Extract from:

THE MORAL DOMAIN OF WAR: A VIEW FROM THE COCKPIT

An Analysis of the factors which enable a pilot to fly in combat.

BY

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ABSTRACT

This study uses Brigadier General J.F.C. Fuller's theory of war to investigate the motivation of pilots flying in combat. The study holds the physical and cognitive domains of war variables constant and analyzes the moral domain effects on pilot behavior. Vietnam era F-105 pilots serve as the case study. A pilot combat motivation model based on J.F.C. Fuller's theory served as the framework for a survey. This survey, sent to 236 F-105 veterans, functioned as a vehicle to obtain data. The veterans returned 173 surveys for a 73.3% response rate. The Statistical Package for the Social Sciences analyzed the data and determined the validity of the model. Other empirical evidence such as unit end of tour reports, flight surgeon aeromedical evaluations, and monographs written by the pilots during the war, helped to verify findings. The results of the study strongly indicate that the proposed pilot combat motivation model explains pilot behavior in combat and suggests areas for future study.

ABOUT THE AUTHOR

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CHAPTER 1
INTRODUCTION

Man's innate fascination with flight, movement in the third dimension, remains insatiate. Even after Captain Charles E. "Chuck" Yeager conquered the transonic demons on 14 October 1947, when he broke the sound barrier,1 and after the historic Apollo 11 space flight of Neil Armstrong, Michael Collins, and Edwin "Buzz" Aldrin, 20 July 1969, which successfully placed men on the moon,2 this fascination continues. Yet, though the air environment allures and captures the imagination with its mystique, surprisingly the necessary factors relating to combat in this arena remain relatively obscure. What enables a pilot to endure combat? Do the same combat factors which cause stress in ground soldiers affect pilots in a similar manner? Many questions such as these remain inadequately answered. Since the inclusion of the airplane in war, few have investigated more complete answers. This work seeks to rectify this problem.

This study uses original research in an attempt to determine analytically the moral domain of war factors which enable a pilot to fly in combat. In chapter 2 a more complete definition of the moral domain appears; however, for now let it suffice to say that the moral domain consists of the motivation forces originating from within a person's heart and soul. Most combat motivation literature focuses on war from the soldier's perspective. This study deviates from this standard treatment and views motivation in war from the pilot's perspective. This emphasis shift gives insights which indicate a fundamentally different set of motivation factors operating on the pilot than generally assumed from projecting ground combatant motivation factors on airmen.3 Specifically, this study argues that the combat motivation factors affecting pilot behavior in combat adheres to a pattern emanating from the moral domain of war. Since the pilot's combat environment radically differs from that of the soldier, the motivation factors required for operation in this environment may differ as well.

This study attempts to expand the body of knowledge concerning the motivation behind a pilot in combat. The aircraft, a fairly new addition to the technological arsenal, initially entering combat in 1911, possesses more than just unique technology.4 It also places the combatant in a different environment. Logic suggests that if the environment and the nature of aerial employment differs from that on the ground, to assume that constituent combatants undergo the same stresses may lead to incorrect conclusions. War imposes many similar stresses for both combatants; however, the possible existence of unique stresses warrants a specific investigation for airmen.

Originally, this study sought to compare and contrast ground and air combatants. Since a dearth of information concerning air combatants exists in comparison to the plethora of that which exists for ground combat operations, it appeared necessary to first explore the nature of combat motivation focused on the air environment. I will propose a likely combat motivation model for pilots. This information could possibly enhance training, organization and employment at a time when force reductions threaten maintaining combat capability at its high level. Though rigorous, this study is not exhaustive. This work also seeks to establish an effective instrument for future study in the nature of aerial combat.

For case study purposes, this work focuses on combat operation of F-105 pilots during the Vietnam War. They arrived and fought the war from its beginning to end and took the war to the North. They suffered an extremely high casualty rate, yet their morale also remained high. Why? How did the majority of these pilots continue to give 100 percent in the face of lethal defenses, high attrition rates, and a perception that the national authorities did not value or understand what their mission entailed?5 This war and these pilots present a useful case study for the moral domain of war because of the stressful environment induced by the war's long duration and the unique employment characteristics of F-105 operations against North Vietnam.

The nature of war in the modern era fundamentally changed as a consequence of three revolutions. The political revolution increased the size of armies as witnessed by the levée en masse in France.6 Wars no longer confined themselves to mercenary armies of monarchs. Now nationalism affected the war effort and involved the entire society.7 The technological revolution increased the sophistication and quantity of weapons available to the armed forces8. The industrial revolution, a product of the technological revolution, allowed economies of scale to produce mass quantities of weapons well within monetary constraints of national treasuries.9 Finally, the managerial revolution allowed the organization and operation of mass armies.10 Bodies such as the German General Staff created a professional officer corps trained in the skills of war planning and execution.11 With these three revolutions and their accompanying accomplishments, the American Civil War marked the dawning of the new era of modern warfare.12 Its carnage served as a harbinger of things to come. World War I served as the initial culmination of this new state of warfare, the total war, followed by the even more lethal World War II.13

Technology changes constantly, management techniques change less frequently, but man himself has not changed since the creation.14 Leadership, strategy and the force of arms still determine victory in war. The United States Air Force does well exploiting technology, and planning for employment in a conflict. However, the Air Force tends to avoid analyzing the moral elements because of the difficulty of incorporating them in either doctrine or organization. In wars of antiquity, when rapidly changing technology did not yet cede the advantage to the innovator, nations understood the sublime importance of the moral force in war. Hannibal's defeat of the Roman army at Cannae illustrates this point.15 So, while the leaders of old realized the moral domain's importance, today's leaders seem to de-emphasize its centrality to warfare and concentrate more on technological capabilities. It is imperative not to rely on what is thought to exist, but what actually exists. Due to uncertainty, a nation cannot possess perfect information. So the information gap between reality and perception exists as illustrated in figure 1. However, accurate information can decrease this gap and form a much more substantial knowledge foundation on which to make decisions in this dynamic world.

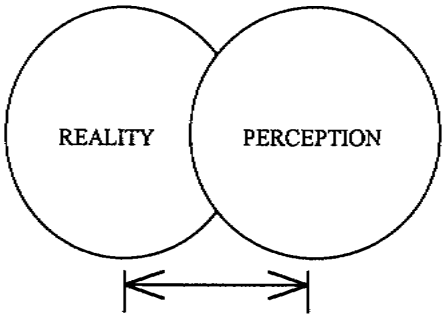

Fig. 1. The Information Gap[16]

Fig. 1. The Information Gap16

With the demise of the Soviet Union, formally marking the end of the Cold War era, the Gulf War marks the beginning of the real and pervasive threat to world peace, regional hegemons. Saddam Hussein sought to emerge as the leader of the Arab world. Many more regional hegemons wait in the flanks for the right time to make their power play. The US, the sole remaining superpower, cannot maintain the force structure required to respond everywhere at once. The US, however, still needs a sufficient military force capable of preserving and protecting its vital interests. During this uncertain time, when we cannot predict when or where the next conflict will erupt, the US needs to use every component of force within its arsenal to prepare for conflict. Since Desert Storm demonstrated that airpower can indeed play a decisive role in a conflict, studying the motivation factors of pilots might reveal some of the underlying principles which enabled the pilots to achieve such a high level of success.17

Monetary forecasts project a 25 percent Air Force reduction within a total Department of Defense Budget decrease to 4 percent of GNP by 1995.18 This is the lowest level since World War II. In this new environment, the luxury of concentrating only on technological capabilities and war plans no longer exists. The nation must also elicit the maximum capability from its fighting forces. To achieve this goal, decision makers must thoroughly understand the nature of the combatants.

