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Examining the Relationship Between Leadership Decision Making Styles and Personality Type Within the Department of Defense

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EXAMINING THE RELATIONSHIP BETWEEN LEADERSHIP DECISION MAKING STYLES AND PERSONALITY TYPE WITHIN DEPARTMENT OF DEFENSE

by

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ABSTRACT

EXAMINING THE RELATIONSHIP BETWEEN LEADERSHIP DECISION MAKING STYLES AND PERSONALITY TYPE WITHIN DEPARTMENT OF DEFENSE

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Old Dominion University, 2015
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Leadership is perhaps the single most important function within the Department of Defense. While the old cliché *"everyone is a leader regardless of position"* may hold moral meaning, personnel in leadership positions are key. Under the umbrella of leadership is decision making. What leadership is to an organization, decision making is to leadership. Yet, despite this knowledge, unsound decisions are readily conducted. There are various theories as to why this holds true, one of which is personality type. Research, shows, though, that there is a limited amount of relevant knowledge to determine if there is, in fact, a significant statistical relationship between personality type and (leadership) decision making style, specifically within the Department of Defense.

The primary purpose of this study is to evaluate leadership personnel in the Department of Defense environment to determine if there is a direct relationship between the dominant mental functions of preferred individual personality types and decision making styles. This study may support Carl Jung's personality theory to which states that a person's core personality (mental preference) remains constant throughout his/her lifetime.

Findings show that there is a strong correlation between the mental functions of the Myers Briggs Type Indicator and the decision making styles of the Decision Style Inventory. When observing as a unit, S/T personality types showed preference toward

behavioral and directive decision making styles; S/F personality type showed preference with the behavioral decision making style; and N/T showed preference toward the analytical decision style. Neither the N/F personality function nor the conceptual decision style showed strong preference. This result may be due to the lack of sample size for each component.

Specific findings show that particular MBTI functions displayed correlation with specific decision making styles. There were correlations with both the sensing and intuition functions with the directive decision making style. There were also very strong correlations with the thinking and feeling functions with the behavioral decision style. Moreover, the thinking mental function showed correlation with the analytical decision style as well.

The results from this research is important because they can provide organizations with the knowledge to understand how individual personality types can influence individual leadership decision making styles.

This dissertation is dedicated to both of my sons, Antoine Jr. and Christopher. You two young men are the reason I pursued this degree. I wanted to be a personal testimony for both of you to show that with hard work, dedication, perseverance, and Christ in your corner, you can achieve anything you set your hearts for. I love you both with all that I have.

"And let us run with perseverance the race marked out for us, fixing our eyes on Jesus, the pioneer and perfecter of faith." Hebrews 12:1-2

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The pursuit of this doctorate has been the longest journey that I have engaged in to date. I have learned so much and have many to thank that have been there for me, not just on this PhD journey, but in my life journey. Without you all, this may not have been possible.

Before I start, I first need to acknowledge my faith in Christ Jesus; without you, I would not be standing in the position that I am in or any position for that matter. It is by your grace and mercy alone that I am alive today to share this with those dearest to me.

Mom, thank you for everything. The sacrifices that you made for me in life I could never repay. Being a teenage mother, you refused to allow me to be a statistic. While life was tough coming up, you continued to be there, even as you were learning how to be there yourself. I reflect on life often and the journey that I have traveled. In all of it, you have always been there. God could not have blessed me with a better mother. My academic journey is over now; your baby boy finally did it ☺.

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hearing you preach the word literally lifts my spirits. While spontaneous human combustion is still a debated theory, the internal fire that flows from you makes the argument turn more in favor of the believers of the theory.

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LIST OF ACRONYMS AND ABBREVIATIONS

ALDP	Army Leader Development Program
ALDS	Army Leadership Development Strategy
CCL	Center of Creative Leadership
COA	Course of Action
CPP	Consulting Psychologist Press
CSA	Chief of Staff of the Army
CSI	Cognitive Style Inventory
F	Feeling
DBB	Defense Business Board
DOD	Department of Defense
DTRA	Defense Threat Reduction Agency
DSI	Decision Style Inventory
E	Extroversion
ELPD	Executive Leadership and Development Program
ESQ	Eysench Personality Questionnaire
FM	Field Manuel
GDMS	General Decision Making Style
GS	General Service
I	Introversion
J	Judging
KAI	Kirton Adaption-Innovation Inventory
LTC	Lieutenant Colonel
MBTI	Myers Briggs Type Indicator

MDMP	Military Decision Making Process
N	Intuition
NASA	National Aeronautics Space Administration
NCO	Non-Commissioned Officer
OPLAN	Operations Plan
OPORD	Operations Order
P	Perceiving
PM	Program Manager
PPI	Personal Proprietary Information
S	Sensing
SPSS	Statistical Package for the Social Sciences
T	Thinking
USD AT&L	Under-Secretary of Defense for Acquisition, Technology and Logistics
UK	United Kingdom
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy

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CHAPTER 1.0 – INTRODUCTION

1.1 Introduction:

Decision making is an intricate phenomenon which is profoundly integrated in everyday life (Allwood & Selart, 2001). Per Ahmed, Hasnain, and Venkatesan (2012), the decision making process is a crucial leadership function that is increasingly becoming convoluted due to technological and politico-socio-economic factors. This is especially true within the government and military realms. As written by Major William S. Blair, USA *"The Army faces an operating environment characterized by volatility, uncertainty, complexity, and ambiguity. Military professionals struggle to make sense of this paradoxical and chaotic setting. Succeeding in this environment requires an emergent style of decision making, where practitioners are willing to embrace improvisation and reflection"* (2010).

Decisions always involve choices from existing options. Leaders vary in their decision making because of the difference in their cognitive style: *"Cognitive style refers to an individual's way of processing information"* (Alqarni, 2003). While decision and cognitive styles interrelate, it is essential to distinguish the difference. Goodyear (1987, as cited by Alqarni, 2003) teaches that *"It is important to note that decision-making is a cognitive process that combines the mental process of perception, action, and coming to closure on stimuli. Cognitive style, on the other hand, is the pattering or linking of these thinking process and coming to closure in the presence of ambiguity and uncertainty."*

According to Senik et al. (2012), the existence of various decision making styles have been recognized for decades. Senik et al., 2012) write, as per Rowe and

Boulgarides, that *"knowing an individual's decision style pattern, we can predict how he or she will react to various situations."* Going further, Bahreinian and Ahi (2012) write that researchers claim that the psychological profile of leaders could have an effect on leadership/decision making style. In other words, a leader's decision style is affected by his/her personality type. Ahmed, Hasnain, and Venkatesan (2012) support this claim stating that *"personality is often considered as a potential determinant of preference for decision making."*

As previously stated, (leadership) decision making is vital within a military environment. Military branches and government agencies invest in extensive training and educational programs for leadership personnel. Two of these training programs are the Department of Defense (DOD) Executive Leadership and Development Program (ELDP) and the Army Leader Development Program (ALDP).

The DOD ELDP was developed in 1985 at the direction of the Secretary of Defense to provide a measured leadership development program for current and future government and military leaders. The mission of the program is "*to develop leaders who have an understanding and appreciation of the global missions of the Department of Defense, the complexities and challenges our warfighters face in carrying out that mission, and to afford through hands-on immersion training, opportunities for experiential learning that enhance the capabilities required to support and lead a military and civilian expeditionary workforce."* (Executive Leadership Development Program, n.d.). The ELDP was *"designed for highly motivated…DOD employees…who have demonstrated outstanding leadership potential"* (Executive Leadership Development Program, n.d.).

The ALDP is the United States Army's specific leadership training program that was developed specifically for active army personnel (e.g. non-commissioned officers, commissioned officers, civilians). Initiated in 2007 by the direction of the Chief of Staff of the Army (CSA), the mission of the ALDP is to *"train, educate, and provide experiences to progressively develop leaders to prevail…in a 21st century security environment and to lead…"* (Department of the Army, 2013). Per the Army Leadership Development Strategy (ALDS), the ALDP's main training instrument, military (Army) and civilian personnel are developed as leaders in three domains: institutional, operational, and self-development. This will be further explained in section 2.1.

However, in spite of all the offered organized and specialized training, there are many examples where ineffective decisions were conducted by military or government leadership decision makers. Some of these examples revolve around military engagements (i.e. the decision to engage in ground war/hand-to-hand combat) while others relate to government agencies (National Aeronautics Space Administration (NASA) Space Shuttle Programs – Losses of Space Shuttles Challenger and Columbia). Naval Captain Niewoehner and Rear Admiral (ret.) Steidle (2009) write that *"…decisions made during Columbia's final flight reflect…ineffective leadership."* All of these ineffective decisions resulted in fatal outcomes. Psychologist Daniel Goleman as referenced by Sewall (2009) stated that *"…a person can have first class training, and incisive mind, and endless supply of good ideas, but still not make a good leader."* Old Dominion professor Charles B. Daniels (2009) writes that the most widely used approach with leadership development *"appears to center around promoting…the best sales*

person or the most ambitious candidate." The approach consequently yields mostly negative results. (Daniels, 2009).

To attempt to gain an understanding of Department of Defense leadership decision making, this research aims to examine whether there is a statistically relevant relationship between leadership personality type and decision making style within the Department of Defense. More specifically, this research will survey a diverse group of government and military officials in leadership positions to determine whether the mental functions of personality type can determine decision making style, thus validating or invalidating the claim that personality type affects leadership decision making style. In addition, this research will focus on the following:

- Identification of dominant mental functions of personality type,
- Identification of decision making styles,
- Identification of relationship existence of personality type and decision making style,
- Identification of relationship existence between personality type and/or decision making style and individual demographics.

1.2 Operational Definitions:

- Leadership – US Army Field Manual 6-22 states that *"(Army) leadership is the process of influencing people by providing purpose, direction, and motivation while operating to accomplish the mission and improve the organization."*

- Personality type – As defined by the work of Carl Jung, personality type (also referred to as psychological type) proposes that there is a specific pattern within each individual by which we participate, perceive, and act on the world (Pearman & Albritton 2010).

- Decision Making – The process of choosing from among alternatives (Lunenberg and Ornstein, 2002 as cited by Jamian, Sidhu, and Aperapar, 2011). It is a cognitive function concerned with the process of reflecting on the consequences of a certain choice (Senik at al., 2012).

- Decision style – decision style displays how an individual visualizes and thinks about situations. It is associated with mental tendencies regarding personal goals, situational avoidance, job satisfaction, like and dislikes, communication, problem solving approach, and decision making (Rowe and Mason, 1987).

Section 2 – Literature Review

2.1 Introduction:

A vast range of literature was studied to evaluate the current state of knowledge in regards to leadership, (military) leadership, personality type, and decision making style. Literature shows that an enormous amount of information exists regarding military leadership, personality, and decision making as independent entities. However, there has been limited study on how personality affects leadership decision making in the DOD. Figure 1 displays a detailed breakdown of the researched topics.

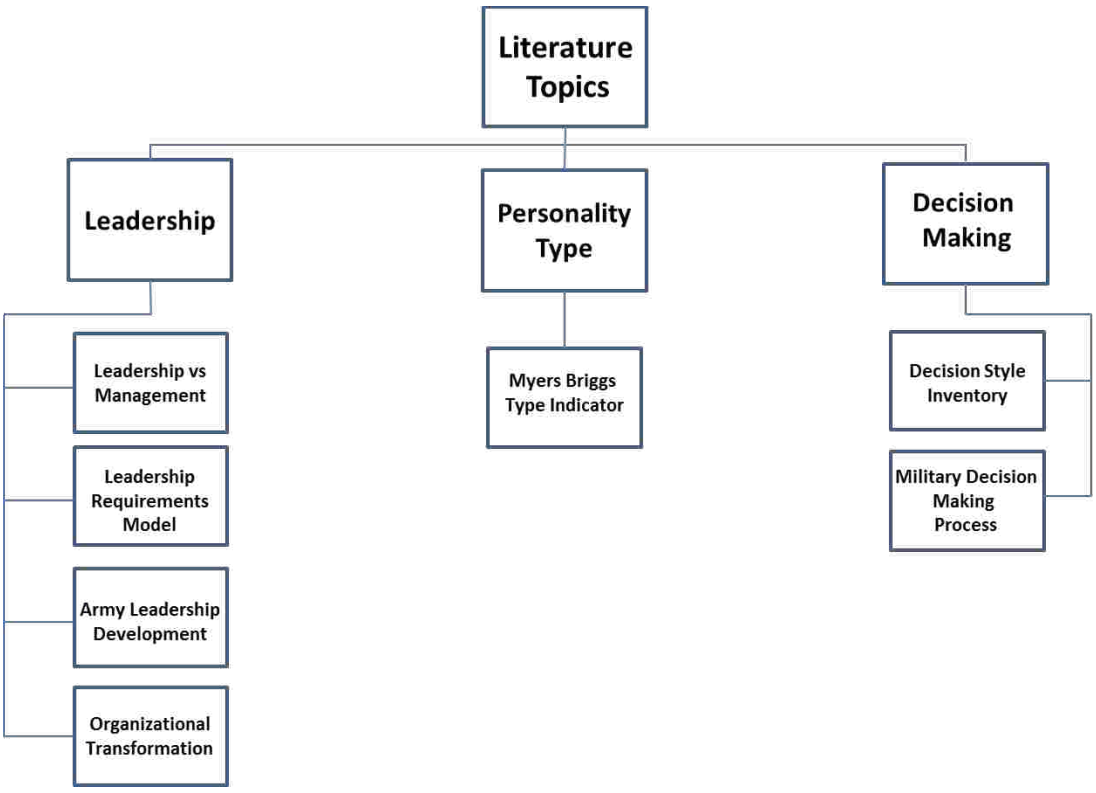

Figure 1 – Literature Map

2.2 Leadership:

Leadership has been a very long studied topic. Leadership, per Horn and Walker (2008), is in many ways a perplexing notion. It has been the topic of entire books without even being clearly defined. Furthermore, leadership is habitually used interchangeably and confused with such terms as command and management. Historian James MacGregor Burns wrote that *"leadership is one of the most observed and least understood phenomena on earth."* Harvard Business School professor and author John Kotter (2001) compares/contrasts managers and leaders as follows:

- Management is about coping with complexity; **LEADERSHIP** is about coping with change;
- Management is about planning and budgeting for complexity; **LEADERSHIP** is about setting the direction for change through the creation of vision;
- Management develops the capacity to carry out plans through organizing and staffing; **LEADERSHIP** aligns people to work toward the vision;
- Management ensures the accomplishment of plans through controlling and problem-solving; **LEADERSHIP** motivates and inspires people to want to accomplish the plan.

Further research seconds Kotter and further distinctions between leadership and management. Per Anantatmula (2010), *"management is usually focused on classical functions such as planning, organizing, and controlling* whereas *leadership is about motivating and guiding…to achieve tougher and [more] challenging organizational goals."*

The quality of leadership is one of the most essential factors in determining the success and survival of organizations. While technologies play a prime factor under certain circumstances, effective leadership has frequently compensated for absence of

resources (Omran, Mahmood, & Hussin 2009). Former Sec. of the Army Francis J Harvey is quoted as saying *"Army leaders in this century need to be pentathletes, multi skilled leaders who can thrive in certain and complex operating environments… Innovative and adaptive leaders who are expert in the art and science of the profession of arms. The Army needs leaders who are decisive, innovative, adaptive, culturally astute, effective communicators, and dedicated to lifelong learning"* (Cojocar, 2011).

US Army Field Manual 6-22 states that *"Leadership is expected from everyone…regardless of designated authority or recognized position of responsibility"* (Department of the Army, 2006). Moreover, Hagey (2009) writes that *"we are all leaders, even though we might not have a designated leadership position on an authorization document."* While these are true statements (similar to the statement "safety is everyone's job"), effective leadership amongst personnel in leadership positions is of the utmost importance for the success of an organization. Leadership authors Kouzes and Posner (2011) write that everything that a leader does is based on one audacious assumption – that the leader matters. Before one can lead, they have to believe in themselves.

Kouzes and Posner (2007) write that there are five practices for exemplary leadership.

- Model the Way – To gain commitment and achieve the highest standard, leaders must be models of the behavior they expect from those they lead.
- Inspire a Shared Vision – To enlist others in a shared vision, a leader must have a true interest and desire in knowing their constituents. Workers must believe that their leaders have their best interests at heart. There must be a common vision.
- Challenge the Process – Leaders must challenge the status quo if it is best for the organization, which is its everyday worker.

- Enable Others to Act – Effective leaders understand that it takes a team effort for an organization to be extraordinary and for that reason; it is paramount that leaders enable and empower others to act.

- Encourage the Heart – The road to success can be long, tedious, and grueling. Workers tend to become disheartened, exhausted, and dissatisfied and are otherwise tempted to submit. Because of these factors, leaders must have the canny yet genuine ability to encourage others to continue to move forward.

Scholar and leadership study pioneer Warren Bennis (1989) adds to and seconds Kouzes and Posner in what makes a leader. Per Bennis, there are four defined competencies that make a leader. They are the management of attention – the ability of a leader to draw others to them because of the leader's extraordinary expression of commitment; the management of meaning – the leader's ability to communicate a common vision; management of trust – a leader must understand and delineate to the organization that trust is essential; and management of self – a leader must know his or her own skills and abilities and deploy them effectively. The leader must also know their limitations. Without management of self, the leader will do more harm than good. Bennis (2009) also explained the importance of candor and transparency with leadership and without it, organizations sicken and fail. To achieve this transparency, leaders must share information, seek information from everyone, and uncover hidden ground rules (Bennis, Goleman, and Biederman 2008). In addition, Kouzes and Posner (2010) teach that there are 10 enduring truths about leadership.

- You Make the Difference – Before a leader can lead, the leader must believe that he or she can have a positive impact on others

- Credibility is the Foundation of Leadership – Others have to believe in the leader as well. If people don't believe in the leader, they won't follow the leader

- Values Draft Commitment – Others want to know what a leader stands for, what he or she believes in, and what he or she values.

- Focusing on the Future Sets Leaders Apart – the ability to imagine and express exciting future possibilities is a defining competence of leaders

- A Leader Cannot Do it Alone – No leader has ever achieved anything extraordinary without the talent and support of others.

- Trust Rules – If a leader is unable to accomplish a task, he or she must be able to trust others to complete it.

- Challenge is the Crucible of Greatness – Exemplary leaders are the kind of leaders people want to follow in order to challenge and change the status quo.

- You Either Lead by Example or you Don't Lead at All – Leaders have to go first as a leader. A leader cannot ask others to do what he or she is not willing to do. A leader must be willing to admit mistakes and to be able to learn from them.

- The Best Leaders are the Best Learners – Learning is the master skill of a leader; thus, leaders are "*constant improvement fanatics.*"

- Leadership is an Affair of the Heart – Leaders have to love their constituents, the customers, clients, and the mission. Leaders make others feel great themselves with gratitude and showing their appreciation. Love is the motivation that energizes leaders to give so much for others.

Just as there are practices of exemplary leadership, there are areas as written by John Kotter (2005) notes areas that leaders want to avoid. These areas cause the most failure in organizations.

- Writing a Memo Instead of Lighting a Fire – Leaders often call a meeting or circulate a report to establish a sense of urgency. Kotter explains this is

the incorrect method. Rather, the leaders should gather a key group of decision-makers to identify factors that are contributing to complacency and then brainstorm ways to counter each factor. Thereafter, an action plan should be developed to implement the path forward.

- Talking too Much and Saying too Little – Kotter writes that most *leaders "under communicate their change vision by a factor of 10"* (2005). An effective change vision must not only include strategies and structures but also new alignment behaviors. This is conducted by leading by example.

- Declaring Victory Before the War is Over – When an initial goal is met, it is tempting to congratulate all involved and proclaim the beginning of a new era. Nonetheless, while it is important and motivating to celebrate results, kidding yourself about the difficulty and duration of transformation can be catastrophic (Kotter, 2005). To avoid this, *"celebrating incremental improvements it is a good way to mark progress and sustain commitment"* (Kotter 2005).

