of multisource ratings on Benchmarks™. Hypotheses were proposed based on past variable-centered research examining the relations between Jungian personality types and self, superior, peer, and subordinate ratings of leader effectiveness. Some support was found for the variable-centered predictions, but the pattern-focused approach provided insight into the dynamics of the five personality preferences examined as well as suggested that indicators other than what would be predicted based on variable-centered studies may contribute to perceptions of leader effectiveness. Overall, the results of this study show that, taken together, variable and person-centered approaches to research may help strengthen the sometimes fragile relationship between personality and leader effectiveness.

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Introduction

In the first half of the 20th century, the trait approach to leadership research emerged through efforts to identify physical characteristics, personality traits, and abilities of people who were deemed "natural" leaders. The disappointing and often conflicting findings of these early examinations were most likely due to the inclusion of some irrelevant variables, failure to consider the situation when considering the importance of various traits, and inattention to the interactions among traits in determining leader effectiveness. Today, there are better measures of personality traits, more consideration of the situation and other interactions among traits, and a greater emphasis on longitudinal designs for studying leader development (Yukl, 1994). Consistent with the recent emphasis on how traits interact, the purpose of the present study is to investigate the relation between leader effectiveness and patterns of personality types and styles of creativity.

Variable and Pattern Approaches to Research

The bulk of research conducted to date in the area of leader effectiveness has been variable-centered. Variable-centered research strategies are a nomothetical approach to science where relations among variables are assumed to be the same for all people, and variables have equal weights for all people (Magnusson & Torestad, 1993). Thus, in a variable-centered study, the focus would be on individual variables or linear combinations of multiple variables and their relation to a specified criterion (Magnusson, 1995). The advantages of variable-centered approaches are that they have the greatest potential for parsimony by giving the researcher the ability to focus on given personality attributes and their relations with other attributes (with the focus always on the variables of interest, not the people who manifest those traits; Ozer & Gjerde, 1989). However, the analysis of individual

variables is generally at an aggregate level and may not tell what is true of any given person in a given situation (Ozer & Gjerde, 1989). In other words, if you take a variable out of context, it may no longer be applicable to a specific individual, and it loses much of its psychological significance (Magnusson & Torestad, 1993). With the variable-centered approach, the assumption is made that the psychological significance of a variable is the same for people at all levels of that variable (i.e., there is no difference in predictive validity across the entire range of a variable).

In addition, the specific contribution or prediction power (in terms of percent of total variance explained) of an individual variable is often small when intercorrelations with other variables are partialled out (Magnusson, 1995). Researchers frequently observe the existence of high correlations among variables, and the implication is that they overlap in terms of content. When there is a high degree of intercorrelation, it may not be optimal from a methodological standpoint to examine the variables independently because the unique contribution of each will be limited (Magnusson & Torestad, 1993).

In contrast, the person-centered perspective of scientific inquiry takes a Gestalt approach to human functioning and development. Essentially, the whole, or the pattern of traits across the person, is greater than the sum its parts (i.e., a linear combination of traits; Magnusson 1990, Magnusson & Allen, 1983). Although the person and the environment are continually in dynamic interaction with each other, people have coherent patterns of self-organization and maintain consistent patterns of intraperson variables (Nesselroade & Ford, 1987). It is in the description and examination of those patterns of intraperson variables where the person-centered approach finds its focus.

Person-centered methodologies have their roots in modern interactionism theory (e.g., Gustafson & Magnusson, 1991; Magnusson, 1990; Magnusson, 1995; Magnusson & Allen, 1983; Magnusson & Torestad, 1993). There are three foundational propositions of modern interactionism theory. First, individual development takes place as a total, dynamic process involving interactions among aspects of a person (i.e., variables). Development, in turn cannot be fully understood by focusing on single variables in isolation from other, simultaneously operating, elements of a person (Magnusson, 1995; Magnusson & Torestad, 1993). An important distinction here is that person variables can depend on each other, but they do not necessarily cause each other (Magnusson & Torestad, 1993). Second, people develop and function through a dynamic process where they continually interact with their environment (Magnusson, 1990; Magnusson, 1995). The third proposition of modern interactionism theory integrates mental and biological factors in a reciprocal relationship with the dynamic person and environment factors (Magnusson, 1990; Magnusson, 1995). Each of the three propositions builds upon each other, and a person is therefore seen as a collection of interdependent traits interacting with a dynamic environment where individual functioning and development are moderated by mental and biological factors.

The most direct applications of modern interactionism theory and the methodologies advocated by Magnusson and colleagues lie within the area of longitudinal research on individual development (e.g., Bergman, 1993; Magnusson, 1990; Magnusson, 1993; Magnusson & Bergman, 1993). However, the most frequent methodological application of modern interactionism is a person-centered research strategy (Magnusson & Torestad, 1993). In person-centered approaches, the person is the central unit of analysis and research

questions are operationalized in terms of individual patterns of performance on the multiple variables being investigated (Magnusson & Torestad, 1993).

It is important to note that the recognition of an individual as a dynamic whole does not mean that person-centered research must be charged with examining<u>all</u> facets of individual functioning at the same time or in the same study (Gustafson & Magnusson, 1991; Magnusson, 1995). Related to this issue are criticisms of person-centered findings as lacking the generalization that is found in variable-centered studies. However, because (1) there are limited numbers of combinations of variables of interest, and (2) individuals can be categorized into subgroups based on pattern similarity, generalizations can indeed be made to appropriate populations (Magnusson & Allen, 1983). An advantage of the person-centered approach is that generalizations can be made to people rather than to variables (Magnusson & Allen, 1983). However, because the environment is an integral aspect of human functioning and development, researchers who utilize person-oriented methodologies should be particularly mindful and attentive to the generalization possibilities of their findings (Nesselroade & Ford, 1987).

Within the examination of patterns of intraperson variables, there are two main tasks: pattern description and pattern dynamics (Magnusson & Torestad, 1993). Pattern description involves the specification of patterns of interacting factors that are either (a) in a single subsystem (e.g., personality), or (b) operating across several subsystems (e.g., cognitive-behavioral-physiological subsystems). Central to the application of pattern description is the belief that the number of possible organizations of subsystem factors is limited, and variables must be carefully chosen in terms of their relation to the phenomena of interest (Magnusson & Torestad, 1993).

The primary merit of the pattern description approach is that it recognizes the dynamic nature of the phenomena it examines. However, in order to examine the within-pattern dynamics (i.e., how these factors interact) and how patterns change over time, models and methods focused on pattern dynamics would have to be employed. Currently, most empirical work has focused on pattern description (Magnusson & Torestad, 1993), and the current study maintains that focus by examining patterns of leader personality and discovering how they relate to leader effectiveness.

The person-centered approach depends on variable-centered research for the identification of relevant variables to include in pattern analyses (Magnusson, 1995; Magnusson & Torestad, 1993). The two approaches are complementary and answer different research questions that depend on the nature of the phenomena under investigation (Magnusson & Torestad, 1993). A person-centered approach is necessary to keep the researcher focused on the complexity of phenomena, but it does not provide criteria for the inclusion of elements into the hypothesized system (Pervin, 1990). In order to avoid a "shotgun approach" to the selection of variables into a pattern analysis, a researcher must first be able to identify the possible operating factors in the dynamic system. Often, variable-centered research studies provide essential information that justifies the inclusion of variables in a pattern analysis (Magnusson, 1995).

Another way that variable-centered approaches augment person-centered research lies in the ability to make substantive implications based on patterns of individual functioning. Once people are grouped into clusters that are defined by similar score profiles across variables, it is necessary to switch to more variable-centered analyses (such as ANOVA; Nesselroade & Ford, 1987) in order to interpret the implications of cluster membership (Ozer

& Gjerde, 1989). An important limitation of person-centered analyses is that they do not inherently provide a method of examining clusters beyond the patterns of variables that define them. Variable-centered approaches will have to be utilized in those research contexts.

The current study takes a blended approach to the examination of the relations between personality and leader effectiveness. The methodology utilized will be primarily person-centered, but hypotheses will be based on past variable-centered studies. The vast majority of research in this area to this point has been variable-centered, and it is prudent to utilize this research to select relevant variables for inclusion in the pattern analyses as well as to predict how the personality patterns that will relate to effectiveness. The primary contribution of this research will be to assess whether or not individual indicators that were found to be related to effectiveness in previous variable-centered research will still maintain those relations when they are examined as a part of a pattern of traits.

Type Theory

The present study is concerned with assessing leader personality patterns and relating the trait patterns to multisource ratings of leader effectiveness. Carl Jung's (1933) theory of psychological type describes four personality preferences that will be assessed in the current study. The reason why Type Theory was chosen for the present study is because it fits nicely into a person-centered investigation of leader effectiveness due to its focus on patterns of personality traits and their interactions. In addition, Type Theory has been extensively researched in variable-centered contexts but needs to be further examined in person-centered research.

In selecting variables to include in a pattern analysis, it is important to carefully describe and analyze the phenomena being investigated (Magnusson & Torestad, 1993). Type theory has its foundations in the assertion that variation in behavior is due to basic observable preferences (Myers & McCaulley, 1985). The core of the theory states that when the mind is active, a person is involved in one of two activities: taking information in (Perceiving), or organizing the information and making decisions (Judging). Perceiving is broken down into two parts: Sensing and Intuition. Sensing refers to obtaining data through the five senses, but Intuition describes a more indirect process of obtaining data where one focuses on the big picture and sees patterns and connections between facts. Judging (decision-making) can be subdivided into Thinking and Feeling. Those with preferences for Thinking evaluate data and make decisions with a logical/impersonal weighing of facts and outcomes of choices. People who prefer Feeling evaluate data and make decisions based on careful consideration of others' feelings and values in a quest for group harmony. The J-P preference reflects whether a person will rely primarily on Judging (T or F) or Perception (S or N) in his/her dealings with the outer world. To measure whether the dominant preference will be directed toward the outer world of people or the inner world of ideas, preferences for Extraversion-Introversion (E-I, respectively) are also measured (Haley & Pini, 1994; Myers, 1962; Myers, 1993).

Type dynamics is a subset of type theory that postulates how the four personality preferences interact. Of the four "middle" preferences (Sensing, Intuition, Thinking, and Feeling), one is considered dominant. Sensing and Intuition are irrational processes that function best in the absence of guidelines. Brainstorming is an example of an irrational process where Intuition would flourish because of the emphasis on possibilities without

criticism or censoring (Myers & McCaulley, 1985). Thinking and Feeling are rational processes that attempt to bring events in harmony with reason. Thinking types rely on principles of cause and effect, while Feeling types consider personal and group values when making decisions. In order to determine which of these four types is dominant, it is necessary to examine preferences for E-I and J-P. The dominant function is the most developed and utilized preference (Myers & McCaulley, 1985).

Judging and Perceiving reflect preferences for what part of the self a person chooses to exhibit to the outer world. Perceivers will be more spontaneous and adaptable and will continually be collecting information in order to make decisions. Judgers have a concern for planning and organizing and making decisions relatively quickly. If P is too strong, the person may tend to procrastinate. If J is too strong, the person may tend to be prejudiced. Perceiving types will have the irrational process (S or N) as their dominant function. Judging types will have the rational process (T or F) as their dominant function.

Preferences for Extraversion versus Introversion dictate whether the individual puts their dominant function, or their "best foot," forward. In other words, Extraverts will show the dominant function to the whole world. Introverts will keep their dominant function to themselves in order to best work within their inner world of ideas. For this reason, Introverts are likely to be underestimated by those who do not know them very well (Myers & McCaulley, 1985). If someone's dominant function is an irrational process (S-N), then their auxiliary function will be their rational preference (T-F). Introverts keep their dominant functions to themselves, but they tend to show their auxiliary (second best) function to the world. Extraverts do the opposite (Myers & McCaulley, 1985).

The Myers-Briggs Type Indicator

The Myers-Briggs Type Indicator (MBTI) was developed to operationalize and collect data on Carl Jung's theory of psychological type. The MBTI is the most widely used personality instrument for understanding normal (i.e., non-clinical) personality patterns (Myers, 1993). Its uses in the business setting include: self-development, career development, team building, resolving conflict, and leadership training (Coe, 1992; Myers, 1993). The MBTI contains four dichotomously scored scales that reflect preferences (Myers, 1993), not necessarily capacity for action, so it is unethical to use the MBTI profile as a basis for any selection-related decisions (Coe, 1992; Kirby, 1997). In other words, MBTI personality types reflect preferred but not necessarily exclusive modes of expression (Haley & Pini, 1994).

Type theory is comprised largely of Isabel Myers' and Katherine Briggs' interpretations and extensions of Jung's theory of psychological types (Myers & McCaulley, 1985) based on their work with the MBTI. The four scales measured on the MBTI are Extraversion-Introversion (E-I), Sensing-Intuition (S-N), Thinking-Feeling (T-F), and Judging-Perceiving (J-P). Scores on the four scales are dichotomized at their scale midpoints, and the examinee is given a psychological "type" that consists of four letters reflecting his/her preferences on each scale (e.g., an "ENFP" denotes an Extraverted, Intuitive, Feeling, Perceiving type).

No value judgments are attached to one personality profile over another, but each of the 16 types has strengths and weaknesses that are somewhat type-specific (McCaulley, 1994; Van Velsor & Fleenor, 1997). The vast majority of the interpretation of the instrument with its users revolves around looking at the profile pattern in its totality instead of

examining the scales separately (e.g., Myers, 1993). In fact, proponents of type dynamics assert that each of the preferences influences the manner in which a person expresses the other three resulting in "16 dynamic pictures of normal functioning" (Fitzgerald & Kirby, 1997, p. 269). In this respect, the MBTI is a person-centered, pattern-focused instrument. Due to the difficulty of finding adequate sample sizes to populate all 16 cells of the type table (Thorne & Gough, 1991), most research tends to focus on the four types independent of each other or in 2-letter combinations. However, the appropriate unit of measurement for the MBTI is the 4-letter type (McCaulley, 1990; McCaulley, 1994). In fact, it is in the combinations of the types (particularly S-N and T-F preferences) where personality is truly characterized according to type theory (Myers & Myers, 1980).

Adaption-Innovation Theory

In addition to the four personality preferences described in Type Theory, creative style, as defined by Adaption-Innovation (A-I) Theory, will be incorporated into the patterns of leader personality examined in the current study. Adaption-Innovation theory describes a basic dimension of personality that relates to the style of creativity one chooses when faced with the need for change (Kirton, 1976). Adaptors, when facing change, prefer to look for existing rule structures and proceed within established guidelines in an effort to do things "better." Adaptors are often seen as disciplined and direct their creative endeavors towards efficient improvement and maximizing group cohesion and acceptance (Kirton, 1976). On the other hand, when Innovators are faced with change, they tend to reorganize or restructure the problem with the goal of doing something "differently." Innovators are sometimes viewed as undisciplined and direct their creativity toward periodic radical change with a style that can be abrasive and/or create group dissonance (Kirton, 1976).

Managing creativity is an aspect of leadership that we know very little about (Hogan, Curphy, & Hogan, 1994). Because successful organizations will be coping more and more with rapid change and development, managing creativity is "one of the most important problems of the future" (Hogan et al., 1994, p. 500). Many researchers concur with the need to examine creative style as a central component of leader personality. Mumford and Connelly (1991) argue that creative style is the "missing element" in understanding many crucial leader behaviors (p. 290), and Lord and Hall (1992) describe leaders as "creative problem solvers" (p. 139). Creative style (i.e., Adaption-Innovation) will dictate leader behavior particularly when situations are ill-defined or ill-structured (Mumford & Connelly, 1991; Van Gundy, 1980). Because organizations are often complex and poorly defined in terms of boundaries and structures, and leadership problems are typically ill-defined (if defined at all), there is a great need to examine creative problem solving styles among organizational leaders (Mumford & Connelly, 1991).

The Foundations of Adaption-Innovation Theory

Adaption-Innovation theory development is rooted in the work of Rogers (1959), Weber (1970), and Merton (1949). Rogers (1959), like most researchers, describes creativity in terms of an Innovator (Kirton, 1976). He defines creativity as the process through which a novel (new to the creator) product comes into being. Rogers asserts that it is useless to measure creativity in terms of degree, or level, because creative products are qualitatively different from each other. In terms of individual differences in creativity, Rogers (1959) posits that people who are more open, have an internal locus of evaluation, and an ability to toy with materials will produce more products that are judged to be significant, novel, and creative. Rogers (1959) also speculates that leaders who support those types of people and

foster an environment in which they can work effectively will have groups that are more creative and more harmonious interpersonally.

Merton (1949) and Weber (1970) described bureaucracy, its strengths, and its many weaknesses. Bureaucracy is noted for its technical efficiency, continuity, hierarchies, and specialized functions. Precision is valued and knowledge of details is central to the functioning of an individual bureaucratic unit. However, bureaucracies are also characterized by depersonalization and inflexibility. Bureaucrats can come to see adherence to the rules as goals rather than as means (Merton, 1949; Weber, 1970). Weber (1970) posited that charisma is a balancing concept to bureaucracy. Weber's (1970) definition of charisma is related to extreme Innovation in that charisma represents: revolutionary forces for radical change, opposition to routines, instability, and focus on values rather than expediency. In the past, bureaucracy worked because of the technological and entrepreneurial continuity that characterized the mid 1900's. Today, businesses must move from the Adaptive mode to the Innovative one because of the social and technical changes that are occurring (Drucker, 1969).

The Kirton Adaption-Innovation Inventory

The Kirton Adaption-Innovation Inventory (KAI) measures the style of creativity one chooses when problem solving or engaging in decision-making (Kirton, 1984). The KAI was born out of studies of change in industry, and it is distinguishable as a measure of problem solving style that places individuals on a continuum ranging from Adaption to Innovation (Kirton, 1987). Although there are three subscales of the KAI, research tends to focus on the aggregate level of this 32-item measure because of its item homogeneity and internal consistency (DeMauro, 1992; Foxall & Hackett, 1992). The subscales of the KAI closely

match Rogers' notions of creativity (1959; KAI Sufficiency of Originality), and Weber's (1970) and Merton's (1949) philosophies of bureaucracy (KAI Efficiency and Rule/Group Conformity).

Consistent with Rogers' (1959) assertions, the KAI measures style not level of creativity (Kirton, 1978; Kirton, 1987). Kirton (1978) examined the relationship between scores on the KAI and scores on a general test of creativity level called the Word Fluency test from the Primary Mental Abilities Battery (PMAB). The KAI did not correlate significantly with the measure of creativity level nor with any of the other aptitude-related subscales of the PMAB. Adaption-Innovation theory holds that even the extreme scorers should not differ with regard to creativity level, and this study supports that contention (Kirton, 1978; Van Rooyen, 1994).