Any endeavor which decreases the gap between our "perceptions" versus "reality," contributes to a greater likelihood of success. For the pilot, control is important. Maintaining control is the key to success. As long as the environment remains familiar, problems do not generally inhibit accomplishing this task. When the environment changes, the pilot has a limited time to make things resemble the familiar. If the pilot fails to regain the familiar environment within sufficient time, loss of control ensues, usually with catastrophic results. The pilot leaves this time sensitive environment after landing and walking away from the aircraft, not to reenter it until the next flight. The pilot, therefore, operates within a dynamic environment. In contrast, the soldier on the ground endures long periods of inactivity, followed by intense fighting--but when in the line continuously remains immersed in the environment.19 The pilot

resembles a sprinter or quarter-miler who runs heats until the final race for victory, while the soldier resembles the marathon runner who builds up endurance, enters the race and runs for broke. This illustrates a fundamental difference between the nature of the ground war and the air war.

The US success in Desert Storm has engendered much analysis. This study presents a tool for one method of analysis. If the moral factors do not receive an in-depth treatment, the analysis cannot be considered comprehensive. Such a failure may create the potential for future defeat as the United States draws down its forces to extremely low levels. In the final analysis, some usefulness can result from knowing which variables affect pilot behavior in combat, and to what degree. These relationships could provide some insight for developing training methods and tactics. Rising above the two dimensional constraints of surface warfare, I intend to investigate the moral domain of war from the boundless expanse of the third dimension.

NOTES

1 Jay Miller, The X-Planes: X-1 To X-31 (Arlington, Texas: Aerofax, Inc., 1988), 18.

2 David Baker, The History of Manned Space Flight (New York: Crown Publishers Inc., 1981.), 339, 341. Also see C.D.B. Bryan, The National Air and Space Museum (New York: Harry N. Abrams, Inc., 1982), 416, 491.

3 Anthony Kellett, Combat Motivation (Hingham, Massachusetts: Kluwer Boston, Inc., 1982), xvi.

4 Charles Christienne and Pieree Lissarrague, A History of French Military Aviation, trans. Francis Kianka (Washington D.C.: Smithsonian Institution Press, 1986),39. The Italians fought with the airplane first in a war against the Turks, where they used the French Blériot to make reconnaissance flights in Libya from Tripoli in October 1911.

5 Hanson W. Baldwin, in Jack Broughton, Thud Ridge (Philadelphia, Pennsylvania: J.B. Lippincott Co, 1969), 12.

6 Modern Warfare and Society, vol. 1, ed. Lieutenant Colonel Robert C. Ehrhart (United States Air Force Academy, Colo.: Department of History, 1982), 5-10.

7 Ibid., 5-1.

8 Martin van Creveld, Technology And War: From 2000 BC. To The Present (New York: The Free Press, Macmillan, Inc., 1969), 161.

9 Ibid., 10-1.

10 Ibid., 10-12 -- 10-13.

11 Ibid., 10-15.

12 Ibid., 9-11, 9-16.

13 Theodore Ropp, War In The Modern World, (New York: Collier Books, 1962), 255 - 256.

14 Frank H. Simonds in Colonel Ardant du Picq, Battle Studies, in Roots of Strategy, Book 2 Colonel John N. Greely and Major Robert C. Cotton trans. (Harrisburg, Pennsylvania: Stackpole Books, 1987), 17.

15 Colonel Ardant du Picq, Battle Studies, in, Roots of Strategy, Book 2 trans. Colonel John N. Greely and Major Robert C. Cotton (Harrisburg, Pennsylvania: Stackpole Books, 1987), 81. In this battle Hannibal encircled the Roman Army, twice the size of his, and annihilated it.

16 The two circles represent information. As perceived information more clearly matches reality the circles come closer together. The ideal situation would result if perceived information equaled reality in which case the circles would be super imposed on each other. In the real world the closer the circles come together a greater likelihood exists that plans may achieve desired outcomes because the strategist possesses a clearer understanding of cause and effect.

17 Richard P. Hallion, Storm over Iraq: Air Power and the Gulf War (Washington D.C.: Smithsonian Institution, 1992), 201.

18 Merrill A. McPeak, "Organize, Train, and Equip", Air Force Association National Convention, 18 September 1991, 2.

19 Roy R. Grinker, MD, and John P. Spiegel, MD, Men Under Stress (New York: McGraw-Hill Book Co., Inc., 1963), 28 - 29.

CHAPTER 2
THE MORAL DOMAIN

Since war consists of many factors, much of the preparation effort fails to include an effective analysis of all applicable forces and the complexity of their interactions. In War and Peace, Tolstoy illustrates the elusive nature of the study of war while portraying compelling evidence of how man seeks to ensure success in this arduous endeavor. Though ardent seekers, we seldom discover sublime solutions.

> In warfare the force of armies is the product of the mass multiplied by something else, the unknown x. Military science, seeing in history an immense number of examples in which the mass of an army does not correspond with its force, and in which small numbers conquer large ones, vaguely recognizes the existence of this unknown factor, and tries to find it sometimes in some geometrical disposition of the troops, sometimes in the superiority of weapons, and most often in the genius of the leaders. But none of those factors yield results that agree with the historical facts.
>
> One has but to renounce the false view that glorifies the effect of the activity of the heroes of history in warfare in order to discover this unknown quantity, x. X is the spirit of the army, the greater or less [sic] desire to fight and to face dangers on the part of all the men composing the army, which is quite apart from the question whether they are fighting under leaders of genius or not, with cudgels or with guns that fire thirty times a minute.1

The very survival of a nation sometimes depends on the complex endeavor of war. To place war in context I will investigate a few past theories concerning the moral domain and then explore a model applicable to the 20th century combat pilot. But how does one study war? General J.F.C. Fuller, a 20th-century British military theorist, provides some fruitful insight into how to study war.

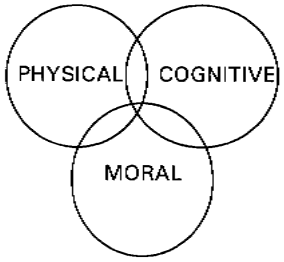

Fig. 2. The Domains of War

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J.F.C. FULLER'S MORAL DOMAIN

General J.F.C. Fuller systematically developed a method of analyzing war. He based war theory on three domains: the physical, the moral and the cognitive (figure 2). The hardware or tools of war

compose the physical domain. Airplanes, air-to-air missiles, and bombs are examples of some of these tools. The cognitive domain includes intellectual endeavors with the expressed purpose of defeating an adversary. Within this domain a nation develops war plans based on assumptions derived from information which frames its perception of reality. Instant Thunder, the Gulf War Allied Air Campaign Plan of 1991, typifies the intellectual function of the cognitive domain. Much more difficulty arises, however, when attempting to codify the moral domain. Within this domain lies the motivation force and other elements which enable military organizations to fight. Will and capability combine within this domain and result in action. As Tolstoy so eloquently stated, the best weapons, numerical superiority, the most ingenious war plans, and the most adept leadership cannot compensate for the military force which fails to close with and destroy the enemy. The Falklands War serves as a good recent example. The Argentines fielded military force much closer to its mainland which could operate with shorter lines of logistics support. Also, they possessed some superior weapons technology, such as the Exocet missile, yet their will to fight was less than that of the British.2 Notably, the Argentine pilots fought courageously by aggressively attacking the British ships and suffering high attrition rates, but their valiant efforts could not compensate for the less aggressive spirit of the entire military force employed. The moral domain, therefore, enables the physical and cognitive domains to achieve desired results. Napoleon's own proclamation, that morale exerts a force three times as potent as the physical force, highlights the critical nature of the moral domain to a great commander.3