- Looking for Villains in all the Wrong Places – Kotter (2005) notes that the perception that major organizations are full of noncompliant middle managers who resist all change is untrue and unfair. It is often the middle level that brings issues to the attention of senior executives. The fact is, the biggest hurdles to change are often those who are just below the CEO – vice presidents, directors, and general managers, all of whom have the most to lose in a change. One must build a guiding coalition that represents all employees.

To add to Kotter, Kouzes, & Posner's take on leadership, East Carolina University (ECU) instructor and Engineering Department director Dr. Eugene Dixon (2009) describes 10 behaviors of visionary leadership.

- Capable Management – Day to day task required of a leadership position.

- Reward Equity – Represents those leadership activities involved in linking goals and performance to rewards and recognition.

- Communication Leadership – Helping others understand tasks required of the organization, accomplishing the mission while remaining faithful to common values and beliefs.

- Credible Leadership – Behavior of integrity of word and deed. These are the elements of building leadership trust.

- Caring Leadership – Characteristic of concern and caring for organization members. It is a process of recognition, reward, and appreciation for the efforts required in the ongoing vitality of the organization.

- Creative Leadership – Demonstration of the leader's acceptance of risk in search of opportunities to improve the organization.

- Confident Leadership – Measure of the leader's self-confidence and the ability to inculcate that confidence in others.

- Follower-Centered Leadership – Leader empowers followers to be active in achieving performance metrics. Followers are seen as partners, not pawns.

- Visionary Leadership – Leader's ability to clearly place his/her perceived future vision of the organization in front of those working to make it happen.

- Principled Leadership – Evinced in the leader's ability to develop and support shared values and beliefs among the organization's constituents.

U.S. Army Field Manual (FM) 6-22[1] (Department of the Army, 2006) quoted Army Chief of Staff (1979 – 1983) General Edward C. Meyer: *"just as the diamond requires three properties for its formation – carbon, heat, and pressure – successful leaders require the interaction of three properties – character, knowledge, and application. Like carbon to the diamond, character is the basic quality of the leader. But as carbon alone does not create diamond, neither can character alone created leader. The diamond needs heat. Man needs knowledge, study, and preparation. The third pressure – acting in conjunction with carbon and heat forms the diamond. Similarly, one's character attended by knowledge blooms through application to produce a leader."* Character is synonymous with personality as is application with decision-making.

[1] U.S. Army Field Manual 6-22 is one of a series of U.S. Army field manuals. FM 6-22 specifically focuses on Army Leadership.

As with private organizations, leadership within the Department of Defense community is of the utmost importance. LTC (Retired) Gerald F. Sewell (2009) states (as referenced in U.S. Army FM 6-22) that "*an (Army) leader is anyone who by virtue of assumed role or assigned responsibility inspires and influences people to accomplish organizational goals."* Per Sewell, the military stresses the significance of putting importance on leadership intangibles, in the sense of leader attributes and competencies (2009). The Army Leadership Requirements Model as referenced in FM 6-22 (Figure 1) displays leader attributes and core leader competences.

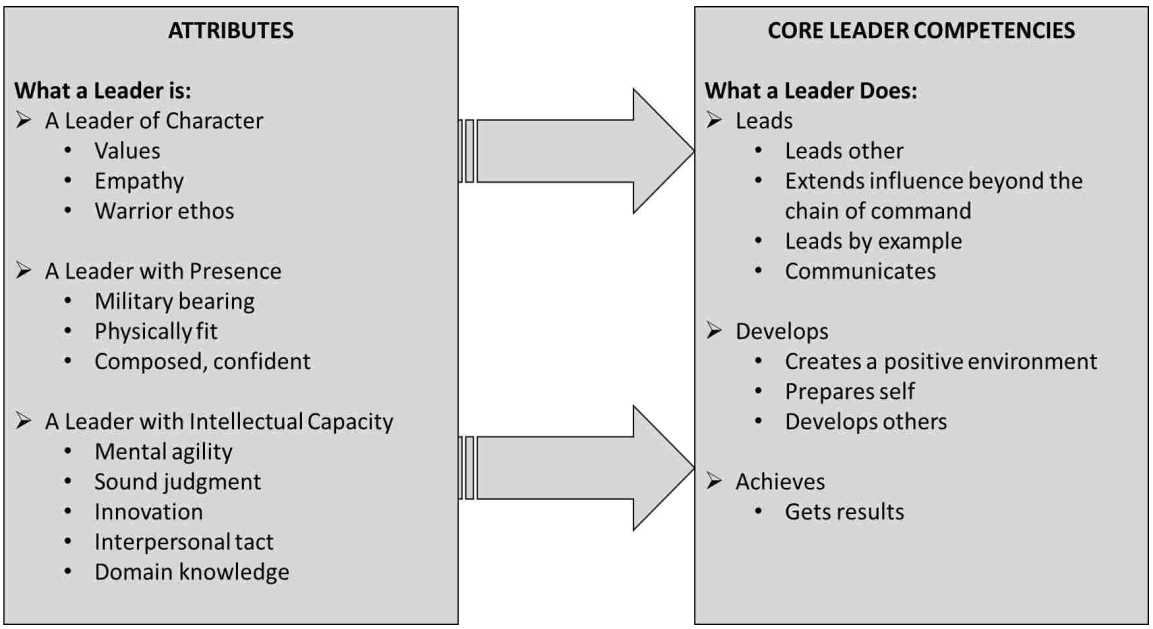

Figure 2 – Leadership Requirements Model (Department of the Army, 2006)

The model aligns leader development activities and personnel practices to a common set of characteristics, valued by the Army. Per Sewell, the basic components of

the model focus on what the leader is and does. Attributes are the desired internal characteristics of a leader; this is who the leader is, whereas competencies (what the leader does) are skilled and learned behaviors. *The leader's character, presence, and intellect empower the leader to master the core leader competencies through devoted lifelong learning. "The balanced application of the critical leadership requirements empowers the leader to build high-performing and cohesive organizations able to effectively project and support the mission"* (Sewell, 2009).

As briefly mentioned in the introduction, Army and civilian personnel are developed as leaders in three domains: institutional, operational, and self-development. This domain type relationship can be viewed in the Army Leader Development Model (Figure 2) referenced in Addendum M of the 2012 Army Posture Statement.

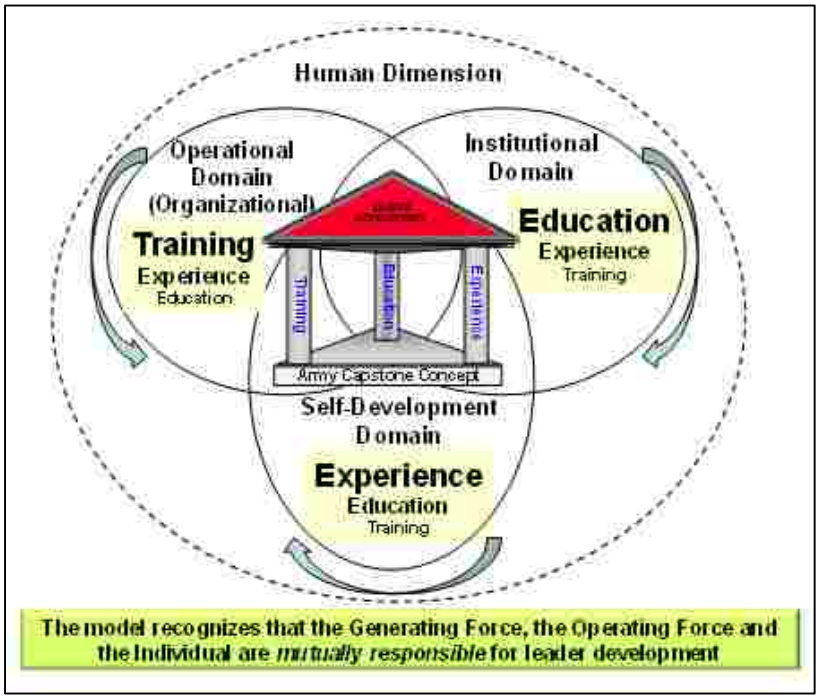

Figure 3 – Army Leader Development Model (Department of the Army, 2012)

The institutional domain includes all organization and activities in the Army (with the exception of deployable units). In this domain, the leader is assigned as a student where he/she learns development responsibilities and expectations: "*The institution provides the knowledge and develops the leadership attributes and competencies at the right time necessary for increased responsibility at the current and future rank or grade"* (Department of the Army, 2013).

The operational domain is where leaders experience the greater part of their development: "*All training, education, and self-development activities conducted during training for execution of planning, preparing, executing, and assessing unified land operations are essential parts of developing leaders in the operational domain*" (Department of the Army, 2013).

The self-development domain is where the leader *"has the responsibility to develop themselves and appreciate that learning occurs over the course of a life time"* (Center for Army Leadership, 2012). Per the Army Leadership Development Strategy (ALDS), this domain bridges the gap between the institutional and operational domains and positions requirements for continuous growth (Department of the Army, 2013).

According to the ALDS, the Army will follow seven leader development imperatives that will direct policy and actions to develop leaders with the necessary qualities and enduring leader characteristics: "*These guiding principles remain constant and consistent from initial service affiliation to retirement creating a leader development continuum that is deliberate, continuous, and progressive"* (Department of the Army, 2013). These imperatives will drive the synchronization and implementation of the Army Leader Development Strategy:

- Commitment to the Army Profession, lifelong learning, and development.
- Balance the Army's commitment to the training, education, and experience components of leader development.
- Manage military and civilian talent to benefit both the institution and the individual.
- Select and develop leaders with positive leader attributes and proficiency in core leadership competencies for responsibility at higher levels.
- Prepare adaptive and creative leaders capable of operating within the complexity of the operational environment and the entire range of military operations.
- Embed Mission Command principles in leader development.
- Value a broad range of leader experiences and developmental opportunities.

With leadership comes the ability to lead through change. John Kotter (1995) writes that the two general lessons of organizational change are:

- Transformation is a process composed of a series of phases that takes considerable time to achieve
- Critical mistakes within or between any of these phases can have catastrophic impact on the process.

To assist with successful organizational transformation, Kotter designed a chronological eight step process for leaders to follow as seen in Table 1. United States Army Major Derek Licina (2010) wrote that Kotter's eight step process is used as a

framework to investigate options to transform the Department of Defense (DOD) in meeting the intent of the Medical Stability Operations DOD Instruction (DODI)[2].

Step	Actions
Establish a sense of urgency	• Examining market and competitive realities • Identifying and discussing crisis, potential crisis, or major opportunities
Form a powerful guiding coalition	• Assembling a group with enough power to lead the change effort • Encouraging the group to work together as a team
Create a vision	• Creating a vision to help direct the change effort • Developing strategies for achieving the vision
Communicate vision	• Using every vehicle possible to communicate the new vision and strategies • Teaching new behaviors by the example of the guiding coalition
Empower others to act on the vision	• Getting rid of obstacles to change • Changes systems or structures that seriously undermine the vision
Plan for and create short-term wins	• Planning for visible performance improvements • Creating those improvements • Recognizing and rewarding employees involved in the improvements
Consolidate improvements and produce more change	• Using increase credibility to change systems, structures, and policies that don't fit the vision • Hiring, promoting, and developing employees can implement the vision
Institutionalize new approaches	• Articulating the connections between the new behaviors and corporate success • Developing the means to ensure leadership development and succession

Table 1 - Eight Steps to organizational transformation (Lucina, 2012)

[2] *"DoDI 6000.16, titled Military Health Support for Stability operations, was published in 2010 and established policy that medical stability operations (MSOs) would be a core military mission. The instructions set out to institutionalize how the Military Help Support (MHS) would effectively support MSOs and assist in bridging the gap with other actors operating in the same space".* (Licina 2012)

All of the previously mentioned imperatives, lessons, and steps mentioned assist with leadership development. The Center of Creative Leadership (CCL) defines leadership development as the "expansion of a person's capability to be effective in leadership roles and processes" (MCCauley and Van Velsor, 2004). Farr and Brazil state that *"leadership development is…mainly an individual process. Academia and business may set up programs and make training accessible, but in the end, it is fundamentally an individual endeavor"* (2009). Farr and Brazil continue with the notion that it is important to understand that each individual leader brings a unique set of qualities attained by *"genetics, upbringing, and experiences"* (2009) and that these qualities shape leadership development. This unique set of qualities that assist with leadership development is referred to as an individual "*life stream*" (Avolio, 2005).

Leadership is a vital concern in the globally competitive world. *"The pressures of global competition and associated processes of change…have contributed to an interest in leadership and leadership development programs"* (Conger, 1999). In addition, the scarcity of effective leaders and the lack of a leadership development *"pipeline"* in organizations have also contributed to the interest and need of leadership development (Daniels, 2009). Former House Majority Leader, Senator Sam Rayburn reportedly stated, *"You cannot be a leader and ask others to follow you unless you know how to follow too"* (Dixon, 2009).

Horn and Walker (2008) write that*"…leadership touches everything we do across the entire spectrum of society"* including but not limited to academia, business, industry, and the military. Kotter (1999) supports Horn and Walker stating that *"Leadership always has been and probably always will be an important factor in human affairs."*

Rehman and Waheed (2012) write that it is essential to determine if leadership personality styles can predict specific decision making styles.

2.3 Personality Type:

Personality type as referenced in the Myers Briggs Type Indicator (MBTI) is based on the work of Swiss psychoanalyst and psychiatrist Carl Jung. The MBTI was developed by Isabel Briggs Myers and Kathryn Briggs *"to indicate, validate, and put to practical use Jung's work on psychological types"* (Martin 2010). The MBTI is recognized as one of the most practical, valid, and reliable tools in the world for describing and assessing personality. (Bahreinian, Lappeenranta, & Soltani 2012). Personality type is the core foundation of who we are individually. Per the MBTI, the framework of the human personality is broken down into four separate dichotomies. Each of these dichotomies possess a specific focus which helps shape our individual personality type (Cohen, Ornoy, Karen 2013). Myers (2003) and Pearman & Albritton (2010) list these dichotomies as seen in Tables 2 through 5.

Where do you prefer to focus your attention? Where do you get energy?	
The E/I Dichotomy	
Extraversion - People who prefer at extroversion like to focus on the outer world of people and activity. They direct their energy and attention outward and receive energy from interacting with people.	**Introversion -** People who prefer introversion like to focus on the inner world of ideas and experiences. They direct their energy and attention inward and receive energy from reflecting on their thoughts, memories and feelings
Characteristics associated with people who prefer Extraversion: • attuned to external environment • preferred to communicate by talking • work out ideas by talking them through • learn best through doing or discussing • have brought interest • sociable and expressive • readily take initiative at work and relationships	***Characteristics associated with people who prefer Introversion:*** • drawn to the inner world • prefer to communicate in writing • work out ideas by reflecting on them • learn best by reflection, mental "practice" • focus and depth on their interest • private and contained • take the initiative when the situation or issue is very important to them

Table 2 – E/I Dichotomy

How do you prefer to take in information?	
The S/N Dichotomy	
Sensing - People who prefer Sensing like to take in information that is real and tangible what is actually happening. They are observant about the specifics of what is going on around them and are especially attuned to practical realities.	**Intuition -** People who prefer Intuition like to take in information by seeing the big picture, focusing on the relationships and connections between facts. They want to grasp patterns and are especially attuned to seeing new possibilities.
Characteristics associated with people who prefer Sensing: • Oriented to present realities • Factual and concrete • Focus on what is real and actual • Observe and remember specifics • Build carefully and thoroughly toward conclusions • Understand ideas and theories through practical applications • Trust experience	***Characteristics associated with people who prefer Intuition:*** • Oriented to future possibilities • Imagine and verbally creative • Focus on the patterns and meanings in data • Remember specifics when they relate to a pattern • Move quickly to conclusions, follow hunches • Want to clarify ideas and theories before putting them into practice • Trust Inspiration

Table 3 – S/N Dichotomy

How do you form judgments?	
The T/F Dichotomy	
Thinking - People who prefer to use thinking in judgment like to look at the logical consequences of a choice or action. They want to mentally remove themselves from the situation to examine the pros and cons objectively. They are energized by critiquing and analyzing to identify what is wrong with something so they can solve the problem. Their goal is to find a standard or principal that will apply in all similar situations.	**Feeling -** People who prefer to use feeling in judgment like to consider what is important to them and others involved. They mentally placed themselves into the situation to identify with everyone so they can make decisions based on their values about honoring people. They are energized by appreciating and supporting others and look for qualities to praise. Their goal is to create harmony and treat each person as a unique individual.
Characteristics associated with people who prefer Thinking: • analytical • use cause and effect reasoning • solve problems with the logic • strive for an objective standard of truth • reasonable • can be "tough-mined" • fair – want everyone treated equally	***Characteristics associated with people who prefer Feeling:*** • Empathic • Guided by personal values • Assess impacts of decisions on people • Strive for harmony and positive interactions • compassionate • May appear tenderhearted • fair – want everyone treated as an individual

Table 4 – T/F Dichotomy

How do you prefer to deal with the outside world?	
The J/P Dichotomy	
Judging - People who prefer to use their Judging process in the outer world like to live in a planned, orderly way, seeking to regulate and manage their lives. They want to make decisions, come to closure, and move on. Their lives tend to be structured and organized, and they like to have things settled. Sticking to a plan and schedule is very important to them, and they are energized by getting things done.	**Perceiving -** People who prefer to use their Perceiving process in the outer world like to live in a flexible, spontaneous way, seeking to experience and understand life, rather than control it. Detailed plans and final decisions feel confining to them; they prefer to stay open to new information and last-minute options. They are energized by their resourcefulness in adapting to the demands of the moment.
Characteristics associated with people who prefer judging: • scheduled • organize their lives • systematic • methodical • make short- and long-term plans • like to have things decided • try to avoid last-minute stresses	***Characteristics associated with people who prefer Perceiving:*** • spontaneous • flexible • casual • open-ended • adapt, change course • like things loose and open to change • feel energized by last-minute pressures

Table 5 – J/P Dichotomy

When the components listed in dichotomy Tables 2 through 5 are mathematically arranged, they expand to a 16 figure personality table as shown in Table 6.

	S	S	N	N	
I	ISTJ	ISFJ	INFJ	INTJ	J
I	ISTP	ISFP	INFP	INTP	P
E	ESTP	ESFP	ENFP	ENTP	P
E	ESTJ	ESFJ	ENFJ	ENTJ	J
	T	F	F	T	

Table 6 – Personality Table

Myers and Briggs state that all humans have one of the stated personality types as shown in Table 6 (Walsh, 2013). Cohen, Ornoy, and Keren (2013) write that a leader's personality type that matches the project he or she leads *"is one of the most influential decisions for the success of the project."*

Many studies have been conducted utilizing the MBTI. A small study authored by Devlin and Singh (2010) was conducted on the United States Air Force (USAF) in regards to MBTI personality type. The study focused on the MBTI and hemisphericity of a small US Air Force Group focused on the global war on terror. The test compared the personality types of 35 USAF officers and enlisted personnel to determine if personality is linked to brain hemisphericity. The findings suggested that there are many similarities between officers and enlisted military personnel. Both officers and enlisted personnel within the studied group were predominately left brainers who preferred introversion over extroversion, sensing over intuition, thinking over feeling, and judging over

perceiving. One possible issue with this study is that it utilized a very small sample size of a unique USAF group. Moreover, within special, close knit military groups, enlisted personnel tend to "mirror" the personality of officers within the group. With the study being so specific, the results tend to be biased to just that group.

Bahreinian, Ahi, and Soltani (2012) conducted a study to examine the relationship between personality type utilizing the MBTI and leadership styles of managers. The study consisted of the results of 52 mid-level managers in an Iranian industrial group. To determine leadership style, the study used the Lutans model which is based on a two orientation relationship – task and people. The study compared the four dichotomies of the MBTI against the two orientations of the Lutans model. The results from the study indicate that specific elements of personality are directly linked to leadership styles. More specifically, the energy focus dichotomy (E/I) has a significant relationship with the people oriented leadership style, and the information process dichotomy (S/N) has a significant relationship with both the task and people oriented leadership styles. Looking further at the discussion of results, it was found that extroversion is related to people orientated leadership styles, sensing is associated with task oriented leadership styles, and intuition is linked to people oriented leadership styles.