Like the MBTI (Hunt, 1991), the KAI is a measure of cognitive style (Kirton, 1987). Kirton (1987) asserts that "cognitive style is part of personality" (p. 289). He made this statement partly due to the evidence he saw supporting links between the KAI and personality traits (Carne & Kirton, 1982; Goldsmith, 1985; Kirton, 1976) as well as the research that has shown no significant relation between cognitive style and cognitive abilities (Kirton, 1978; Kirton, 1987; Kirton, 1989). Cognitive style is independent of managerial competencies, but style does affect how competencies are expressed (Schroder, 1989). The theory that underlies the KAI does not posit any specific overlap between cognitive style and other dimensions of personality (Kirton, 1976). In addition, the Adaption-Innovation construct, because it is not part of a theory of human development, is not a personality trait per se (Goldsmith, 1989), but Kirton (1976) hypothesized and tested what he called an "adaptor-innovator personality continuum" (p. 628) in developing the KAI.

Integrating Adaption-Innovation and Type Theory

The KAI and the MBTI are complementary instruments and are frequently used in concert in the field (Church & Waclawski, 1998). Both the KAI and the MBTI are measures of preferences not abilities (Goldsmith, 1989; Myers, 1993). In addition, both theories do not find it useful to make value judgments based on one's type because each type (or style) has its own strengths and weaknesses (Kubes, 1992; McCaulley, 1994; Van Velsor & Fleenor, 1997). There are also similar philosophies between these two theories regarding the veritable immutability of type/style from childhood (Buttner & Gryskiewicz, 1993; Myers & Myers, 1980). In fact, the most obvious difference between the two instruments is that distributions of scores on the KAI are normal (Foxall, 1990; Van Rooyen, 1994) while latent trait (IRT) models of the MBTI have shown clear bimodal distributions (Harvey & Murry, 1994; Harvey & Thomas, 1996). The overall similarities in the dichotomous scoring schemes as well as the theories that underlie the MBTI and the KAI lend credence to the examination of the relations between these two instruments.

Variable-Centered Research Linking Adaption-Innovation and Personality Type

Fleenor and Taylor (1994) examined the MBTI Creativity Index (3 SN + JP – EI – .5 TF) and found that it correlated significantly (r = .62) with the KAI (scores are positively keyed toward Innovation). Although Fleenor and Taylor call the MBTI a measure of creativity level (which the KAI purports not to measure), other researchers have disagreed with that characterization of the MBTI (e.g., Jacobson, 1993). Fleenor (1997) found that the strongest correlation between the MBTI types and the KAI occurs with Intuition (r = .54), then Perception (r = .49), and Extraversion (r = .23). The correlation between the Thinking-

Feeling scale and the KAI was not significant in the sample of 12,115 Center for Creative Leadership participants (Fleenor, 1997).

Carne and Kirton (1982) did not find significant relationships between E-I and T-F and the KAI in their sample of Brittish management students. However, Intuition (r = .44) and Perception (r = .53) were significantly correlated with the KAI (i.e., positively related to Innovation). An even stronger correlation resulted from a combining N and P before correlating them with Innovation (r = .62; Carne & Kirton, 1982). In a similar study, Jacobson (1993) found that Intuition (r = .66), Perception (r = .49), Extraversion (r = .25) and Feeling (r = .23) were all correlated significantly with Innovation in a sample of 54 American managers and executives. The combination of N and P yielded a .65 correlation with the KAI in this study (Jacobson, 1993).

Significant correlations were also found between Intuition and Innovation (r = .41) and Perceiving and Innovation (r = .41), but not between the KAI and E-I or T-F (Gryskiewicz & Tullar, 1995). Gryskiewicz (1980) found positive correlations in two samples of leaders between the KAI total score and Extraversion (r = .33 and.22), Intuition (r = .54 and .39), and Perception (r = .53 and .23). Church and Waclawski (1994, 1995, 1998) found significant correlations between the MBTI scales and the KAI that, on two dimensions, disagree with other research. For example, Innovation was significantly related to Introversion (r = .25) and Thinking (r = .25). Findings that were more in line with other studies include a significant correlation between Innovation and Intuition (r = .45) and Perception (r = .38). Lastly, when Goldsmith (1985) divided the MBTI S-N scale to yield two independent scores, the correlation between the KAI and Intuition was .55 and the correlation between the KAI and Sensing was -.62. In an examination of the 4-letter MBTI

types among 87 female South African managers, ENTPs were the most Innovative (KAI = 122.6) followed by ENTJs (109.3). All other types were adaptive, but the sample sizes were small for the 16 type patterns (Van Rooyen, 1994).

In general, the correlational research provides strong support for the contention that Ss and Js are more likely to be Adaptors, while Ns and Ps are more likely to be Innovators. Three of the studies cited found a significant correlation between Extraversion and Innovation (one study showed the opposite). The evidence is even less strong for Thinking-Feeling because one of the six correlational studies cited found a significant relationship between Feeling and Innovation and another showed that Thinking was significantly related to Innovation.

The MBTI Manual (Myers, 1962) describes Intuitives and Sensing types using terminology that is similar to Adaption-Innovation (Carne & Kirton, 1982). Intuitives and Innovators both "like solving new problems…dislike doing the same thing over and over again…[and] are impatient with routine details" (p. 80a). Sensing types and Adaptors "dislike new problems unless there are standard ways to solve them…like an established routine…[and] work more steadily" (p. 80a). The similarities between Judging types and Adaptors lie in the fact that they are organized, methodical, and disciplined. Perceptive types and Innovators are similar in that they both are good at adapting to crises and may be described as undisciplined (Jacobson, 1993). However, the descriptions of the Sensing-Intuitive dimension are not a one-to-one match with descriptions of Adaption-Innovation (Carne & Kirton, 1982). Conceptually, the two MBTI scales are different from the KAI in that S-N measures how a person prefers to obtain data, J-P measures whether a person prefers to collect or evaluate data, but Adaption-Innovation measures problem-solving/creative style.

Although these two MBTI scales are correlated with Adaption-Innovation, they are not measuring the same things and may thus provide incremental value over each other when utilized in tandem.

Kirton (1987) asserts that the MBTI is measuring creativity level not style. The research reported in the MBTI Manual (Myers, 1962; Myers & McCaulley, 1985) uses words such as "most," "less," and "least" when discussing how the MBTI assesses creativity (Myers, 1962, p. 33). Specifically, the Manual asserts that people with high Intuition and Perceiving preferences will be more creative (particularly Intuition). However, there is the recognition in the Manual that Intuition is not the only trait needed for creativity to occur, and the strength of the preference for Intuition is a key consideration in creativity (Myers, 1962). Therefore, because creativity is an important component of leader effectiveness (Hogan et al., 1994; Lord & Hall, 1992; Mumford & Connelly, 1991), and the MBTI is not a sufficient measure of creative style, it is useful to incorporate KAI scores with MBTI preferences in determining style of creativity.

Person-Centered Research Linking Adaption-Innovation and Personality Type

Because creativity is an inherently multivariate phenomenon that necessitates the measurement of a variety of traits (Mumford & Gustafson, 1988), it is useful to examine it from a person-centered focus. In addition, because the KAI may provide information on creativity style and problem solving that the MBTI may not adequately assess, it is valuable to explore these two instruments in tandem in a pattern oriented context.

Church and Waclawski (1994) performed a k-means cluster analysis on normalized scores for the KAI and the four scales of the MBTI for 319 senior executives. The final model contained four clusters that were labeled: (1) innovators for change or Inventors (n =

60), (2) analytical coordinators or Managers (n = 65), (3) organized pragmatists or Implementers (n = 70), and (4) enthusiastic idealists or Motivators (n = 58). The resulting clusters were used to predict ratings from direct reports of leadership behaviors.

Inventors were the highest Innovators (of the four clusters), were moderate on E-I, high on N, moderate on T-F, and highest on Perception. Inventors are perceived by themselves and their direct reports as exhibiting more transformational leadership behaviors, particularly in determining direction and establishing purpose (Church &Waclawski, 1994, 1998). However, Inventors are also seen as significantly less likely to celebrate accomplishments (Church & Waclawski, 1995).

Managers were found to be moderate on the KAI, moderate on E-I and S-N, and the highest Thinkers and Judgers. Analyses performed on this cluster did not show that Managers were significantly higher on any of the leadership effectiveness dimensions that were measured. The only exception was that Managers saw themselves as better at establishing purpose (a transformational leader trait), but their direct reports' ratings showed that they were transactional leaders (Church &Waclawski, 1994, 1998)

Implementers were the strongest Adaptors, highest Introverts and Sensors, moderate on T-F, and highest Judgers (tied with Managers). Implementers are seen as more transactional in their leadership style than are Inventors and Motivators (Church & Waclawski, 1994, 1998). They are also significantly less likely to encourage risk-taking, maintain a challenging work environment, and take time to celebrate accomplishments (Church & Waclawski, 1995).

Motivators were moderate-to-high Innovators, the strongest on Extraversion and Intuition, and moderate Thinkers and Judgers. Motivators are seen as transformational

leaders, especially when influencing followers (Church & Waclawski, 1994, 1998). Motivators are also viewed as encouraging risk-taking, maintaining a challenging work environment, and taking time to celebrate accomplishments (Church & Waclawski, 1995). In addition, Motivators have more managerial self-awareness than the other three groups (Church & Waclawski, 1995).

The profiles of inventors (high N, high P, high Innovator) and implementers (high S, high J, strong Adaptor) are what would be predicted on the basis of the correlational research cited above. Motivators prefer Judging as opposed to Perceiving but retain the predictable high Intuition-high Innovator relation. The implications of the Manager pattern of traits have not been explored fully in the three Church and Waclawski studies cited above, but their high Thinking-high Judging characteristics would probably be more predictive of responses on an executive survey that measured skills more related to interpersonal aspects of leadership.

Personality and Leader Effectiveness

The purpose of the current study is to utilize a pattern approach in examining the personality and creativity preferences described above and test the patterns against multisource ratings of leader effectiveness. An important link to examine in order to justify the purpose of this study is the relation between personality (in general) and leader effectiveness. In addition, the issue of how leader effectiveness is measured is a critical question that will be addressed below.

Hogan et al. (1994) addressed a series of issues about leadership and personality in an effort to respond to organizational decision-makers who often ask psychologists, "Who *should* rule?" (p. 493). Hogan et al. (1994) assert that leader personality has consistent and predictable effects in three primary areas: team performance (e.g., Chidester, Helmreich,

Gregorich, & Geis, 1991; Foushee & Helmreich, 1988), leader emergence (e.g., Gough, 1990; Lord, De Vader, & Alliger, 1986; Zaccaro, Foti, & Kenny, 1991), and leader effectiveness (e.g., Bentz, 1990; Bray & Howard, 1983; Stogdill, 1974). Of these three areas, the current study focuses on leader effectiveness.

Hogan et al. (1994) discuss the literature on traits and leader effectiveness in terms of the Five Factor Model of personality (i.e., "Big Five"). Although the Big Five model has been criticized (e.g., Block, 1995), it is often used as a comprehensive model of normal personality (e.g., Barrick & Mount, 1991). The five factors are: extraversion, agreeableness, conscientiousness, emotional stability, and openness. Hogan et al. (1994) assert that, although Stogdill (1974), Bentz (1990), and Bray and Howard (1983) did not use the Big Five model in relating personality dimensions to leader effectiveness, their studies can be viewed in that light. For example, Stogdill (1974) found that extraversion (i.e., dominance, energy, sociability), emotional stability (i.e., adjustment, self-confidence), conscientiousness (i.e., responsibility, initiative), and agreeableness (i.e., friendliness, support) were all positively related to ratings of leader effectiveness (Hogan et al., 1994). Bentz (1990) found that executives who had personality traits related to extraversion, emotional stability, and conscientiousness were promoted to the highest levels (Hogan et al., 1994). Lastly, Bray and Howard (1983) discovered that managerial advancement and subordinate ratings of effectiveness were significantly predicted by variables related to extraversion, emotional stability, conscientiousness, and openness (Hogan et al., 1994).

Hogan et al. (1994) organize their literature review in terms of the Big Five personality traits, but the present study examines Jung's four psychological types and Kirton's measure of creative style to pattern leader personality. The MBTI is the most

widely used instrument for examining normal personality (Myers, 1993), and research has shown that the four scales from the MBTI are significantly correlated to the Five Factor Model of personality. Preferences for Extraversion on the MBTI are significantly correlated with measures of extraversion on the Five Factor Model. In addition, there are also significant correlations between Intuition and openness, Feeling and agreeableness, and Judging preferences and conscientiousness (Furnham, 1996; McCrae & Costa, 1989). The only area where there is not a consistent relation between Jungian types and the Big Five is in the area of emotional stability. (McCrae & Costa, 1989).

Measuring Leader Effectiveness

Just as leader personality can be defined using different taxonomies, definitions of leader effectiveness can differ profoundly between researchers (Yukl, 1994). Leader effectiveness is often operationalized in terms of team success and goal attainment as determined by (1) objective measures of performance or (2) subjective ratings of effectiveness from superiors, peers, and/or direct reports (Yukl, 1994). Hogan et al. (1994) propose that leader effectiveness in an organizational setting should be determined by assessing a leader's impact on the team, group, or organization's bottom line. However, these types of measures are difficult to utilize because they are frequently contaminated by external events. Nevertheless, followers should be considered whenever leader effectiveness is evaluated (Hogan et al., 1994).

In describing how leadership ability should be evaluated, Hogan et al. (1994) proposed that there are five major categories into which the literature on leader performance can be organized. These categories are: (1) actual team performance, (2) subordinates', peers', and/or superiors' ratings of leader performance, (3) strangers' ratings of leader

performance in interviews, simulations, assessment centers, and leaderless group discussions, (4) self-ratings of leader effectiveness, and (5) examinations of leaders who have derailed in their careers (i.e., have been passed over for promotion, have been fired, or are on the brink of termination due to poor performance).

Although team performance (i.e., category one) is a desirable measure of leader effectiveness, it is very problematic due to the difficulty of obtaining useful measures and the fact that external factors can contaminate any measures that are taken. For this reason, Hogan et al. (1994) recommend the multisource rating techniques advocated in category two (subordinates', peers', and/or superiors' ratings of leader performance) to evaluate leader effectiveness. Another desirable aspect of multisource ratings is that they are significantly related to team performance (Campbell, 1991). In addition, because they often involve judgments of the frequency of certain leader behaviors, multisource ratings tend to show stronger links with personality measures than is seen in the other four categories (Hogan et al., 1994), most likely due to the fact that behavior is a function of personality (Hogan, Hogan, & Roberts, 1996).

The literature reviewed above is characteristic of the bulk of trait research that is currently performed. In essence, personality traits are compared one at a time to a criterion, such as leader effectiveness. Little attention is paid to the potential interactions among traits that may have profound implications on leader performance. Multivariate, or pattern-oriented, approaches are beginning to be advocated more and more as extensions of the traditional single variable, or nomothetic, approach to the assessment of the links between personality and leader performance (e.g., Holmes, Sholley, & Walker, 1980; Lord, Foti, & De Vader, 1984; Lord & Hall, 1992; Zaccaro et al., 1991).

The current study will utilize a person-centered approach in examining leader personality and will define leader effectiveness in terms of categories two and four in Hogan et al.'s (1994) structure. In other words, leader personality will be operationalized as patterns across the four Jungian types and the measure of creative style, and leader effectiveness will be operationalized as superior, peer, subordinate and self ratings on a feedback instrument that assesses leadership skills and perspectives.

Person-Centered Leadership Research

Person-centered research strategies have been successfully applied in a wide variety of domains. Some of the domains examined using pattern approaches include female achievement (Gustafson, 1994), female career development (Gustafson & Magnusson, 1991), delinquency (Gibbs, 1982; Goeke, Tosi, & Eshbaugh, 1993), sexuality (Limentani, 1984), career indecision (Tango & Dziuban, 1984), headaches and daily hassles (De Benedittis & Lorenzetti, 1992), and male social adjustment (Pulkkinen & Tremblay, 1992). Although trait research in the leadership realm has primarily focused on variables as described above, more and more person-centered analyses are being published.

The second category of Hogan et al.'s (1994) grouping consists of leader effectiveness as determined by ratings from one or more groups of coworkers. Two person-centered studies have examined leader effectiveness in terms of suchmultisource ratings. Johnson, Schneider, and Oswald (1997) identified three types of managers based on scores on the Management Skills Profile (MSP) and compared the obtained typologies in terms of personality and performance variables. Johnson et al. (1997) described three managerial performance profiles: Task-Oriented Technicians who were skilled technically but not interpersonally, Amiable Underachievers who were skilled interpersonally but did not have

much motivation or managerial proficiency, and People-Oriented Leaders who excelled in leadership and supervisory skills but lacked financial or quantitative skills. Results showed that peers and superiors rated the People-Oriented Leaders and Task-Oriented Technicians as approximately equally effective overall. However, subordinates' ratings of overall performance were higher for the People-Oriented Leaders than they were for the Task-Oriented Technicians. On average, the Amiable Underachiever is rated lower than the other two types (Johnson et al., 1997).

Church and Waclawski (1994, 1995, 1998) conducted a series of studies that utilized subordinate ratings of leader effectiveness to differentiate between empirically derived personality patterns. Church and Waclawski (1994) cluster analyzed a sample of 319 executives who had completed the MBTI and the KAI and found four different personality patterns (Inventors, Managers, Implementers, Motivators) based on the scores on the four scales of the MBTI and the overall KAI score. Church and Waclawski (1995, 1998) examined those four groups in more detail. The 1995 study showed that personality patterns of leaders were not significantly different in terms of overall degree of workgroup enablement experienced by subordinates, but they did differ significantly in terms of specific leader behaviors employed and managerial self-awareness. The 1998 study of the same four personality clusters resulting from cluster analyzing the MBTI and KAI found that the groups also differed in their utilization of transformational versus transactional leader behaviors.

The fourth Hogan et al. (1994) category of leader performance measures involves employing self-ratings of leader effectiveness. One study of leadership that utilized a person-centered approach fits into this category. Kipnis, Schmidt, Swaffin-Smith, and Wilkinson (1984) constructed a questionnaire assessing how frequently a manager utilizes certain

influence strategies. These researchers identified three patterns of managerial influence: Shotgun Managers who use the full range of influence strategies, Tactician Managers who rely primarily on reason to influence others, and Bystander Managers who do not frequently use any of the seven identified influence strategies. A supplemental self survey about work attitudes and work descriptions showed that Shotgun Managers feel inexperienced on the job and have many unrealized goals, Tacticians rate themselves as successful, satisfied, and powerful, and Bystanders rate themselves as dissatisfied, low on power, and low on ambition (Kipnis et al., 1984).

Type Theory and Leader Effectiveness

Although there has been a notable amount of person-centered research on leader effectiveness, the vast majority of the research involving Type Theory has been variable-centered. The criteria for leader effectiveness in these studies utilizing the MBTI have differed as well. However, it is important to review the variable-centered MBTI research in order to justify the inclusion of these Type Theory constructs in the patterns hypothesized in the current study. In this section, the literature review will be organized around categories two and four in Hogan et al.'s (1994) structure of leader effectiveness research.