GENERAL PRINCIPLES AND BASIC ELEMENTS

Fuller's treatment and insight into the domains of war forms the basis of this study. I will not delve into the intricacies of the cognitive and physical domains since other works extensively cover them, but focus specifically on the moral domain.4 Fuller applied the inductive method to study war and recognized three general principles.5 The general principles of determination, endurance and demoralization form the foundation for his moral domain model.6 To Fuller, the moral domain manifests itself in a force different than the cognitive and physical domains. When compared to the physical and mental forces the moral force at first appears nonexistent, its presence permeates all human endeavors. A pilot cannot fly a bomb run by the moral force alone. However, the pilot cannot fly the bomb run without its contributing force. The moral force holds things together. This force allows desire and will to combine in order to achieve action. The moral force is not the outcome of the action, but the ability and movement to act. Fuller said, "though moral is all important in war, it is not a thing in itself, as it is so frequently considered to be, but a link between will and action."7 Through reasoning, Fuller goes on to define the realm of the moral domain by specifying its basic parts. He defines the moral sphere as "the domain of the soul, ego, or 'heart'."8

Within the soldier, the sphere of the moral domain manifests itself in the instincts of self-preservation, self-sacrifice and self-assertion. Those three instincts accentuate the elements of fear, courage and comradeship through the elements of fear, moral and will.9

INTERACTIONS

Investigating the relationship of the moral with the other domains and observing this domain's uniquely internal elements is essential to understanding the nature of the moral domain. The cognitive function of military training serves to "transmute conscious associations into subconscious habits."10 The physical domain uses repetition of necessary actions to make familiarity with the task second nature. Also, through the cognitive function, courage defeats moral fear through reason while in the physical domain courage defeats fear by physical means.11 With the defeat of moral fear, a soldier's will is carried out in a physical act. However, the soldier needs fear to effectively control his actions. A soldier devoid of fear acts as a maniac. His subsequent irrational acts would probably thwart the military objective and would act as a detriment to his side's operations. A soldier without courage, who fails to close with and destroy the enemy when ordered to do so, equally threatens mission accomplishment. This soldier only feels comfortable striking when absolutely certain he possesses the advantage. The execution of military plans cannot proceed with efficiency in such a case. Thus, within the soldier, a force must exist to balance fear to allow him to act willfully and courageously. The presence of sufficient fear fosters prudence in carrying out of the mission, while courage enables the prompt and effective execution of the military task. Therefore, Fuller balances fear with the moral force, the force consisting of internal fortitude. This force then enables the soldier to disregard self-preservation in the face of danger to accomplish the military objective in a controlled manner. The presence of fear and courage and the balance between fear and morale allow constructive actions. When these elements are out of balance the soldier subsequently loses control as shown in figure 3.

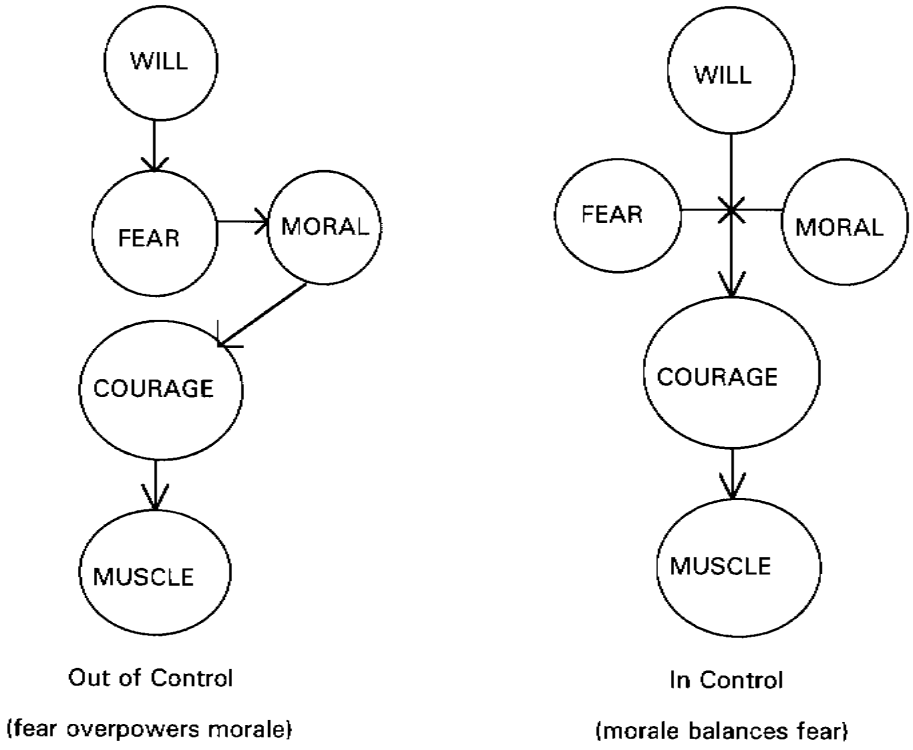

Fig. 3. The Balancing of Morale and Fear[12]

Fig. 3. The Balancing of Morale and Fear 12

Robert Jackson, MD inspector general of British army hospitals in 1794, outlined a scientific approach of the moral domain:

> Habits of practice give, to the soldier, such skill and management in the use of arms in the day of battle, as might be expected to be acquired by experience, in working, in unison, the separate parts of a machine of compound movement. The knowledge and ability, acquired by such experience, aided by a correct direction of powers in general movement, ensure the application of united impulse, at the proper time and in the proper circumstances of action, producing a powerful effect, and a calculable one, as depending upon a uniform rule. It is thus that experience of actual war imprints, upon the soldier, the character of veteran--a courage, arising from knowledge of things, and a consciousness of superiority in the art of applying powers. Such courage is cool and tempered: that of unexperienced troops is impetuous, blind, and headlong--liable to mistake its purpose unless plain and prominent in all its aspects.13

To Fuller, courage causes a military to seek victory with determination and not merely to display fearlessness. However, courage requires the support of a purpose.

Fuller postulates that the moral domain reveals itself within the soldier as simply love; moral courage produces love.14 This love manifests itself as a love of country in patriotism; respect for leaders in loyalty; confidence in colleagues in comradeship; confidence in self as self-respect; and confidence in arms as skill.15 This love empowers the soldier to release self-centeredness and sacrifice his own interest in order to contribute to achieving the group objective. The soldier internally strengthens these virtues if the leadership demonstrates its desire and commitment to preserve his life.16 In all, the moral domain endows the soldier with a spirit which enables him to transcend selfishness and accomplish the tasks at hand. 17

CARL VON CLAUSEWITZ

In particular, Clausewitz places the moral domain of war in context:

> [T]he moral elements are among the most important in war. They constitute the spirit that permeates war as a whole, and at an early stage they establish a close affinity with the will that moves and leads the whole mass of force, practically merging with it, since the will is itself a moral quantity.18

Within his concept of friction we find the causes of stress in war. Adapting to friction essentially determines success or failure, victory or defeat.

Friction differentiates real war from paper war. When we plan at ground speed zero we use the luxury of time and a pristine environment devoid of distractions. When flying using the terrain following radar at 400 feet and 450 knots, the pilot operates in a totally different environment. The stress of high speed, unpredictable weather and the possibility of a system malfunction allowing an unseen object unexpectedly entering the aircraft's flight path causes concern. The stress of the actual situation differs from the planning portion of the mission because of the environment. Thus, though everything in war appears very simple, the simplest things are difficult to accomplish.19 As Clausewitz tells us, "[f]riction is the only concept that more or less corresponds to the factors that distinguish real war from war on paper."20 The moral force, then, exerts itself when the individual is under stress and remains inactive until this time.