Researchers Ahmed, Hasnain, and Venkatesan (2012) performed a study to examine the relationship of personality type, cognitive styles, and decision making styles of postgraduate business students. The sample size of the group was 130 (45 female and 82 male). The study utilized the Myers Briggs Type Indicator (MBTI), Decision Style Inventory (DSI), and Cognitive Style Inventory (CSI). The CSI is a 25 item self-reporting measuring tool that measures thinking, judging, decision making, storing information,

remembering, and believing in interpersonal relationships, all of which points to two cognitive styles: systematic and intuitive. The results from the study displayed a positive relationship between systematic cognitive styles and analytical decision making. Moreover, the study showed a positive relationship with the MBTI function of judging and analytical decision making, feeling associated with behavioral, and thinking with both directive and analytical.

Passmore, Holloway, and Rawle-Cope (2010) of the University of East London's School of Psychology executed a study that investigated the relationship between personality types and preferred methods of UK-based therapists and coaching using the MBTI. Examining a data pool of 212, the results indicated that coaches were considerably more likely to have an intuitive preference than a sensing preference when compared to the wider UK population. Coaches were significantly different from UK counsellors in the realm between the thinking and feeling function, with coaches being guided more by thinking preferences and counsellors favoring the feeling preference. Moreover, a statistically significant relationship between MBTI type and career roles for coaching or counselling was uncovered.

A study was conducted by Rick Harrington and Donald A. Loffredo (2009) to determine if the MBTI could be used to help determine if there was a personality preference with online learning versus in-class learning. A total of 166 college students participated in the study. Results from the study statistically showed that a significant majority of introverts preferred online classes, and extraverts preferred traditional, in class learning. In addition, a trend with a small effect size toward perceiving types preferring traditional courses was found as well.

In 1993, John C. O'Conner III conducted an analysis to determine if the MBTI could be used to predict the successful academic achievement, military performance, and resignation status of United States Coast Guard Academy cadets. A random sample of 100 cadets from the class of 1993 was used in the study. Findings from the study indicate that there is a significant correlation among personality preference, academic achievement, and military performance. The results showed that cadets who preferred sensing over intuition tended to have a higher grade point average (GPA). Moreover, cadets that preferred the judgment function were more likely to succeed militarily. The study also indicated that it was safe to state that cadets who managed their time wisely to meet all Academy standards more efficiently showed a preference toward the judgment function as well.

Francis and Jones (2000) performed a study using the MBTI to understand the relationship of the psychometric survey and the Eysench Personality Questionnaire of 377 church members. Similar to the MBTI, Eysench Personality Questionnaire (EPQ) is a personality assessment that measures the three major dimensions of personality that account for, according to developers Hans Eysench and Sybil Eysench (1991), *"most of the variance in personality."* The three dimensions of the EPQ are Extroversion (similar to the MBTI), Neuroticism which examines one's self placed inferiority, unhappiness, anxiety, dependence, hypochondria, guild, and obsessiveness, and Psychoticism which looks at ones urge for risk taking, impulsivity, irresponsibility, manipulativeness, sensation seeking, tough mindedness, and practicality (Hersen, 2004). Results from the study showed an expected positive correlation between the E/I dichotomy of the MBTI and the extroversion dimension of the EPQ. In addition, the E/I dichotomy showed a

positive correlation with the EPQ psychoticism as well. Like the E/I dichotomy, the J/P dichotomy also showed a strong positive correlation with the psychoticism dimension of the EPQ. Other MBTI dichotomies and EPQ dimensions showed relatedness; however, they were not very strong. A similar study was conducted by Francis, Craig, and Robbins (2007) examining 554 undergraduate students at the University of South Wales. Results from the study showed similar results as with the previous study. The authors argue that based on their interpretation of findings, *"the MBTI and the Eysenckian models should be viewed as interacting in a dynamic and informative fashion, not as unrelated, totally disparate models"* (Francis, Craig, and Robbins, 2007).

Furnham, Moutafi, and Crump (2003) conducted a study to examine the relationship between the MBTI and the Revised NEO-personality inventory (NEO PI-R). The Revised NEO-personality inventory was developed by Robert R. McCrae and Paul Costa and "measures five high orders of personality called the Five Factor Model (FFM)" (Furnham, Moutafi, and Crump, 2003). The five dimensions of the NEO PI-R and descriptions of each dimension are as follows.

- Neuroticism – Refers to the tendency to experience negative emotions (e.g. anxiety, depression and anger).
- Extraversion – refers to high activity and sociability. Also, possesses the tendency to experience positive emotions.
- Openness – represents the tendency to engage in intellectual activities and new experiences.
- Agreeableness – refers to finally considerate and modest behavior.
- Conscientiousness – associated with persistence, self-discipline, and the need for achievement.

A total of 900 participants completed the study, 717 men and 183 women ranging in age from 23 to 64 with a mean of 42 years of age. The results of the study show a high correlation between neuroticism and the E/I dichotomy. In addition, the extroversion dimension of the NEO PI-R displayed a high correlation with the E/I dichotomy as well. Openness showed a correlation with the S/N dichotomy, agreeableness correlated with T/F, and Conscientiousness was most correlated with the J/P function.

Cohen, Ornoy, and Keren performed a study in 2013 to determine whether personality type had any association with the success of project managers and how they compared to the general population. The study surveyed 280 project managers. Results from the study taught that project managers *"have a unique distribution of personality type (MBTI), which separates them from the general population"* (Cohen, Ornoy, and Keren, 2013). Results from the study also showed that there were considerably more project managers with the mental function of NT percentage wise than in the general population. The authors of the study conclude that this is because "*NT project managers base their decisions on intuition and analysis. This is expected, because project managers must make decisions in the face of ambiguity and uncertainty and have to rely on intuition while lacking some of the facts"* (Cohen, Ornoy, and Keren, 2013). The results were found for both women and men. In terms of gender, females are about 28% of the project manager survey population. They were as successful as males, but significantly younger than the male project managers in the survey which reflects their absence from project management in previous decades (Cohen, Ornoy, and Keren, 2013).

Researchers Carr, de la Garza, and Vorster (2002) performed a study to investigate the extent to which personality preference is predictive of career performance.

The research set out to study the relationship of individual personality type using the MBTI and performance of engineering and architectural professionals. Per Carr, de la Gaza, and Vorster, "o*ne of the prominent trends in business organizations today is the attention placed on individual personality traits as a means of predicting job performance"* (2002). The study looked at four different project services: contract documents, conceptual design, firm management duties, and construction administration. Results from the study showed that individuals that possessed a preference for intuition and perceiving outperformed their colleagues who had preferences of sensing and judging in both the conceptual design and construction phases. Further results exhibited those individuals with the preference of judging excelled in the designed phase. However, contrary to pre-study predictions, the thinking/feeling dichotomy did not influence the performance in any service category (Carr, de la Garza, and Vorster, 2002).

Researchers Scott G. Isaksen & Kenneth J. Lauer and executive consultant Glenn V. Wilson constructed an analysis to investigate the relationship between the psychological type as measured by the MBTI and cognitive style as measured by the Kirton Adaption-Innovation Inventory (KAI) (2003). A total of 1483 individuals from education and business participated in the study. The KAI was developed by Dr. Michael J. Kirton to *"measure people's characteristic preferred style of creativity and problem solving"* (Hughes 1994). The results from the KAI indicate whether an individual has a preference as an adaptor or an innovator. Per Hughes (1994), an innovator is an individual who "*breaks the rules and paradigms to produce a new way of doing things*" (Hughes 1994). In contrast, an adaptor is an individual who works to improve in a

defined environment as opposed to "*breaking the paradigm*" (Hughes 1994). The results from the study showed a significant relationship between the KAI and the MBTI.

Rosswurm, Pierson, and Woodward conducted a study to investigate the relationship between the attachment styles of adults as described by researchers Hazan and Shaver (2007). Attachment style was first introduced by British psychoanalyst John Bowlby to understand the bond between infants and parents. Hazan and Shaver's work set out to understand the association between personal differences in adult attachment based on three measures – secure, avoidant, and anxious-resistant (Fraley and Shaver, 2000). Results from the study showed a relationship between individuals that have the MBTI attribute of extroversion and the attachment style of secure. However, the results showed a stronger relationship between the sensing MBTI attribute and the secure attachment style (Rosswurm, Pierson, and Woodward, 2007).

Rooted within the essence of Jung's comprehensive theory of type are the four basic mental functions. These functions are Sensing (S), Intuition (N), Thinking (T), and Feeling (F) (Myers, Mccaulley, Quenk, & Hammer 2009). The four combinations that stem from these functions form the dominant mental functions of ST, SF, NF, and NT. The following table, per Myers and Myers (1995) and Myers, Mccaulley, Quenk, & Hammer (2009), provides a brief description of the four dominant mental functions.

Preference	S/T	S/F	N/F	N/T
Attention Focus	Facts	Facts	Possibilities	Possibilities
Handle focus with	Non-personal analysis	Personal warmth	Personal warmth	Non-personal analysis
Tend to become	Practical and matter of fact	Sympathetic and friendly	Enthusiastic and communication	Logical and ingenious
Find scope for abilities in	Technical areas with facts and objectives	Practical help and services for people	Understanding and communication with people	Theoretical and technical developments

Table 7 – Mental Functions (Myers and Myers, 1995)

Table 7 shows how the dominant mental functions compare and contrast in regards to attention focus, handling focus, and abilities. Pearman and Albrittion (2010) announce that these four mental functions, as referenced in Table 7, have always been present within a person while Ahmed, Hasnain, & Venkatesan (2013) state that "*personality is often considered as a potential determinant of preferences for decision-making."* Newell and Grashina support this stating that "…personality types of the members of a group of people who are communicating plays an important role in providing effective communications" (2004). This effective communication often leads to effective decision making.

2.4 Decision Making:

The decision making process is an *"important aspect of the managerial function that is becoming increasingly complex due to technological and global impacts"* (Pennino, 2002). Historically, decision style has been referred to as *"cognitive style," "psychological type," or "problem solving style."* While these terms have been used

interchangeably, they are different. Cognitive style is the information processing habits of an individual. Myers and Briggs (1995) explain that psychology type is a theory to explain the normal differences between healthy people. The Center for Creative Learning (2013) defines problem solving style as the *"consistent individual differences in the ways people prefer to deal with new ideas, manage change, and respond effectively to complex, open-ended opportunities and challenges."*

Research on decision making per research has, from its inception to the late 1940s and early 1950s, been based on two questions, *How should decisions be made and what is the best decision, and how can the decision maker (DM) find, recognize, and implement it?* (Edwards and Fasolo, 2001). A decision implies actions that the decision maker considers sufficiently critical to warrant an investment of effort and thought: *"The goal of that investment is to do what, in retrospect, the decision maker will consider to have been the right thing. In short, a decision is an irrevocable choice of an action that has value-relevant consequences"* (Edwards and Fasolo, 2001).

Authors Jamian, Sidhu, and Aperapar (2011) write that numerous studies have been conducted in the areas of leadership and management and indicate that decision-making style is a prime factor that contributes to the success of both leaders and their organizational performance. Pennino (2002) writes (as cited by Rowe and Mason), that decision making style, is *"the way one visualizes and thinks about situations."* Pennino (2002) continues that decision style is one of the areas that can provide understanding as to how leaders approach, comprehend, and process information and knowledge associated with decision making.

Traditionally, decision making theory has focused on the cognitive process by which an individual makes a decision (Jacoby, 2006). Per Streufertn and Streufertn (1978), information within the decision making process is strategically organized "through the human manipulation of information." Jacoby (2006) writes that a momentous amount of research has displayed deviations between individual decision making. For instance, some individuals make quick, rash decisions while others analyze and ponder. This type of individual decision processing has been defined under the term cognitive style (Jacoby, 2006).

Within military organizations, effective decision-making is vital to ensure the success of an organization. According to Leonard, Scholl, and Kowalski (1999), decision making is the fundamental function in any organization. As stated in the introduction, the military faces a complex operating environment and *"succeeding in this environment requires an emergent style of decision making"* (Blair 2010). Decision making involves the selection of a preferred alternative from multiple options in an attempt to optimize a specific objective (Ahmed, Hasnain, & Venkatesan 2012).

Unfortunately, not all decision outcomes are optimal. The choice of suboptimal decision outcomes are often due to the inability of the decision maker to understand the preferred alternative while other times it may be due to negligence or other outside influences. This inability to understand and choose an optimal outcome often results in ineffective decision-making. Loo (2000) announced that *"relatively little attention has been paid to the characteristics of the decision maker that effect decision outcomes compared to the attention paid to the decision task and decision situation."* Herbert Simon has a slightly different notion on this topic. Under what Simon calls *Bounded*

Rationality, decision makers are limited in their decision making due to their cognitive (rational) limitations (Eatwell, Milgate, & Newman, 1990). Per BusinessMate.org (2011) as referenced by authors Richard Scott and Gerald Davis, Simon believes this limitation is due to, but not limited to, the following factors:

- *"Rationality requires complete knowledge and understanding of the consequences of a given action. Gaining full understanding of future consequences is, of course, a very difficult task, and therefore this complete knowledge is seldom present at the time decisions are made."*

- *"Given that consequences of actions, per definition, will emerge in the future, it is difficult for decision-makers to fully evaluate the future worth of their decisions."*

- *"Rationality requires that all alternative actions are known. In actual decision-making processes, very few alternatives are known, which inhibits humans in making optimum decisions."*

Within the paradigm of bounded rationality, Herbert Simon introduced an idea called satisficing, which explains that individuals chose the first alternative in which they deem the outcome satisfactory whether it is the optimal choice or not (Byron 2004). Consequently, this method of decision making could prove costly if the optimal choice is not the selected choice. George, as reported by Pfiffner (2011), *"argued that presidents need to ensure that their advisory systems provide them with a range of alternatives for any important decision."* This is to ensure that the president has as many relevant alternatives as possible so that the optimal "best" choice can be selected.

According to Ahmed, Hasnain, & Venkatesan (2012) *"The studies of decision-making and decision styles have evolved over the last century. By the early 1990s several*

theorists embarked on a mission to define decision making style." Decision-making style is referred to as the way in which the mind views problems that involve discovery and judgment all the while providing a means for understanding the way that the human mind operates in making decisions (Rowe and Davis 1996). Per Mau (1995), *"decision-making style has been considered a crucial factor that affects an individual's career development."* Rowe and Boulgarides (1992, cited by Jamian, Sidhu, and Aperapar 2011) asserted that *"individual decision-making styles form the backbone of effective decision making."*

Recent research on decision-making styles specifies that there are different decision-making styles exhibited by military officers (Thunholm 2009). To determine an individual's decision making style, Alan J. Rowe and Richard O. Mason developed what is called the Decision Style Inventory (DSI) which was conceptualized from their Cognitive Complexity Model (Rowe and Mason, 1987). Cognitive complexity as defined by Rowe and Mason and later repeated by Rowe and Boulgarides (1992) deals with the subject of tolerance for ambiguity (Leonard, School, & Kowalski, 1999). The DSI itself measures an individual's inclination when approaching several decision making circumstances. It quantifies four styles of decision making - analytical, behavioral, directive, and conceptual (Ahmed, Hasain, & Venkatesan 2012).

Analytical decision makers are described as those having a high leniency for ambiguity. Because of their desire to stringently analyze a situation, they require an elevated amount of information and consider more alternatives: *"These individuals…often base their decisions on objective, rational data from management control systems and other sources. They search for the best possible decision based on*

the information available" (Daft & Lane 2009, p. 226). Analytical decision makers tend to take their time making a decision, but at the same time they react well to new or uncertain situations (Hodgetts & Legar, 2007).

Behavioral decision makers are listed as those with a strong concern for people as individuals and the organization. They have an understanding of feelings and personal development. These types of decision makers have a very low tolerance for uncertainty and a high morale for personnel. Bryson (2006) teaches that behavioral decision makers limit the use of data in making their decisions and instead rely on people. They are very open to suggestions or ideas. Nevertheless, they are conflict avoiders and per Hodgetts & Legar, don't like making tough decisions especially if they are unpopular ones (2007).

Conceptual decision makers are ones who have a broad outlook on a situation. They consider many alternatives and future possibilities. They rely on intuition as well as on information from others while considering a decision. Conceptual decision makers tend to take risks and are clever at finding creative ways to solve problems. Similar to analytical decision makers, conceptual decision makers also have a high tolerance for ambiguity.

Directive decision makers are described by Bryson (2006, p. 224) as *"efficient and logical,"* yet they have a *"low tolerance for ambiguity and a low cognitive complexity."* Individuals of this sort desire simple, straight to the point solutions to the problem set. They like to focus on the facts and make quick decisions with limited information or alternatives. Directive decision makers prefer to be in control and rely on organizational policies and procedures in their decision making.

Table 8 is a view of the decision making model and gives a view of how the four decision-making styles of the DSI compare to one another.

		Value Orientation/ Concerns	
		Technical and Task Concerns	***Social and People Concerns***
Tolerance for Ambiguity	***High***	**Analytical** Enjoys problem solving Wants best answers Uses considerable date Enjoys variety Is innovative Uses careful analysis	**Conceptual** Is achievement-oriented Has a broad outlook Is creative Is humanistic/artistic Initiates new ideas Is future-oriented
	Low	**Directive** Expects results Is aggressive Acts rapidly Uses rules Uses intuition Is verbal Wants to be in control	**Behavioral** Is supportive Uses persuasion Is empathetic Communicates easily Prefers meeting Uses limited data
		Left Brain	**Right Brain**

Table 8 – Decision Style Model (Rowe and Mason 1987)

Not only does the model show tolerance for ambiguity and value orientation/concerns, but it also shows brain hemisphere relationship: *"Brain dominance refers to an individual's tendency to think and act according to the characteristics of one side of the brain rather than the other"* (Alqarni 2003 as per Mech 1993). Left brain

dominant individual characteristics are those of logic, results focused, abstract, and detailed view whereas right brain dominant individual characteristics correspond with broad view, creativity, empathy, and gregariousness (Mech 1993).

Table 9 gives a tabulated view of the behavioral reactions of the decision making styles as per Rowe and Boulgarides. (Table sourced from Jacoby 1996).

Decision Style	**Reaction to Stress**	**Motivated by**	**Solves Problems by**	**Thinking Mode**
Analytical	Procedural	Problems	Analysis and Insight	Logical
Behavioral	Evading	Acceptance	Feeling and Instinct	Emotional
Conceptual	Erratic	Recognition	Intuition and Judgment	Creative
Directive	Explosive	Power and Status	Rules and Policies	Focused

Table 9 – Decision Making Style Behavior (Jacoby, 1996)

There have been several studies that utilized the DSI to examine the connection between decision making style and specific variables. In one study, a doctoral student set out to determine if there was a relationship between school principals' decision making style and their acceptance and use of modern technology. Findings from the study exhibited no relationship between decision making style and acceptance and use of technology (Jacoby, 2006). A separate doctoral study was conducted utilizing the DSI to investigate decision styles among management personnel at different management levels. It was concluded from this particular study that individuals at higher management levels

displayed the conceptual decision making style while individuals in lower management positions demonstrated the behavioral decision making style (Pennino, 2000).

Yet another doctoral study was performed employing the DSI with a focus on the managerial decision styles of Florida State University library management personnel (e.g. directors, associated directors, assistant directors, and the heads of departments). The study investigated the relationship between decision styles and seven different variables of management personnel (i.e. gender, age, ethnicity, education level, college major, experience, and position). Findings from the study showed no relationship between decision style and age, gender, or education. However, it was found that experience, ethnicity, position, and college major were related to decision style among the personnel used in the study (Alqarni, 2003).

Jamian, Sidhu, and Aperapar (2011) published the results from a study that examined the decision making styles of deans of a Malaysian public university. The study revealed that a majority of the university's deans possessed more than one style, which implies that the deans have flexibility in their decision making styles and are able to change styles from one situation to another.