Superior Ratings. Superior ratings of leader effectiveness fit into Hogan et al.'s (1994) second category. Leader effectiveness as defined by supervisor ratings of engineering managers was correlated significantly with a type preference for Intuition and Perceiving (Hay, 1966). Performance appraisal data from Chinese and European middle and senior managers shows that Sensing is a significant predictor of the ability to lead and motivate, and Thinking and Perceiving are significant predictors of innovating (Furnham & Stringfield, 1993). In addition, faculty ratings of students show that Intuition is significantly correlated

with showing originality, Perceiving types are seen as performing below capacity, and Judging types are viewed as students who work steadily (Myers, 1962).

In assessing organizational development (OD) consultant effectiveness, Hamilton (1988) found that preferences for Intuition were significant predictors of superiors' ratings of success as an OD consultant. The most likely explanation is the need for OD consultants to make sense out of ambiguity and be able to find patterns that exist beyond sensory data (Hamilton, 1988). Superiors' ratings on the SMP for Extraverts and Intuitives were significantly correlated with one of the eleven SMP scales. Effectiveness ratings from superiors on three of the eleven SMP scales were correlated with preferences for Feeling (Wilson & Wilson, 1994). Superior ratings on a multisource instrument called Benchmarks did not correlate significantly with MBTI scales (Van Velsor & Fleenor, 1994).

Peer Ratings. Van Velsor and Fleenor (1994) correlated scores on Benchmarks with the four scales on the MBTI for 788 managers who had participated in leadership development programs at the Center for Creative Leadership (CCL). With one exception, Extraversion and one of the Respect for Self and Others scales, there were no significant E-I, S-N, or J-P correlations between Benchmarks scales and peers' ratings of leader effectiveness. There were, however, significant correlations between preferences for Feeling and five of the sixteen Benchmarks Managerial Skills scales when peer ratings were utilized (two scales pertaining to Leading People and three measuring Respect for Self and Others; Fleenor, 1995; Van Velsor & Fleenor, 1994). Peer ratings were also examined on the MSP (Fitzgerald, 1994). Findings showed that peers rate Introverted managers as significantly more skilled on thirteen of the nineteen dimensions measured by the MSP (Fitzgerald, 1994).

Lastly, peers' ratings of OD consultant effectiveness are significantly correlated with preferences for Intuition (Hamilton, 1988).

Subordinate Ratings. Several studies have employed subordinate ratings in operationalizing leader effectiveness. The first study utilized subordinate ratings obtained on a measure of managerial skills called the PROFILOR (Quast & Hansen, 1994). The PROFILOR measures 25 dimensions that have been identified by executive job analyses as important to managerial effectiveness. The S-N scale was the only one of the four dimensions measured on the MBTI to correlate significantly with the PROFILOR. Executives who preferred Sensing were rated highly by subordinates on seventeen of the twenty-five dimensions measured by PROFILOR. Specifically, Ss were highest on using sound judgment, knowing the business, and influencing others (Quast & Hansen, 1994). Secondly, in a study assessing transformational leadership among Navy midshipmen, subordinates' ratings showed that Sensing and Feeling types were seen as more transformational and gave more positive reinforcement to followers (Roush & Atwater, 1992). In addition, subordinates' ratings of leader effectiveness on the SMP were significantly correlated to psychological type. Specifically, of the eleven SMP operational skills, Extraversion was significantly correlated with three scales, Sensing was related to one, and Perceiving was significantly related to two SMP scales (Wilson & Wilson, 1994). Lastly, subordinates' ratings on Benchmarks were not correlated significantly with any MBTI scale except Thinking-Feeling. Preferences for Feeling were significantly related to direct reports' effectiveness ratings on two of the five Leading People and three of the seven Respect for Self and Others scales. Contrary to expectations, INFJs received the highest

scores from subordinates of the 16 MBTI types on most of the Benchmarks scales (Van Velsor & Fleenor, 1994).

Self-Ratings. Three feedback instruments measuring aspects of leadership effectiveness that included self-ratings are considered a part of Hogan et al.'s (1994) fourth category. Fitzgerald's (1994) examination of psychological type and the Management Skills Profile is one example. In this sample, there were 386 middle/upper middle managers who were predominantly Is, Ss, Ts, and Js (83% male). Findings showed that Es rated themselves higher on 8 of the 19 MSP scales.

The Survey of Management Practices measures eleven operational managerial skills and four skills dealing with interpersonal relationships. Two studies have assessed psychological type and the SMP: Johnson & Golden (1994) and Wilson & Wilson (1994). Both studies found that self-ratings from Es were higher than the self-ratings of Is on several SMP scales. In contrast, on most of the SMP dimensions with high E self-scores, Wilson & Wilson (1994) did not observe proportionally high observers' ratings. This finding fits with the results of other studies that have shown that Introverts and Sensors had the most accurate self-perceptions (Roush & Atwater, 1992).

Benchmarks measures sixteen managerial skills and perspectives important to leader effectiveness (Van Velsor & Fleenor, 1994). Two studies have related psychological type and Benchmarks. Self-ratings have been shown to be higher for Extraverts on nine Benchmarks scales. In addition, self-ratings of effectiveness have been shown to be higher on one scale for Intutive types, and on 2 of the 16 scales for leaders with preferences for Feeling (Fleenor, 1995; Van Velsor & Fleenor, 1994).

Summary. Superior ratings of effectiveness in operational managerial skills tend to be higher for Es, Ns, and Ps. However, there are no differences in superior ratings of interpersonal skills of leaders. Peer ratings of leader effectiveness tend to be mixed for the E-I dimension (depending on whether operational or interpersonal skills are being rated), and are significantly higher for Ns and Fs. Subordinates' ratings of operational skills effectiveness are higher for Es, Ss, and Ps. However, subordinates rate Is, Ns, Js, and especially Fs higher on the more interpersonal aspects of leadership effectiveness. Self-ratings of leader effectiveness tend to be higher for Extraverts.

Adaption-Innovation and Leader Effectiveness

Unlike Type Theory, the relation between Adaption-Innovation and leader effectiveness has not been extensively examined either using variable or person-centered approaches (Church & Waclawski, 1998). However, because creative style is an important leader trait (Lord & Hall, 1992; Mumford & Connelly, 1991) that is ignored too often (Hogan et al., 1994), it has been included in the personality patterns examined in the current study.

In a study that related Adaption-Innovation to aggregated multisource ratings of leader effectiveness on an instrument called Benchmarks, the sample of participants in a leadership development program for upper-level managers was disproportionately Innovative. In addition, Innovators were rated higher than Adaptors on several Benchmarks dimensions that were most predictive of ratings of promotability, performance appraisals, and actual promotions of organizational leaders. Correlations between these multisource ratings (n = 111) and the KAI showed that Innovation is significantly related to Decisiveness (r = .41) and Doing Whatever it Takes (r = .20; McCauley & Lombardo, 1990).

The Present Study

The three Church and Waclawski (1994, 1995, 1998) studies assessing the relations between personality patterns and self and direct report ratings provided the impetus for this proposal. The purpose of the current study is to utilize a person-centered approach to leader personality preferences and test the personality patterns against effectiveness ratings from the self, supervisors, peers, and direct reports in a sample of 2,000 managers. This study will contribute to the literature by broadening the assessment of leader personality beyond what is often assessed (i.e., Big Five personality traits) to MBTI preferences and creative style, which is an important aspect of leader effectiveness (Hogan et al., 1994; Lord & Hall, 1992; Mumford & Connelly, 1991). In addition, this study contributes to the literature by taking a pattern-oriented approach in the context of multisource ratings of leader effectiveness, which will be unique to the literature. With the exception of Johnson et al. (1997), research investigating the links between personality and multisource feedback to this point has been variable-centered.

Like Church and Waclawski (1994, 1995, 1998) the four MBTI scales and the single measure of Adaption-Innovation were assessed. Unlike Church and Waclawski's studies, a priori hypotheses were derived (based on past published studies) and tested regarding what clusters would actually emerge from the data as well as what patterns would relate to leader effectiveness. In addition, the current study differs from Church and Waclawski by including superior and peer ratings in addition to self and subordinate ratings of leader effectiveness.

The variable-centered literature reviewed above that addressed the correlation between the MBTI and the KAI showed that there are consistent relations between the S-N, J-P, and A-I personality dimensions. In the present study, there is one hypothesized

pattern/cluster that includes Intuition, Perception, and Innovation and another pattern/cluster that includes Sensing, Judging, and Adaption. The operation of E-I and T-F in these patterns is unclear in previous research and was hypothesized in the current study in all possible combinations. Using cluster analytic techniques, data from 2,000 managers' MBTI and KAI profiles were assessed to see if the following eight patterns emerged:

	Extraversion-Introversion	Sensing-Intuition	Thinking-Feeling	Judging-Perceiving	Adaption-Innovation
Pattern 1	E	N	T	P	Inn.
Pattern 2	E	N	F	P	Inn.
Pattern 3	I	N	T	P	Inn.
Pattern 4	I	N	F	P	Inn.
Pattern 5	E	S	T	J	A
Pattern 6	E	S	F	J	A
Pattern 7	I	S	T	J	A
Pattern 8	I	S	F	J	A

In essence, S-N, J-P, and A-I were held constant, and E-I and T-F were varied in order to assess the interactions that may occur. The first four patterns all included Intuition, Perceiving, and Innovation, and the last four all included Sensing, Judging, andAdaption. Relating these eight hypothesized patterns to Church and Waclawski's (1994, 1995, 1998) findings, Pattern 3 represents an Inventor and Pattern 7 is an Implementer. Church and Waclawski's Manager is like Pattern 5 except that the Manager was slightly Innovative, and Pattern 5 hypothesizes Adaption as the preferred creative style. Church and Waclawski's Motivator is like Pattern 1 except for the J-P preference. A notable distinction is that Church and Waclawski defined "moderate" scores instead of the dichotomy that is most often employed when utilizing the MBTI and the KAI scales. The current study maintained this

dichotomy in order to remain consistent with Type Theory, Adaption-Innovation Theory, and the majority of past research on both the MBTI and KAI.

When the final cluster solution was formed, some general predictions were examined regarding how the multisource leader effectiveness ratings will relate to the obtained clusters. The following predictions were made on the basis of variable-centered research cited earlier in this manuscript. Assessing the across-rater dynamics that occur when the person is the principal unit of analysis will be the primary contribution of this study.

For the self-ratings, past research (Fitzgerald, 1994; Fleenor, 1995; Johnson & Golden, 1994; Wilson & Wilson, 1994; Van Velsor & Fleenor, 1994) found that Extraverts tend to rate themselves higher than Introverts. For this reason, Hypothesis 1 predicts that Patterns 1, 2, 5, and 6 will receive higher Benchmarks scores than patterns 3, 4, 7, and 8.

Superior ratings utilizing Benchmarks, the multisource instrument that will also be assessed in the current study, have not been shown to discriminate among MBTI types (Van Velsor & Fleenor, 1994). However, using other measures of effectiveness, superiors have rated Intuitive leaders significantly higher than Sensing types (Hamilton, 1988; Hay, 1966; Myers, 1962; Wilson & Wilson, 1994). Thus, Hypothesis 2 predicts that superiors' ratings on Benchmarks will be higher for Patterns 1-4 because they are all Intuitive.

Peers have been shown to rate Extraverted and Feeling types significantly higher (Fleenor, 1995; Van Velsor & Fleenor, 1994), so Hypothesis 3 predicts that there will be higher peer ratings for Patterns 2 and 6 if these variable-centered findings generalized to the person-centered approach. Lastly, direct reports' ratings tend to be significantly higher for Feeling types (Fleenor, 1995; Van Velsor & Fleenor, 1994), so Hypothesis 4 predicts that patterns 2, 4, 6, and 8 will be higher from the direct report perspective.

Hypotheses 1 – 4 are based on findings from previous variable-centered research. The purpose of examining the individual indicators is to see how, in the context of a pattern of traits, they relate to ratings of leader effectiveness. It is expected that the variable-centered findings will generalize to the person-centered approach, but it may depend on the criterion, the rater group, and the other variables in the pattern. Exploratory analyses will be conducted based on the observed clusters to assess the dynamics that occur when multiple indicators differ.

Method

Participants

Participants in the Leadership Development Program (LDP) at the Center for Creative Leadership (CCL) provided the data for this study. Participants in LDP typically have 8 to 10 years of management experience and are sent to the program (typically on a voluntary basis) by companies wishing to develop them as leaders. People are sent to LDP most often because they are either high-potential employees or because there are fears of career derailment. The Leadership Development Program began in 1974 and over 30,000 people have taken the course. A single (5-day) open-enrollment session of LDP will typically have 20-30 participants. Rarely are there more than two participants from a single company in an open-enrollment LDP course simultaneously. All biographical data and assessment questionnaires are distributed and collected before the program begins.

The sample that was used in the current study contained data on 2,000 randomly selected people who participated in LDP between 1994-1997. There is approximately a 1:9 ratio of self to observer data on Benchmarks, so the total number of observers (superiors, peers, and direct reports) is 18,636. The LDP participants are primarily upper-middle managers or above (71%) and work in the business sector (87%). The sample of participants was 72% male and 87% white. The ages of the participants ranged from 22 to 78 with an average age of 42 (SD = 7). In terms of education, 89% of the participants in this sample had a Bachelor's degree or higher.

Instruments

Myers-Briggs Type Indicator. Form F of the MBTI was administered and 94 of the 166 items were scored. The MBTI is a widely used instrument that has demonstrated

acceptable levels of internal consistency and test-retest reliability within its four subscales (e.g., Myers & McCaulley, 1985). IRT models of the MBTI have shown clear bimodal distributions (Harvey & Murry, 1994; Harvey & Thomas, 1996) that help support the assertion that there are distinct personality types measured by the MBTI.

Kirton Adaption-Innovation Inventory. Scores on the KAI can range from 32 to 160. The scale is dichotomized at its midpoint, with scores above 96 characterizing Innovators, and scores below characterizing Adaptors (DeMauro, 1992). The first item of the KAI is not scored. Research utilizing the KAI has found excellent levels of test-retest reliability over 3.5 year time intervals (r = .82; Clapp, 1993).

Benchmarks. Benchmarks is a multi-rater feedback instrument created by and used primarily at the Center for Creative Leadership (Van Velsor & Fleenor, 1994). According to Hogan et al.'s (1994) typology of leader effectiveness measures, Benchmarks would fall into category two due to its utilization of superiors', subordinates', and peers' ratings and category four due to the inclusion of self-ratings of skills related to leader effectiveness. Benchmarks assesses leadership skills as well as provides feedback on problems/flaws that can stall one's career (i.e., derailment factors; McCauley & Lombardo, 1990). The dimensions measured on Benchmarks were constructed based on results of studies of high-potential people who, for various reasons, reached an early plateau in their careers, were fired, or were forced into early retirement (McCall & Lombardo, 1983a). Executives who derailed as well as those who "arrived" were interviewed extensively and provided data regarding defining moments in their careers and the lessons they learned from those experiences (Lombardo, Ruderman, & McCauley, 1988; McCall & Lombardo, 1983b; McCall, Lombardo, & Morrison, 1988; Van Velsor & Leslie, 1991). Content analysis of the

interviews and questionnaires revealed 16 categories of critical development incidents that eventually formed the Managerial Skills and Perspectives section of Benchmarks (Van Velsor & Leslie, 1991). The unique aspect of Benchmarks is that it was developed through studies of things that managers have learned through experience and how those competencies are related to job success (McCall et al., 1988; McCauley, Lombardo, & Usher, 1989). The fact that managers are not born with these skills helps insure that Benchmarks measures skills that can realistically be developed in an executive who receives feedback from the instrument (McCauley & Lombardo, 1990).

Benchmarks contains a total of 22 scales in two sections. The first is Managerial Skills and Perspectives (16 subscales, 106 items) and the second is called Potential Flaws (6 subscales, 26 items). The current study will use the Managerial Skills and Perspectives section to operationalize leader effectiveness (see Table 1). The response scale used on Benchmarks is a 5-point Likert scale and number of items per subscale ranges from 3 to 17 (see Table 2). Test-retest reliability coefficients for the subscales of section one range from .62 to .87 (self) and .71 to .95 (others). Measures of internal consistency (alpha) have been shown to range from .75 to .97 for the subscales (McCauley et al., 1989; VanVelsor & Leslie, 1991).

Validity evidence for Benchmarks has centered on supporting the contention that the instrument measures skills important for continued effectiveness as a manager. To this end, ratings of potential for promotion, performance appraisal data, and actual movement within an organization have all served as dependent variables in Benchmarks validation efforts (McCauley et al., 1989). Resourcefulness and Doing Whatever it Takes were most strongly related to promotability, and Balance Between Personal Life and Work was the only

Benchmarks scale that was unrelated to promotability (McCauley et al., 1989; Van Velsor & Leslie, 1991). Interestingly, when the organizations who provided performance/promotability data were classified into hierarchy-based versus pay-for-performance categories, scales related to concern for others, teamwork, and self-awareness were more strongly related to ratings of promotability in the pay-for-performance system (McCauley et al., 1989). Promotion data collected 24 to 30 months after the administration of Benchmarks showed high predictive validity on all but two scales (Work Team Orientation and Balance Between Personal Life and Work; McCauley et al., 1989; Van Velsor & Leslie, 1991).

Preliminary Analyses

A series of confirmatory factor analyses (CFAs) were conducted on both the scale-level and item-level data on the Managerial Skills and Perspectives section of Benchmarks in order to verify the factor structure of the instrument. The Benchmarks data were split in half for the analyses. On the first half, three models were tested. Section one of Benchmarks has been conceptually (i.e., non-experimentally) categorized into three subgroups: Meeting Job Challenges, Leading People, and Respecting Self and Others (e.g., McCauley et al., 1989; McCauley & Lombardo, 1990). This conceptual grouping of Benchmarks is currently found in its feedback reporting structure (e.g., McCauley et al., 1989; McCauley & Lombardo, 1990) and comprised the 3-factor solution (see Table 1). A 2-factor solution was also tested due to the results of previous exploratory factor analyses on Benchmarks items that revealed two large first and second factors (interpersonal and task) that accounted for 79% of the variance in a sample of 45,325 raters (Fleenor, 1993). These two factors are reminiscent of the Ohio State Leadership Studies that found two primary dimensions (Consideration and

Initiating Structure) of leadership effectiveness (e.g., Yukl, 1994). Lastly, Benchmarks was tested as a unidimensional instrument as has been utilized in previous research (e.g., Atwater, Ostroff, Yammarino, & Fleenor, 1998; Van Velsor, Taylor, & Leslie, 1993). Table 1 shows the a priori Benchmarks models.