GENERATING STRESS

The realm of war consists of danger, physical exertion and chance. Friction permeates these three realms, increasing the difficulty of accomplishing tasks even remotely according to plan. As Clausewitz expressed it, "danger is part of the friction of war. Without an accurate conception of danger we cannot understand war."21

Like danger, physical effort generates friction in war.22

Finally, chance or uncertainty concerning plans, the environment, enemy actions or even actions of friendly military forces cause the combatant stress. The haphazard effects of chance explains why surprise acts as an effective principle of war. Surprise shocks the enemy, knocks him off balance and keeps him preoccupied, making him susceptible to exploitation. Anything that distorts the plan can cause stress. Also, anything that causes the combatant to hesitate, causes stress. All of these factors constitute friction which acts as the genesis of stress in war. Stress necessitates the use of the moral force to balance and neutralize its inhibiting effects, to allow the will to achieve its desired action. Thus, Clausewitz's concept of friction provides some guidance on how and where to look for the moral force in operatation.23

OTHER THEORISTS

Numerous other theorists made significant contributions toward understanding the moral domain. Several theorists from both Eastern and Western cultures demonstrate that this view of war did not manifest itself merely as a phenomenon of Western civilization. Nor did this phenomenon recently develop, for Sun Tzu wrote in approximately 500 BC.24 The written evidence of two and a half millennia suggests that the moral force consistently manifests itself whenever war occurs. Some of these theorists discuss warfare in the modern era.25

Sun Tzu wrote of two key propositions for victory in warfare. He counseled to attack the enemy's plans as the primary objective. Though a war plan is a cognitive element, thwarting them profoundly affects the moral domain by increasing the enemy's doubt of a favorable outcome. To achieve success in this endeavor he commanded, "know the enemy and know yourself; in a hundred battles you will never be in peril."26 Accomplishing these two tasks required an understanding of the moral domain. Knowing the enemy and friendly forces required some understanding of the moral force and how it operated because strategists predict future actions based on assumptions. Using Sun Tzu's principles, Mao Tse Tung defeated his Chinese rival Chiang Khai-Sheck. He accomplished this with an army inferior in weapons and materiel.27 Mao used the moral force against his adversary's physical force to achieve his war aims which included preserving his forces while destroying the enemy's.28

French Colonel Ardant du Picq also contributed much to the study of the moral domain, writing during the 1860's of Frederick the Great and Napoleonic warfare from the combatant's viewpoint. He concluded that cohesion enabled an army inferior in numbers and weapons to defeat a superior adversary. Du Picq surveyed soldiers in combat to gather the data upon which he based his conclusions.29 S.L.A. Marshall updated du Picq's battle survey technique to gather data to make conclusions concerning World War II. He further refined the analysis of the moral domain and surmised that cohesion could enhance communication and training. He concluded that fear severely degraded moral force effectiveness. Therefore, training needed to prepare the soldier to face this moral fear.30 Finally, Lord Moran, a British physician who became a flight surgeon, observed soldiers in World Wars I and II and British pilots in World War II. He concluded that within the moral domain, courage enabled the combatant to achieve success. Therefore, all activities of the military should contribute to enhancing this courage.31

COMBAT PILOT MORAL DOMAIN MODEL

The information and analysis gathered by these theorists presents the ground soldier's perspective, except for Moran, who also dealt with RAF pilots in World War II. Only a smattering of writing deals with the airmen's perspective. Granted, as mentioned earlier, the airplane, first used in warfare in 1911, only recently entered the profession of arms. However, it also operates in a profoundly different environment. Because of this unique environment, air combatants necessarily require a separate treatment. Ground analogies are not necessarily valid for the simple fact that soldiers move in two dimensions at a much slower pace than the ubiquitous airman who operates at an exponentially greater speed in three dimensions. Since a moral domain model does not exist for analyzing the activities of airmen in war, I am proposing one in this study.

MORAL DOMAIN BASIC ELEMENTS

The moral domain for the combat pilot consists of three major areas which are further divided into sub-groups where interactions occur between the basic elements. The major areas are relationships to: absolutes, others and self. The relationships to absolutes consist of a the pilot's morality, the things he holds dearest--the ineffable factors which are the most difficult to articulate and yet the most profound. Such factors as his view of his responsibility or lack of responsibility to God, what he will die for, and what motivates him when no one else is watching all come into play. His true ideology exists in this realm of the moral domain. Within the relationship to the "others" area exist such factors such as cohesion with his contemporaries, views of leadership, confidence in his equipment and group social approval. Within the relationship to the "self" area exists control, courage, self-confidence, will and desire. These basic elements come under the stress of distractions, fatigue and fear which tend to attenuate the original motivation and aptitude to fly. Therefore, the pilot uses self and institutionally developed mechanisms to deal with these threats to his fundamental desire to accomplish the mission. Figure 4 illustrates the general moral domain model for the combat pilot.

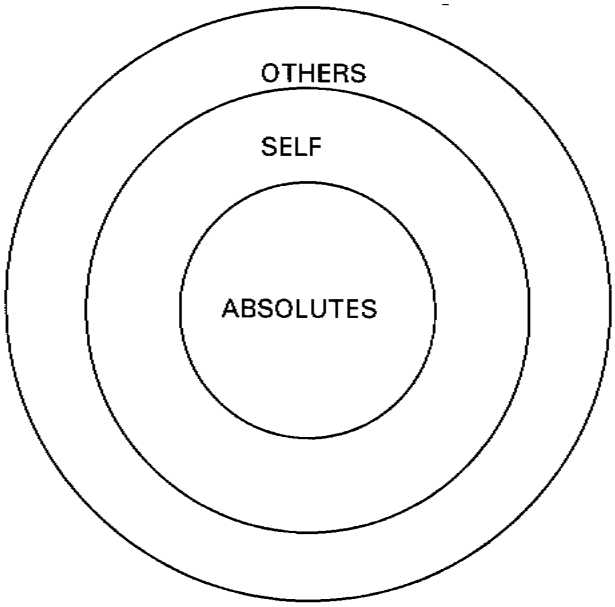

Fig. 4. General Moral Domain Model

Fig. 4. General Moral Domain Model

INTERACTIONS

The realm of the pilot hinges on maintaining control in an allotted time. Fuel constraints usually regulate the length of the mission. The aircraft's freedom of movement in conjunction with its potential for attack from any direction keeps the pilot continually vigilant. Therefore, the pilot must maintain continuous control to effectively operate in an air environment. Anything that threatens control threatens the pilot and induces the stress of time compression. When an unfamiliar situation arises the pilot cannot stop monitoring other required tasks. He must now include an additional task within his already busy attention span. As the situation deteriorates the potential for task saturation increases. Task saturation can potentially cause catastrophic results. The pilot, therefore, must maintain control in order to successfully accomplish the mission. A finite amount of time, usually dictated by limited fuel, constrains a pilot to achieve a solution to all problems promptly. He cannot wait for inspiration and insight, he must act immediately. Motivation and aptitude are the quintessential requirements for every pilot and serve as the source for all pilot responses.32 Even in World War II one major difference between ground soldiers and airmen was that the airmen were volunteers for combat flying duties.33

This motivation and aptitude then synergistically produce the desire and will to fly. The pilot maintains desire and will by controlling fear with courage through discipline within a stressful aviation environment filled with distractions. Factors which contribute to courage include self-confidence or competence, mutual trust with

contemporaries and superiors and subordinates, squadron cohesion, and the ability to control fatigue. See figure 5.

< Figure 5 Not Available >

Fig. 5. The Moral Domain Factor Interactions Model.

Thus, the resultant of the moral domain produces the moral force. The moral force acts to translate desire into action. In congruence with Fuller's theory, this force does not equal action itself, but the potential to carry out an action as well as the execution of the desired act. The moral force enables the cognitive domain's training to combine with the physical domain's strength which empowers the pilot with the ability to perceive the precise moment to pull back on the stick which initiates aircraft takeoff rotation, while simultaneously moving the rudder in the necessary manner. On the basis of this context I sought to explain what sustains pilot motivation while flying in combat. How do pilots maintain focus while numerous stresses seek to break concentration and ultimately to defeat them? As noted above, most theorists assume the same combat motivation forces which govern the ground soldiers govern airmen. Because the operational environment of the airman differs dramatically from that of the ground soldier, I consider this analogy faulty. However, all men in arms probably share some basic principles in common. This study focuses, therefore, on the specific moral force components which affect the pilot. In the next chapter I will test the veracity of the theory and the robustness of the model.