Pennino (2002) conducted a study focused on the relationship of decision styles and moral development among managers in the United States. The study used the DSI in conjunction with the Defining Issues Test (DIT) and examined 270 leadership personnel. The DIT was developed in 1979 by James Rest to determine how one reasons and defines issues in a social problem. The study found that there is a relationship with higher directive decision making scores and lower reasoning scores. The findings suggested that

personnel who displayed the directive decision style may benefit from *"training and education interventions in the area of ethics"* (Pennino, 2002).

Leonard, School, and Kowalski (1999) performed and published a study to survey and gauge the interrelationship between and conceptually link four separate stylistic measurements: the Learning Styles Inventory, the Embedded Figure Test, the MBTI, and the DSI. The Learning Styles Inventory, credited to David Kolb, measures an individual's learning style and is separated into four learning styles; diverging, assimilating, converging, and accommodating. Learning style *"refers to the way in which individuals acquire and use information"* (Leonard, School, and Kowalski, 1999). A brief description of the four styles can be viewed in Table 10. The Embedded Field Test was designed by Herman Watkin in 1971 to test his concept of field dependence. "*Field dependence is the ability to separate an object or phenomenon from its environment"* (Leonard, School, and Kowalski, 1999). The actual test requires the participant to spot a simple form within a more complex figure. The results from the Leonard, School, & Kowalski study proved that there was no meaningful connection between the four measures.

Learning Style	Description
Diverging	*"This style looks at things from different perspectives. They are sensitive. They prefer to watch rather than do, tending to gather information and use imagination to solve problems. They are best at viewing concrete situations from several different viewpoints..*
Assimilating	*"Preference is for a concise, logical approach. Ideas and concepts are more important than people. These people require good clear explanation rather than practical opportunity. They excel at understanding wide-ranging information and organizing it a clear logical format."*
Converging	*"Solve problems and use their learning to find solutions to practical issues. They prefer technical tasks, and are less concerned with people and interpersonal aspects. People with a converging learning style are best at finding practical uses for ideas and theories. They can solve problems and make decisions by finding solutions to questions and problems."*
Accommodating	*"'Hands-on', and relies on intuition rather than logic. These people use other people's analysis, and prefer to take a practical, experiential approach. They are attracted to new challenges and experiences, and to carrying out plans."*

Table 10 – Learning Style Inventory (McLeod, 2013)

In 2012, researchers Ahmed, Hasain, and Venkatesan conducted a study designed to examine the relationship of cognitive styles, personality, and decision making styles of future managers using the MBTI, DSI, and Cognitive Style Inventory. The Cognitive Style Inventory is a 25 item instrument that identifies patterns of behavior that epitomize an individual's approaches to activities such as thinking, learning, problem solving, and decision making (Martin, 1998). The CSI measures two types of cognitive styles; systematic and intuitive. Conclusions from the "*study suggest that personality and cognitive styles are related to decision styles"* (Ahmed, Hasain, and Venkatesan, 2012). More specifically, this study showed that the MBTI component of thinking was related to the DSI component of directive decision making style; judging showed a preference towards analytical decision-making style; intuitive displayed a significant relationship

with conceptual decision making style (Ahmed, Hasain, and Venkatesan, 2012). In addition, systematic cognitive style had a significant relationship with analytical decision style; however, both cognitive styles had an inverse relationship with behavioral decision making (Ahmed, Hasain, and Venkatesan, 2012).

Author J. P. Hearing conducted a small study utilizing the DSI to investigate precise explanations which led to an individual's decision style. It was found that an individual's decision was inclined to result from the desired amount of information and the number of alternatives that was considered (Herring, 1999).

Muhammad, Isa, and Othman (2010) performed and presented results from a study utilizing the DSI to verify whether decision styles differ in leadership hierarchical level, knowledge, and demographic profile in higher education institutions. It was concluded that gender showed no significant difference in decision making style; however, age and education displayed a substantial difference. The results showed that lower level (i.e. younger) leaders displayed more of an analytical decision style whereas high level (i.e. older) leaders have more of a directive, command style (Muhammad, Isa, and Othman, 2010).

Associate Professor Ahmad Al-Omari (2013) conducted a study to determine the relationship between decision making styles and leadership styles among public school principals using the DSI and Administrative Styles Questionnaire (ASQ) to determine decision making styles and leadership styles respectively. A total of 108 principles participated in the study. Findings from the study revealed no significant relationship between leadership and decision making styles. Nevertheless, it did reveal that the majority of the principles were predominately directive decision makers.

There have been other decision making style surveys developed in an attempt to determine one's decision style. One of those developed surveys is the general decision making style (GDMS) inventory developed in 1995 by researchers Suzanne G. Scott and Reginald A. Bruce. Like with the DSI, the GDMS was designed to evaluate how decision-makers approach decision situations. The target audience for this inventory was intended to be very broad, ranging from military officers to engineers (Jacoby, 2006). Even though the GDMS was supported by various theoretical viewpoints, the validity of the prescribed decision styles appear to be unclear and problematic (Thunholm, 2004). While various decision making style surveys are used, Rehman and Waheed (2012) state that *"there is no universally accepted model of decision making style."*

Multiple research sources including results from the US Navy and US Air Force allude to the fact that certain decision making styles are better suited for specific organizational functions. The US military, more specifically the US Army, has its own process for conducting a major offensive or defensive decisions. While this specific decision making process is not the focus of this research, understanding it may help shed some light on the notion of military decision making.

2.5 Military Decision Making Process:

Per (Bruine de Briun, Fischhoff, & Parker (2007), *"The decision-making processes have been studied in isolation in order to understand each detail. The price paid for that Is limited understanding of how individual decision-making skills are related to (a) of the decision-making skills, (b) demographic characteristics such as socioeconomic status and age, (c) of the cognitive abilities in the decision-making styles,*

and (d) real-world outcomes." The US Military has a seven step process model which is followed when major decisions are conducted. The process model is called the Military Decision Making Process (MDMP) Model and "e*ach step of the process begins with certain inputs that are built upon from the previous step"* (Department of the Army, 1997). The following tables show a condensed (Table 11) and expanded (Table 12) view of the MDMP with staff inputs and outputs.

Step 1	Receipt of Mission
Step 2	Mission Analysis
Step 3	Course of Action (COA) Development
Step 4	Course of Action Analysis
Step 5	Course of Action Comparison
Step 6	Course of Action Approval
Step 7	Orders Production

Table 11 – Steps in the MDMP (Department of the Army, 1997)

The MDMP begins with the receipt of a new mission. The new mission can either come from an order issued by higher headquarters or derived from an ongoing operation or mission. For example, the commander may determine that he has an opportunity to accomplish the higher commander's intent considerably different from the original COA

due to a variation in the enemy's disposition. This may cause him to plan for a significantly different COA (Department of the Army, 1997).

The mission analysis is a crucial step in the MDMP. It allows the commander to visualize the "battlefield." The result of the mission analysis is describing the tactical problem and starting the process of establishing practical resolutions (Department of the Army, 1997).

Course of action development takes place after receiving guidance from the mission analysis step of the MDMP. The commander must involve the entire staff in the development of the courses of action. The guidance and intent of the commander focuses the creativity of the staff resulting in a comprehensive, flexible plan: "*COA development is a deliberate attempt to design all predictable COAs"* (that is difficult for the enemy to deduce) (Department of the Army, 1997).

The COA analysis identifies which specific COA will accomplish the appointed mission with the minimum casualties and collateral damage all the while best situating the force to maintain the initiative for future operations. The analysis assists the commander and staff with the following (Department of the Army, 1997):

- *"anticipating battlefield events,"*
- *"determining how to maximize combat power versus the enemy while protecting friendly forces,"*
- *"minimizing collateral damage,"*
- *"determining when to apply the force's capabilities,"*
- *"determining conditions and resources required for success,"*
- *"identifying the coordination requirements to produce synchronize results,"*

- *"determining the most flexible course of action."*

The COA comparison begins with each staff officer analyzing and evaluating advantages and disadvantages of each COA from his perspective. Each member presents findings for the others' consideration. Utilizing evaluation criteria developed earlier in the process, the commander's staff outlines each COA, emphasizing the advantages and disadvantages of each. This allows for identifying the strengths and weaknesses of the COAs with respect to one another (Department of the Army, 1997).

After comparing the COAs, the commander determines which one he believes will be the most advantageous. However, if the commander decides to reject all of the developed COAs, this staff will have to begin the process over again. Once the commander has chosen a COA, he may refine his intent statement to support the selected COA. Thereafter per the commander's final guidance and decision, *"the staff refines the COA and completes the plan it prepares to issue the execution order" (*Department of the Army, 1997*).*

INPUT	PROCESS STEP	OUTPUT	
* Mission received from higher HQ	**Receipt of Mission**	> CDR's initial guidance * Warning order 1	
* Higher HQ order /plan/ IPB * Staff estimates * Facts & assumptions	**Mission Analysis**	* Initial IPB products > Restated mission > CDR's intent > CDR's guidance	* Warning order 2 * Staff products * Battlefield framework * Preliminary movement
* Restated mission * CDR's guidance * CDR'ss intent * Staff estimates & products * Enemy COAs	**COA Development**	* COA statements and sketches	
* Enemy COA * COA statements and sketches * Staff COA	**COA Analysis**	* War-game results * Task organization * Mission to subordinate units * CCIR	
* War-game results * Establish criteria	**COA Comparison**	* Decision matrix	
* Decision matrix	**COA Approval**	> Approved COA > Refined CDR's intent > Specified type of order > Specified type of rehearsal > High pay-off target list	
* Approved COA	**Orders Production**	> OPLAN/OPORD	
Notes for Table 11: Note 1: > Denotes commanders' responsibility Notes 2: Underlying the entire process are continuing Commander's and staff estimates			

Table 12 – Staff inputs and outputs (Department of the Army, 1997)

There are also theories on how decisions are made and how they should be made. According to Edwards and Fasolo (2001), theories about how people make decisions are called "descriptive," and theories about how decisions should be made are called "normative." Because decisions are made by a decision maker, with or without the aid of

physical and intellectual tools, normative theories of decision making, like descriptive theories, attempt to describe the behavior of a decision maker. The distinction is that normative theories are concerned with human decision makers who wish to use intellectual tools to make decisions. They detail how to go about selecting and utilizing those tools. According to Edwards and Fasolo (2001),"*descriptive theories are not directly linked to tools, but they obviously cannot omit the possibility that the decision makers may use them. Thus, normative theories are special cases of descriptive theories of decision making. Every normative theory may also be descriptive; however, not all descriptive theories are normative."*

2.6 Literature Review Summary:

Burns (1978) writes that *"leadership is one of the most observed and least understood phenomena on earth."* Many in industry and academia confuse the notions of leadership and management so much that the terms are sometimes used interchangeably. Leadership (and the quality thereof) is one of the most essential factors in the success and survival of an organization. As stated by Horn and Walker (2008), *"leadership touches everything we do across the entire spectrum of society."* This is a profound statement within the Department of Defense community. United States Army soldiers are taught that *"leadership is expected from everyone…regardless of designated authority or recognized position of responsibility"* (US Army Field Manual 6-22). Being a leader is more than being the one in charge, it requires one to have the cognitive reasoning to also conduct sound decision making for the betterment of the organization, not for one's personal gain.

Decision making is a cognitive process that is conducted in everyday life in every moment of the conscious state of being. Per Jamian, Sidhu, and Aperapar (2011), *"decision making style is reflective of leadership."* Within DOD organizations, (effective) decision-making is vital to ensure the success of an organization. As stated earlier, the military faces complex operating environments, and *"succeeding in this environment requires an emergent style of decision making"* (Blair 2010). Early research on decision making per Edwards and Fasolo (2001) has been based on three questions:

- How should decisions be made?
- What is the best decision?
- How can the decision maker (DM) find, recognize, and implement it?

Forming decisions are directly related to a specific decision making style. Studies on decision making and decision making style have evolved over the years, and by the turn of the century (2000), several theorists began a quest to define decision making style (Ahmed, Hasnain, & Venkatesan 2012). Two of these theorists were Alan J. Rowe and Richard O. Mason. Their work led to the creation of the Decision Style Inventory (DSI) which quantifies four styles of decision making: analytical, behavioral, directive, and conceptual. Thunholm (2009) writes that recent research on decision-making styles specifies that there are different decision-making styles exhibited by military officers.

Personality type is the core foundation of who we are individually. Personality type per the MBTI is based on the work by Swiss psychoanalyst and psychiatrist Carl Jung. The MBTI is a psychometric self-assessment developed to understand individual personality types. Per the MBTI, the framework of the human personality is broken down into four separate dichotomies. Each of these dichotomies possesses a specific focus

which helps shape our individual personality type (Cohen, Ornoy, Karen 2013). These dichotomies are:

- Extroversion/ Introversion – Where one focuses attention;
- Sensing/ Intuition – How one receives information;
- Thinking/ Feeling – How one processes information;
- Judging/ Perceiving – How one deals with the outside world.

The four dichotomy sets mathematically form the 16 personality types that make up the MBTI. Walsh (2013) references Myers and Briggs and states that all humans have one of the 16 personality types of the MBTI. Many studies have been conducted by the US military utilizing the MBTI to understand personality types of military personnel, specifically decision making personnel.

Table 12 displays a quick overview of what is known and unknown about decision-making styles, personality types, and leadership. This research is designed to address the unknown factors.

What is known	What is unknown
• How to determine individual decision-making styles • How decision-making styles interrelate • How personality types correspond to one another • How to determine personality type per the MBTI • Which decision-making styles have tolerance for ambiguity • Defined leadership characteristics • Little research have been done to examine military leadership in regards to personality and decision style • Components of a leader • The military decision-making process • Various uses of the MBTI and DSI • Steps of the MDMP • Difference between cognitive style and decision making style	• If mental functions of personality type in regards to the MBTI have a statistical significant relationship to individual decision making styles of the DSI. • If personality type influenced decision-making styles • If certain personality types handle ambiguity more effectively than others • If there is correlation between individual personality type functions and decision-making styles • If there is a correlation between decision making styles and/or personality functions and specific demographics

Table 13 – Literature Review Summary

Section 3.0 – Study

3.1 Introduction:

Decision making per Omar and Kleiner (1997) is a *"conscious selection from a course of actions of which there is more than one option."* Further, even when a decision maker feels he or she has no choice, chooses not to decide, or leaves the situation up to fate or to someone else, there is not a decision not to decide (Omar and Kleiner, 1997). Decision making of this caliber can be detrimental within the DOD community.

In researching literature on decision making, many studies have examined the cognitive process of decision making (Jacoby, 2006). More specifically, these studies have looked at how decision makers conduct decisions, why they (decision makers) conduct specific decisions, to what extent the decisions are being made, and what exact decisions are being made. Nevertheless, few studies have attempted to correlate decision maker's style to his or her use of decision making tools (personality type) (Jacoby, 2006).

Personality type per Ahmed, Hasain, and Venkatesan (2012) *"is often considered as a potential determinant for decision making."* Most of the literature on personality type is based on the work of Carl Jung and his theory on personality in which he believes that "individual behavior affects the way one thinks, evaluates, decides, and perceives (Ahmed, Hasain, and Venkatesan, 2012). To assist with the determination of one's personality, the MBTI was developed. The MBTI was not developed in an attempt to stereotype an individual; rather, it was developed to assist with the core understanding and recognizing of one's own personality type.

Devlin and Singh (2010) write that the US Air Force is the world's largest and most technologically advanced air force. It comprises hundreds of thousands of members, all with different personalities that need to work together to ensure our national security. This is not only true for the U.S. Air Force, but for all of the US Armed Forces and government supported agencies as well.

This study attempts to investigate the extent to which the mental functions of a decision maker's preferred personality style correlates to his or her selected decision making style. Some studies have indicated that individuals with like personalities gravitate toward one another in the work environment. Still, it is unknown whether the like personalities have similar or different decision making styles.

3.2 Problem Statement:

Research show that a limited amount of relevant research has been conducted to determine if there is a significant statistical relationship between personality type and leadership decision making style specifically within the DOD environment. As stated by Bruine de Bruin, Fischhoff, & Parker (2007), *"few studies have examined correlations between multiple decision making tasks."* Within Department of Defense organizations, this knowledge may prove vital when the need to understand the rationale behind decisions within the Department of Defense community arises.

3.3 Purpose of the Study

The primary purpose of this study is to evaluate leadership personnel in the Department of Defense environment to determine if there is a direct relationship between

the dominant mental functions of their preferred individual personality types and decision making styles. This study may support Carl Jung's theory in regards to personality which states that our core personality (mental preference) remains constant throughout our life time. In addition, it may help validate Alan and Rowe's mapping of the DSI and MBTI (Refer to Table 58).

There are two main elements to this study: decision making style and personality type. To determine both, the decision style inventory (DSI) will be used to determine individual decision making styles, and the Myers Briggs Type Indicator (MBTI) will be utilized to determine preferred individual personality types. After determining the individual's personality type, their dominant mental functions can be determined as well.

In addition to the above main elements, demographic variables such as gender, education, branch of service, rank, years of service, ethnicity, and age will be looked at as well. While not a primary function of this research, the demographic variable data will be evaluated to see if there is any connection to either one's preferred personality type or decision making style. Demographic data has been used in previous research documents referenced in this research. These elements should verify the unknowns listed in Table 13.

3.4 Research Question

Per Chartand, Rose, Elliott, Marmarosh, & Caldwell (1993), trait based theories on personality propose that traits can be used to predict and explain human behavior. To help validate this claim, the primary research question is: *Is there a meaningful relationship between mental functions of the Myers-Briggs type indicator and the*

decision-making styles among leadership personnel in Department of Defense organizations?

3.5 Hypothesis:

Based on the conceptual model (see figure 4), the main hypothesis of this research is as follows:

Main Hypothesis:

H_m - There is a statistically significant relationship between dominant mental functions of personality type and decision-making styles.