After assessing the fit of the three models in the first half of the data, the intent was to verify the best fitting factor structure on the second half of the data. In addition, because raters from different perspectives may rate differently (Borman, 1997), and different factor structures may result, the second half of the data were to be split into self, superior, peer, and direct reports and the final measurement model was to be verified to ensure that it fit the various perspectives. However, previous research using confirmatory factor analysis and structural equation modeling has shown that different rater groups define the majority of Benchmarks scales similarly (Raju, 1999; Wise, 1997).

In addition, MBTI preference scores were converted to continuous scores as described in Myers and McCaulley (1985). The midpoint for each scale was set to 100, scores for E, S, T, and J were subtracted from 100, while scores for I, N, F, and P were added to 100. The KAI scores were not adjusted because the continuum does not consist of any negative numbers. Benchmarks scores are on a 1 to 5 scale and were not altered for data analysis.

Major Analyses

Cluster analytic techniques available in SLEIPNER 2.0 (Bergman & El-Khouri, 1998) were utilized to combine people into homogeneous subgroups based on their MBTI and KAI profiles. Cluster analysis is consistent with a person-centered approach in that it is

non-linear and does not assume that the relations among variables are the same for all people (Gustafson & Magnusson, 1991).

Before clustering was performed, cases with missing data were removed from the data set because cluster analysis requires complete data from all participants (Bergman & El-Khouri, 1998). Three participants were removed from the analysis, which left 1,997 complete cases. In addition, because it is unreasonable to expect that every individual can and should fit into a parsimonious classification (Bergman, 1988; Bergman & Magnusson, 1987), an analysis was conducted to remove any residual cases (i.e., outliers) before clustering, as is advocated by many researchers (Aldenderfer & Blashfield, 1984; Bergman, 1988; Bergman & Magnusson, 1987; Borgen & Barnett, 1987). The presence of outliers can confuse the assignment of cases that should be part of a particular cluster (Milligan, 1980) as well as adversely affect some hierarchical clustering methods (Everitt, 1993). The SLEIPNER recommended criterion for removal was utilized in the present study and residual cases were removed if they were not similar to at least one other case by an average squared Euclidean distance of 0.5 (using standard scores; Bergman & El-Khouri, 1998). Only one outlier was identified and removed, leaving 1,976 cases for subsequent analysis.

The data for the MBTI and KAI for the remaining cases were standardized, and squared Euclidean distances were calculated in order to perform a hierarchical agglomerative cluster analysis using Ward's (1963) minimum variance clustering algorithm. Data were standardized as z scores prior to the construction of the similarity matrix because the MBTI and KAI are not on the same scale, and the similarity index, squared Euclidian distance (D^2), is sensitive to the measurement units of the indicators. The similarity matrix represents the distances across all individuals and across all five measures (Gustafson & Magnusson, 1991).

Next, the Ward (1963) clustering algorithm was used to group similar people into the appropriate clusters. The Ward minimum variance clustering algorithm is an agglomerative hierarchical clustering technique that clusters cases together that result in the smallest increase in the error sum of squares. Ward's method was chosen because past Monte Carlo simulation studies have found it to be equivalent or superior to all other methods for recovering true cluster structures (Aldenderfer & Blashfield, 1984; Milligan, 1981a). The technique strives to optimize the within-cluster (i.e., error) variance (Aldenderfer & Blashfield, 1984). An advantage of Ward's method is that it provides an objective function, the error sum of squares (ESS) that can be plotted to determine the appropriate number of clusters (Borgen & Barnett, 1987). In addition to the ESS graph, five internal criterion measures for cluster analysis were calculated in order to determine the appropriate number of clusters to retain. These five measures were: the point-biserial correlation, the C-index, the Gamma index, the W/B index, and the G(+) index. All of these methods except for the W/B index were found in two Monte Carlo studies to be among the best at true cluster structure recovery (Milligan, 1981b; Milligan & Cooper, 1985).

Once the optimal cluster solution was determined, a procedure to reevaluate case placement was conducted. One of the drawbacks of the hierarchical methods for cluster analysis is that once a case is placed in a cluster, it is never removed as the agglomeration continues (Everitt, 1993). This results in a "drifting" of cluster means as the algorithm continues, and cases that were initially placed in a cluster may not belong in that cluster at the end of the procedure. For this reason, and because it is better to use more than one method of cluster analysis on a data set (Bergman & Magnusson, 1987), the optimal hierarchical solution served as the initial partition for a k-means analysis that iteratively

relocates cases to the cluster with the nearest centroid (Aldenderfer & Blashfield, 1984) until no further reduction in ESS can be achieved (Bergman & El-Khouri, 1998).

After the optimal cluster solution was selected and the relocation procedure had been performed, several within-cluster statistics were examined to ensure that the chosen solution contained meaningful, useful subgroups. First, the homogeneity coefficients, which are the average squared Euclidean distances between each case and its cluster centroid (across all indicators; Gustafson & Magnusson, 1991) were examined in order to see if the patterns within the cluster solution were homogeneous. Second, a ratio of within-cluster variance to total sample variance was calculated for each indicator in each subgroup (e.g., Gustafson & Ritzer. 1995) to ensure that cluster subgroups did not show more variance on an indicator than the whole sample did. Lastly, the percent reduction in error variance (PR) for the cluster solution, compared to the total sample variance, was examined (Gustafson & Magnusson, 1991).

After the data were cluster analyzed, the clusters were compared in terms of Benchmarks ratings for self, supervisor, peers, and direct reports. For each participant, ratings were aggregated within rater group, and the aggregated ratings were utilized in subsequent analyses. Sample sizes for the aggregated rater groups were as follows self $\underline{n}$=1990, superior $\underline{n}$=1880, peer $\underline{n}$=1929, and subordinate $\underline{n}$=1824.

One-way analyses of variance (ANOVAs) were performed to see whether the clusters differed significantly in the predicted ways for the Benchmarks dimensions for each of the four observer groups. Post hoc analyses were conducted using the Bonferroni test, which is based on Student's $\underline{t}$ statistic, and adjusts the observed significance level for the fact that multiple comparisons are made. An alpha level of .05 was used for all statistical tests.

Results

Results from the confirmatory factor analyses did not show that Benchmarks could be meaningfully grouped into any of the three a priori structures, but a subsequent exploratory factor analysis showed a two-factor structure. Cluster analyses showed that a seven-cluster solution provided the best fit for the data. Only three of the hypothesized patterns were present in the seven-cluster solution. However, all four of Church and Waclawski's (1994, 1995, 1998) patterns emerged in this data set. Hypotheses regarding how observer groups would rate leader effectiveness were tested using the three a priori hypothesized clusters that did emerge from the data. Some support was found for the hypotheses regarding how different observers would rate the personality patterns. Several exploratory analyses were also performed.

Factor Structure of Benchmarks

Item and scale-level CFAs were conducted using LISREL 8.3. Covariance matrices were calculated using PRELIS 2.3. Because the Maximum Likelihood (ML) estimation technique assumes that measured variables are multivariate normal, Mardia's (1970) tests of multivariate skewness and kurtosis were conducted on the data. As can be seen in Table 3, neither the item or scale-level data were multivariate normal ($p < .05$).

Researchers have proposed various solutions to the problem of non-normality of data. One class of techniques involves transforming variables to better approximate a normal distribution (Bollen, 1989, West, Finch, & Curran, 1995). An exponential transformation using a squared term was deemed most appropriate for the distribution seen in the current study (cf. Daniel & Wood, 1980), but the transformation did not result in multivariate normality (see Table 3).

Another solution involves selecting an estimation method that does not require a normal distribution (Bollen, 1989). Unweighted Least Squares (ULS) is more suitable than ML to non-normal data (Nunnally & Bernstein, 1994), and asymptotic distribution-free methods, such as Weighted Least Squares (WLS), are also recommended alternatives when sample sizes are large (Bollen, 1989; Browne, 1984; Hu & Bentler, 1995; Joreskog & Sorbom, 1993; West et al., 1995). The minimum sample size required to compute the asymptotic covariance matrix needed for WLS is $\underline{k}(\underline{k} + 1)/2$, where $\underline{k}$ equals the number of indicators in the model (Byrne, 1995), which makes WLS not feasible for models with lots of indicators (Bollen, 1989). After a listwise deletion of missing values, sample sizes were inadequate in the cross validation subgroups. For this reason, ULS was utilized. However, these item-level models would not converge due to the fact that 106 indicators were being analyzed. One way to deal with a large number of indicators is to use item parcels.

Parcels are aggregates of items that are used as indicators in latent models (Ha**l**, Snell, & Singer Foust, 1999). When a measurement instrument has multiple subscales, aggregation into item parcels is particularly appropriate (Hall et al., 1999). Because Benchmarks has 16 preexisting scales, it was decided to perform the CFAs using the Benchmarks scales as indicators in the three models being tested. A drawback of using parcels is that more than one factor may underlie any given parcel (West et al., 1995), so it is important to show that parcels are unidimensional. Raju (1999) used principal components analysis and confirmatory factor analytic techniques and found that, for all four rater groups (self, superiors, peers, subordinates) unidimensionality within the 16 Benchmarks scales was supported. In addition, the coefficient alphas assessing internal consistency of the 16 scales are all reasonable for the number of items they contain (see Table 2;Nunnally & Bernstein,

1994). Lastly, the average item intercorrelations were examined. For the entire instrument, the average overall pairwise item intercorrelation was .29 across the 106 items. The within-scale average correlations all surpassed the average overall pairwise item intercorrelation for the total instrument, and ranged from .32 to .66 (see Table 2). Taken together, these results justify using the 16 Benchmarks scales as parcels. Table 4 shows the correlations between the 16 scales.

The scale-level data were not multivariate normal (see Table 3), so WLS was the estimation method chosen. Researchers advise minimum sample sizes in the 1,000-5,000 range for WLS (Byrne, 1995; West et al., 1995). The sample size in the first half of the scale-level data was 7,613, which is more than adequate for the computation of the asymptotic covariance matrix on 16 indicators.

Table 5 reports the fit statistics for the 3-factor, 2-factor, and 1-factor model of Benchmarks. LISREL computes a plethora of statistics in order to determine if the model in question fits the data. Hoyle and Panter (1995) recommend selecting at least two indices of absolute fit and at least two measures of incremental fit. Measures of absolute fit assess the degree to which the covariance matrix implied by the model matches the observed covariance matrix. Chi-square is such a measure where large (i.e., statistically significant) values are indicative of a poor fitting model. The Adjusted Goodness of Fit (AGFI) is another example of an absolute fit measure that is similar to multiple R-square in regression and adjusts for the degrees of freedom in the model (Byrne, 1989; Hu & Bentler, 1995). In addition, the Parsimony-adjusted Goodness of Fit Index (PGFI) will be examined because competing models are being assessed (Hoyle & Panter, 1995). AGFI and PGFI range from 0 to 1, with values above 0.90 indicating a well-fitting model.

Measures of incremental fit assess the adequacy of a target model in relation to a baseline model and are divided into three types (Hu & Bentler, 1995). Type I incremental indices (e.g., Normed Fit Index – NFI) are not recommended due to their positive relation with sample size (Hoyle & Panter, 1995; Hu & Bentler, 1995). The Non-Normed Fit Index (NNFI) is the type II incremental index that will be used because it is adjusted for degrees of freedom (Nunnally & Bernstein, 1994), and the Comparative Fit Index (CFI) will be the type III incremental index utilized because it takes sample size into account (Byrne, 1994). Again, values exceeding 0.90 for the NNFI and the CFI are indicative of good fit.

Table 5 shows that the fit indices for the three Benchmarks models tested were not optimal, and thus, none of the a priori CFA models fit the data. Because post hoc model modification capitalizes on sample idiosyncrasies (Bollen, 1989; Hoyle & Panter, 1995) and should only be done if there is an "unusually clear and compelling substantive reason" (Hoyle & Panter, 1995, p. 172), it was not performed in the current investigation. Instead, an Exploratory Factor Analysis (EFA) was conducted on the item-level data.

Because of the non-normal data, ULS estimation was used to extract factors from the data. Table 6 shows the initial eigenvalues for the first 12 factors. The scree plot (see Figure 1) of these eigenvalues shows that there is a break in the data at a two-factor solution. For this reason, the 106 items were then rotated into the two-factor solution (using a direct oblimin method). To interpret these two factors, the number of items on each of the 16 Benchmarks scales that fell into factor 1 and factor 2 were examined (see Table 7). With the exception of two scales (Setting a Developmental Climate and Straightforwardness & Composure), the items from each scale fell relatively cleanly into the proposed CFA two-

factor solution (see Table 1). For this reason, factor 1 will be called interpersonal, and factor 2 will be called task. The correlation between these two factors is 0.47.

Cluster Structure

Ward's minimum variance method produces an index of within-group error (the ESS) at each stage of the agglomeration that can be plotted and examined in order to determine the appropriate number of clusters to retain (Borgen & Barnett, 1987). Similar to the examination of a scree plot in factor analysis, disproportionate "jumps" are indicative of two dissimilar groups being combined. When a "break" is observed in the ESS graph, the cluster solution that immediately preceded the break is chosen as the appropriate solution. Figure 2 shows the graph of the ESS for the final 30 fusions of the cluster analysis. The first two disproportionate jumps in the graph occur as a result of agglomerating from seven to six clusters and from five to four. The ESS difference from five to four clusters is greater, but the jump from seven to six was the first break in the graph. For these reasons, both the five and seven cluster solutions were compared in order to determine the appropriate number of clusters to retain.

A secondary analysis comparing homogeneity coefficients across the final 10 cluster solutions was also performed. The purpose was to see if there were significant differences in the average homogeneity coefficients that might aid in the selection of the optimal solution. A one-way analysis of variance (ANOVA) was performed on the average homogeneity coefficient for cluster solutions two through ten. A Duncan New Multiple Range post-hoc test showed that the homogeneity coefficients for cluster solutions five and seven did not differ significantly. However, the coefficients for the two and three-cluster solutions both differed significantly from the seven-cluster solution. This was indicative of the fact that

even though the breaks in the ESS graph were larger for the two and three cluster solutions, they are significantly less homogeneous than the seven-cluster solution, and therefore are less desirable choices. See Figure 3 for the complete results from this analysis.

The five and seven cluster solutions were each evaluated by examining several internal criterion measures (see Table 8). All measures except for the point-biserial correlation favored the seven-cluster solution. However, of the best ten internal criterion indices examined by Milligan and Cooper (1985), the point-biserial measure exhibited the highest error rate for determining too few clusters. For this reason, the seven-cluster solution was chosen as the optimal solution for this data set.

Due to the centroid drift problem described above, a k-means iterative partitioning procedure was performed to relocate cases to other clusters that would lead to a reduction in ESS. K-means procedures require that an initial solution and clustercentroids be specified a priori (Aldenderfer & Blashfield, 1984), and the seven-cluster solution obtained through Ward's (1963) procedure provided this needed initial assignment. The explained ESS (i.e., PR) was increased from 47.75 before relocation to 55.34 after the procedure, and the average cluster homogeneity was reduced from 1.03 to 0.90 after relocation. Because the homogeneity coefficient is the average squared Euclidean distance for all possiblepairwise comparisons, lower numbers are preferable and are indicative of more homogeneous clusters. Relocation also increased the point-biserial internal criterion measure from 0.30 to 0.33, which, consequently, was higher than the point-biserial obtained in the five-cluster solution. Descriptive statistics for the seven-cluster solution are given in Table 9, and a graphical depiction of the clusters is available in Figure 4.

Within-cluster statistics for the seven-cluster solution were favorable. Table 10 presents the homogeneity coefficients for the subgroups of the seven-cluster solution. They ranged from 0.75 to 1.05. The ratios of within subgroup variance on an indicator to total sample variance on the indicator were also favorable. As can be seen in Table 10, they ranged from 0.53 to 0.88. Because none of these variance ratios were above 1.0, none of the subgroups showed greater variance on any indicator than the whole sample did. The seven cluster solution accounted for a 55 percent reduction in ESS over considering the sample as one large cluster (i.e., a one-cluster solution).

The means for each of the five indicators dictated the pattern (i.e., INTP-I) for each obtained cluster solution (see Table 11). However, it is important to determine how many cases in each cluster have the exact pattern that the mean profile would suggest. Table 11 shows that the percentage of exact patterns in the seven-cluster solution ranged from 3% to 63%. Cluster E's mean profile suggests that it contains ENFJ-A, but there are several of the indicators that have means close to the cutoff and/or large standard deviations, so only 3% of the cluster actually have the ENFJ-A pattern.

To further examine how distinct the clusters were from each other on the five personality preferences, a one-way ANOVA was conducted for each indicator to assess differences across the seven clusters. Post hoc analyses were conducted usingBonferroni's test to help control for Type I error. By reading down the columns on Table 9, it can be seen that cluster means with the same superscript letter were not significantly different from each other. In addition, the highest means were assigned the superscript letter a, the second highest means were assigned letter b, and so on. Notably, all means that fell on one side of the cutoff scores for the MBTI and KAI were significantly different from means on the

opposite end of the dichotomy. In other words, clusters with opposite preferences on an indicator were always significantly different from each other.

For the sake of clarity, the hypothesized patterns will be referred to by a number, (1 through 8) and the obtained clusters will be referred to by a letter (A through G). Of the eight hypothesized patterns, three were present in the seven-cluster solution, providing limited support for the predictions made on the basis of the variable-centered literature. Results showed that cluster A was pattern 3, cluster D was pattern 7, and cluster G was pattern 2. The mean profiles of these three clusters suggest that cluster A has INTP-I preferences, cluster D is ISTJ-A, and cluster G is ENFP-I.

Results also showed a remarkable overlap with the findings of Church and Waclawski (1994, 1995, 1998) who used a similar sample of executives participating in developmental workshops. Clusters A, B, C, and D were Church and Waclawski's Inventor, Motivator, Manager, and Implementer, respectively. Both the Manager and Motivator were not hypothesized based on the variable-centered literature, but they emerged from the data. See Table 11 for a summary of the obtained clusters.

Ratings of Leader Effectiveness

Because clusters A, D, and G were predicted a priori, they will be used in the hypothesis testing across the rater groups. All seven of the obtained clusters will be examined to some extent in the exploratory analyses described below. If all eight hypothesized clusters had emerged in the current study, it would have been possible to assess the impact of single indicator differences between clusters on ratings of effectiveness. The majority of the clusters that did emerge in the current study were not hypothesized. However, there is still an opportunity in the present study for some meaningful tests of

previous variable-centered findings regarding personality preferences and leader effectiveness.