Notes

1 Nikolayevich Tolstoy, War and Peace, translated by Constance Garnett, trans. (McClure, Phillips and Co., New York, 1904), III, Part XIV, 268.

2 Dr. Charles Moskos, review of Mates and Muchachos: Unit Cohesion in the Falkland/Malvinas War, by Nora Kinzer Stewart, Parameters; US Army War College Quarterly, Vol. XXII, No. 3 (Autumn 1992), 111.

3 Military Air Power: The CADRE Digest of Air Power Opinions and Thoughts, compiled by Lieutenant Colonel Charles M. Westenhoff (Maxwell AFB, Alabama: Air University Press, 1990), 152.

4 For a complete treatment of Fuller's exposition of the domains of war refer to his work The Foundation of the Science of War (London: Hutchinson & Co., Ltd., 1925). While Darwinism and Fascism negatively influence some aspects of his theory and detract from its viability, overall the theory has merit. Also see Martin Van Creveld's Command in War (London: Harvard University Press, 1985), and Technology And War: From 2000 B.C. To The Present (New York: The Free Press, 1989) for a more recent treatment of the cognitive, and physical domains respectively.

5 J.F.C. Fuller, The Foundation of the Science of War (London: Hutchinson & Co., Ltd., 1925)15, 45.

6 Ibid., 15.

7 Ibid., 115.

8 Ibid., 116.

9 Ibid., 117.

10 Ibid., 118.

11 Ibid., 122.

12 Ibid., 119.

13 Robert Jackson, in Foundations, 122. George Smith, eds. Sir Leslie Stephen and Sir Sidney Lee The Dictionary of National Biography (London: Oxford University Press, 1917), 542. Jackson studied medicine, eventually became a surgeon and served with the British Army.

14 The Bible in I John 4:18 says, "There is no fear in love. But perfect love drives out fear, because fear has to do with punishment. The man who fears is not made perfect in love." This supports Fuller's line of reasoning at this point in his theory. Though Fuller dabbled in the occult during his adult years he was the son of an Anglican Minister and probably was conversant with the Scripture. The Scripture probably influenced this area of his theory. For further investigation, concerning his background see "A Memorial Appreciation of J.F.C. Fuller," Military Affairs, Summer 1966, 100.

15 Fuller, Foundations, 123.

16 Ibid.

17 Ibid.

18 Carl von Clausewitz, On War, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976), 184.

19 Ibid., 118.

20 Ibid.

21 Ibid., 114.

22 Clausewitz, On War, 115.

23 I encourage the reader to explore On War in order to gain a full appreciation of Clausewitz 's war theory.

24 Sun Tzu, The Art of War, trans. Samuel B. Griffith (London: Oxford University Press, 1963), vii.

25 Charles Moskos, "From Citizens' Army To Social Laboratory," Military And Society (Winter 1993): 83-94.

26 Sun Tzu, The Art of War, 9, 84.

27 Mao Tse Tung, "Problems of Strategy in China's Revolutionary War," Six Essays on Military Affairs, (Peking: Foreign Languages Press, 1972), 33.

28 Mao Tse Tung, "Problems of Strategy in Guerrilla War against Japan," Six Essays on Military Affairs, 271.

29 The reader should refer to du Picq's Battle Studies to gain a fuller understanding of how he analyzed the moral domain. He discusses ancient warfare along with contemporary warfare for his time which included the Napoleonic era.

30 S.L.A. Marshal, Men Against Fire, (Gloucester, Massachusetts: Peter Smith, 1978), 37, 38, 173.

31 Lord Moran, The Anatomy of Courage, second edition (Garden City Park, New York: Avery Publishing Group, Inc., 1966), is definitely worth exploring for the reader to gain insight into the unique environment in which the pilot operates as compared to the soldier.

32 Stanley J. Rachman, Fear and Courage (San Francisco: W.H. Freeman and Company., 1978), 59.

33 Samuel A. Stouffer, et. al., The American Soldier: Combat and Its Aftermath, Vol. II (Princeton, New Jersey: Princeton University Press, 1949), 324.

CHAPTER 3
METHODOLOGY

To determine analytically the nature of the moral force, presents an interesting challenge. In general, pilots do not talk about the moral force factors. Since this tendency helps to obscure these elements, devising a method to explore pilots' thoughts explicitly becomes important. A suitable environment to observe the interactions of the moral force components in operation also became essential. Vietnam presented a very appropriate environment because that war possessed certain unique characteristics. The F-105, which flew combat operations during the entire conflict, surfaced as a desirable weapon system for investigation. To obtain information from pilots who flew the F-105 in Vietnam, an anonymous survey based on the pilot combat motivation model developed in chapter 2 solicited their comments. The objective sought to determine if the model accurately explains how the pilots dealt with the stresses of combat by comparing predicted behavior with actual behavior.

To balance the highly subjective nature of the survey, I investigated other sources of empirical data. These included: unit end of tour reports, flight surgeon records, unit histories, and monographs written by the pilots themselves. This chapter explains how survey data and other supporting evidence, which constituted the empirical database, was used to evaluate the validity of the combat pilot moral domain model.

VIETNAM

US vital interests, grand strategy, and military strategy influenced the use of the direct, or ordnance delivering, mode of airpower in Vietnam.1 The outcome of the war demonstrates that the incorrect use of this mode of airpower failed to achieve US political goals. I conclude that this effort failed because the political decision makers formulated a faulty strategy which never established a link between military means and desired political outcomes. Thus, the frustration of attempting to execute an ineffective strategy created a high stress environment for the combatants who saw operational and tactical errors resulting from that strategy and paid the high price in blood because of it. This stressful environment created an opportunity in which to observe the moral force motivation factors which underwent stimulation and remained active in the combatants for the entire conflict.

The United States fought the Vietnam War in an attempt to contain Communism.2 The US Air Force, prepared to combat Communism directly, felt convinced it could effectively fight a limited war. Therefore, Communist aggression within developing nations did not appear to present any major problems, since the prevailing logic assumed that the ability to fight a total war necessarily meant that a nation could prosecute a limited war.3

The Air Force incorrectly analyzed the Korean War when it considered that war an aberration. This blinded the Air Force to the volatile and complex nature of limited war.4 The Air Force never really accomplished the required peacetime planning necessary to prosecute a war of this nature. Therefore, viewing the festering insurgency in South Vietnam as instigated and supported by North Vietnam, an instrument of monolithic communism, the Johnson Administration responded to block the insurgency.5 In 1965 the South Vietnamese Army with their American military advisors were not capable of accomplishing a successful ground campaign. So, President Johnson turned to airpower as the means to carry out the military strategy necessary to achieve his political aims.6

GRAND STRATEGY

President Johnson believed he could achieve the political objective of securing South Vietnam if the North Vietnamese stopped supporting the insurgency in the South. He theorized that if he applied sufficient pressure on North Vietnam the insurgency would cease and the South's government could then strengthen, reform and protect itself. The constraints of avoiding Red Chinese or Soviet intervention and to assure the success of his domestic agenda caused President Johnson to search for an economical method to achieve his goals.7 He chose airpower because initially its use did not appear to mandate a ground commitment and he could regulate its intensity.8

This plan of action resulted from the American perception that the enemy would behave as a Western nation. The air strategy aimed at gradually increasing the punishment level--demonstrating the US ability to inflict greater damage.9 This punishment strategy intended to coerce the North Vietnamese to cease their support of South Vietnam's insurgents.10 If Hanoi did not comply, they risked incurring increasing damage inflicted on their people, economy and military forces. If the strategy worked, the North Vietnamese would receive the

signal and stop supporting the insurgency.11 Gradually executing this plan would not alarm the Communist into thinking that the US desired to overthrow the North Vietnamese regime and minimize risks of Chinese or Soviet intervention.12

MILITARY STRATEGY

Air Force strategy in 1965 was a subset of massive retaliation strategy and could not be used to effectively fight a limited, guerrilla war.13 President Kennedy had embraced General Maxwell Taylor's flexible response strategy as a solution to rectify this problem.14 President Johnson used this strategy in the form of gradualism to coerce North Vietnam to stop supporting the insurgency in South Vietnam.15

The Air Force sought to systematically bring sufficient power to bear on the enemy so that he would see the American willingness to destroy selected military targets in North Vietnam. Relying on standard operating procedures, Air Force planners proposed targets threatening the industrial base to degrade war making capability.16 President Johnson intended these attacks to change North Vietnamese behavior. He restricted this punishment strategy through the following methods: extensive rules of engagement, tight control over the frequency of bombing, and personal selection of targets.17 These constraints emanated from his major negative political objectives.