Accordingly, the subsidiary hypothesizes are as follows:

- *H_1: There is a significant statistical relationship that exists between the mental function of Sensing (S) and analytical decision making.*
- *H_2: There is a significant statistical relationship that exists between the mental function of Sensing (S) and directive decision making.*
- *H_3: There is a significant statistical relationship that exists between the mental function of Sensing(S) and behavioral decision making.*
- *H_4: There is a significant statistical relationship that exists between the mental function of Sensing (S) and conceptual decision making.*
- *H_5: There is a significant statistical relationship that exists between the mental function of Feeling (F) and analytical decision making.*
- *H_6: There is a significant statistical relationship that exists between the mental function of Feeling (F) and directive decision making.*

- *H_7: There is a significant statistical relationship that exists between the mental function of Feeling (F) and behavioral decision making.*
- *H_8: There is a significant statistical relationship that exists between the mental function of Feeling (F) and conceptual decision making.*
- *H_9: There a significant statistical relationship that exist between the mental function of Thinking (T) and analytical decision making.*
- *H_{10}: There is a significant statistical relationship that exists between the mental function of Thinking (T) and directive decision making.*
- *H_{11}: There is a significant statistical relationship that exists between the mental function of Thinking (T) and behavioral decision making.*
- *H_{12}: There is a significant statistical relationship that exists between the mental function of Thinking (T) and conceptual decision making.*
- *H_{13}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and analytical decision making.*
- *H_{14}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and directive decision making.*
- *H_{15}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and behavioral decision making.*
- *H_{16}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and conceptual decision making.*

3.6 Conceptual Model

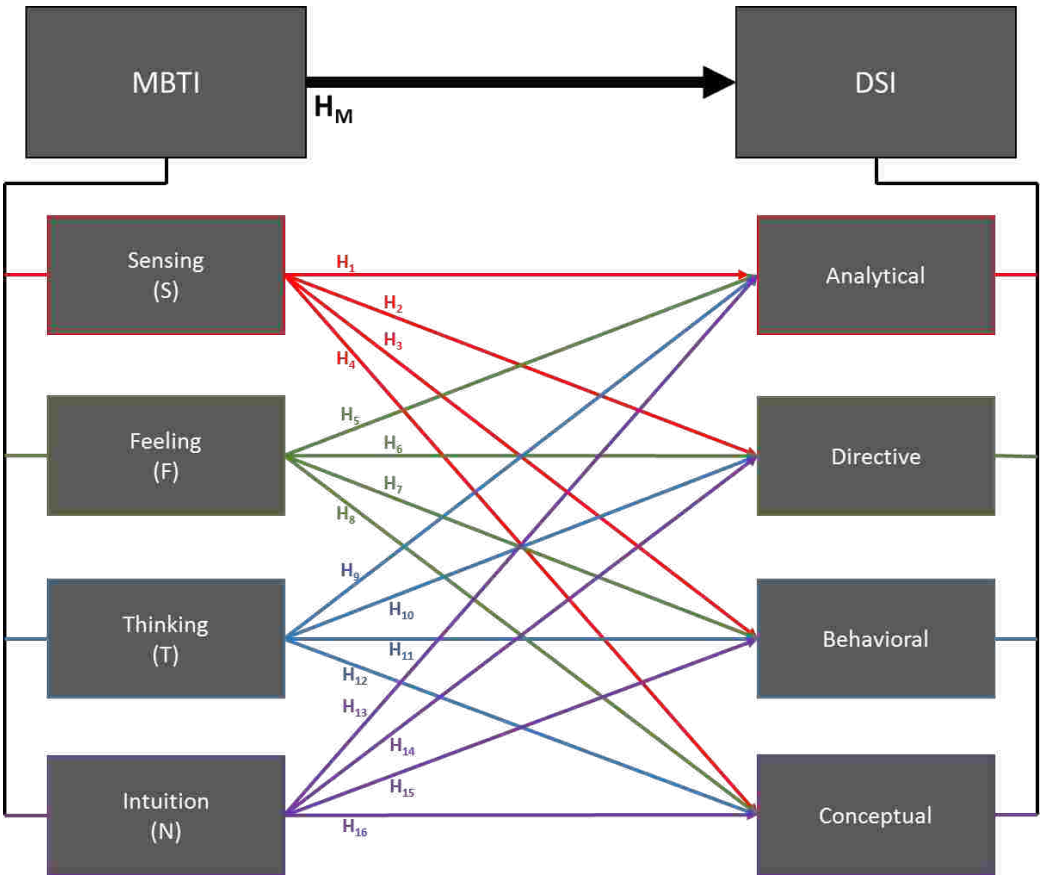

Figure 4 – Conceptual Model

3.7 Significance of the Study

Decision making in itself can be a very convoluted and ambiguous process. This is especially true within the Department of Defense community. George Mason University Professor James P. Pfiffner (2011) writes that "*Chief executives (in the Obama White House) face daunting challenges in evaluating the onslaught of information, judging the perspectives of their subordinates, and ensuring that they receive advice based on presidential perspectives rather than the priorities of their subordinates."* This

is to ensure that the president has the correct information to conduct sound decisions for the betterment of the country.

As previously stated, Thunholm (2009) writes that recent research indicates that there are varying styles of decision making exhibited by military officers. These varying styles could potentially be a result of varying personality styles. Ahmed, Hasnain, and Venkatesan report that *"personality is often considered a potential determinant of preference for decision making"* (2012).

Müller and Turner (2007) write that selecting a project manager (decision maker) with a personality profile that complements the project the project manager will be leading "*is one of the most influential decisions for the success of the project."* This may hold true within the Department of Defense as well because of the emergence of project management within the Department of Defense community.

Because of the well-known magnitude of decision making within the Department of Defense community, this study hopes to answer the question: Is there a relationship between the mental functions of the Myers-Briggs type indicator and the decision-making styles among leadership personnel in Department of Defense organizations? Answering this question may lead to understanding why and how Department of Defense leaders cognitively process information and conduct certain decisions and if a certain personality type and/or decision making style is viewed as more or less desirable in a leader.

3.8 Benefit to the Field of Engineering Management:

Engineering Management is a specialized form of management that is concerned with the application of engineering principles to business practice. As an academic field

of study, it was formulated in 1914 at the Massachusetts Institute of Technology (MIT) (Omurtag, 2009). Per research, *"the engineering management discipline addresses the problems, design, and management of projects and complex operations…while exploiting the tools of management science and project management*" (Old Dominion University, 2015).

Project management within the Department of Defense has become very important to the success of the Department, so much so that it was report in the 2011 Defense Business Board Report to the Secretary of Defense that "*The Under Secretary of Defense for Acquisition, Technology and Logistics (USD (AT&L)), is committed to improving the performance of the Department's acquisition program managers (PMs). To assist this effort, he requested that the Defense Business Board (DBB) identify best business practices that could improve the intake and development of uniformed program managers."* The Department is requiring many of its leadership personnel to have program management experience, both in academia and industry.

This research promotes the field of engineering management via its program management element through the study of leadership personnel in DOD who have program management experience.

3.9 Limitations

Limitations of this study may include the following:

1. Limited responses from senior level decision makers (06 and higher, GS15 and higher, or E7 and higher).
2. May acquire inadequate data due to incomplete survey responses

3. Study is focused on both aspects of the Department of Defense community (military and civilian). May not received sufficient data to report on each independently (i.e. may receive adequate government (civilian) response but not adequate military responses or vice versa).
4. Design of study (anonymity) will not allow for future study of individuals who participated in the study. This limitation, however, will not have an impact on this current study.

Section 4.0 – Research Design and Methodology

4.1 Research Design:

The design selected for this research is a correlation research design. Correlational research design is described as a research design with the intent to determine if two or more variables convey without manipulation of either variable (Bordens & Abbott, 2011). This type of correlation design is specifically known as explanatory design. Creswell (2008) defines explanatory design as *"the extents to which two or more variables co-vary, that is, where changes in one variable are reflected in changes in the other."*

4.2 Methodology:

A quantitative methodology has been deemed proper for the design of this research. Quantitative research is described as research that *"must be objective, quantifiable and statistically valid"* (Anderson, 2006). This research consists of the use of survey instruments that will be used to test the proposed hypotheses with a goal to obtain logical, measured data which leads to a conclusion that can be experimentally repeated.

4.3 Sample Group:

The sample group from this study consists of active Department of Defense individuals from various government installations including (but not limited to) the following:

- Defense Threat Reduction Agency – Ft. Belvoir, VA and Eglin AFB, FL;
- Naval Surface Warfare Center – Crane, IN;
- US Army Dugway Proving Ground Special Programs Division – Dugway, UT;
- National Reconnaissance Office – Chantilly, VA;
- United States Army – Ft. Campbell, KY;
- United States Navy – Naval Station San Diego, CA;
- United States Air Force – Eglin AFB, FL;
- United States Marines – Camp Pendleton, CA.

Every participant in the study is at a minimum rank of E5 for non-commissioned officer personnel, O1 for commissioned officers, WO1 for warrant officers, or GS12 (or equivalent) for civilian (non-uniform military) personnel. A total of 150 military and civilian personnel were invited to conduct the assessments in support of this research.

Section 5.0 – Data Collection Process:

5.1 Survey Instruments:

The survey instruments used for this research were the Myers Briggs Type Indicator (MBTI) Step I Form M and the Decision Style Inventory (DSI) Surveys, both of which are descriptive surveys. The MBTI is a 93 item questionnaire that measures preferences on four basic scales with opposite poles which are 1) extraversion/introversion, 2) sensing/intuition, 3) thinking/feeling, 4) judging/perceiving. The outcome of this questionnaire results in the 16 personality types displayed in Table 6. Table 14 below redisplays the four dichotomy sets of the MBTI. Actual sample questions for the MBTI can be viewed in appendix A.4. The test-retest reliability of the MBTI is 0.75 - 0.90.

Dichotomy Description	**Individual Dichotomy Components**	
Attention Focus	Extroversion	Introversion
Information Obtain Process	Sensing	Intuition
Judgment Formation	Thinking	Feeling
Outer World Orientation	Judgment	Perceiving

Table 14 – Dichotomy Components

This research will focus on the specific mental functions of the MBTI, known as the information intake dichotomy (sensing and intuition) and the judgment formation

dichotomy (thinking and feeling) and compare them individually with the components from the DSI.

The DSI is a 20 item questionnaire that determines decision making style based on four separate intensity levels. Testing for the validity and reliability of the DSI began in 1977 when Rowe and colleagues examined the leadership characteristics of military officers. The initial study included 59 military officers who exhibited decision making styles in the military (Goodyear, 1987). Table 15 displays the four decision styles resulting from the DSI. Ahmed, Hasnain, and Venkatesan (2012) and Alqarni (2003) write that the DSI has a face validity of 0.9 and test-retest reliability of 0.70. The actual questions from the DSI can be viewed in appendix A.5.

Per Alqarni (2003) as written by Rowe and Mason (1987), various actions were conducted to determine the validity and reliability of the DSI. They are as follows:

- Split-half reliability testing using nine groups from different organizations;
- Test/retest reliability using different groups;
- Item analysis of the instrument;
- Correlation with other test instruments (i.e. MBTI, Imbedded Figures Test, Learning Style Inventory, and the Brain Dominance Instrument);
- Face validity based on personal interviews and observations in longitudinal studies in organizations;
- Comparisons of performance in various occupations with style patterns.

The DSI is measured on levels of intensity. The scale is individually dependent on the specific decision making styles. The intensity levels can be seen in Table 15.

Style	Least Emphasis	Back-Up	Dominant	Very Dominant
Directive	Below 68	68 - 82	83 - 90	Over 90
Analytical	Below 83	83 - 97	98 - 104	Over 104
Conceptual	Below 73	73 - 87	88 - 94	Over 94
Behavioral	Below 48	48 - 62	63 - 70	Over 70

Table 15 – DSI Intensity Levels

Similarly, the MBTI scales are based on intensity, or, more language specifically, clarity categories. However, the numerical range for each dichotomy slightly differs from one another. The reason for this slight overlap is directly attributed to the related questions for each specific dichotomy. Table 16 gives a side by side comparison of the sensing/ intuition & thinking/feeling dichotomy clarity levels.

Preference Clarity Category	Greatest Raw Points Sensing/ Intuition	Greatest Raw Points Thinking/Feeling
Slight	13 – 15	12 – 14
Moderate	16 – 20	15 – 18
Clear	21 – 24	19 – 22
Very Clear	25 – 26	23 – 24

Table 16 – S-N/ T-F Dichotomy Comparison

5.2 Data Collection Approach:

Empirical data was generated from both the MBTI and DSI. Both surveys were given to DOD personnel. The surveys were administered via email with electronic links directing the participants directly to each survey. To ensure anonymity, participants were asked to provide their middle initial followed by the last four digits of their social security number. Because of the possible use of personal proprietary information (PPI), permission to use this method of anonymity was requested of the Defense Threat Reduction Agency (DTRA) security and counter intelligence personnel. Because this method can be deemed uncomfortable because of the use of PPI, the participants were also given the choice to use middle initial and the last four digits of a home or cell phone number as opposed to the last four of their SSN. If the participant did not have a middle initial, then the last letter of the participant's first name sufficed. This will serve as the participant's unique reference number.

Under no circumstance did the researcher have access to individual identification nor was the researcher able to associate a specific participant to a specific unique reference number. The reference numbers only use was to link the individual participant's surveys. This ensured that the correct survey set was compared to one another during data collection and analysis. In addition, the participants that agreed to partake in this research were assured that accepting the survey doesn't obligate participation. The researcher provided the DTRA J9CXW Branch Chief executive assistant with the names and contact info of potential participants. Thereafter, the surveys were administered by the DTRA J9CXW Branch Chief executive assistant via email with the supplied electronic links to each survey (DSI and MBTI).

The DSI survey was administered electronically using Survey Monkey. The survey was set up so that no personal identification was allowed to be inputted by the participant. Once the survey was completed, the researcher was notified via email from Survey Monkey, at which time the researcher retrieved the results from the survey. With the MBTI survey, the assessment was taken electronically directly through CPP, who is the publisher of the MBTI. Once the MBTI assessment was completed, the researcher was notified via email by CPP that the survey was completed. The researcher was then able to retrieve the MBTI results from an online account set up by CPP.

The primary sources of research were via topic related peer review journals, military doctrine (military field manuals, unclassified published military papers, and military journal articles), and electronic sources.

The boundaries of the participants were limited to civilian ranks of GS12 or equivalent and above, noncommissioned officers (E-5 and up), warrant officers, and commissioned officers. In addition to the MBTI and DSI surveys, a demographic survey was given. This data assisted with understanding the results in regards to gender, age, education level, branch or service, rank, years of service, and ethnic background. The demographic survey can be viewed in appendix A.6. Moreover, the variable descriptions for both the MBTI and DSI can be viewed in Tables 17 and 18 respectively.

Variables	Operational Definition	Numerical Range			
		Slight	Moderate	Clear	Very Clear
Sensing (S)	Individuals who like to take in information that is real and tangible, focusing on what is actually happening.	13-15	16-20	21-24	25-26
Intuition (N)	Individuals who like to take in information by seeing the big picture, focusing on the relationships and connections between facts.	13-15	16-20	21-24	25-26
Thinking (T)	Individuals who use thinking in judgment like to look at the logical consequences of a choice or action. They want to mentally remove themselves from the situation to examine the pros and cons objectively.	12-14	15-18	19-22	23-24
Feeling (F)	Individuals who use to use feeling in judgment like to consider what is important to them and others involved. They mentally placed themselves into the situation to identify with everyone so they can make decisions based on their values about honoring people.	12-14	15-18	19-22	23-24

Table 17 – MBTI Variable Descriptions

Variables	Operational Definition	Numerical Range			
		Least Emphasis	Back-Up	Dominant	Very Dominant
Analytical	Individuals described as having a high leniency for ambiguity. Because of their desire to stringently analyze a situation, they require an elevated amount of information and consider more alternatives	Below 83	83 - 97	98 - 104	Over 104
Directive	Individuals desire simple, straight to the point solutions to the problem set. They focus on the facts and make quick decisions with limited information or alternatives. Prefer to be in control and rely on organizational policies and procedures in their decision making.	Below 68	68 - 82	83 - 90	Over 90
Behavioral	Individuals listed as those with a strong concern for people as individuals and the organization. These types of decision makers have a very low tolerance for uncertainty and a high morale for personnel.	Below 48	48 - 62	63 - 70	Over 70
Conceptual	Individuals who have a broad outlook to a situation. Consider many alternatives and future possibilities. They rely on intuition as well as on the information from others while considering a decision. Tend to take risk and are cleaver at finding creative ways to solve problems.	Below 73	73 - 87	88 - 94	Over 94

Table 18 – DSI Variable Descriptions

5.3 Statistical Significance:

Per Polit & Beck (2010) and Connelly (2014), statistical significance is *"the probability that an effect seen in a study is not likely to be due only to chance variation."* Statistical significance is expressed in terms of probability (e.g. $p \leq 0.05\%$ or $p > 0.05\%$). In other words, a p value less than or equal to 0.05% is considered statistically significant or relevant. Conversely, a p value greater than 0.05% means that there is no statistical relationship between the studied variables.

Section 6.0 – Findings

6.1 Introduction

This chapter presents the quantitative findings of this study. The principal focus of this study is to determine if there is a significant statistical relationship between the mental functions of the Myers-Briggs type indicator and the decision-making styles of the DSI among leadership personnel in DOD organizations. The focus of this section will be to present, interpret, and evaluate the collected data from each hypothesis in support of the main research question. All data obtained in this study was elicited via the use of online surveys. Section 4 of this paper provided a detailed narrative of the data collection process used in support of this research.

6.2 Participant and Demographic Data

A total of 150 individuals were invited to participate in this research. Of the 150 invitees, 54 individuals responded with 51 individuals fully completing both surveys for a response completion of 34%. The following subsections display the demographic data in regards to age, gender, ethnicity, education, branch of service, rank, and years of service.

6.2.1 Participant Age

Table 19 shows the results from the participants in regards to age. As seen in the table, the majority (per frequency) fell in the 25 – 34 age range whereas the minority fell in the 65 – 74 age range.

Age Group (yrs.)	Frequency (n)	Percentage (%)
18 – 24	3	5.9
25 – 34	16	31.4
35 – 44	14	27.4
45 – 54	11	21.6
55 – 64	5	9.8
65 – 74	2	3.9
Total	51	100

Table 19 – Participant Age

6.2.2 Gender

Figure 5 displays the number of respondents in relation to gender. Of the 51 respondents, 38 were male and 13 were female. In relation to Table 19, 1 male respondent fell into the 18 – 24 age group whereas 2 female respondents fell into the like age group. A total of 11 males were in the 25 – 34 age range as opposed to 5 females. Results showed that 10 males were of the 35 – 44 age range while 4 were female. Of the 45 – 54 age group, 9 respondents were male and 2 were female. Still, in the 55 – 64 age group, there were 5 male respondents and 0 female respondents. In the final age group of 65 – 74, only 2 total respondents, both male, fell into this category.

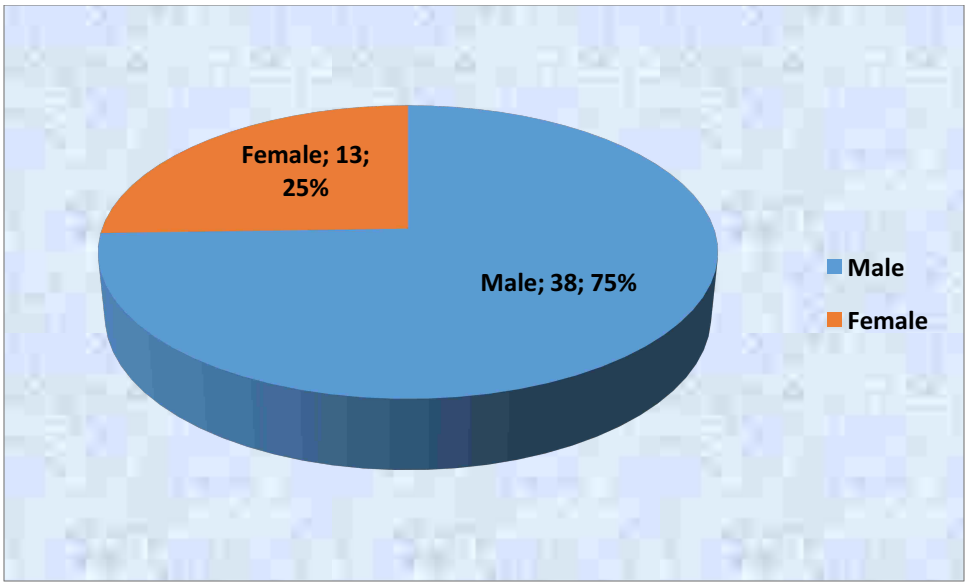

Figure 5 – Gender

6.2.3 Ethnicity

Data in Table 20 displays the participant's ethnic background. As seen in the table, the respondents in this study were predominately White while the minority response in this study was Asian. Please note that 1 participant choose not to disclose his ethnicity. Additionally, the ethnic backgrounds shown in table 19 reflect only those who elected to participate in this study. It does not reflect any attempt to exclude any ethnicity that does not show in the table.

Race	Frequency (n)	Percentage (%)
Asian (East Asian Decent)	2	3.9
Black (African American or African decent)	7	13.7
Hispanic/ Latino (Spanish Decent)	3	5.9
White (Caucasian or European Decent)	38	74.5
N/A	1	2.0
Total	51	100

Table 20 – Ethnicity

In comparing gender to ethnicity (following the order of Table 20), of the Asian respondents, 2 were male and 0 were female. Of the Black (African American) respondents, 2 were male and 5 were female. Of the Hispanic/ Latino respondents, the response was 2 to 1 male to female. Observing the White ethnic group responses, 29 of 36 were male while 9 of 36 were female. As stated earlier in this section, 1 respondent choose not to disclose his ethnicity.

6.2.4 Education:

Table 21 shows the participants' highest education level. This education level reflects the highest degree obtained at the time of participation in this study. In reviewing the data, an overwhelming majority (51%) of the participants have obtained a master's level degree while 2.0% (1 participant) obtained an associate's degree.