The most straightforward way to test Hypotheses 1 through 4 would have involved comparing clusters that only differed in terms of the indicator(s) of interest, but these cluster combinations do not exist in this sample of executives. However, among the obtained patterns, some of these analyses could be performed. For example, three sets of clusters only differed by one indicator. Clusters B (ENTJ-I) and F (INTJ-I) differed by their E-I preferences only, clusters B and C (ESTJ-I) only differ in terms of S-N, and clusters A (INTP-I) and F only differ by J-P preferences. These three sets of clusters were compared in terms of self, superior, peer, and subordinate ratings on Benchmarks. Although these analyses are exploratory, two of the comparisons have particular implications for the stated hypotheses. First, because clusters B and F only differ by their E-I preferences, self-ratings were tested to see if E-I preferences (with everything else held constant) would result in significant differences in self-scores on Benchmarks. Secondly, the exploratory comparison between clusters B and C was examined with regards to superior ratings because they only differ by their S-N preferences. However, because these analyses are exploratory, they will be performed for all four rater groups regardless of whether or not a difference would be hypothesized based on previous variable-centered research.

In addition, past variable-centered research has shown that the S-N and J-P scales are significantly correlated with Adaption-Innovation. There were two sets of clusters that only differed in terms of two preferences (of these three scales). Cluster D is an ISTJ-A and cluster F is an INTJ-I. These two clusters differ by their S-N and A-I preferences, so they were compared across all four Benchmarks groups. In addition, clusters E (ENFJ-A) and G

(ENFP-I) only differ in terms of their J-P and A-I preferences, so they were compared for all rater groups as well.

Tables 12 and 13 show the results from the hypothesis tests and the exploratory analyses for the each rater group. Significance testing for the three hypothesized patterns was conducted as described in the previous chapter. Levene's statistics were calculated to see if the ANOVA assumption of homogeneity of variance was violated. The non-significance of all of the Levene's statistics indicates that this assumption was not violated (see Table 12). Exploratory analyses were conducted using t-tests. To assess the meaningfulness of the results, effect sizes (e.g., Cohen, 1988) were calculated for every significance test performed. Results showed that where there was a statistically significant difference, the corresponding effect size was small to medium, and where there was a non-significant difference, effect sizes tended to be below Cohen's (1988) cutoff point of .20 (see Tables 12 and 13) indicating that the difference was not meaningful.

Self-ratings. To test Hypothesis 1 which stated that self-scores on Benchmarks would be higher for Extraverts, cluster G (ENFP-I) was compared to clusters A (INTP-I) and D (ISTJ-A). Clusters A and G differed in terms of preferences on E-I and T-F. Bonferroni's post-hoc analyses showed that, self-ratings of interpersonal leadership skills were significantly higher for cluster G. Thus, when both clusters are NP-Is, EFs will rate themselves significantly higher than ITs on interpersonal dimensions. In addition, clusters A and D were compared to see if, holding Introversion (and Thinking) constant, self-ratings on leader effectiveness would differ. Cluster A had significantly higher means on task dimensions showing that NP-Is will rate themselves higher than SJ-As when IT is held constant. Clusters D and G differed in terms of all five indicators examined. Preferences for

ENFP-I (cluster G) were reflected in significantly higher ratings than ISTJ-As (cluster D) on both task and interpersonal dimensions of leader effectiveness. These significantly higher ratings for cluster G are reflected in the negative mean differences in Table 12 where the complete results from these analyses can be seen. Thus, results show support for Hypothesis 1, but also suggest that preferences other than E-I can affect self-ratings.

Exploratory self-ratings. Comparisons of clusters A (INTP-I) and F (INTJ-I) where only J-P preferences differed as well as clusters B (ENTJ-I) and C (ESTJ-I) where only S-N preferences differed were not statistically significant. The exploratory comparison that had implications for the hypotheses made for the self-ratings was clusters B and F due to the fact that they only differ in terms of Extraversion-Introversion preferences. Results showed that self-ratings for both task and interpersonal dimensions were higher for cluster B.

Self-ratings were also examined for clusters that differed in terms of two personality preferences. Means for cluster F were significantly higher than those for cluster D (ISTJ-A) on the task dimension. Cluster G (ENFP-I) was significantly higher than cluster E (ENFJ-A) on the task dimension as well. See Table 13 for the results from the exploratory analyses on self-ratings of leader effectiveness.

Superior ratings. Hypothesis 2 predicted that superiors would rate Intuitive types higher than Sensing types. For this reason, superiors' ratings on Benchmarks for clusters A (INTP-I) and G (ENFP-I) were compared to those on cluster D (ISTJ-A). Clusters A and D differed in terms of S-N, J-P, and A-I preferences. Results showed that NP-Is receive higher ratings from superiors than SJ-As (with IT held constant) on task dimensions. Clusters A and G and both NP-Is, and results from that comparison show that EFs will receive higher interpersonal effectiveness ratings than ITs from superiors. Clusters G and D differ in terms

of all five indicators. Results showed that ENFP-Is receive higher task ratings from superiors than ISTJ-As. These results support the contention that superiors will rate Intuitive types higher (i.e., Hypothesis 2), but this happens only on task dimensions. When Intuition is held constant, other indicators (i.e., Extraversion, Feeling) will be rated higher on interpersonal dimensions, and Extraverts are also rated higher than Introverts (everything else constant) on task dimensions (see Table 12).

Exploratory superior ratings. Clusters B (ENTJ-I) and C (ESTJ-I) only differed in terms of preferences on the S-N scale. Results showed that superiors rate Intuitive types higher on task dimensions when the other preferences are held constant. However, comparison of clusters B (ENTJ-I) and F (INTJ-I) showed that mean superior ratings will also be significantly higher for Extraverts when all other indicators are held constant. In addition, clusters D (ISTJ-A) and F only differed in terms of S-N and A-I preferences, and superior ratings were significantly higher for cluster F on task dimensions (see Table 13).

Peer ratings. Hypothesis 3 proposed that peers would rate Extraverted Feeling types higher than they would rate Introverted Thinking types. When cluster G (ENFP-I) was compared to cluster A (INTP-I), this hypothesis was supported for interpersonal dimensions of leader effectiveness (when NP-I is held constant). In addition, for the Introverted Thinking leaders, peer ratings were higher for those with preferences for NP-I over SJ-A on task dimensions as evidenced by the comparison of clusters A and D (ISTJ-A). Lastly, when clusters D and G who have no preferences in common are compared, the ENFP-Is receive higher ratings from peers on the task dimensions (see Table 12). These results show support for Hypothesis 3 for interpersonal dimensions of leader effectiveness.

Exploratory peer ratings. Where S-N was the only indicator that differed, cluster B (ENTJ-I) received significantly higher peer ratings than cluster C (ESTJ-I) on the task dimension, and cluster C was significantly higher on interpersonal ratings of effectiveness. Exploratory comparisons where two indicators differed also showed significant results. Cluster F (INTJ-I) was significantly higher than cluster D (ISTJ-A) on task, and cluster D was higher than F on interpersonal. Again, an S-N difference (along with an A-I difference) resulted in differentially higher ratings of effectiveness. When clusters B and F (INTJ-I) were compared because they only differed in terms of E-I preferences, mean peer ratings for cluster B (ENTJ-I) were significantly higher on task ratings. This finding is consistent with past research showing higher peer ratings for leaders who prefer Extraversion, but S-N preferences also interact with task and interpersonal ratings. Table 13 contains the results from the exploratory analyses of peer ratings of leader effectiveness.

Subordinate ratings. Past research has shown that subordinates tend to rate Feeling types higher than Thinking types. To test Hypothesis 4, subordinates' ratings on cluster G (ENFP-I) were compared to clusters A (INTP-I) and D (ISTJ-A). In addition to differing on T-F, clusters A and G also diverge on E-I preferences, and results showed that theEFs receive higher ratings of interpersonal effectiveness compared toITs (all other indicators held constant). Clusters D and G have no preferences in common, and subordinate ratings were significantly higher for cluster G on both task and interpersonal dimensions of effectiveness. Lastly, when Introversion and Thinking are constant, preferences for NP-I (cluster A) received higher subordinate ratings of task effectiveness than preferences for SJ-A (cluster D). These results support Hypothesis 4, but also suggest that indicators other than T-F will affect subordinate ratings, particularly on the task dimensions (see Table 12).

Exploratory subordinate ratings. There were no significant differences in mean ratings of effectiveness for clusters A (INTP-I) and F (INTJ-I) on Benchmarks (see Table 13), showing that a difference on the J-P scale was not discriminating for subordinates. Subordinates' ratings were higher for cluster B (ENTJ-I) on task ratings when compared to cluster C (ESTJ-I) where the S-N scale was all that differed. Where E-I was the discrepant indicator, cluster B received significantly higher ratings on task dimensions when compared to cluster F (INTJ-I). The t-tests for clusters D and F (a two-indicator difference) were not significant. When both J-P and A-I differed, subordinates rated cluster G (ENFP-I) significantly higher on both task and interpersonal dimensions compared to cluster E (ENFJ-I; see Table 13).

Supplementary Analyses

Previous variable-centered research has shown that S-N, J-P and A-I preferences are significantly and positively correlated with each other. Table 14 shows the correlations among the S-N, J-P and A-I scales for the entire sample and the seven clusters. As would be predicted by the variable-centered literature, the correlations between the S-N, J-P and A-I scales for the whole sample were all statistically significant. However, these correlations were not always significant within clusters. When the within-cluster correlations were corrected for restriction of range, the correlations within the clusters still did not approach the magnitudes of those seen in the whole sample. In addition, within the three clusters that were predicted a priori (A, D, and G) based on the variable-centered literature, there were few significant correlations between the S-N, J-P and A-I scales. The full correlation matrices for the whole sample and the seven clusters can be seen in Table 15.

Cluster cross-validation. The stability of the 7-cluster solution was assessed across subsets of this sample. The sample was divided into two approximately equal parts. The first cross-validation sample contained 980 of the participants, and the second sample contained 1,017 participants. The same clustering and solution evaluation procedures were performed on the subsamples as were conducted on the entire sample.

Figures 5 and 6 show the ESS graphs for the final 15 fusions of both samples. For subsample one, the first ESS jump occurs at an 8-cluster solution, but another jump also takes place for a 4-cluster solution (see Figure 5). Subsample two has an ESS jumps at the 7- and 4-cluster solutions (see Figure 6). These solutions were compared to each other using internal criterion measures (see Table 16). For subsample one, 5 of the 7 internal criteria were more favorable for the 8-cluster solution, and for subsample two, all but one internal criteria were more favorable for the 7-cluster solution (see Table 16). Tables 17 and 18 show the descriptive statistics for these two solutions.

The optimal solution for subsample one was an 8-cluster solution, and cluster E was the only pattern not present in the solution. The optimal solution for subsample two was a 7-cluster solution. Results for sample two did not fit as well with the obtained solution for the whole sample as clusters A, B, and D were the only patterns present in this solution. However, one pattern very closely approximated cluster G, and another pattern was very similar to cluster C (see Table 18). The close correspondence between the patterns seen in subsample one support the replicability of the solution found in the whole sample (except for cluster E). The correspondence between the results from the subsample 2 and the entire sample was not as favorable, but still shows that the solution has some replicability.

Discussion

A significant amount of recent research has demonstrated the links between leader personality traits and leader effectiveness (Yukl, 1994). In addition, many studies have operationalized leader effectiveness in terms of multisource ratings (Hogan et al., 1994). The present study contributes to this body of literature by utilizing past variable-centered research in order to construct a person-centered test of the links between leader personality and multisource ratings of leader effectiveness, as well as exploring personality in terms of Jungian types and style of creativity.

Two previously unrelated studies helped form the basis of the current investigation. Johnson et al. (1997) utilized multisource ratings, but they formed patterns based on across-rater aggregates of effectiveness scores and then assessed the obtained patterns in terms of personality and effectiveness ratings for the individual groups. In essence, Johnson et al. (1997) used these ratings both to form their clusters as well as to evaluate the effectiveness of the leaders in their clusters. Church and Waclawski (1994, 1994, 1998) explored patterns of personality types using the MBTI and KAI, but they only used self and subordinate ratings of leader effectiveness (superior and peer ratings were not included in their studies). The present study combines and extends the goals of Johnson et al. and Church and Waclawski and improves on their methodologies.

As stated above, the present study is distinctive in how it measures leader personality, particularly with the wide attention given to the Five Factor Model of personality in the literature (e.g., Barrick & Mount, 1991). The MBTI is considered an unusual personality assessment instrument because it is based on a classic personality theory, it reports dichotomous types rather than continuous traits, and it is widely used as a developmental tool

in applied settings (McCrae & Costa, 1989). The Big Five has been put forth as a comprehensive model of normal personality and has received acceptance, particularly in the field of Industrial and Organizational Psychology (Barrick & Mount, 1991; Goldberg, 1993). Although criticisms for both the MBTI (McCrae & Costa, 1989) and the Big Five (Block, 1995) have arisen, both views of personality continue to be utilized in academic and field research. Some researchers have assessed the Big Five personality traits in person-centered contexts (e.g., Buchanan, 1998; Craig & Smith, 2000; Lorr & Strack, 1993). However, the notion of type dynamics that is inherent in Type Theory is much more in line with modern interactionism theory than other measures of personality that are not theory-based. Type Theory is not variable-centered, it is person-centered, and is particularly applicable to pattern-focused research. However, this is not to say that other personality instruments should not be used in pattern-oriented studies, but the MBTI is well suited.

In addition, the inclusion of Adaption-Innovation was an important contribution of the current study. Creative style is a poorly understood, yet key leader trait (Hogan et al., 1994). Drucker noted in 1969 that one of the "new realities" of organizations of the future would be that "entrepreneurial innovation will become the very heart and core of management" (p. 52). Few people would question the fact that this has come to pass. Organizations today are characterized by complexity and change (Mumford & Connelly, 1991), which necessitates problem solving in many forms. The Kirton Adaption-Innovation Inventory was a logical complement to the MBTI due to the past studies showing the correlations between the two instruments as well as their psychometric and philosophical similarities.

The results of the current study demonstrated the existence of seven distinct clusters that can describe Jungian personality preferences and creative problem solving style in a group of upper-level executives. Four of these clusters were found in previous research utilizing a different sample of executives (Church & Waclawski, 1994). Three of these seven clusters are what would be expected based on the variable-centered literature showing the direct relationships between the S-N, J-P and A-I scales (e.g., Carne & Kirton, 1982; Gryskiewicz & Tullar, 1995). In order to test the hypothesized contributions of single indicators, the three clusters that were predicted a priori were compared to each other in terms of multisource ratings of leader effectiveness. Some exploratory analyses were also performed that assessed all seven personality clusters. Overall, multisource ratings of leader effectiveness were in agreement with the variable-centered literature predictions but there were other indicators that impacted ratings in unpredicted ways. In addition, a pattern that was not present in Church and Waclawski's (1994) data (cluster G: ENFP-I) was consistently significantly higher than other tested clusters in terms of leader effectiveness across rater groups (see Tables 12 and 13). Results consistently demonstrated the value of combining the variable and person-centered approaches.

A Seven-Cluster Solution

A disproportionate increase in ESS (see Figure 2), the results of several internal criterion measures (see Table 8), and the within-cluster statistics (see Table 10), all indicated that a seven-cluster solution was the appropriate choice for this sample. Although there are no established rules of thumb for cluster homogeneity coefficients, 5 of the 7 clusters had average squared Euclidean distances of less than 1.0 (see Table 10). Interestingly, when examining the percentage of cases in each cluster that have the exact pattern that the cluster's

mean profile suggests (see Table 11), the mean profile pattern is also the most frequently occurring "exact pattern" for the five clusters with homogeneity coefficients below 1.0. For the two clusters with homogeneity coefficients above 1.0, the pattern suggested by the mean profile is not the most frequently occurring exact pattern. These results suggest that meaningful distinctions in homogeneity coefficients can be established by examining how many people in a cluster have the pattern that a cluster's mean profile suggests. In the case of the current study, a homogeneity coefficient rule of thumb of 1.0 is meaningful.

The clusters found in the current study replicate and extend the findings of Church and Waclawski (1994, 1995, 1998). Church and Waclawski found that a four-cluster solution was appropriate for their sample of 253 senior executives participating in executive leadership training. However, across their three studies that utilized this sample, the methods of clustering and selecting the optimal solution are not clear. The 1994 and 1995 studies indicate that a k-means cluster analysis was all that was performed, and there was no specification of how the initial partitions were decided upon, nor how the final solution was evaluated. The 1998 study indicates that a hierarchical cluster analysis (with acentroid clustering method) provided the basis for the k-means analysis, and the four-cluster initial solution was selected by examining incremental jumps in agglomeration coefficients. The latter approach is similar to the current study, except the current study used Ward's (1963) clustering algorithm instead of centroid clustering, and internal criterion measures aided in the selection of the optimal solution. One explanation for the parallels between Church and Waclawski's four clusters and the seven clusters currently obtained is the similarity in analysis as well as the comparable samples. However, replication is one method of validating cluster solutions advocated by Aldenderfer and Blashfield (1984). Specifically,

these researchers state: "if a cluster solution is repeatedly discovered acrossdifferent samples from the same general population [emphasis added], it is plausible to conclude that this solution has some generality" (p. 65).

Where the current study and the findings of Church and Waclawski differ is in terms of clusters E, F, and G (see Table 11). Mean profiles of Church and Waclawski's four clusters did not show any Feeling types. Clusters E (ENFJ-A) and G (ENFP-I) in the current study both prefer Feeling according to their respective mean profiles. However, clusters E and G both have homogeneity coefficients greater than 1.0 (see Table 10). Interestingly, cluster G was one of the a priori hypothesized patterns, and not only was it never found to be significantly lower in leader effectiveness than any cluster it was compared to, but it was significantly higher in effectiveness in many of its comparisons (see Tables 12 and 13). Cluster F (INTJ-I), although not predicted based on the variable-centered literature, had significantly higher effectiveness ratings in many the exploratory analyses (see Table 13). Cluster F also had the lowest (i.e., best) homogeneity coefficient of any cluster solution (see Table 10). So, even though clusters G and F are not replicated in the findings of Church and Waclawski, these results suggest that they are meaningful patterns in terms of leader effectiveness.

Cluster E (ENFJ-A) was the final cluster found in the current study that did not emerge in Church and Waclawski's (1994, 1995, 1998) sample. However, this cluster is very problematic because only 9% of the people in that cluster were ENFJ-As (see Table 11). In addition, the means across the five indicators in cluster E were close to the cutoff points for the MBTI and the KAI, and the standard deviations for these indicators were large (see Table 9). Church and Waclawski defined "mid range" scores within their sample means, but the

current study maintained the dichotomy postulated by Type Theory and Adaption-Innovation Theory. Had a mid range category been utilized in the current study, cluster E would have been classified as mid range on almost all of its indicators. Thus, it is arguable that it is the definition of cluster E as Extraverted, Intuitive, Feeling, Judging, and Adaptive that is most problematic. However, although the pattern exists in the data, it is not very homogeneous and was not found to be significantly higher in leader effectiveness in the exploratory comparisons when compared to cluster G. Future research with other samples will be needed to replicate this cluster analysis to see if all seven clusters generalize.