MODE OF AIRPOWER

The resulting mode of direct, independent airpower, named Rolling Thunder, resulted in an interdiction bombing campaign initially designed to bring about the desired political objective through airpower alone.18 Using the domains of war I will illustrate some salient factors related to obtaining this objective.

Physical components of this strategy consisted of the F-105 fighter-bombers, which dropped conventional bombs on North Vietnam. In theory, this approach increased North Vietnam's cost of supporting the insurgency. The match between aircraft attacking military and industrial targets with conventional, general-purpose munitions appeared proportional and logical and therefore adequately matched strategy with means provided the enemy viewed US efforts in a like manner.

Within the cognitive domain, the US desire to thwart North Vietnam's support of the insurgency by raising the cost of the effort seemed less satisfactory. Secretary of Defense Robert S. McNamara's direction to the Joint Chiefs of Staff to institute a program of "graduated overt military pressure" demonstrated a lack of insight into the nature of the problem. Little evidence exists which proves that the Johnson adminstration understoo the insurgency.19 The adminstration assumed a solution by projecting Westrn characteristics upon the adversary.20 The negative political objectives of avoiding Chinese or Soviet intervention, protecting the "great Society" and maintaining favorable world opinion, gave rise to the gradual response strategy. Finally, an unsatisfactory moral contest of US will to inflict damage against Hanoi's will to continue its effort resulted. The US leadership did not adequately establish the link between the North Vietnamese and the insurgency.21 Therefore, American leaders never explicitly determined the necessary conditions that sparked the insurgency. Even as originally conceived, the signaling plan did not convince the North Vietnamese of US resolve because the low bombing intensity and frequency

did not critically affect them. Finally, President Johnson and his advisors did not discern the moral factors influencing the viability of the South Vietnamese government. Any efforts which would strengthen these factors could help to legitimize the government in the eyes of the Vietnamese people and eliminate a lucrative source of political exploitation for the insurgents. Thus, they carried out a seriously flawed plan.22

In the case of Rolling Thunder, the US effort failed. The military strategy did not adequately support the positive political objective.23 The direct and independent use of airpower against North Vietnam did not significantly affect the insurgency in the South.24 It probably strengthened the enemy's will to resist while the US supported an increasingly unstable South Vietnamese government.25 Rolling Thunder failed because the Johnson administration did not link the use of airpower to the desired political outcome of an independent, stable, free non-Communist South Vietnam. Faulty strategy at the top, coupled with indecision, adversely affected American pilot morale. Such actions ultimately increased tensions in the cockpit.

F-105 CHARACTERISTICS

To test the combat pilot motivation model adequately required holding the cognitive and physical war domain variables constant. This would reveal how moral domain factors contribute to behavior. Since Vietnam's restrictive environment provided a fertile example of stress in a macro sense, the necessity arose to find a weapons system where the interactions of the moral domain factors interacted in a micro sense. The F-105 fulfilled the criteria. The domains of war serve as a tool to illustrate the uniqueness of this weapon system.

Limiting the study to one type of combat aircraft fixed the physical domain factors affecting this study. This eliminated the problems associated with equating different types of weapons systems while attempting to determine how they affected the pilots in combat. The F-105 Thunderchief, or more affectionately called the 'Thud',26 had longevity. The Thud flew the entire duration of the Vietnam War. As a primarily single seat fighter it allowed a less complex examination of one individual as opposed to the interactions of multiple crew members. This factor enabled a close investigation of stress effects and direct response of a single individual, not attenuated or modified by the presence of others in the same aircraft. Though the "Wild Weasel" mission involved two crew members in a dual seat fighter detecting and directing efforts to suppress enemy radar guided ground defenses, this study focuses on the single seat mission. Framing the problem in this manner enables a full investigation of the moral domain factors present in the pilot and how the factors affected his response to this stressful environment. The Thud also flew the same air to ground mission during the conflict. The absence of multiple primary missions obviated the need for diverse training and separate squadrons with different primary missions. Notably the Thud downed MiGs in air-to-air combat and also flew some close air support along with other important missions, but it primarily flew strikes against targets in North Vietnam. Consistent mission training produced a homogenous pilot cadre, with common experiences. These two situations fixed the cognitive domain elements for the F-105 pilot and nullified any variations in behavior stemming from its effects.

THE COMBAT PILOT MOTIVATION SURVEY

The survey served as the primary means of determining the validity of the combat pilot moral domain model. Appendix A contains a copy of the survey. The objective proposed to gather analytical data relating the attitudes, perceptions and behavior of pilots in combat. If accurate, the empirical data gleaned from the survey should verify the model. If not, corrections to the model should enable it to more accurately explain the data. The survey consisted of eight sections covering the pilots' attitude toward combat operations, the aircraft, colleagues, background and any other comments they desired to make. To obtain representative results, this study sought out as large a number of these pilots as possible. The "River Rats," a fraternal organization of pilots who flew in North Vietnam, provided the means to obtain a large sample of aviators.27

The survey questions resulted from the variables in the combat pilot moral domain model developed in chapter 2. Each question represented a unique variable. Theory guided the determination of interactions between the variables. Questions concerning fear, a major source of stress, were developed from the Peter Lang three system model of fear.28 This robust model investigates mental apprehensions, physiological responses, and emotional responses to fear, and not simply a single variable response. To discriminate between subtle differences in attitudes and behaviors, the survey contained Likert scales, which allow the respondent to differentiate between slight differences in attitude.29 In some cases the survey also included Guttman scales, an even more precise attitude discriminator, to determine relationships between variables.30 The survey questions also asked the pilot to differentiate between the beginning, middle and end of his combat tour so as to determine how he adapted over time.

The survey also collected extensive background information. This data provided the pilot's profile, which the survey then used to determine how the educational, military, and aircraft training background related to combat attitudes and behavior. Some questions asked if the pilot experienced any aircraft damage, injuries, or internment as a prisoner of war while in combat. Finally, the last section provided short answer questions to allow the respondent the chance to address any area omitted. Because the moral domain consists of many areas which a pilot generally does not like to discuss, the respondents remained anonymous. Anonymity, it was also hoped, would increase participation. A statement at the end of the survey did encouraged those who desired to write additional comments. By this method if a major omission occurred, the veteran could make his opinion known. Comprehensiveness guided the design of the survey. I did not intend to make it exhaustive.

OTHER EMPIRICAL EVIDENCE

Because the perception of what actually happened during historical events tends to decrease in accuracy with time, the survey asked general questions and not questions dealing with minute detail. To verify the subjective opinions and perceptions of the survey respondents, the analysis relied on other sources. These sources included: unit end of tour reports, flight surgeon records, unit histories, and monographs written by the veterans themselves. Since the pilots wrote them during

the war, these information sources do not tend to embellish results which could potentially influence accuracy; however, they could include some biases. Some sources, such as the flight surgeon reports, came from outside observers who possessed first hand experience and familiarity with operations. Their detached status allowed for greater objectivity. These sources helped to establish the accuracy and reasonableness of the survey results. The stronger the correlation between the different data sources, the more convincing the results.