Highest Degree Obtained	Frequency (n)	Percent (%)
High School Diploma	5	9.8
Associates	1	2.0
Bachelors (B.S., B.A., etc.)	12	23.5
Masters (M.S, M.A., etc.)	26	51.0
Doctorate (Ph.D., M.D. J.D., etc.)	7	13.7
Total	51	100

Table 21 - Education

Comparing education to both gender and ethnicity, it was found that of the participants who had obtained an education level of high school diploma, 2 were male and 3 were female. In addition, 2 of the participants were Black, 1 was Hispanic, and the remaining 2 were White. Only 1 participant had obtained an associate degree. That participant was designated a White male. Of the 12 reported bachelor's degree holders, 9 were male and 3 were female. In regards to ethnicity, 1 of 12 was Asian, 3 of 12 were Black, 1 of the reported 12 was Hispanic, and the majority, 7 of 12, were White. Observing the individuals who have obtained a master's degree, it was found that it was more than a 3 to 1 ratio of males (20) to females (6). Looking at the ethnicity component of the participants that hold a master's level degree, 1 individual was Asian, 2 were Black, 22 were White and 1 individual chose not to report ethnicity. At the level of

doctorate, 7 participants responded as holding a doctorate level degree. Of these individuals, 6 were White males and 1 was a White female.

6.2.5 Branch of Service:

This section describes the branch of service within the Department of Defense that the respondents represent. Four of the five military branches as well as DOD civilian personnel participated in this research. Nearly half of the respondents were civilian personnel while the Marine Corps, Navy, and Army had the fewest respondent with 1, 5, and 7 respectively. The number of representatives from each branch within the Department of Defense can be viewed in Table 22.

Branch of Service	Frequency (n)	Percentage (%)
Air Force	14	27.4
Army	7	13.7
Marines	1	2.0
Navy	5	9.8
Civilian	24	47.1
Total	51	100

Table 22 – Branch of Service

Looking further at the participant's branch of service in regards to gender and ethnicity, of the 14 Air Force service members that participated in this study, 11 were male (2 Asian, 1 Hispanic, 7 White, 1 male did not disclose his ethnicity), and 3 were female (1 Black and 2 White). There were 7 total Army soldiers that successfully completed both surveys in this study. Of those, 5 were White males, 1 was a Hispanic female, and 1 was a White female. The lone Marine who responded was a white male. A total of 5 Navy sailors participated in this research. Of the 5 sailors, 4 were male (1 Black, 1 Hispanic, and 2 White) and 1 was female (1 Black). In the civilian section, there were 24 respondents; the majority of them were male (17). Within these 17 males, there was 1 Black respondent and 16 White respondents. There were 7 female respondents – 3 Black and 4 White.

6.2.6 Rank:

Data from this section focuses on the individual ranks from each respondent. One of the criteria for participation in this research was that each respondent had to have a minimal rank of E5 if active non-commissioned officer personnel, 01 if active officer personnel or GS12 if active civilian personnel. Because of the quantity and variety of ranks between the services, the respondent ranks will be displayed in 4 tables (Tables 23 – 26) with Table 23 displaying the non-commissioned officer ranks, Table 24 displaying the commissioned officer ranks, Table 25 showing civilian grades (ranks), and Table 26 showing total comparison of Tables 23 – 25.

NCO Ranks	Rank Description per Branch				Frequency (n)	Percentage (%)
	Air Force	**Army**	**Navy**	**Marines**		
E5	Staff Sergeant	Sergeant	Petty Officer 2nd Class	Sergeant	6	11.8
E6	Technical Sergeant	Staff Sergeant	Petty Officer 1st Class	Staff Sergeant	0	0
E7	Master Sergeant/ 1st Sergeant	Sergeant 1st Class	Chief Petty Officer	Gunnery Sergeant	0	0
E8	Senior Master Sergeant/ 1st Sergeant	Master Sergeant/ 1st Sergeant	Senior Chief Petty Officer	Master Sergeant/ 1st Sergeant	0	0
E9	Chief Master Sergeant/ 1st Sergeant/ Command Chief Master Sergeant	Sergeant Major/ Command Sergeant Major	Master Chief Petty Officer/ Command Master Chief Petty Officer	Master Gunnery Sergeant/ Sergeant Major	0	0
Total					6	11.8

Table 23 – Non-Commissioned Officer Personnel

As seen in Table 23, 6 respondents (11.7%) were non-commissioned officers with all 6 being the rank of E5.

Commissioned Officer Ranks	Rank Description per Branch				Frequency (n)	Percentage (%)
	Air Force	**Army**	**Navy**	**Marines**		
O1	2nd Lieutenant	2nd Lieutenant	Ensign	2nd Lieutenant	3	5.9
O2	1st Lieutenant	1st Lieutenant	Lieutenant Junior Grade	1st Lieutenant	1	2.0
O3	Captain	Captain	Lieutenant	Captain	6	11.8
O4	Major	Major	Lieutenant Commander	Major	4	7.8
O5	Lieutenant Colonel	Lieutenant Colonel	Lieutenant Commander	Lieutenant Colonel	4	7.8
O6	Colonel	Colonel	Captain	Colonel	3	5.9
Total					21	41.2

Table 24 – Commissioned Officer Personnel

Table 24 shows that there was a significant response from commissioned officer personnel. Please note that this table omits the ranks of O7 – O10 all of which are General/ Admiral ranks. These are senior level personnel to which the researcher did not have access in contacting for participation.

Civilian Grade	Frequency (n)	Percentage (%)
GS12	4	7.8
GS13	8	15.7
GS14	2	3.9
GS15	7	13.7
SES	3	5.9
Total	24	47.1

Table 25 – Civilian Grades

Table 25 shows that nearly half of the participants in this study were civilian personnel. The highest individual percentage of participants from all ranks/grades was GS13 at 16.7%. Please note that the percentages in Tables 23 – 25 were calculated using the total number of participants, not the total from the respective table. Table 26 shows the totals responses from Tables 23 – 25.

Personnel	Frequency (n)	Percentage (%)
Non-Commissioned Officer	6	11.8
Commissioned Officer	21	41.2
Civilian	24	47.0
Total	51	100

Table 26 – Total Personnel Responses

6.2.7 Years of Service:

This final demographic data section reports the years of service (experience level) of the participants. Table 27 displays a tabulated view of the respondents' experience levels. Per the results, more than half of the respondents had 10 years or less (combining the <5 year and 5 – 10 year age groups) of experience with the least in the 21 – 25 year range.

Years of Service	Frequency (n)	Percentage (%)
< 5	15	29.4
5 – 10	11	21.6
11 – 15	7	13.7
16 – 20	5	9.8
21 – 25	3	5.9
> 25	10	19.6
Total	51	100

Table 27 – Participant Years of Service

6.3 MBTI Results

This section illustrates the dominant mental functions of the participant's personality types. As previously mentioned in section 2, the mental functions of one's personality type is that of the Sensing/ Intuition dichotomy (how one takes in information) and the Thinking/ Feeling dichotomy (how one forms judgments). Tables 28 – 31 display the Sensing, Intuition, Thinking, and Feeling results respectively with clarities as seen in Table 16 as independent functions. Data in subsection 6.5 will display the two dichotomies as one conjoined function (i.e. S/T, S/F, N/T, N/F). Please note that the percentages in tables 28 – 31 will be calculated using the total number of participants (51) in the study.

Sensing Clarity Level	Frequency (n)	Percentage (%)
Very Clear	3	5.9
Clear	9	17.6
Moderate	14	27.4
Slight	6	11.8
Total	32	62.7

Table 28 – Sensing

In comparing the gender, ethnicity, age, and rank, to the Sensing preference, it was found that 20 were males and 12 were female. Of the 20 males, 2 were Hispanic and 18 were White. Within the 12 females, 5 were Black, 1 was Hispanic, and 6 were White. In regards to age, 2 individuals fell within the 18 – 14 age range, 7 were of the 25 – 34 age group, 5 were between 35 – 44, 6 were in the 45 – 54 group, 3 were of the 55 – 64 age group and the remaining 1 was in the 65 – 74 age range. Within the military ranks/ civilian grade structure, 2 service members were the rank of E5, 1 single individual reported the rank of O1, 3 respondents were O3s, 2 were O4s, 2 were O5s and 3 were O6s. In the civilian side, 2 individuals were GS12 level, 5 were GS13s, 1 was the level of GS14 and 4 were the grade of GS15.

Intuition Clarity Level	Frequency (n)	Percentage (%)
Very Clear	3	5.9
Clear	2	3.9
Moderate	8	15.7
Slight	6	11.8
Total	19	37.3

Table 29 – Intuition

Reviewing the demographic data and comparing the results to the Intuition preference, it was found that for gender, 18 were male as opposed to just 1 female. Of the 18 males, 2 each were Asian and Black, 13 were White, and 1 male did not disclose his ethnicity. The lone female was White. In looking at the age ranges, 1 reported in the 18 – 24 age group, 4 reported in the 25 – 34 age range, 8 fell in the 35 – 44 age group, 4 were within the 45 – 54 range, and 1 each were in the 55 – 64 and 65 – 74 age groups. With regards to military rank, 1 participant was an E5, 2 service members were O1, 3 reported the rank of O3, and 2 each were the ranks of O4 and O5. Within the civilian grades, there were 3 each reporting as GS13 and GS15.

Thinking Clarity Level	Frequency (n)	Percentage (%)
Very Clear	8	15.7
Clear	12	23.5
Moderate	11	21.6
Slight	9	17.6
Total	40	78.4

Table 30 – Thinking

Evaluating the Thinking preference and relating it to the recorded demographic data, it was found for gender that there were 30 males and 10 females. Of the 30 males, there was 1 each for Asian, Black, and Hispanic. A majority of the 26 total were White, and 1 chose not to disclose his ethnicity. Of the 10 reported females, 4 were Black and 6 were White. With the associated age groups, 3 fell within the 18 – 24 age range, 10 were in the 25 – 34 range, 13 reported the age range of 35 – 44, 10 reported the age range of 45 – 54, 3 respondents fell in the 55 – 64 age group and the remaining respondents in the 65 – 74 age range. With respect to military rank or civilian grade, all reported ranks and grades were represented by this function. In the enlisted ranks, there were 3 E5s. With the military officers, 3 individuals reported O1, 1 respondent was an O2, 4 each were O3s and O4s, 3 reported as O5, and 2 reported O6. Within the civilian grades, there were 3 GS12s, 8 GS13s, 2 GS14s, 4 GS15s, and 3 SES grades.

Feeling Clarity Level	Frequency (n)	Percentage (%)
Very Clear	0	0
Clear	1	2.0
Moderate	4	7.8
Slight	6	11.8
Total	11	21.6

Table 31 – Feeling

In assessing the Feeling preference, the data shows that a limited number of respondents reported having the Feeling function. A total of 11 out of a possible 51 individuals reported having this specific function. Of the 11 individuals, 8 were male and 3 were female. With respect to ethnicity, 1 gentleman each was Asian and Black while the remaining 6 were White. There was 1 female each for Black, Hispanic, and White. With the age groups, 6 of the respondents fell within the 25 – 34 age group while 1 individual was in the 35 – 44 and 1 was in the 45 – 54 age range. A total of 2 individuals were listed as 55 – 64, and 1 respondent reported 65 – 74. Within the military rank structure, 3 individuals reported being E5, 2 reported being O3, and 1 each as O5 and O6. In the civilian grades, 1 was GS12 and 3 were GS15s.

6.4 DSI Results

Table 32 displays the reported decision making styles of the participants. In reviewing the table, it can be seen that there was a fair amount of representation from

each decision style. Tables 33 – 36 display each decision making style with associated intensity levels. Please note that the percentages in Tables 33 – 36 will be calculated utilizing the total number of participants (51) in the study.

Decision Style	Frequency (n)	Percentage (%)
Analytical	12	23.5
Behavioral	17	33.3
Conceptual	7	13.7
Directive	15	29.4
Total	51	100

Table 32 – Total DSI Results

Intensity Level	Frequency (n)	Percentage (%)
Least Emphasis	0	0
Back-Up	0	0
Dominant	3	5.9
Very Dominant	9	17.6
Total	12	23.5

Table 33 – Analytical

Comparing the analytical results from Table 33 to demographics of gender, age, ethnicity, and rank, it was found that there were 9 analytical males to 3 analytical females. Of the 9 analytical males, 1 was Asian and 8 were White. For the 3 analytical females, 1 was Black and 2 were White. Moreover, 3 of the analytical respondents fell into the 25 – 34 age group, 5 were in the 35 – 44 age range, 2 were in the 45 – 54 group, and 2 were in the 65 – 74 age group. In looking at military rank or civilian grade, 1 individual was a GS12, 4 were GS13s, 2 were GS15s, and 1 was an SES. There were also 2 O3s and 1 each O4 and O5.

Intensity Level	**Frequency (n)**	**Percentage (%)**
Least Emphasis	0	0
Back-Up	2	3.9
Dominant	3	5.9
Very Dominant	12	23.5
Total	17	33.3

Table 34 – Behavioral

For the 17 behavioral decision making style individuals (as seen in Table 34), the results were a ratio of 12 males to 5 females. Within the 12 behavioral males, there were 2 Black, 2 Hispanic, and 7 White. The remaining individual chose not to disclose his ethnicity. For the 5 female behavioral decision making styles, 2 were Black, 1 Hispanic,

and 2 White. As far as age range of the behavioral decision making style respondents, 2 respondents were 18 -24, 8 were in the 25 – 34 age group, 2 were in the 35 – 44 range, 3 in the 45 – 54 age range, and 2 were in the 55 – 64 age group. In regards to military rank, 5 E5s reported as behavioral. In addition, there was 1 each of O1 and O2. There were 2 reported O3s, and 1 O4, O5, and O6 each. With civilian personnel, there were 5 who reported as having a behavioral decision making style. Of the 5, 2 were GS13s and 1 GS14 and 2 GS15s.

Intensity Level	**Frequency (n)**	**Percentage (%)**
Least Emphasis	0	0
Back-Up	1	2.0
Dominant	4	7.8
Very Dominant	2	3.9
Total	7	13.7

Table 35 – Conceptual

In reviewing the conceptual decision making style, 6 of the 7 respondents were male, and 1 was female respondent. Of the 6 males, 1 was Asian and 6 were White. The one female was reported White. In observing the age groups, 1 respondent fell in the 18 – 24 age category, 2 each in the 25 – 34 and 35 – 44 age groups, and 1 each in the 45 – 54

and 55 – 64 age ranges. Within the ranks/ grades, there were 2 GS12s; O1, O3, O5, GS13, and SES had 1 respondent each.

Intensity Level	Frequency (n)	Percentage (%)
Least Emphasis	0	0
Back-Up	0	0
Dominant	8	15.7
Very Dominant	7	13.7
Total	15	29.4

Table 36 – Directive

The final decision making style of directive had a reported 15 respondents. With regards to gender, there were 11 males and 4 females. All 11 males were White. The female respondents were split evenly 50/50; 2 were Black and 2 were White. Within the decision style, 3 individuals were in the 25 – 34 age range, 5 each were in the 35 – 44 and 45 – 54 age ranges; the remaining 2 were in the 55 – 64 age range. This decision style displayed the widest range with regards to rank/grade. A total of 8 military ranks were associated with the decision style. Of the 8 reported military ranks, 1 individual each reported in the ranks of E5, O1, O3, O5 while 2 individuals reported as O4 and O6. In the civilian grades, there was 1 respondent each in the GS12, GS13, GS14, and SES grades while 3 individuals were GS15s.

6.5 MBTI/ DSI Raw Data Comparison:

Table 37 shows a tabulated view of the MBTI data results versus the DSI data which supports the main hypothesis. Table 37 displays the mental function group in comparison to decision styles. Findings show that numerically, the S/T MBTI function slightly favored the directive decision making style, the S/F function strongly preferred the behavioral decision style, and the N/T and N/F functions showed slight preferences toward the analytical decision making style. While there were a total of 7 respondents whose decision style preference was conceptual, data did not show that there was dominant mental function that numerically correlated with the conceptual decision style.

Mental Function Group	Decision Style				Total
	Analytical	Behavioral	Conceptual	Directive	
S/T	3	8	3	10	24
S/F	1	6	0	1	8
N/T	6	2	4	4	16
N/F	2	1	0	0	3
Total	12	17	7	15	51

Table 37 – Mental Function/ Decision Style Comparison

6.6 Data Analysis:

The collection of data was analyzed using SPSS software. To analyze the data, multiple data analyses were used. To compare the categorical variables, a contingency table analysis using a chi-square statistic was used to examine the association between the categorical variables. A *"contingency table analysis is a common method of analyzing the association between two categorical variables"* (Elliott & Woodward 2007). When performing a correlation analysis, a Pearson's correlation coefficient was used. A correlation analysis was appropriate for use in this research because it exhibits the existence of a correlation between different variables when the items are deemed to be relational (Babbie, 2001).

6.7 Hypothesis Results

H_m - There is a significant statistical relationship between the preferred dominant mental functions of personality type and decision-making styles. Prior to testing this hypothesis, it first had to be determined which types of variables were being analyzed. After reviewing the variables (MBTI and DSI), it was determined that the variables were nominal, categorical variables. Within each variable are 4 categories (constants) in which an individual is grouped based on their individual preferences. Therefore, to test this hypothesis, a contingency table analysis using a chi square statistic was used. The results were as follows:

Myers Brigs Type Indicator * Decision Style Inventory Cross tabulation							
			Decision Style Inventory				Total
			Analytical	Behavioral	Conceptual	Directive	
Myers Brigs Type Indicator	S/T	Count	3	8	3	10	24
		Expected Count	5.6	8	3.3	7.1	24
	S/F	Count	1	6	0	1	8
		Expected Count	1.9	2.7	1.1	2.4	8
	N/T	Count	6	2	4	4	16
		Expected Count	3.8	5.3	2.2	4.7	16
	N/F	Count	2	1	0	0	3
		Expected Count	0.7	1	0.4	0.9	3
Total		Count	12	17	7	15	51
		Expected Count	12	17	7	15	51

Table 38 – MBTI/DSI Cross Tabulation

Table 38 shows the tabulated results when comparing the MBTI versus the DSI. The table shows the exact count of individuals who displayed a certain MBTI function versus decision making styles. Table 38 displays similar information as Table 37; the disparity lays two fold. Table 37 was manually calculated whereas Table 38 is an SPSS output. Moreover, Table 38 also shows the expected count in addition to the exact count. The expected count is used in determining the p-value which can be seen in Table 39.

Chi-Square Tests				
	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)
				Sig.
Pearson Chi-Square	17.614[a]	9	0.04	0.02
Likelihood Ratio	18.697	9	0.028	0.039
Fisher's Exact Test	14.801			0.039
Linear-by-Linear Association	4.179	1	0.041	0
N of Valid Cases	51			
a. 12 cells (75.0%) have expected count less than 5. The minimum expected count is .41.				

Table 39 – Chi-Square Test

As seen in Table 38, the p-value for the chi-square test was 0.04 which shows significance. However, as seen in the footnote section of Table 39, the assumptions for the chi-square have been violated due to 12 cells having an expected count (frequency) of more than 5. Because of this violation, Howell (2010) writes that the Fisher's Exact Test result should be used. The reason for this is because the chi-square statistic has a limitation of accurately calculating data with small expected frequencies. Observing the Fisher's Exact Test result, it can be seen that the resulting p-value is 0.039 which, like the chi-square result, shows significance. Therefore, hypothesis H_M is accepted.

To test the 16 subsidiary hypotheses, the same practice was used in determining the variables as with the main hypothesis. Looking at each component (category) of the MBTI and DSI individually, it was seen that they are determined based on numerical range making them ordinal variables (Figure 6 shows a pictorial view of the categorical

and range levels). Because of this, all 16 subsidiary hypotheses were tested via a correlation analysis using a Spearman's Rho statistic.