The results from the cluster cross-validation also point to the need for future research to be conducted to assess the external validity of the cluster solution. Although replication across different samples or a series of data sets is especially important, it is also valuable to show replication of a cluster solution within a single sample (Aldenderfer & Blashfield, 1984). The lack of a one-to-one correspondence between the subsample clusters and the whole sample clusters is a limitation of the current study. However, it is important to note that clusters A, B, and D were found both in Church and Waclawski's research as well as in both subsamples of the current study. In addition, clusters C and G were both present in the subsample one and missed being present in subsample two by a small margin on the A-I and J-P scales, respectively (see Table 18). In short, the three clusters on which hypothesis tests were conducted (A, D, and G) did show acceptable levels of replication across subsamples, and not surprisingly, cluster E was not replicated in either subsample.

Multisource Ratings of Leader Effectiveness

Church & Waclawski (1994, 1995, 1998) utilized self and subordinate ratings only. Johnson et al., (1997) utilized multisource ratings both to form their clusters as well as to

evaluate them. Aldenderfer and Blashfield (1984) advocate evaluating cluster solutions using variables other than those that were used to generate the clusters. The present study further contributes to the literature by using personality variables to form clusters (e.g., Church and Waclawski), along with self, superior, peer, and subordinate ratings of leader effectiveness to evaluate the clusters (e.g., Johnson et al.). Latham and Wexley (1994) and Hogan et al. (1994) advocate the use of multiple perspectives (i.e, self, superior, peer, and subordinates) in order to gain a more comprehensive picture of a person's effectiveness. Because of this and the fact that results differed meaningfully among rater groups in the current study, future research in the area of personality and leader effectiveness should consider utilizing non-aggregated multisource ratings wherever possible.

Self-Ratings of Leader Effectiveness. Hypotheses regarding whether Extraverts would rate themselves higher than Introverts, as has been found in the variable-centered literature (Fitzgerald, 1994; Fleenor, 1995; Johnson & Golden, 1994; Van Velsor & Fleenor, 1994; Wilson & Wilson, 1994) were tested by comparing cluster G (ENFP-I) to clusters A (INTP-I) and D (ISTJ-A). Results showed that EFs rate themselves higher than ITs on the interpersonal dimension and NP-Is rate themselves higher on the task dimension than SJ-As with all other indicators held constant. Thus, it is not surprising that when ENFP-Is are compared to ISTJ-As that there are significantly higher self-ratings on both task and interpersonal dimensions for the ENFP-Is (see Table 12). However, previous variable-centered research has only supported the contention that E-I differences result in different self-ratings of effectiveness. These results show that all five indicators can have an effect.

Clusters B and F in the exploratory analyses only differed in terms of their preferences on Extraversion-Introversion. Results showed that members of cluster B (ENTJ-

I) rated themselves significantly higher than members of cluster F (INTJ-I) on both task and interpersonal dimensions. There were no significant differences when S-N and J-P were the only indicators that differed, but when A-I varied along with these two indicators, self ratings on the task dimension were significantly higher for clusters whose mean profiles showed preferences for N-I and P-I (see Table 13). This finding suggests that A-I is an important variable when examined along with S-N and J-P preferences for self-ratings. Results such as this one would not have been possible if a person-centered methodology had not been utilized.

Superior Ratings of Leader Effectiveness. Previous variable-centered research utilizing Benchmarks as a measure of leader effectiveness found that superior ratings did not differ significantly for the four Jungian Types (Van Velsor & Fleenor, 1994), but the current study found that superior ratings of leader effectiveness for the hypothesized personality clusters differed along both the task and interpersonal dimensions of leader effectiveness measured by Benchmarks. The results of past research have shown that superior's ratings of leader effectiveness tend to be higher for Intuitive types on operational aspects of leadership (e.g., Hamilton, 1998; Hay, 1966; Myers, 1962; Wilson & Wilson, 1994). Results in the current study showed that whenever two clusters that differed in terms of S-N preferences were compared, the Intuitive cluster always had significantly higher task ratings from superiors (see Table 12). However, findings also suggest that when Intuition is held constant, Extraversion and Feeling may also be related to superiors' ratings of effectiveness (as part of a pattern of traits). Again, a person-centered methodology is necessary to uncover within-trait dynamics such as these.

Peer Ratings of Leader Effectiveness. Previous variable-centered studies utilizing Benchmarks to operationalize leader effectiveness found that peers rate Extraverted and Feeling types higher than they rate Introverts and Thinkers (Fleenor, 1995; Van Velsor & Fleenor, 1994). Peer ratings for cluster G (ENFP-I) were significantly higher than for the two Introverted, Thinking clusters (A and D; see Table 12). The higher ratings for EF were on the interpersonal dimension, and the higher peer ratings for NP-I were on the task dimension. In the exploratory analysis where only E-I differed, Extraversion was associated with higher peer ratings of effectiveness on the task dimension (T was held constant). In addition, ENFP-Is were higher than ISTJ-As on the task dimension only. These results support the contention that Extraversion and Feeling make a difference to peers, but Feeling preferences may be more related to interpersonal effectiveness and Extraversion preferences may be more related to task effectiveness from the peer perspective.

Exploratory analyses show that clusters that only differed in terms of Intuition or a combination of Intuition and Innovation received higher peer ratings on task dimensions (see Table 13). Conversely, clusters that were distinguished by preferences for Sensing or a combination of Sensing and Adaption received higher ratings on the interpersonal dimension. These findings are new to the literature and will need to be replicated in other samples.

Subordinate Ratings of Leader Effectiveness. Ratings of leader effectiveness by subordinates utilizing Benchmarks have been shown in previous variable-centered research to be significantly higher for leaders with preferences for Feeling (Fleenor, 1995; Van Velsor & Fleenor, 1994). To test this hypothesis, cluster G (ENFP-I) was compared to clusters A (INTP-I) and D (ISTJ-A). Preferences for Extraversion and Feeling (all other indicators held constant) resulted in significantly higher subordinate ratings of effectiveness on the

interpersonal dimension. Preferences for NP-I (when I and T were held constant) resulted in significantly higher ratings of task effectiveness. This finding was not predicted based on the variable-centered literature. When you combine these preferences (ENFP-I), there are significantly higher ratings from subordinates on both task and interpersonal effectiveness according to the hypothesis tests conducted in the current study (see Table 12).

Exploratory analyses showed that preferences for Intuition (all other indicators constant) and Extraversion (all other indicators constant) resulted in higher subordinate ratings of task effectiveness (see Table 13). In addition, Perceiving/Innovation versus Judging/Adaption (all other indicators constant) results in higher subordinate ratings of interpersonal effectiveness, which shows that the T-F scale is not the only indicator that can affect these types of ratings as would be predicted by the variable-centered literature.

Patterns vs. Variables in Leadership Research

Unlike Church and Waclawski (1994, 1995, 1998), the current study included a priori predictions about what clusters would emerge from the data. These predictions were formulated based on variable-centered research that was primarilycorrelational in nature. The consistent findings in the literature were significant and positive correlations between the MBTI's S-N and J-P scales and Adaption-Innovation. Table 14 shows that this finding held for the sample as a whole but was not consistently found within each cluster solution. Even among the three clusters (A, D, and G) that were predicted to emerge from the data, correlations between the S-N, J-P, and A-I scales were low in magnitude and not consistently significant. These findings held even when the correlation coefficients were corrected for the restriction of range that would inevitably occur between the entire sample and the cluster subgroups (see Table 14). The variable approach would assume that the significant

correlations between the three scales seen in the whole sample would apply to everyone in the sample. Breaking the sample into its component subgroups, however, shows that this is not the case. In short, the well established variable-centered finding of significant correlations between S-N, J-P, and A-I virtually disappears when the pattern approach is taken – even among clusters whose mean profiles seemed to support the correlational research.

One, Two, and Three Indicator Differences.

There were three comparisons where only one indicator differed. When the J-P scale was the only discriminating indicator (i.e., clusters A and F), there were no significant differences in ratings from any of the four rater groups. When two clusters (B vs. C) differed only in terms of S-N preferences, superiors' and subordinates' ratings were higher for the task dimension, and peer ratings differed on both task and interpersonal. When the discriminating indicator was E-I, ratings for all four rater groups were significantly higher for cluster B over cluster F on the task dimension (self-ratings were also higher on interpersonal). In short, individual indicators contribute to the pattern as evidenced by the fact that single indicator differences between clusters did result in some significantly different ratings on leader effectiveness dimensions.

There were two comparisons where clusters differed in terms of two of the three indicators hypothesized to covary (i.e., S-N, J-P, and A-I). Clusters D and F only differed by their S-N and A-I preferences, and clusters E and G only differed by their J-P and A-I preferences. The comparison of clusters D (ISTJ-A) and F (INTJ-I) yielded significantly higher ratings for cluster F on the task dimension for self, superiors, and peers. Peer ratings were also significantly higher for cluster F on interpersonal ratings of effectiveness. The

comparison of clusters E (ENFJ-A) and G (ENFP-I) were not significant for superiors' and peers' ratings. Self and subordinates both rated cluster G higher on the task dimension. Subordinate ratings were also higher for cluster G on interpersonal effectiveness. However, it is important to note that cluster E (ENFJ-A) was problematic in terms of low homogeneity and large standard deviations that overlapped the cutoff points on the five personality indicators (see Tables 9 and 10), so results for the E vs. G comparison should be viewed with caution.

In sum, the results from the exploratory analyses and the within-cluster correlations show that person-centered analyses in the area of leader personality and effectiveness offer unique information over the variable-centered approach. However, it is important to emphasize that person-centered research cannot exist without variable-centered studies. Variable-centered research provides the necessary background information regarding what variables to include in the pattern analysis (Magnusson, 1995; Magnusson & Torestad, 1993). Without considering the findings of the variable-centered studies, pattern analyses are shotgun empiricism. In addition, cluster analysis is a mathematical, not statistical procedure. Variable-centered analyses (i.e., ANOVA; Nesselroade & Ford, 1987) are necessary in order to test and validate cluster solutions on external variables (Aldenderfer & Blashfield, 1984). The results of this study show that, taken in tandem, variable and person-centered research may be able help solidify the, at times, tenuous relationship between personality and leader effectiveness (Yukl, 1994).

The problematic nature of the Benchmarks factor structure is a notable limitation to the generalizability of the current study. None of the CFA models fit the data, and an exploratory factor analysis, such as the one conducted in the current investigation, can

capitalize on chance characteristics of the sample. Other criteria of leader effectiveness may produce different results. Another important shortcoming of the current study is the possibility of Type I error due to the number of statistical significance tests conducted. Bonferroni corrections to significance levels were utilized to help control the error rate, but it still could be problematic. In addition, the sample was not as diverse as is preferable in terms of gender and ethnicity. Future research will be needed to determine thereplicability of the seven-cluster solution in other, hopefully more diverse, samples of leaders. Because results suggest that the effects of Adaption-Innovation on leader effectiveness are particularly pattern-specific, other researchers are especially encouraged to test the A-I construct in other relevant contexts and patterns. However, even with these limitations, the results of the current study lend support to utilizing a combination of variable and person-centered research strategies to examine the relationships between personality and leader effectiveness.

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Table 1

Benchmarks™ Scales and Proposed Models for Confirmatory Factor Analysis

Scale Name	3-factor	2-factor
Resourcefulness	MJC	Task
Doing Whatever It Takes	MJC	Task
Being a Quick Study	MJC	Task
Decisiveness	MJC	Task
Leading Employees	LP	Interpersonal
Setting a Developmental Climate	LP	Interpersonal
Confronting Problem Employees	LP	Task
Work Team Orientation	LP	Interpersonal
Hiring Talented Staff	LP	Task
Building and Mending Relationships	RSO	Interpersonal
Compassion and Sensitivity	RSO	Interpersonal
Straightforwardness And Composure	RSO	Interpersonal
Balance Between Personal Life and Work	RSO	Interpersonal
Self-Awareness	RSO	Interpersonal
Putting People At Ease	RSO	Interpersonal
Acting With Flexibility	RSO	Interpersonal

Note. MJC = Meeting Job Challenges; LP = Leading People; RSO = Respecting Self and Others.

Table 2

Within-Scale Statistics on Benchmarks™

Scale Name	# of Items	α	Mean Pairwise r
Entire Instrument	106	.98	.29
Resourcefulness	17	.91	.38
Doing Whatever It Takes	14	.89	.38
Being a Quick Study	4	.85	.59
Decisiveness	4	.79	.48
Leading Employees	13	.90	.41
Setting a Developmental Climate	5	.82	.48
Confronting Problem Employees	4	.79	.49
Work Team Orientation	4	.75	.43
Hiring Talented Staff	3	.80	.56
Building and Mending Relationships	11	.92	.50
Compassion and Sensitivity	4	.80	.51
Straightforwardness And Composure	6	.74	.32
Balance Between Personal Life and Work	4	.82	.53
Self-Awareness	4	.82	.54
Putting People At Ease	4	.89	.66
Acting With Flexibility	5	.82	.48

Table 3

Tests of Multivariate Normality

	Item-level data	Scale-level data	Squared items
Skewness			
Value	393.47	6.67	374.59
z-score	156.15*	105.81*	138.03*
Kurtosis			
Value	1550.78	58.33	1335.58
z-score	114.17*	86.12*	107.64*
Skewness and Kurtosis			
χ^2	37416.820*	18612.62*	30636.82*

Note. Statistically significant *z*-scores or χ^2 are indicative of non-normality.

*$p < .05$

Table 4

Benchmarks™ Scale Descriptives and Intercorrelations

Scale	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Resourcefulness	3.68	0.54	--															
2. Doing Whatever It Takes	3.81	0.57	.81	--														
3. Being a Quick Study	3.92	0.67	.65	.62	--													
4. Decisiveness	3.58	0.76	.50	.66	.40	--												
5. Leading Employees	3.52	0.64	.74	.64	.44	.33	--											
6. Setting a Developmental Climate	3.64	0.69	.71	.70	.46	.42	.83	--										
7. Confronting Problem Employees	3.32	0.77	.59	.62	.36	.50	.52	.51	--									
8. Work Team Orientation	3.65	0.75	.47	.35	.18	.20	.61	.51	.35	--								
9. Hiring Talented Staff	3.71	0.69	.58	.56	.36	.35	.55	.58	.46	.42	--							
10. Building & Mending Relationships	3.56	0.69	.74	.60	.43	.27	.79	.68	.42	.46	.46	--						
11. Compassion & Sensitivity	3.50	0.76	.50	.44	.28	.17	.73	.67	.32	.40	.39	.68	--					
12. Straightforwardness & Composure	3.96	0.67	.47	.39	.30	.14	.51	.43	.30	.29	.28	.53	.40	--				
13. Balance Personal Life & Work	3.66	0.85	.18	.09	.12	.02	.29	.20	.11	.31	.10	.28	.32	.26	--			
14. Self-Awareness	3.45	0.76	.63	.56	.38	.27	.73	.65	.43	.42	.41	.71	.64	.50	.25	--		
15. Putting People At Ease	3.74	0.87	.42	.36	.23	.12	.61	.52	.20	.34	.31	.70	.68	.35	.33	.55	--	
16. Acting With Flexibility	3.57	0.69	.72	.65	.42	.34	.82	.75	.50	.49	.49	.80	.70	.50	.29	.72	.64	--

Note. n = 15190

Table 5

Confirmatory Factor Analysis Fit Indices

	3-Factor model	2-factor model	1-factor model
χ^2	4830.91*	5012.01*	5350.21*
df	101	103	104
N	7613	7613	7613
AGFI	.75	.74	.73
PGFI	.35	.61	.61
NNFI	.31	.30	.26
CFI	.42	.40	.36

Note. AGFI = Adjusted Goodness of Fit Index; PGFI = Parsimonious Goodness of Fit; NNFI = Non-Normed Fit Index; CFI = Comparative Fit Index.

*$p < .05$

Table 6

Eigenvalues for Exploratory Factor Analysis

	Initial Eigenvalues		
Factor	Total	% Variance	Cumulative %
1	33.85	31.94	31.94
2	6.87	6.48	38.41
3	3.05	2.88	41.29
4	2.69	2.53	43.82
5	2.25	2.12	45.95
6	2.12	2.00	47.95
7	1.94	1.83	49.77
8	1.48	1.40	51.17
9	1.40	1.32	52.50
10	1.23	1.16	53.66
11	1.17	1.10	54.77
12	1.14	1.07	55.84

Note. Analyses conducted using ULS extraction and direct oblimin rotation. Remaining factors each accounted for less than 1% of total variance.

Table 7

Correspondence Between Scale Items and the Two-Factor EFA Solution

Scale Name	Proposed 2-factor solution	Total # Items	EFA Results	
			# on Factor 1	# on Factor 2
Resourcefulness	Task	17		17
Doing Whatever It Takes	Task	14	1	13
Being a Quick Study	Task	4		4
Decisiveness	Task	4		4
Leading Employees	Interpersonal	13	12	1
Setting a Developmental Climate	Interpersonal	5	2	3
Confronting Problem Employees	Task	4	1	3
Work Team Orientation	Interpersonal	4	4	
Hiring Talented Staff	Task	3		3
Building and Mending Relationships	Interpersonal	11	10	1
Compassion and Sensitivity	Interpersonal	4	4	
Straightforwardness And Composure	Interpersonal	6	4	2
Balance Between Personal Life & Work	Interpersonal	4	4	
Self-Awareness	Interpersonal	4	4	
Putting People At Ease	Interpersonal	4	4	
Acting With Flexibility	Interpersonal	5	5	

Table 8

Five- and Seven-Cluster Solutions (Before Relocation)

Internal Criterion Measure	5-Cluster Solution	7-Cluster Solution
Explained ESS (i.e., PR) †	41.21	47.75
Point-Biserial r †	0.32	0.30
Gamma Index †	0.50	0.55
C-Index ††	0.17	0.15
W/B Index ††	0.53	0.49
G(+) Index ††	0.09	0.06
Average Homogeneity Coefficient ††	1.15	1.03

Note. †Larger numbers optimal. ††Smaller numbers optimal

Table 9

Descriptive Statistics for Seven-Cluster Solution (After Relocation) †

		Myers-Briggs Type Indicator				Kirton Inventory
		E-I	S-N	T-F	J-P	A-I
Whole Sample	M	98.83	100.54	78.65	90.03	103.44
	SD	26.72	28.64	22.59	27.00	16.79
Cluster A	M	117.97 [b]	114.73 [c]	68.63 [d]	117.49 [b]	113.97 [b]
	SD	17.17	21.88	15.59	17.20	11.76
Cluster B	M	74.21 [e]	119.68 [b]	68.50 [d]	87.39 [c]	114.66 [b]
	SD	14.3	16.36	14.97	20.07	10.66
Cluster C	M	82.01 [d]	74.89 [e]	65.09 [d]	74.86 [d]	99.90 [c]
	SD	15.81	16.45	14.24	17.72	10.83
Cluster D	M	124.11 [a]	62.91 [f]	75.26 [c]	69.22 [e]	81.49 [e]
	SD	17.21	15.66	19.87	17.67	11.04
Cluster E	M	91.94 [c]	100.63 [d]	105.45 [a]	87.64 [c]	94.64 [d]
	SD	21.59	21.00	13.81	19.73	11.45
Cluster F	M	123.77 [a]	104.45 [d]	66.21 [d]	72.86 [e]	99.96 [c]
	SD	14.46	18.59	14.64	14.32	11.40
Cluster G	M	82.63 [d]	128.54 [a]	100.75 [b]	125.42 [a]	120.78 [a]
	SD	21.97	17.63	18.19	18.35	11.44

Note. MBTI values below 100 indicate a preference for E, S, T, or J. MBTI values above 100 indicate a preference for I, N, F, or P. KAI scores below 96 are indicative of an Adaptive preference. KAI scores above 96 show a preference for Innovation.