Notes

1 Mark Clodfelter, The Limits of Air Power (New York: The Free Press, 1989), ix-xii.

2 Bernard Brodie, War and Politics (New York: Macmillan Publishing Co., Inc., 1973), 119; John Schlight, The War in South Vietnam: The Years Of The Offensive 1965-1968, (Washington D.C., Office of Air Force History, 1988), 2.

3 Clodfelter, Limits, 30.

4 Brodie, War and Politics, 106-107, 177-179; Bernard Brodie, Strategy In The Missile Age (Princeton, New Jersey: Princeton University Press, 1965), 311, 314, 356. Schlight, Offensive, 33.

5 Douglas Kinnard, The War Managers (New York: Da Capo Press, Inc., 1979), 23. Clodfelter, Limits, 40.

6 Schlight, Offensive, 22.

7 Clodfelter, Limits, 43-44. Schlight, Offensive, 22-23.

8 Admiral U. S. Grant Sharp, Strategy For Defeat: Vietnam In Retrospect Novato, California: Presidio Press, 1978), 268.

9 Clodfelter, Limits, 60, 69, 71.

10 Thomas C. Schelling, Arms And Influence (New Haven: Yale University Press, 1966), 69-91, 148-149, 151.

11 Wallace J. Thies, When Governments Collide: Coercion and Diplomacy in the Vietnam Conflict 1964-1968 (Berkeley, California: University of California Press, 1980), 4.

12 Brodie, War and Politics, 190; Schlight, Offensive, 61.

13 Brodie, War and Politics, 105, 121.

14 Schlight, Offensive, 3.

15 Brodie, War and Politics, 125.

16 Graham T. Allison, Essence of Decision (Cambridge, Massachusetts: Harper Collins Publishers, 1971), 81-83.

17 USAF Oral History interview of Colonel Henry H. Edelen by Major Samuel E. Riddlebarger and Lieutenant Colonel S. Bissell, 27 January 1970, AFHRC, file number K239.0512-243, 1 - 6, 15 - 17, 24 - 26, in Clodfelter, Limits, 86.

18 Schlight, Offensive, 16.

19 Clodfelter, Limits, 71.

20 Brodie, War and Politics, 158.

21 Ibid., 141-142; Schlight, Offensive, 291.

22 Brodie, War and Politics, 164.

23 Sharp, Strategy, xiii, 271.

24 Brodie, War and Politics, 179.

25 Ibid., 164, 168.

26 Jack Broughton, Going Downtown: The War Against Hanoi and Washington (New York: Orion Books, 1988), xiii.

27 Mark Clodfelter, and Barry Craig, Red River Valley Fighter Pilots (Paducah, Kentucky: Turner Publishing Company, 1989), 27.

28 Stanley J. Rachman, Fear and Courage (San Francisco, California: W. H. Freeman and Company, 1978), 2.

29 Wayne K. Kirchner, "The Attitudes of Special Groups Toward The Employment Of Older Persons," Journal of Gerontology, Vol. 12 (1975): 216 - 220. Refer to Appendix A, survey question A in section I, Combat Operations for an example of the Likert scale.

30 Norman Nie, Dale H. Bent, and Hull C. Hadlai, Statistical Package for the Social Sciences (New York: McGraw Hill, 1970), 529; Raymond L. Gordon, Unidimensional Scaling of Social Variables (New York: McMillian, 1977), 46. Refer to Appendix A, survey question J, Section I Combat operations for an example of a Guttman scale.

CHAPTER 4
SURVEY RESULTS AND ANALYSIS

F-105 veterans returned 173 of the 236 surveys sent out. This exceptional response rate of 73.3% established the analysis database. This chapter discusses the survey analysis and presents its findings. Flight surgeon aeromedical evaluations, unit end of tour reports, as well as with postwar monographs corroborate survey findings. Based on the surveys received, I argue that the behavior of F-105 combat pilots adheres to a pattern. Since the cognitive and physical domain variables remain constant for this study, the pilots' behavior pattern derives from the moral domain. This analysis demonstrates the existence and affect of the moral domain of war on pilot behavior during combat operations.

SURVEY DATA EXTRACTION

The survey included responses from former officers, ranging from lieutenants to full colonels, who had flown combat in Vietnam. Experience levels consisted of recent undergraduate pilot training graduates as well as seasoned fighter pilots with numerous hours.1 Some respondents had even participated in World War II and the Korean War.2 A total of 169 respondents flew over North Vietnam with an average of 92 missions each. The respondents participated in combat operations spanning from 1965 until 1973. The majority of the respondents had combat tours in 1966. The wide cross section of respondents made data skewing less likely. Once returned, the survey data fell into one of three categories.3 The first category, the analytical portion contained in sections I - IV of the survey, included numerical responses to the questions. The second category, sections V - VII, contained the profile or background data on each respondent. The last category consisted of short answers to questions listed in the back the survey in section VIII and any marginal notes or additional comments made by the respondents. This last survey section contained the attitudes of the respondents and offers a wealth of information. My analysis focuses primarily on sections I - IV; examining the other two sections lies beyond the scope of this study.

To interpret the survey's first four sections, I used the Statistical Package for the Social Sciences, SPSS.4 This computer program determines the existence of principal component factors inherent in a body of data and gives insight into the strength of the correlation's or interrelationship's between those factors. As mentioned earlier, the survey contained questions developed from the theory of the moral domain of war. Each question related to one of the elements of the proposed combat motivation model and also represented a unique variable. These variables in the raw data form establish the foundation for interpretation. The SPSS routines evaluated the veracity of the pilot motivation model and the associations between the elements presented in Chapter 2. SPSS, a powerful statistical analysis program, provides numerous capabilities which include the following: determining the number of cases in each variable category; calculating variable averages; determining associations among variables; determining variable correlation's; accomplishing regression analysis; and creating tables and graphs.5 Information extracted from the survey constituted the analysis data for the SPSS program. I wrote a unique computer program

in SPSS syntax to extract the combat pilot survey data. The computer program extracted the raw data from the surveys and then used the SPSS principal component factor analysis procedure. This procedure used the Pearson r technique to determine whether the variables were associated in the manner that the model presented in chapter 2 predicted.6 This process produced the evidence necessary to evaluate the validity of the combat motivation model.

PREDICTED RESULTS

The combat pilot motivation model illustrated in chapter 2, postulated the existence of 13 elements which govern the pilot's behavior in combat. These elements predict pilot response as presented in the following relationship. An input element consisting of motivation and aptitude result in the desire and will to fly.7 The pilot maintains this desire and will by controlling fear with courage through discipline within the hazardous combat environment. Distractions may also deter the pilot from successfully accomplishing the mission. The elements of mutual trust, cohesion and the ability to control fatigue enhance courage and self-confidence, or competence. Finally, the model output, control, or the desire and will to act, determines which behavior the pilot manifests. (Refer to figure 5 in chapter 2).

In a "perfect" environment, the input of motivation and aptitude would translate directly into the pilot's desire and will to act. Mere desire would equate to action. However, real world inputs tend to attenuate the initial input and transform this simple relationship into a much more complex one.

In a balanced process the initial input signal maintains sufficient strength to allow the pilot to maintain control. In an unbalanced process fear overcomes courage and jeopardizes control. In severe cases a pilot experiences loss of control which usually ends in catastrophe. In the final analysis some usefulness can result from knowing which variables affect pilot behavior in combat, and to what degree. These relationships, for example, provide some insight for developing training methods and tactics.

RESULTS

SPSS determined that the data contained 12 of the original 13 elements mentioned in chapter 2 which possessed statistically significant relationships. The statistical significance of the Pearson r analysis determined the strength or weakness of the interrelationship between factors. This analysis considered a significance range of .0000 to .0009 as an indication of a strong interrelationship and a range of .0010 to .0099 as a weak interrelationship. A value of .0000 equated to perfect statistical significance meaning that the factors shared mutual effects indicating the strongest possible interrelationship. This analysis considered anything greater than a value of .0099 as insignificant or no interrelationship between factors.8 Another method of interpreting the statistical significance is to view the smaller the number the more unlikely the correlation between variables occurred by chance. At .0000 there is a high confidence that the occurrence did not happen by chance. At .0100, however, a greater possibility of chance producing the observed outcome exists. These factors, therefore, constitute the elements of the combat pilot motivation model. Table 1

lists the SPSS analysis results of the survey data.