The Spearman's Rho statistic is reported with two values. One of the values is the statistical significance probability (p-value) which is explained in section 5.3. The other value is the correlation coefficient value (explained in terms of rho). The rho value assesses the strength of the relationship between two variables. If the rho value between two variables is 1 (or -1), the correlation or relationship between the variables would be deemed perfect. For example, for every increase (or decrease) a variable experiences, the associated variable experiences the exact same increase (or decrease) which would result in a 1 to 1 linear relationship. In addition, the closer to 1 (or negative 1) the rho value is, the stronger the relationship.

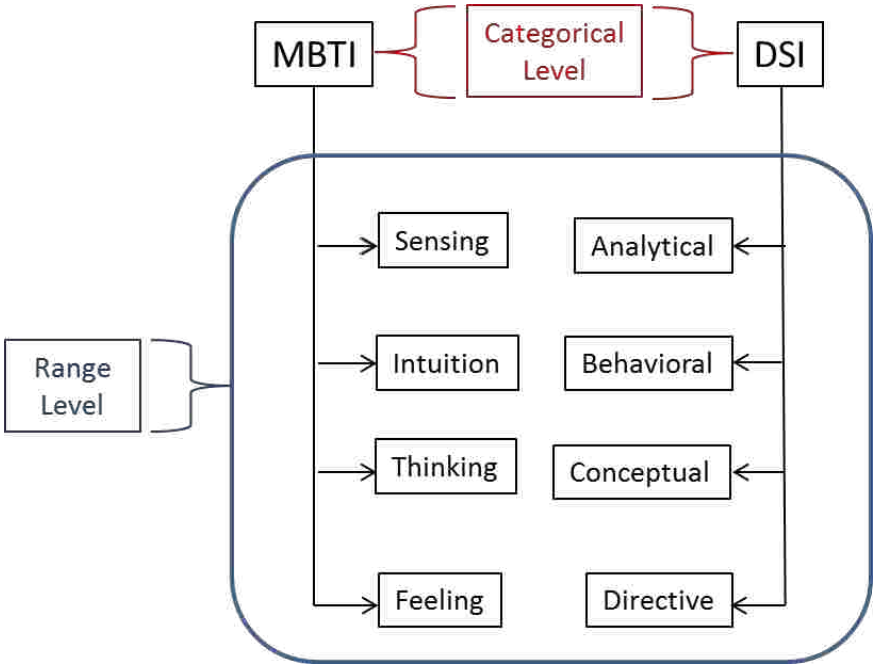

Figure 6 – Variable Level

H_1 - There is a significant statistical relationship that exists between the mental function of Sensing (S) and analytical decision making. This hypothesis is rejected. The relationship between the sensing function and analytical decision making shows a correlation of (rho = -.243, p = .086) at the .05 significance level. The analysis of this data show that there is some correlation (at the .01 level), however, the correlation isn't strong enough to be deemed significant. Table 40 shows the actual output of sensing versus analytical.

Spearman's rho		Analytical
Sensing	Correlation Coefficient	-.243
	Sig. (2-tailed)	.086
	N	51

Table 40 – Sensing/ Analytical Correlation

H_2: There is a significant statistical relationship that exists between the mental function of Sensing (S) and directive decision making. This hypothesis is accepted. The relationship between the sensing function and the directive decision making style shows a correlation of (rho = .325, p = .020) at the .05 significance level. Table 41 shows the actual output of sensing versus directive.

Spearman's rho		Directive
Sensing	Correlation Coefficient	.325*
	Sig. (2-tailed)	.020
	N	51

Table 41 – Sensing/ Directive Correlation

H_3: There is a significant statistical relationship that exists between the mental function of Sensing(S) and behavioral decision making. This hypothesis is rejected. The relationship between the sensing function and the behavioral decision making style shows a correlation of (rho = .202, p = .156) at the .05 significance level. Table 42 shows the actual output of sensing versus behavioral.

Spearman's rho		Behavioral
Sensing	Correlation Coefficient	.202
	Sig. (2-tailed)	.156
	N	51

Table 42- Sensing/Behavioral Correlation

H_4: There is a significant statistical relationship that exists between the mental function of Sensing (S) and conceptual decision making. This hypothesis is rejected. The relationship between the sensing function and the conceptual decision making style shows a correlation of (rho = .261, p = .064) at the .05 significance level. Like with the sensing/ analytical correlation, results show that there is correlation at the .01 level.

Nevertheless, significance at the .05 level is what is required to be deemed significant. Table 43 shows the actual output of sensing versus conceptual.

Spearman's rho		Conceptual
Sensing	Correlation Coefficient	.261
	Sig. (2-tailed)	.064
	N	51

Table 43 – Sensing/Conceptual Correlation

H_5: There is a significant statistical relationship that exists between the mental function of Feeling (F) and analytical decision making. This hypothesis is rejected. The relationship between the feeling function and the analytical decision style shows a correlation of (rho = .194, p = .173) at the .05 significance level. Table 44 shows the actual output of feeling versus analytical.

Spearman's rho		Analytical
Feeling	Correlation Coefficient	.194
	Sig. (2-tailed)	.173
	N	51

Table 44 – Feeling/Analytical Correlation

H_6: There is a significant statistical relationship that exists between the mental function of Feeling (F) and directive decision making. This hypothesis is rejected. The relationship between the feeling function and the directive decision style shows a correlation of (rho =.265, p = .060) at the .05 significance level. Table 45 shows the actual output of feeling versus directive.

Spearman's rho		Directive
Feeling	Correlation Coefficient	-.265
	Sig. (2-tailed)	.060
	N	51

Table 45 – Feeling/Directive Correlation

H_7: There is a significant statistical relationship that exists between the mental function of Feeling (F) and behavioral decision making. This hypothesis is accepted. The relationship between the feeling function and the behavioral decision style shows a correlation of (rho = .454, p = .001) at the .01 significance level. A correlation of this magnitude shows very strong significance between variables. The actual output of feeling versus behavioral can be seen in Table 46.

Spearman's rho		Behavioral
Feeling	Correlation Coefficient	.454**
	Sig. (2-tailed)	.001
	N	51

Table 46 – Feeling/ Behavioral Correlation

H_8: There is a significant statistical relationship that exists between the mental function of Feeling (F) and conceptual decision making. This hypothesis is rejected. The relationship between the feeling function and the behavioral decision style shows a correlation of (rho = .030, p = .833) at the .05 significance level. This specific relationship is the weakest of all those that were tested. The actual output of the feeling vs. conceptual relationship can be seen in Table 47.

Spearman's rho		Conceptual
Feeling	Correlation Coefficient	.030
	Sig. (2-tailed)	.833
	N	51

Table 47 – Feeling/Conceptual Correlation

H_9: A significant statistical relationship exists between the mental function of Thinking (T) and analytical decision making. This hypothesis is accepted. The relationship between the thinking function and the analytical decision style shows a

correlation of (rho = .300, p = .032) at the .05 significance level. Table 48 displays the actual output of thinking versus analytical.

Spearman's rho		Analytical
Thinking	Correlation Coefficient	.300*
	Sig. (2-tailed)	.032
	N	51

Table 48 – Thinking/Analytical Correlation

H_{10}: There is a significant statistical relationship that exists between the mental function of Thinking (T) and directive decision making. This hypothesis is rejected. The relationship between the thinking function and the directive decision style shows a correlation of (rho = .268, p = .057) at the .05 significance level. Table 49 shows the actual output of thinking versus directive.

Spearman's rho		Directive
Thinking	Correlation Coefficient	.268
	Sig. (2-tailed)	.057
	N	51

Table 49 – Thinking/Directive Correlation

H_{11}: There is a significant statistical relationship that exists between the mental function of Thinking (T) and behavioral decision making. This hypothesis is accepted. The relationship between the mental function thinking and the behavioral decision style shows a correlation of (rho = .472, p = .000) at the .01 significance level. This association is the strongest correlation of all tested. Table 50 displays the actual output of thinking versus behavioral.

Spearman's rho		Behavioral
Thinking	Correlation Coefficient	.472**
	Sig. (2-tailed)	.000
	N	51

Table 50 – Thinking/Behavioral Correlation

H_{12}: There is a significant statistical relationship that exists between the mental function of Thinking (T) and conceptual decision making. This hypothesis is rejected. The relationship between the mental function thinking and the conceptual decision style shows a correlation of (rho = -.058, p = .685) at the .05 significance level. This association is the second weakest of all tested. Table 51 shows the actual output of thinking versus conceptual.

Spearman's rho		Conceptual
Thinking	Correlation Coefficient	-.058
	Sig. (2-tailed)	.685
	N	51

Table 51 – Thinking/Conceptual Correlation

H_{13}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and analytical decision making. This hypothesis is rejected. The relationship between the mental function intuition and the analytical decision style shows a correlation of (rho = .260, p = .065) at the .05 significance level. Table 52 displays the actual output of intuition versus analytical.

Spearman's rho		Analytical
Intuition	Correlation Coefficient	.260
	Sig. (2-tailed)	.065
	N	51

Table 52 – Intuition/Analytical Correlation

H_{14}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and directive decision making. This hypothesis is accepted. The relationship between the mental function intuition and the directive decision style shows a correlation of (rho = .399, p = .015) at the .05 significance level. Table 53 shows the actual output of intuition versus directive.

Spearman's rho		Directive
Intuition	Correlation Coefficient	.339*
	Sig. (2-tailed)	.015
	N	51

Table 53 – Intuition/Directive Correlation

H_{15}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and behavioral decision making. This hypothesis is rejected. The relationship between the mental function intuition and the behavioral decision style shows a correlation of (rho = -.186, p = .191) at the .05 significance level. Table 54 displays the actual output for intuition versus behavioral.

Spearman's rho		Behavioral
Intuition	Correlation Coefficient	-.186
	Sig. (2-tailed)	.191
	N	51

Table 54 – Intuition/behavioral Correlation

H_{16}: There is a significant statistical relationship that exists between the mental function of Intuition (N) and conceptual decision making. This hypothesis is rejected. The relationship between the mental function intuition and the conceptual decision style shows a correlation of (rho = .121, p = .396) at the .05 significance level. Table 55 shows the actual output for intuition versus conceptual.

Spearman's rho		Conceptual
Intuition	Correlation Coefficient	.121
	Sig. (2-tailed)	.396
	N	51

Table 55 – Intuition/Conceptual Correlation

Table 56 displays the entire SPSS output for the Spearman's Rho correlation analysis.

Correlations						
			Analytical	Behavioral	Conceptual	Directive
Spearman's rho	Sensing	Correlation Coefficient	-.243	.202	.261	.325*
		Sig. (2-tailed)	.086	.156	.064	.020
		N	51	51	51	51
	Intuition	Correlation Coefficient	.260	-.186	.121	.339*
		Sig. (2-tailed)	.065	.191	.396	.015
		N	51	51	51	51
	Thinking	Correlation Coefficient	.300*	.472**	-.058	.268
		Sig. (2-tailed)	.032	.000	.685	.057
		N	51	51	51	51
	Feeling	Correlation Coefficient	.194	.454**	.030	-.265
		Sig. (2-tailed)	.173	.001	.833	.060
		N	51	51	51	51
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Table 56 – Spearman's Rho Analysis

6.8 – Additional Findings

Additional research aimed to determine if there was a relationship between either the MBTI mental functions and/or the DSI mental functions versus demographic data. While these findings were not the focus of this research, they may prove useful in helping organizations understand decision makers with regards to gender, age, ethnicity, education, branch of service, years of service, and rank.

After analysis, it was found that there was not a relationship between MBTI mental functions and gender ($p = .098$), age ($p = .314$), ethnicity (.137), education ($p = .216$), branch of service ($p = .627$), year of service (.353), or rank (.490).

In reviewing decision making style versus demographics, results from the analysis showed that there was not an association between decision making style and gender ($p = .961$), branch of service ($p = .569$), rank ($p = .686$), years of service ($p = .451$), ethnicity ($p = .137$), or age ($p = .275$). There was, however, an association between decision making style and level of education ($p = .039$). Conducting an analysis between specific decision making style and level of education, the strongest correlation was found between education level and analytical decision style (rho = .303, $p = .031$) and behavioral decision style (rho = -.283, $p = .044$). There was not a correlation between conceptual (rho = .037, $p = .798$) or directive (rho = -.101, $p = .479$) decision styles and education level.

Section 7.0 – Conclusions

7.1 – Introduction

The decision making process is a crucial leadership function that is increasingly becoming convoluted due to technological and politico-socio-economic factors. This can be seen throughout the government & military realm. Per Major William S. Blair, USA, *"The Army faces an operating environment characterized by volatility, uncertainty, complexity, and ambiguity. Military professionals struggle to make sense of this paradoxical and chaotic setting. Succeeding in this environment requires an emergent style of decision making, where practitioners are willing to embrace improvisation and reflection"* (2010).

Per Senik (et al., 2012), the existence of various decision making styles have been recognized for decades. Senik et al. (2012) write, that *"knowing an individual's decision style pattern, we can predict how he or she will react to various situations."* Going further, Bahreinian and Ahi (2012) write that researchers claim that the psychological profile of leaders could have an effect on leadership/decision making style. In other words, a leader's decision style is affected by his/her personality type. Ahmed, Hasnain, and Venkatesan (2012) support this claim stating that *"personality is often considered as a potential determinant of preference for decision making"* (Department of the Army, 2013).

The results conducted by this research support the prior quote in that personality is a potential determinant for decision making. As seen in this research, there is a strong relationship between MBTI personality style mental functions (i.e. cognitive process) and DSI decision making styles. Moreover, this research displayed specific correlations

between individual mental functions and specific decision making styles. This is useful information in that it provides organizations with knowledge about how decision making forms and conducts decisions and how these individual decisions are related to individual personality types.

7.2 – Known Unknowns

Looking at Table 57 (excerpted from Table 13), the unknowns for this research can be seen. One of the purposes of this research was to answer the listed unknowns. The following discussion specifies each unknown and whether it was answered.

What is unknown
• If mental functions of personality type in regards to the MBTI have a statistical significant relationship to individual decision making styles of the DSI. • If personality type influenced decision-making styles • If certain personality types handle ambiguity more effectively than others • If there is correlation between individual personality type functions and decision-making styles • If there is a correlation between decision making styles and/or personality functions and specific demographics

Table 57 – Unknowns

Unknown 1 - If mental functions of personality type with regards to the MBTI have a statistically significant relationship to individual decision making styles of the

DSI. Results from the contingency table analysis showed a p-value of .039. Therefore, this unknown has been answered.

Unknown 2 - If personality type influenced decision-making styles. Data analysis shows that certain personality types correlate more with certain decision styles than others. Therefore, it can be assumed that personality type influences decision making style. This unknown is answered.

Unknown 3 - If certain personality types handle ambiguity more effectively than others. Research shows that analytical and conceptual decision styles have a high tolerance for ambiguity. Table 58 by Rowe and Mason as referenced by Pennino (2002) reports that NT types map best with analytical, and NF types map with conceptual. Per data analysis, thinking types have a strong correlation with analytical. Analysis did not show any correlation with conceptual decision styles. This is believed to be due to the lack of sample size (respondents). The result of the thinking function mapping with analytical agrees with the research. Therefore, this unknown is partially answered.

	Thinking (T)	**Feeling (F)**
Intuition (N)	NT Type (Analytical)	NF Type (Conceptual)
Sensing (S)	ST Type (Directive)	SF Type (Behavioral)

Table 58 – Jungs's typology vs. DSI Styles

Unknown 4 - If there is correlation between specific individual personality type functions and specific decision-making styles. Data analysis clearly shows that there is a correlation between individual personality type functions and decision styles (see Table 56). This unknown is answered.

Unknown 5 - If there is a correlation between decision making styles and/or personality functions and specific demographics. Results from data analysis show that there is only a correlation between decision making style and level of education. There was an association between analytical and behavioral decision styles and level of education. There were no other correlations. This unknown is therefore answered.

7.3 – Discussion of Hypothesis Testing

Hypothesis testing was perhaps the single most important aspect of this research. Prior to conducting the testing, the first thing that had to be established was the type of variables that were being analyzed. The main hypothesis compared the MBTI to the DSI.

In looking at each of these variables as a whole, it was determined that they were categorical. The reason for the conclusion is because the MBTI and DSI are each separated into categories that describe each specific individual. By design, individuals can fall into only one category in each assessment (i.e. they are either S/T or S/F; analytical or behavioral).

Moreover, the categorical variables are classified as nominal. This was determined because they are not ranked variables. Specifically, the order of their respective sub variables is irrelevant (of non-importance in relation with one another). For example, the mental function N/F and N/T of the MBTI has no numerical order in relation to one another. The order in which the functions are displayed is a matter of preference.

The same holds true for the decision styles of the DSI. Analytical or behavioral can be ordered behavioral or analytical without having any specific value lost. Once this was determined, the next step was deciding the proper analysis. Because the variable was found to be categorical and the purpose of the main hypotheses was to determine if there was a relation between the two, a contingency table analysis was used to determine the relationship between the two variables.

The subsidiary hypotheses aimed to determine if there was a correlation between the specific mental functions of the MBTI and the specific decision types of the DSI. Setting up this analysis proved slightly more convoluted. Upon review of each specific variable, it was determined that the variables were ordinal (ranked). The reason for this determination was due to how both of the assessments are designed. The MBTI functions are based on a numerical clarity scale with “slight” being the least and “very clear” being the greatest. The scales for the sensing/intuition dichotomy and the thinking/feeling

dichotomy slightly differ. The sensing/intuition scale ranges from 13 – 26 whereas the thinking/feeling scale range from 12 – 24 (please reference Table 16 in section 5.1). This slight difference in scale did not, however, affect the data analysis.

The DSI is designed very similar where there is a numerical intensity level scale with "least emphasis" being the least and "very dominant" being the greatest. However, the scales for each style differed greatly. Because of these differences, the scales had to be converted to a like scale for proper analysis. The resulting conversion scale can be viewed in Table 59.

Style	Least Emphasis	Back-Up	Dominant	Very Dominant
Directive	Below 68	68 – 82	83 – 90	Over 90
Analytical	Below 83	83 – 97	98 – 104	Over 104
Conceptual	Below 73	73 – 87	88 – 94	Over 94
Behavioral	Below 48	48 – 62	63 – 70	Over 70
Conversion Scale	70	80	90	100

Table 59 – Conversion Table

The above table shows the exact scale of each decision type and conversion scale. The conversion scale is the same for each decision style. The reason for this conversion is due to the extreme variation of the exact scale. The exact scale prevents accurate results when correlating the data. For example, for the exact scale of behavioral, anything over

70 would be classified as very dominant. However, on a numerical scale, the back-up level for analytical would appear higher than the very dominate behavioral. To prevent this, the conversion to an even scale was developed. To apply the scale, the DSI test was conducted. Once the individual results were obtained, (e.g. Directive 71 – Back up, Analytical 82 – Least Emphasis, Conceptual 88 – Dominant, Behavioral 81 – Very dominant) the results were taken and converted to the corresponding converted level. Please see the following example:

- Directive 71 (Back Up) converts to 80 Back Up;
- Analytical 82 (Least Emphasis) converts to 70 Least Emphasis;
- Conceptual 88 (Dominant) converts to 90 Dominant;
- Behavioral 81 (Very Dominant) converts to 100 Very Dominant.

Converting the results in this manner ensures that the data analysis tool isn't "confused as to which intensity level result is greater. Once this was conducted, data analysis could be performed.

Subsidiary hypotheses 1 – 16 all focused on determining if there was a correlation between ordinal (ranked) variables. With this information, it was determined that the best method to perform a correlation analysis is Spearman's Rho.

7.4 – Wrap up & Future Research

Results from this research proved that there is an association between personality type mental functions and decision making styles. However, the sample size for the research was relatively small (n=51). While adequate for statistical relevancy and to

conduct an analysis, the lack of sufficient representation for each category leaves the big picture unclear.