[a] Highest mean for an indicator; [b] second highest mean; [c] third highest mean (and so on)

† Read and interpret this table by columns instead of rows

Table 10

Within-Cluster Statistics for the Seven-Cluster Solution

			Homogeneity	Variance Ratio				
	Pattern	N	Coefficient	E-I	S-N	T-F	J-P	A-I
Cluster A	INTP-I	259	0.95	0.64	0.76	0.69	0.64	0.70
Cluster B	ENTJ-I	300	0.80	0.54	0.57	0.66	0.74	0.63
Cluster C	ESTJ-I	302	0.77	0.59	0.57	0.63	0.66	0.65
Cluster D	ISTJ-A	276	0.94	0.64	0.55	0.88	0.65	0.66
Cluster E	ENFJ-A	306	1.03	0.81	0.73	0.61	0.73	0.68
Cluster F	INTJ-I	282	0.75	0.54	0.65	0.65	0.53	0.68
Cluster G	ENFP-I	271	1.05	0.82	0.62	0.81	0.68	0.68

Note. The pattern for each cluster was determined based on the means presented in Table 7.

Table 11

Summary of Obtained Clusters

	Pattern	N	Exact Pattern f	Hypothesis	Church & Waclawski
Cluster A	INTP-I	259	117 (45.2%)[a]	Pattern 3	Inventor
Cluster B	ENTJ-I	300	185 (61.7%)[a]		Motivator
Cluster C	ESTJ-I	302	132 (43.7%)[a]		Manager
Cluster D	ISTJ-A	276	174 (63.0%)[a]	Pattern 7	Implementer
Cluster E	ENFJ-A	306	9 (2.9%)[b]		
Cluster F	INTJ-I	282	90 (31.9%)[a]		
Cluster G	ENFP-I	271	80 (29.5%)[c]	Pattern 2	

Note. The pattern for each cluster was determined based on the means presented in Table 7.

[a] The most frequently occurring pattern in the cluster is the exact pattern suggested by the mean profile.

[b] The most frequently occurring patterns in this cluster were ENFJ-I (f = 33, 10.8%) and ESFJ-A (f = 30, 9.8%).

[c] The pattern suggested by the mean profile is the second most frequently occurring pattern in the cluster. The most frequently occurring pattern is ENTP-I (f = 100, 36.9%).

Table 12

Hypothesis Testing of Ratings of Leader Effectiveness

			Mean Difference (d)		
	Levene Statistic	f (df=2)	A vs. D	A vs. G	D vs. G
Self					
Interpersonal	0.63	18.36*	0.009 (.03)	-0.149* (.44)	-0.158* (.46)
Task	1.14	40.44*	0.238* (.68)	-0.009 (.02)	-0.246* (.66)
Superior					
Interpersonal	0.68	6.04*	-0.084 (.17)	-0.151* (.31)	-0.067 (.14)
Task	0.06	5.42*	0.102* (.22)	-0.026 (.06)	-0.129* (.28)
Peer					
Interpersonal	0.35	7.58*	-0.074 (.17)	-0.141* (.35)	-0.067 (.17)
Task	0.41	6.95*	0.085* (.23)	-0.029 (.08)	-0.114* (.31)
Subordinate					
Interpersonal	1.28	10.43*	-0.014 (.03)	-0.172* (.38)	-0.159* (.33)
Task	2.73	13.16*	0.096* (.26)	-0.077 (.21)	-0.174* (.44)

Note. Non-significant Levene's Statistics indicate that the assumption of equal variances is upheld. Effect Sizes (d) were calculated using equations 2.2.2 and 2.3.2 in Cohen (1988; .20=small, .50=medium, .80=large).

*$p < .05$

Table 13: Exploratory Analyses of Leader Effectiveness

	t-value (d)				
	A vs. F	B vs. C	B vs. F	D vs. F	E vs. G
Self					
Interpersonal	-1.42 (.12)	-0.79 (.06)	3.00* (.25)	-1.70 (.14)	-0.18 (.02)
Task	0.69 (.06)	1.86 (.15)	4.00* (.33)	-7.00* (.60)	-4.87* (.41)
Superior					
Interpersonal	-0.63 (.06)	-0.24 (.02)	1.35 (.12)	1.28 (.11)	1.04 (.09)
Task	0.28 (.02)	1.97* (.17)	2.40* (.21)	-2.29* (.20)	-1.30 (.11)
Peer					
Interpersonal	0.31 (.03)	-2.09* (.17)	0.21 (.02)	2.27* (.20)	0.65 (.05)
Task	0.68 (.06)	1.97* (.16)	2.82* (.24)	-2.04* (.18)	-0.94 (.08)
Subordinate					
Interpersonal	0.93 (.09)	-0.57 (.05)	0.84 (.07)	1.27 (.11)	-2.25* (.20)
Task	1.76 (.16)	2.18* (.18)	3.31* (.29)	-1.05 (.09)	-3.31* (.29)

Note. Negative t-values indicate that the mean for the cluster on the right is greater. Positive t-values indicate that the mean for the cluster on the left is greater. Effect Sizes (d) were calculated using equations 2.2.2 and 2.3.2 in Cohen (1988; .20=small, .50=medium, .80=large). *$p < .05$

Table 14

Correlations Between the S-N, J-P, and A-I Scales

		r (r corrected for range restriction)		
	Pattern	S-N and J-P	S-N and A-I	J-P and A-I
Whole Sample		.42*	.54*	.47*
Cluster A	INTP-I	-.12 (-.16)	.25* (.32)	-.08 (-.13)
Cluster B	ENTJ-I	-.09 (-.16)	.00 (.00)	.11 (.15)
Cluster C	ESTJ-I	-.01 (-.02)	-.19* (-.32)	.14* (.21)
Cluster D	ISTJ-A	.08 (.15)	.03 (.05)	.22* (.33)
Cluster E	ENFJ-A	.04 (.05)	.17* (.23)	.01 (.01)
Cluster F	INTJ-I	-.12* (-.18)	-.05 (-.08)	.05 (.09)
Cluster G	ENFP-I	.05 (.08)	.21* (.33)	.07 (.10)

Note. Corrections for range restriction were calculated using Equation 10-12 in Ghiselli, Campbell, and Zedeck (1981).

*$p < .05$

Table 15

Correlation Matrices for Personality Type and Creative Style

		EI	SN	TF	JP	AI
Whole Sample	E-I	--				
	S-N	-.19*	--			
	T-F	-.12*	.18*	--		
	J-P	-.12*	.43*	.20*	--	
	A-I	-.27*	.54*	-.04	.47*	--
Cluster A (INTP-I)	E-I	--				
	S-N	.15*	--			
	T-F	.13*	.10	--		
	J-P	-.11	-.12	-.02	--	
	A-I	-.02	.25*	-.16*	-.08	--
Cluster B (ENTJ-I)	E-I	--				
	S-N	-.08	--			
	T-F	-.02	-.02	--		
	J-P	-.21*	-.09	-.26*	--	
	A-I	.05	.00	-.12*	.11	--
Cluster C (ESTJ-I)	E-I	--				
	S-N	-.20*	--			
	T-F	-.17*	-.01	--		
	J-P	.10	-.01	-.04	--	
	A-I	.15*	-.19*	-.10	.14*	--
Cluster D (ISTJ-A)	E-I	--				
	S-N	-.03	--			
	T-F	-.10	.18*	--		
	J-P	.15*	.08	.11	--	
	A-I	.18*	.03	-.15	.22*	--
Cluster E (ENFJ-A)	E-I	--				
	S-N	.15*	--			
	T-F	.08	-.04	--		
	J-P	.20*	.04	.03	--	
	A-I	-.08	.17*	-.05	.01	--
Cluster F (INTJ-I)	E-I	--				
	S-N	-.14*	--			
	T-F	.10	.19*	--		
	J-P	.00	-.12*	.10	--	
	A-I	.00	-.05	-.10	.05	--
Cluster G (ENFP-I)	E-I	--				
	S-N	.09	--			
	T-F	.23*	.03	--		
	J-P	-.07	.05	-.18*	--	
	A-I	-.06	.21*	-.28*	.07	--

*$\underline{p} < .05$

Table 16

Cross-Validation Cluster Solution Comparisons

	Subsample One		Subsample Two	
Internal Criterion Measure	4-cluster	8-cluster	4-cluster	7-cluster
Explained ESS (i.e., PR) †	37.94	52.93	37.53	49.99
Point-Biserial r †	0.32	0.31	0.31	0.28
Gamma Index †	0.48	0.63	0.50	0.60
C-Index ††	0.14	0.16	0.07	0.06
W/B Index ††	0.55	0.43	0.54	0.46
G(+) Index ††	0.10	0.05	0.10	0.05
Avg. Homogeneity Coefficient ††	1.23	.95	1.25	1.01

Note. †Larger numbers optimal. ††Smaller numbers optimal

Table 17

Descriptive Statistics for the Optimal Solution for Subsample One

Cluster	Pattern (Whole Sample)		Myers-Briggs Type Indicator E-I	S-N	T-F	J-P	Kirton Inventory A-I
1	ENTP-I	M	71.51	127.61	80.02	127.43	124.67
		SD	14.80	16.00	21.22	16.66	10.65
2	ISTJ-A (D)	M	128.55	59.73	61.24	66.73	85.32
		SD	15.11	15.54	13.07	17.33	11.82
3	INTP-I (A)	M	118.92	117.55	60.23	108.26	116.96
		SD	16.74	21.24	12.01	22.32	9.98
4	ENTJ-I (B)	M	73.71	119.52	77.58	78.05	109.66
		SD	13.82	16.07	15.89	13.58	10.73
5	ESTJ-I (C)	M	82.36	76.47	63.84	80.86	103.08
		SD	16.14	14.66	13.12	17.59	10.39
6	ESFJ-A	M	98.18	76.11	100.73	75.10	81.77
		SD	22.96	17.55	14.54	15.49	11.73
7	ENFP-I (G)	M	97.58	119.36	109.47	112.42	107.29
		SD	23.29	18.92	13.78	18.37	11.73
8	INTJ-I (F)	M	122.35	104.31	74.17	77.63	96.81
		SD	14.40	16.75	14.43	16.73	9.90

Note. MBTI values below 100 indicate a preference for E, S, T, or J. MBTI values above 100 indicate a preference for I, N, F, or P. KAI scores below 96 are indicative of an Adaptive preference. KAI scores above 96 show a preference for Innovation.

Table 18

Descriptive Statistics for the Optimal Solution for Subsample Two

Cluster	Pattern (Whole Sample)		Myers-Briggs Type Indicator				Kirton Inventory
			E-I	S-N	T-F	J-P	A-I
1	ESTJ-A (C†)	M	81.29	70.62	65.91	70.55	94.35
		SD	15.17	17.86	15.40	19.20	14.40
2	INTP-I (A)	M	124.17	115.05	78.70	110.53	110.04
		SD	12.59	20.19	18.78	20.94	11.83
3	ENTJ-I (B)	M	83.55	113.50	67.35	78.68	110.09
		SD	17.76	15.90	13.16	15.75	10.94
4	ISFJ-A	M	109.04	79.77	104.10	75.40	83.12
		SD	20.31	21.21	14.56	19.39	10.45
5	ISTJ-A (D)	M	127.12	76.05	62.80	69.55	90.00
		SD	14.17	23.00	13.70	18.00	12.46
6	ENFJ-I (G†)	M	76.34	113.78	109.31	99.59	106.73
		SD	17.81	20.93	13.31	18.98	11.22
7	ENTP-I	M	79.70	127.67	81.26	130.26	125.55
		SD	18.32	20.85	20.31	17.61	10.75

Note. MBTI values below 100 indicate a preference for E, S, T, or J. MBTI values above 100 indicate a preference for I, N, F, or P. KAI scores below 96 are indicative of an Adaptive preference. KAI scores above 96 show a preference for Innovation.

†This subsample pattern differs from a whole sample pattern by one indicator that is close to a cutoff point

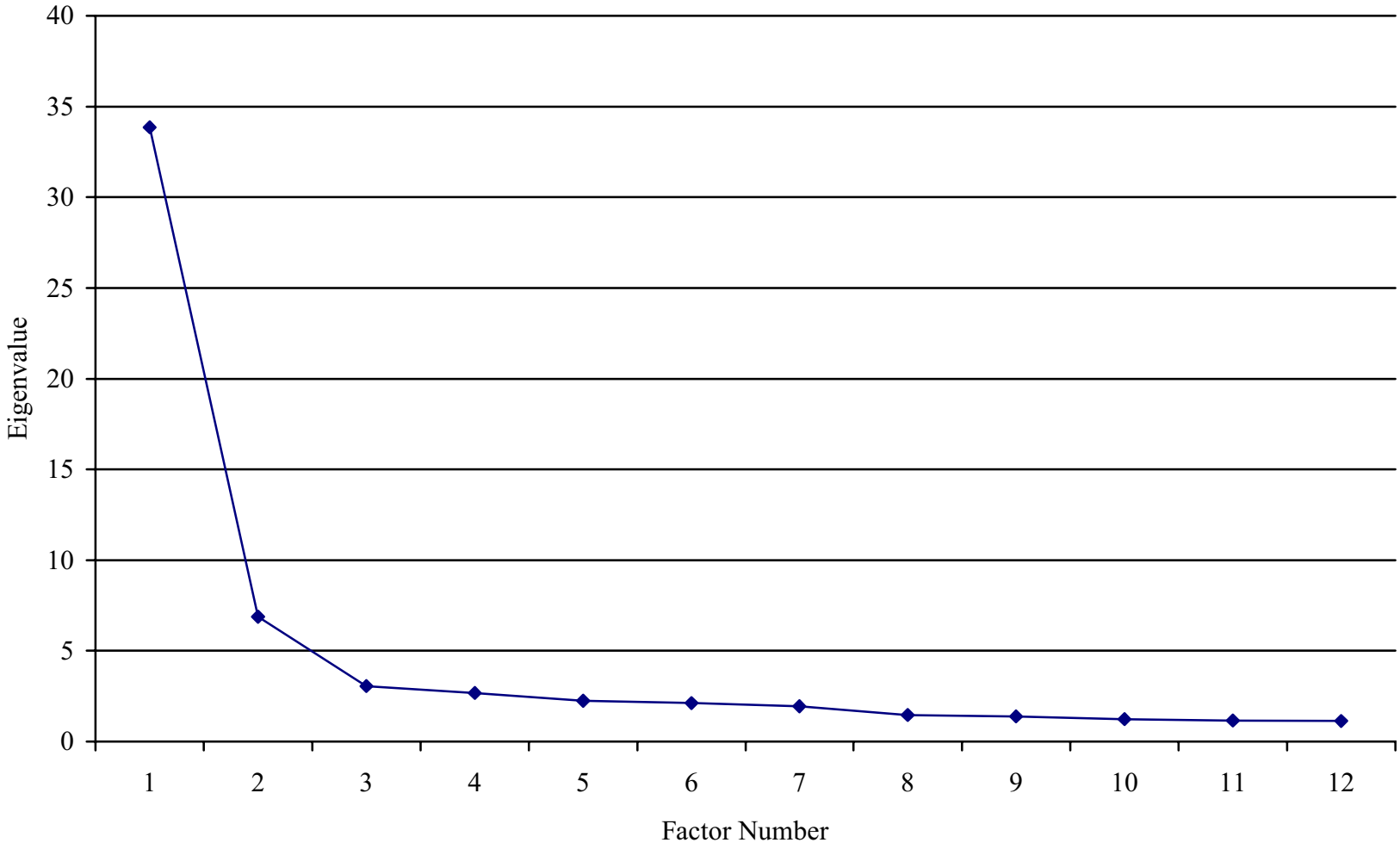


Figure 1. Scree plot for the Exploratory Factor Analysis. Remaining factors each accounted for less than 1% of variance.

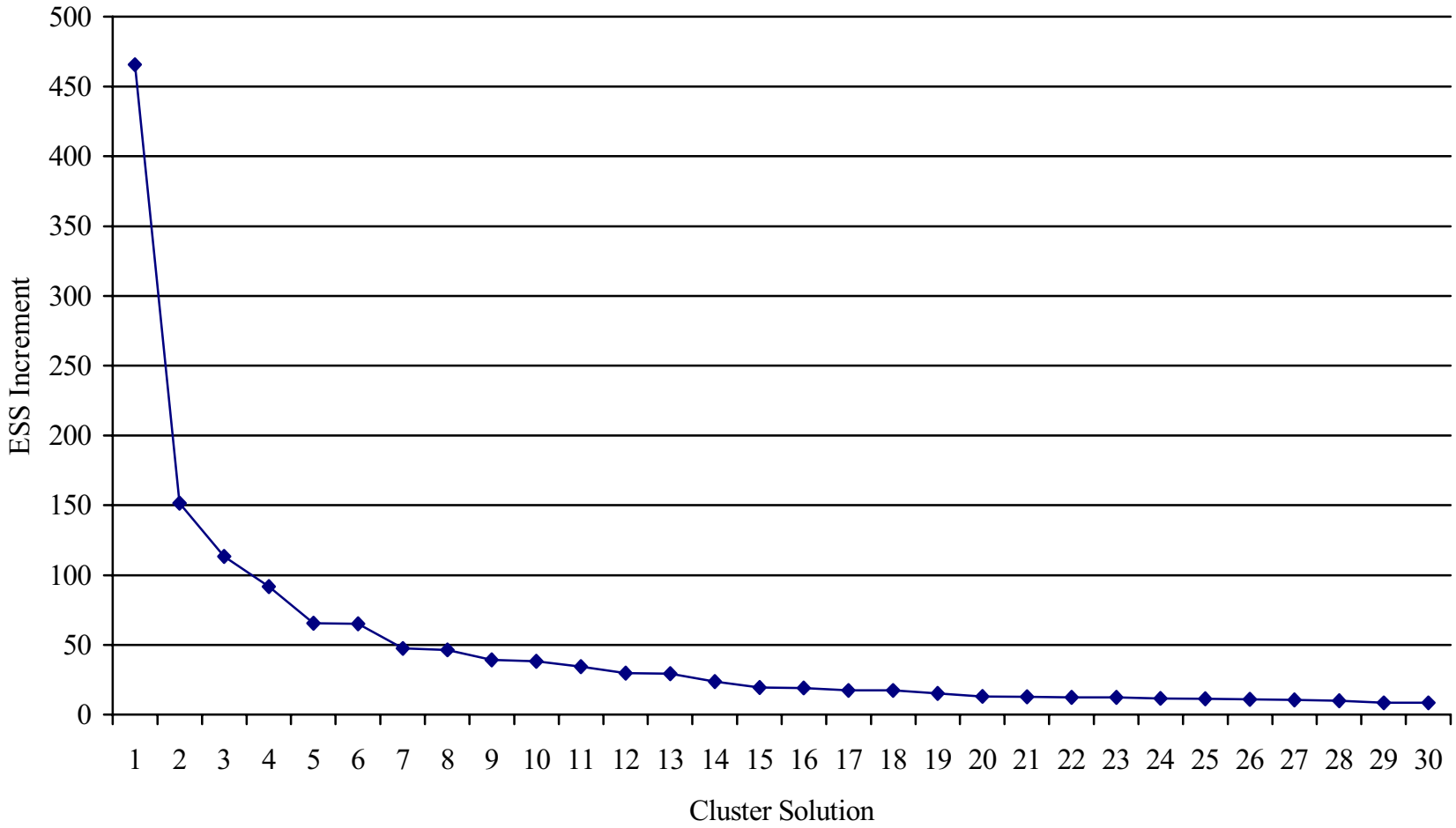
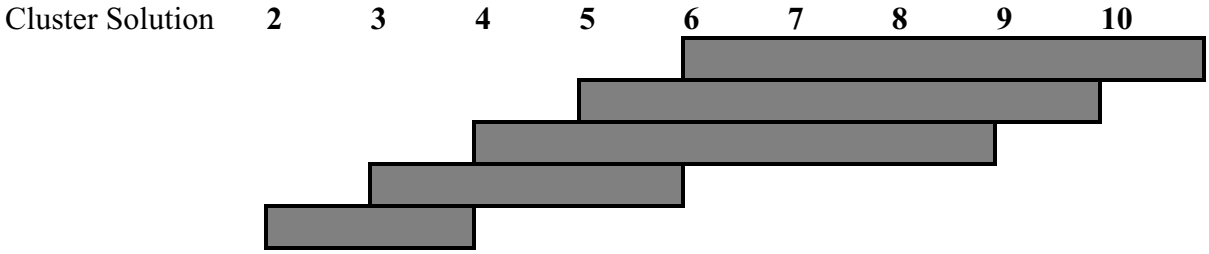
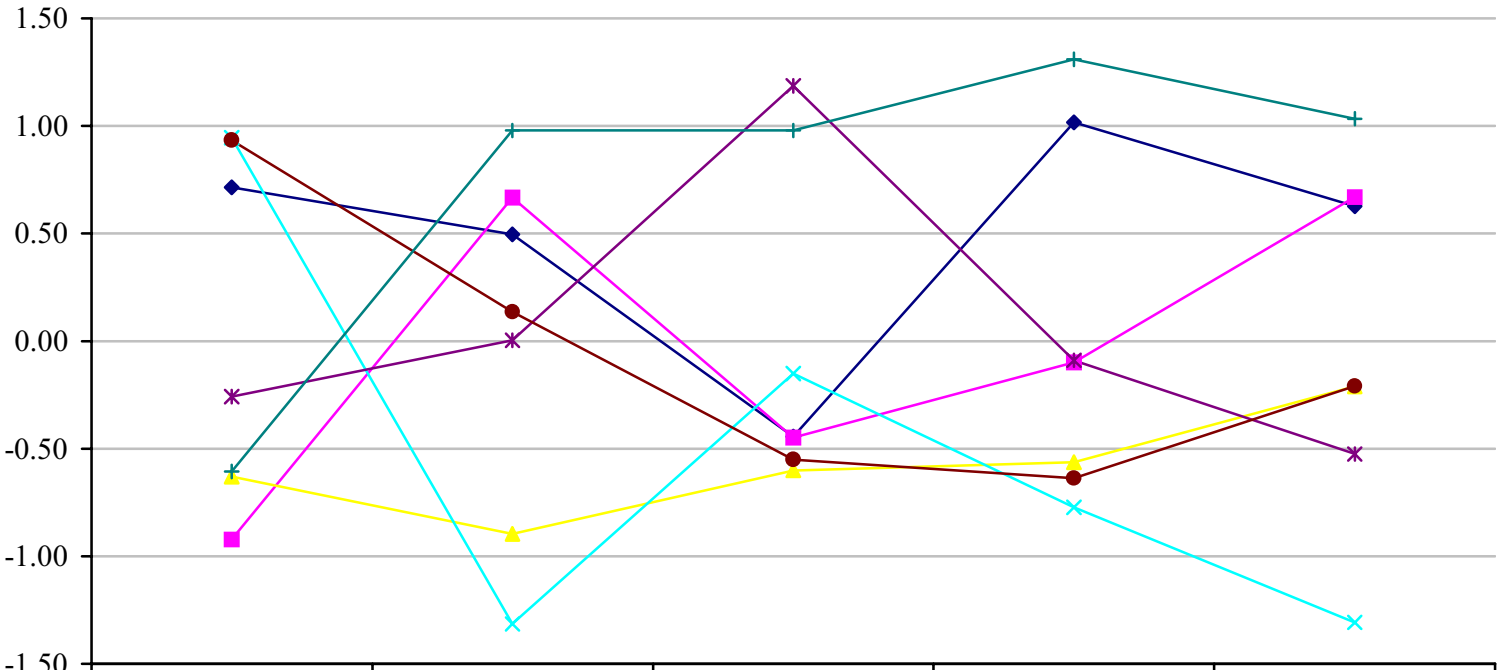


Figure 2. ESS Increase for the final 30 fusions for the entire sample (n = 1997).



Homogeneity M	1.51	1.38	1.25	1.15	1.06	1.03	0.98	0.94	0.88
Homogeneity SD	0.16	0.13	0.17	0.08	0.19	0.17	0.21	0.20	0.19

Figure 3. Summary diagram of results from Duncan's New Multiple Range test on the average homogeneity coefficients for cluster solutions two through ten.



	E-I	S-N	T-F	J-P	A-I
A: INTP-I	0.72	0.50	-0.44	1.02	0.63
B: ENTJ-I	-0.92	0.67	-0.45	-0.10	0.67
C: ESTJ-I	-0.63	-0.90	-0.60	-0.56	-0.21
D: ISTJ-A	0.95	-1.31	-0.15	-0.77	-1.31
E: ENFJ-A	-0.26	0.00	1.19	-0.09	-0.52
F: INTJ-I	0.93	0.14	-0.55	-0.64	-0.21
G: ENFP-I	-0.61	0.98	0.98	1.31	1.03

Figure 4. Standardized mean personality preferences by cluster. Positive z-scores indicate a preference for: I, N, F, P or Innovation.

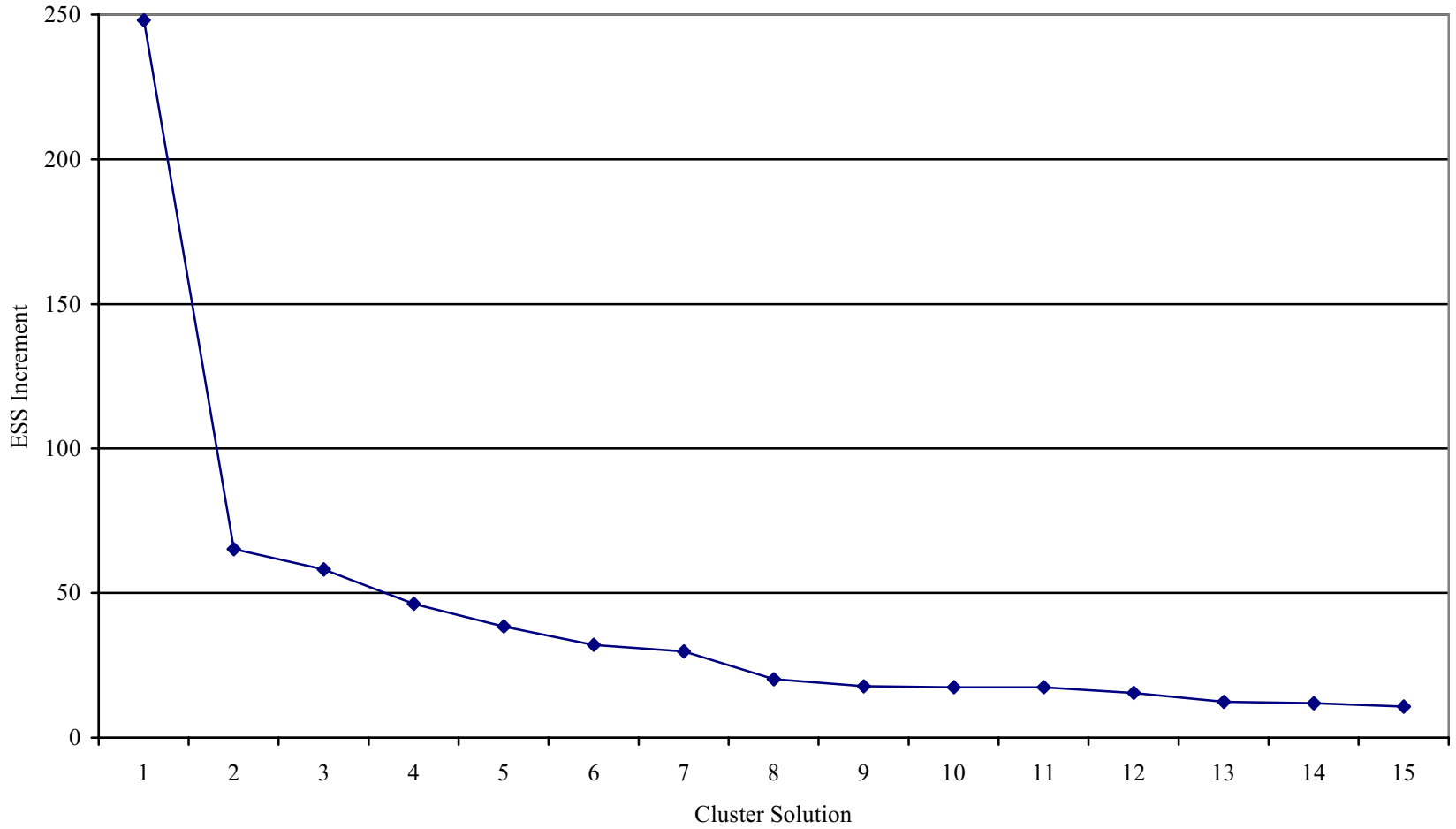


Figure 5. ESS Increase for the final 15 fusions for the subsample one (n = 980).

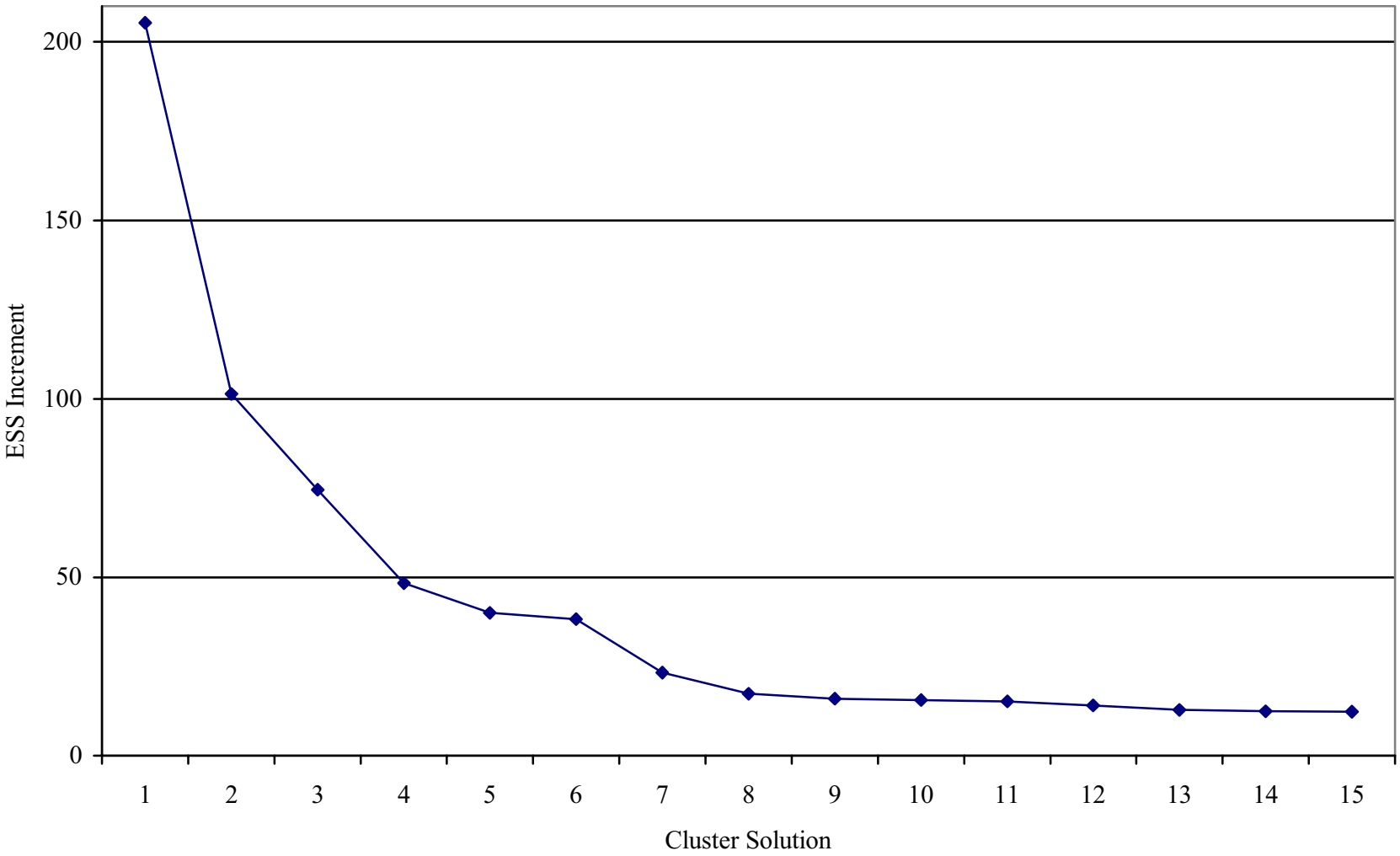


Figure 6. ESS Increase for the final 15 fusions for the subsample two (n = 1,017).

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Ph.D., Industrial/Organizational Psychology, August, 2000

- Dissertation Title: Leader Effectiveness among Patterns of Personality Types and Creativity Styles

M.S., Industrial/Organizational Psychology, May, 1997

- Thesis Title: Gender and Ethnicity-Based Differential Item Functioning on the Myers-Briggs Type Indicator

Wake Forest University — Winston-Salem, North Carolina

B.A., Cum Laude, Psychology, May, 1995

- Honors Thesis Title: Social Loafing in Individuals versus Groups: Assessing Quantity, Quality, and Creativity

Professional Experience

1998 - present — Protective Life Corporation — Birmingham, Alabama

Organizational Development Associate

- Developed and currently administer a leadership development initiative for senior management
- Responsible for administration, analysis, and reporting of employee feedback survey
- Manage HR intranet (internal web site) project
- Provide internal consulting on measurement, statistical, and quality issues

1995 - 1998 — Virginia Polytechnic Institute and State University — Blacksburg, Virginia

Instructor

- Developed, delivered lectures, and coordinated laboratory sections for Social Psychology, Psychological Tests and Measurements, and Introductory Psychology.

1996 - 1997 — Center for Creative Leadership — Greensboro, North Carolina

Research Assistant

- Performed a comprehensive critical review of program evaluation research
- Created a research program for merging and interpreting quantitative and qualitative data
- Prepared group reports of aggregated participant data for clients
- Integrated data from previously unrelated surveys/tests and reported results

6/94 – 8/94 — Jaycee Camp Hope — Clemson, South Carolina

Program Director

- Supervised a team of activity leaders. Developed and implemented evening programs for developmentally disabled campers.

6/93 – 8/93 — La Maison Maternelle Orphanage — Paris, France

Foreign Intern

- Responsible for the care of fifteen orphaned 3 to 8 year-olds. Researched the children's backgrounds and the French human services system.

Key Skills

- Experience in survey and questionnaire design and administration, leadership, personality, training, and creativity.
- Extensive analytical and statistical experience.
- Proficient in many computer/statistical programs and packages (SPSS, SAS, Word, Powerpoint, Excel, Lotus Notes, LISREL, SLEIPNER,BILOG).
- Strong project management, presentation, and written communication skills
- French language competency

Papers and Presentations

Gratias, M.B. (2000, April). Scale anchor development on job analytic instruments. In J. Mitchell (Chair), Benchmarking job and work characteristics. Symposium presented at the annual meeting of the Society of Industrial/Organizational Psychology, New Orleans, LA.

Gratias, M.B. (1999, April). Scaling behavioral anchors on the Occupational Information Network. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, Atlanta, GA.

Gratias, M.B., & Harvey, R.J. (1998, April). Gender and ethnicity-based differential item functioning on the Myers-Briggs Type Indicator. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, Dallas, TX.

Gratias, M.B., & Hills, D.A. (1997, April). Social loafing in individuals versus groups: An assessment of quantity, quality, and creativity. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, St. Louis, MO.

Graduate Coursework

Psychology and Management

- Industrial Psychology: performance appraisal systems, employee selection, legal issues, validation models, job analysis, test fairness
- Organizational Psychology: leadership, job attitudes, work motivation, goal setting, organizational change, growth, theory, structure, and environment
- Strategic Human Resources Management: staffing, compensation, work teams, health/safety
- HR Staffing and Development: interviews, testing, training needs, designs, and evaluation
- Social Psychology: social comparison, influence, interpersonal perception, attitudes
- Personality Processes: traits, interactionism, influences on personality
- Cognitive Psychology: information processing, problem solving, reasoning, intelligence

Statistics, Research Methods, and Psychometrics

- Research Methods: conducting and interpreting research, philosophies of science
- Statistics in Research: hypothesis testing, analysis of variance models, simple regression
- Advanced Statistics in Education: multiple regression, path analysis, structural equation models
- Psychological Measurement: design and administration of psychological tests
- Quantitative Topics in Applied Psychology: factor analysis, multivariate statistics
- Test Development/Psychometric Theory: item response theory, differential item functioning, computer adaptive testing

References

Available Upon Request