This research answered some vital questions, demonstrated a relationship, and supported prior literature. Nevertheless, sampling was limited in sample size and audience (Department of Defense personnel). Further research with increased sampling and audience (i.e. Department of Homeland Security, Department of Energy, National Aeronautics and Space Administration, Department of Labor, etc.) may offer deeper understanding of the cognitive process of decision making and its relationship and/or influence to leadership decision making styles.

Moving forward, this research will support topics in academic, industry, and government journals such as the following:

- Engineering Management Journal,
- Journal of Management,
- The Military review,
- Harvard Business Review,
- The Leadership Quarterly,
- Leadership Management in Engineering,
- Project Management Journal,
- Journal of Management Development,
- Judgment and Decision Making,
- Journal of Management in Engineering.

Information from this research will be used to publish scholarly work in the aforementioned journals.

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9.0 – Appendix

A.1. Invitation and instructions to conduct assessments

The following is the invitation and instructions that was sent to participants to conduct the MBTI and DSI assessments. Links to both surveys are included with the invitation.

Thank you for taking part in my PhD research. The purpose of my research is determine if there is a relationship between the mental functions of the Myers-Briggs type indicator and the decision-making styles among leadership personnel in military/ government organizations.

There are two assessments that you will be asked to complete; the Myers Brigs Type Indicator (MBTI) and the Decision Style Indicator (DSI). Links to both surveys are at the end of this document.

The MBTI is a 93 question assessment that determines ones personality type. Per the MBTI, personality type is broken into four dichotomies, each consisting of two components. Please view the following table:

	Components	
Attention Focus	**Extraversion (E)** Focus attention on the outer world of people and things	**Introversion (I)** Focus attention on the inner world of ideas and impressions
Information Procession	**Sensing (S)** Take in info through the five senses and focus on the here and now	**Intuition (N)** Take in info from patterns and big picture and focus on future possibilities
Form Judgment	**Thinking (T)** Judgment formed based on logic and objective analysis of cause and effect	**Feeling (F)** Judgment formed based on values and subjective evaluation of person-centered concerns
Outer World Relationship	**Judging (J)** Prefer a planned and organized approach to life	**Perceiving (P)** Prefer a flexible and spontaneous approach to life

Table 60 - MBTI

The final personality output will be a combination of one component from each of the four dichotomies (e.g. ESTJ). The average time to complete the MBTI is approx. 5 - 10 minutes.

The DSI is a 20 question survey assessment that determines ones decision making style. Per the DSI, decision style is broken down into one of four types:

Decision Style	Brief Description
Directive	Have a low tolerance for ambiguity and cognitive complexity. Focus on facts and make quick decisions with limited info or alternatives. Prefer to be in control of decisions.
Analytical	Have a high leniency for ambiguity. Base decisions on objective, rational data from management control systems and other sources.
Conceptual	Have a broad outlook to a situation. Consider many alternatives and future possibilities. Risk takers who have a high tolerance for ambiguity.
Behavioral	Have a strong concern for people as individuals and the organization. Low tolerance for ambiguity. Base decisions on the concern for others.

Table 61 – DSI

The average time to complete the DSI is less than 5 minutes.

Prior to taking the assessments, there are a few guidelines that must be followed. First and foremost, under no circumstance am I to have any knowledge of individual participants. To ensure this, you are **NOT** to list your first or last name on the assessment. The DSI survey has been designed to not provide an option for first or last name. Instead, you are required to provide a “unique identifier”. This unique identifier will consist of

your middle initial and either the last four digits of your SSN, home or cell phone. If you do not have a middle initial, then use the last letter of your first name (e.g. A1234).

The MBTI does not have a field labeled “unique identifier”. It actually has fields for your first and last name. **PLEASE DO NOT** list either your first or last name. Please follow the same instructions as with the DSI. In each of the first and last name fields, list your personal unique identifier. There is also a field titled “Personal ID”. This field is optional but you can place your personal identifier here as well.

IT IS VITAL THAT ONLY THE UNIQUE IDENTIFIER IS LISTED ON THE ASSESSMENTS. THE UNIQUE IDENTIFIER WILL NOT ONLY BE USED FOR ANONMINITY PURPOSES, IT WILL ALSO BE USED TO LINK EACH SURVEY.

For example, DSI “A1234” goes with MBTI “A1234”. If the unique identifier is used for the DSI and first and last name for the MBTI, I will be unable to compare the surveys (e.g. DSI “A1234” & MBTI “Jon Doe”).

All demographic information for the MBTI is optional. However, the demographic information on the DSI is mandatory.

Please make sure to answer every question. Aside from typing your unique identifier, no typing will be involved with the survey. Every question is a choice type question.

Following are links to both surveys.

This is the link for the DSI. It is fairly straight forward and self-explanatory.
https://www.surveymonkey.com/s/QJ8QZH6

This is the link for the MBTI.
https://online.cpp.com
The first thing you will have to do is sign in. Please use the following info:

Login: Prince101 (case sensitive)
Password: football82 (case sensitive)
User ID: leave this field blank

Once logged in, you will see the “begin” button”. Once you hit the “begin” button, you will be taken to a second page. The first item on this page is “batch name”. Select “Prince Dissertation” under the dropdown menu. This is also where you put your unique identifier, **NOT** your first or last name. Also, **DO NOT** enter neither your email nor home postal code. All other demographic information you can leave blank. I will capture the demographics from the DSI survey.

Because of the anonymity of this type of research, I will be unable to provide individuals with their individual results. I can however test individuals personally at the conclusion of my data collection. The reason for this is to ensure ALL of data included with my research is completely anonymous. If you would like me to assess you one on one, please contact me by email at the following:

Alprince78@hotmail.com

I will set up a time where I will provide info for you to take the assessment and receive your individual results.

By completing and submitting the surveys, you agree to allow the use of your data results for academic purposes only.

Again, thank you so much for partaking in my research. If you are aware of any one else who would not mind participating, please send this to them. The only requirements are that they would have to be active civilian or government grade GS12 or higher, officer 01 or higher, enlisted E5 or higher, or warrant officer W01 or higher.

HAVE FUN!!!

Antoine Prince

A.2. BCET Protocol

Title:

Examining the Relationship between Leadership Decision Making Style and Personality Type within the Military & Government Community

RPI: Dr. Charles Daniels – Academic Advisor

Co-PI: Antoine Prince – PhD Student

Introduction:

Decision making is an intricate phenomenon which is profoundly integrated in everyday life (Allwood & Selart, 2001). Per Ahmed, Hasnain, and Venkatesan (2012), the decision making process is a crucial leadership function that is increasingly becoming convoluted due to technological and politico-socio-economic factors. This is especially true within the government/ military realm. As written by Major William S. Blair, USA, *"The Army faces an operating environment characterized by volatility, uncertainty, complexity, and ambiguity. Military professionals struggle to make sense of this paradoxical and chaotic setting. Succeeding in this environment requires an emergent style of decision making, where practitioners are willing to embrace improvisation and reflection"* (2010).

Going further, Bahreinian and Ahi (2012) write that researchers claim that the psychological profile of leaders could have an effect on leadership style. In short, a leader's leadership style is affected by their personality type. Ahmed, Hasnain, and Venkatesan (2012) support this claim stating that *"personality is often considered as a potential determinant of preference for decision making"*.

As previously stated, decision making is vital within a military environment. However, there are many examples where ineffective decisions were conducted by military or government leadership officials. Some of these examples revolve around military engagements (i.e. the decision to invade Iraq) while others relate to government entities (NASA's Space Shuttle Program - Challenger launch decision). All of these

ineffective decisions resulted in unforeseen outcomes. John C. Maxwell (2007) writes that *"mistaken priorities lay at the heart of ineffective leadership."*

To attempt to gain an understanding behind military/ government leadership decision making, this research aims to examine if there is a statistical relevant relationship between leadership personality type and decision making style within a government/military organization. More specifically, this research will survey a diverse group of government and military officials in senior leadership positions to determine if the dominate mental functions of personality type can prognosticate decision making style, thus validating or invalidating the claim that personality type affects leadership style. In addition to this, this research will focus on the following:

- Identification of mental functions of personality type
- Identification of decision making styles
- Identification of relationship existence of personality type and decision making style

Purpose of Study and Research Questions:

Research shows that a limited amount of relevant research to determine if there is a significant statistical relationship between personality type and (leadership) decision making style specifically within the government/ military environment. As stated by Bruine de Bruin, Fischhoff, & Parker (2007), *"few studies have examined correlations between multiple decision making tasks".* Within government organizations, this knowledge may prove vital when the need to understand the rationale behind within the government/military community arises.

The purpose of this study is to examine and survey leadership personnel within the military/ government community to determine if there is an independent/ dependent relationship with their preferred personality type and decision making styles. The research question of this study is: *Is there a relationship between the mental functions of the Myers-Briggs type indicator and the decision-making styles among leadership personnel in military/ government organizations?*

Procedures:

A. Criteria for inclusion of this research must meet the following guidelines:
    a. Participants must be a current member of the US Armed forces or government employee
    b. Individuals must be of the rank of GS12 or higher for civil service; O1 or above for military officers; E5 or above for enlisted personnel
B. The research will take place within various military/government organizations – (e.g. DTRA HQ, DTRA Eglin, Dugway Proving Ground, Ft. Campbell, etc.)
C. Subject population will be military/government personnel. Approx. age range 21 – 50; both male and female participants, all ethnicities will be invited to participate, and goal is to obtain 150 participants. Electronic links for each survey will be sent to all participants.
D. The study will utilize the Myers Briggs Type Indicator and the Decision Style Inventory
E. The procedure of the study if for the Co-PI to distribute the MBTI and DSI surveys electronically to each participant. Each participant will take both surveys and identify the surveys with just their individual middle initial and last four of their SSN or home number. The Co-PI will be electronically notified once each survey is completed. At that point, the data will be able to be extracted without the knowledge of the participant.

Risk and benefits for Participation:

A. There are not any risks to the participants for participating in the study.
B. No procedures or plans necessary to minimize risk.

Data Collection:

A. Raw data collected will be managed only by the Co-PI. The data will be electronically housed on the CPP and Survey Monkey web accounts. CPP is the publisher of the MBTI. The data will be reported in the final dissertation submittal.
B. Anonymity will be maintained with none of the researchers having knowledge of who participated in the study. Each participant will be instructed to use their middle initial and last four of SSN or home numbers only to link the two surveys.

C. If necessary, the data will be deleted five years after project completion..

Informed Consent:

A. The subjects will be recruited by email invitation and by association. What is meant by association is the Co-PI will ask a participant if her/she would ask a colleague if he/she would participate in the study. Potential participants will be informed that submitting completed surveys will imply consent to use data. However, no information concerning any participant's data results will be shared.

Data Analysis:

A. The collection of data will be analyzed using SPSS software. All the data collected will be analyzed using descriptive statistics. Because of this, Analysis of Variance (ANOVA) (multivariate analysis) and Spearman rho (correlation analysis) will be used. *"The use of ANOVA is an appropriate method for utilization due to its ability to access the relative magnitude of variation among different variables"* (Jacoby, 2006). A correlation analysis is appropriate for use in this research because it exhibits the existence of a correlation between different variables when the items are deemed to be relational. (Babbie, 2001).

A.3. MBTI Permission Form

Number 19440

CPP Permission

Sample Item Request Form

Date 12 November 2014

Name Antoine L. Prince, Sr.

Address _____

Telephone Number

Fax Number

Email Address:

CPP Customer Number 434456

Specific title, form, and edition of the instrument for which sample items are needed: Sample questions of the MBTI Form M in appendix of dissertation

Sample items will be published in: (Dissertation) Thesis Research Project Other _____

Title of Project or Article or Publication: Examining the Relationship between Leadership Decision making Style and Personality Type within the Military and Government Community

Terms and Conditions for Research Use

If permission is granted by CPP, Inc. ("CPP") the following terms and conditions will apply:

1. CPP will issue pre-selected sample items for the assessment requested. Only these sample items may be used.
2. Permission is limited to only the one-time use specifically described above.
3. You agree to use a credit line supplied by CPP whenever sample items appear.
4. This permission does not include any commercial or for-profit use of the sample items.
5. There is no fee associated with this permission.
6. You assume responsibility for any misuse of the sample items you use pursuant to this agreement. CPP shall not be responsible for your use or misuse of the sample items.
7. You agree that the sample items as provided by CPP and used by you pursuant to this agreement remain the property of CPP.
8. You agree not to adapt, modify, translate, alter, or change the sample items in any way.

I hereby request permission from CPP for sample items as described above and agree to the terms outlined above for such research use:

Signature

12 November 14
Date

CPP, Inc., hereby extends you permission under the terms stated above for the sample items you have requested.

CPP Authorized Signature

NOVEMBER 17, 2014
Date

THAD STEPHENS
VICE PRESIDENT &
GENERAL COUNSEL

9.09

A.4. Myers Briggs Type Indicator Sample Assessment Questions

Sample Items

From the

Myers-Briggs Type Indicator Instrument® Form M

By Katharine C. Briggs and Isabel Briggs-Myers

Your answers will help show you how you like to look at things and how you like to go about deciding things. There are no "right" and "wrong" answers to these questions. Knowing your own preferences and learning about other people's can help you understand what your strengths are, what kinds of work you might enjoy, and how people with different preferences can relate to one another and contribute to society.

Part I: Which answer comes closest to telling how you usually feel or act?

16. Are you inclined to
    A. value sentiment more than logic, or
    B. value logic more than sentiment?

20. Do you prefer to
    A. arrange dates, parties, etc., well in advance,
    or
    B. be free to do whatever looks like fun when the time comes?

Part II: Which word in each pair appeals to you more? Think about what the words mean, not about how they look or sound.

36. A. systematic
    B. casual

58. A. sensible
    B. fascinating

Part III: Which answer comes closest to describing how you usually feel or act?

59. When you start a big project that is due in a week, do you
    A. take time to list the separate things to be done and the order of doing them,
    or
    B. plunge right in?

67. At parties do you
    A. do much of the talking, or
    B. let others do most of the talking?

Part IV: Which word in each pair appeals to you more? Think about what words mean, not about how they look or how they sound.

79. A. imaginative
B. realistic

91. A. devoted
B. determined

A.5. Decision Style Inventory Assessment

Decision-Making Style Inventory

A. J. Rowe, R. Mason, and K. Dickel, Strategic Management and Business Policy (Reading, Mass.: Addison-Wesley) 1982

Use the following numbers to rate the answers to each question:

8 = when the question is MOST like you.
4 = when the question is MODERATELY like you.
2 = when the question is SLIGHTLY like you.
1 = when the question is least like you.

One of the numbers must be entered on each line following the answers to each question. Do not repeat any number on a given line. For example, the numbers you might use to answer a given question could look as follows: 8 2 1 4

In answering the questions, think of how you NORMALLY act in your work situation. Use the first thing that comes to your mind when answering the question. Your responses should reflect how you feel about the question and what you prefer to do, not what you think might be the right thing to do.

		I		II		III		IV
My prime objective is to:	Have a position with status.		Be the best in my field.		Achieve recognition for my work.		Feel secure in my job.	
I enjoy jobs that:	Are technical and well defined.		Have considerable variety.		Allow independent action.		Involve people.	
I expect people working for me to be:	Productive and fast.		Highly capable.		Committed and responsive.		Receptive to suggestions	
In my job, I look for:	Practical results.		The best solutions.		New approaches.		Good working environment.	
I communicate best with others:	In a direct one-to-one basis.		In writing.		By having a group discussion.		In a formal meeting.	
In my planning I emphasize:	Current problems.		Meeting objectives.		Future goals.		Developing people's careers.	
When faced with solving a problem, I:	Rely on proven approaches.		Apply careful analysis.		Look for creative approaches.		Rely on my feelings.	
When using information, I prefer:	Specific facts.		Accurate and complete data.		Broad coverage of many options.		Limited data that is easily understood.	
When I am not sure about what to do, I:	Rely on intuition.		Search for fact.		Look for a possible compromise.		Wait before making a decision.	
Whenever possible, I avoid:	Long debates.		Incomplete work.		Using numbers or formulas.		Conflict with others.	
I am especially good at:	Remembering data and facts.		Solving difficult problems.		Seeing many possibilities.		Interacting with others.	
When time is important, I:	Decide and act quickly.		Follow plans and priorities.		Refuse to be pressured.		Seek guidance or support.	
In social settings, I generally:	Speak with others.		Think about what is being said.		Observe what is going on.		Listen to the conversation.	
I am good at remembering:	People's names.		Places we met.		People's faces.		People's personality.	
The work I do provides me:	The power to influence others.		Challenging assignments.		Achieving my personal goals.		Acceptance by the group.	
I work well with those who are:	Energetic and ambitious.		Self-confident.		Open-minded.		Polite and trusting.	
When under stress, I:	Become anxious.		Concentrate on the problem.		Become frustrated.		Am forgetful.	
Others consider me:	Aggressive.		Disciplined.		Imaginative.		Supportive.	
My decisions typically are:	Realistic and direct.		Systematic or abstract.		Broad and flexible.		Sensitive to the needs of others.	
I dislike:	Losing control.		Boring work.		Following rules.		Being rejected.	
Check-sum = 300?	**0**	0		0		0		0

Left hemisphere (logical) / Right hemisphere (relational)

Tolerance for ambiguity	**Analytical II** Enjoys problem solving Wants best answer Wants control Uses considerable data Enjoys variety Is innovative Uses careful analysis **N-ACH**, needs challenges	**Conceptual III** Is achievement-oriented Has a broad outlook Is creative Is humanistic/artistic Initiates new ideas Is future-oriented **N-ACH**, is independent and wants recognition
Cognitive Complexity		
Need for structure	**Directive I** Expects results Is aggressive Acts rapidly Uses rules Uses intuition Is verbal **N-POW**, needs power	**Behavioral IV** Is supportive Uses persuasion Is empathetic Communicates easily Prefers meetings Uses limited data **N-AFF**, needs affiliation

Thinking (ideas) / Doing (action)

Task/technical / People/social

Values Orientation

Decision Style Intensity Levels

Style	*Intensity* — *Least Preferred*	*Back-up*	*Dominant*	*Very Dominant*
Directive	Below 68	68 to 82	83 to 90	Over 90
Analytic	Below 83	83 to 97	98 to 104	Over 104
Conceptual	Below 73	73 to 87	88 to 94	Over 94
Behavioral	Below 48	48 to 62	63 to 70	Over 70

A.6. Demographics

1) Gender
   a. Male
   b. Female

2) Highest Education Level
   a. High School or GED
   b. Vocational School
   c. Associates Degree
   d. Bachelor's Degree
   e. Master's Degree (Includes MBA)
   f. Doctorate Degree (PhD, MD, JD, etc.)

3) Branch of Service
   a. Air Force
   b. Army
   c. Coast Guard
   d. Marine Corps
   e. Navy
   f. Civilian

4) Military/ Government Affiliation

a. Non-Commissioned Officer	E5	E6	E7	E8	E9	
b. Officer	O1	O2	O3	O4	O5	O6
c. Warrant Officer	W1	W2	W3	W4	W5	
d. Civil Service	GS12	GS13	GS14	GS15	SES	

5) Years of Service/ years employed
   a. 0 – 5 years
   b. 6 – 10 years
   c. 11 – 15 years
   d. 16 – 20 years

e. 21 – 25 years
f. 25+ years

6) Ethnic Background
   a. African American/ Black
   b. Asian/ East Asian Decent
   c. Caucasian/ White
   d. Latino/ Hispanic/ Spanish Decent
   e. Native American
   f. Other (Please specify) _____

10.0 – Vita

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Mr. Prince is currently a technical project manager with the Defense Threat Reduction Agency (DTRA) where he provides engineering, test, and programmatic expertise to support DTRA's mission in safeguarding the United States and its allies from the global WMD threats by integrating, synchronizing, and providing expertise, technologies, and capabilities across all operating environments.

Mr. Prince has nearly 14 years of engineering, test, project management, and systems integration experience supporting major military programs while serving as configuration management engineering integration and change cell lead on the USS George H. W. Bush (CVN 77) Nimitz-class supercarrier and test engineer lead on the United States Marine Corps (USMC) Expeditionary Fighting Vehicle (EFV) program.