TABLE 1: SPSS Survey Analysis Results9

FACTOR INTERACTION	SIGNIFICANCE	PERCENTAGE OF EFFECT
INPUT X COURAGE	.0055 w*	5.77%
INPUT X TRUST	.0047 w	7.30%
INPUT X MORALITY	.0002	9.85%
INPUT X CONFIDENCE	.0000	19.89%
INPUT X CONTROL	.0000	15.14%
FEAR X COURAGE	.0000	19.38%
FEAR X TRUST	.0074 w	7.96%
FEAR X FATIGUE	.0000	29.17%
TRUST X CONTROL	.0071 w	6.52%
FATIGUE X DISTRACTION	.0000	15.77%
DISCIPLINE X IDEOLOGY	.0038 w	6.99%
MORALITY X IDEOLOGY	.0005	8.96%
DISTRACTION X IDEOLOGY	.0055 w	5.87%
CONTROL X IDEOLOGY	.0000	17.02%
CONFIDENCE X CONTROL	.0000	13.86%

*w - weak interaction significance

The results of this analysis yielded different relationships between the elements than originally theorized in chapter 3. Therefore, the original model inaccurately explained the survey results. Modifications of the variable relationships alter the original model to alleviate this inaccuracy. Figure 6 illustrates the new pilot combat motivation model based on the survey results. An investigation of each factor determined by the survey results follows.

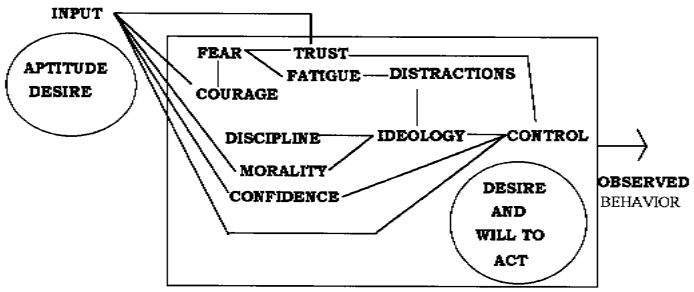

Fig. 6. Survey Derived Combat Motivation Model.

FACTOR ANALYSIS
Fig. 6. Survey Derived Combat Motivation Model.

FACTOR ANALYSIS INPUT

The factors of motivation and aptitude comprise the input element. As determined during the Second World War, all qualified military pilots possess these two factors.10 Logic supports this finding because pilots will not graduate from pilot training if they lack the motivation to fly or if they do not possess the cognitive ability or physical coordination required. Many pilots commented in the survey concerning their strong desire to fly from their very early childhood years.

Input, therefore, acts as the combat pilot motivation model's entering element.

FEAR

Because of this element the pilot "feels anxiety and agitation caused by the presence or nearness of danger, pain, dread terror, fright or apprehension."11 SPSS detected the presence of multiple factors relating to fear. In this study fear acts as the major source of stress in combat. This key variable excited the other factors to respond and not remain dormant. Just as the three systems model of fear developed by Peter Lang explained behavior more accurately than the lump sum model, the survey data revealed that there may exist a more definitive model of fear.12 Refining the element of fear may give rise to other obscure nuances which might more accurately explain combat pilot behavior. As mentioned earlier the survey developed from the model used Peter Lang's physical response, physiological response, and mental response to fear. Perhaps within each of these categories lie distinct subdivisions. Or possibly, a totally new paradigm in fact exists.

Ninety-six percent of the respondents stated they had fear. Flight surgeon monthly aeromedical reports written during the war verified this finding. A flight surgeon wrote of seven ejections in one unit with only five recoveries during July 1967. The following account insightfully illustrates the stressful combat flying environment in which fear operated:

> On 2 July, an F-105 pilot ejected over North Viet Nam after his aircraft was hit by ground fire. While descending in his parachute he noted that villagers were running towards him, and he was able to slip his chute away from the enemy in the direction of some hills. After landing, he heard the sound of shouting and gunfire from the valley below, and immediately took cover in thick underbrush approximately 50 yards from his parachute. Within minutes, the area was surrounded by armed villagers, some of which were 20 feet away from the pilot's hiding place. A rescue effort was begun, but was called off because of darkness. The pilot spent the night hiding under the thick brush, while the villagers continued their search. At dawn, the rescue aircraft returned. They had difficulty communicating with the pilot because he was unable to raise his radio antenna or speak above a whisper for fear of giving away his position to the enemy. He stated that the hiss of the radio was unusually loud, and he was forced to turn it off several times due to the proximity of the North Vietnamese. After fourteen hours on the ground, the pilot was rescued by a CH-3C crew. There were no injuries from ejection or evasion, and the pilot reported only fatigue.13

Author and retired USAF Brigadier General Ken Bell, who flew combat as a major, noted that from 1965 to 1972 321 F-105's were lost in combat out of 833 built. During 1966 alone 111 of these aircraft were lost.14 This high attrition rate definitely caused fear. It affected the pilots because friends died around them continuously over the one year or 100 mission tour. Each pilot knew he might be next to meet his demise but the majority did not dwell on this point. The following comment made by

the Director of Base Medical Service at Korat Royal Thai AFB, supports this proposition:

> The prevalent bad weather over the past month has provided a much needed respite from the grim losses of October and November [1967], with an according rise in the spirits of the strike air crews. It must be remembered that crews now in mid-tour have made half of their missions in high risk areas and had quite reasonably began to feel 'there is no way' to finish a hundred missions. The chance to acquire 'counters' in lower risk areas during this period has allowed them again to feel, as a man must in this type of encounter, that they can reasonably expect to survive. Given the current condition, I feel that the fear of flying case will remain an isolated one.15

COURAGE

This element combats fear and enables the pilot to compartmentalize16 it or simply put it in a box out of his conscious thoughts while flying the mission. The courageous manifest "the attitude of facing and dealing with anything recognized as dangerous, difficult, or painful, instead of withdrawing from it."17 Self-preservation logic infers that only the abnormal person willfully places himself in danger of death. Therefore, the F-105 pilots overcame the natural tendency to avoid danger and in fact embraced it when they flew their hazardous missions.

A flight surgeon's report noted on 30 April 1967 that an F-105 pilot was admitted to the Clark AFB Hospital in the Philippines due to "an acute depressive reaction during his trip through Jungle Survival School." After treatment the Air Force granted him a waiver to fly in combat.18 On the next report, four months later the flight surgeon stated:

> The F-105 pilot referred to in the report for the period March through April [1967] who received a waiver for an acute depressive reaction has since completed 100 missions over North Vietnam. During his tour he performed very well and distinguished himself in combat.19

This account illustrates how a pilot overcame fear. His subsequent actions demonstrated courage, prevalent among the Thud pilots.

TRUST

Pilots working together manifest trust because they possess a mutual firm belief or confidence in the honesty, integrity, and reliability in each other.20 Successful mission accomplishment depends on trust. Many respondents stated that survival in the target area depended on mutual support. They trusted the other formation members to carry out their respective responsibilities to the flight. For example, each pilot knew that after weapons release he must leave the target quickly to minimize vulnerability to the strike flight by rendering mutual electronic countermeasure support.21 Without trust the pilots could not achieve mutual support.

FATIGUE

Fatigue insidiously affects the pilot. It causes "physical or mental exhaustion, or weariness."22 Vietnam flight surgeons defined fatigue as "that condition characterized by a detrimental alteration or decrement in skilled performance."23 The pilot may not detect fatigue initially and may need another person to indicate its presence to him.24 Because of the prolonged nature of the Vietnam War, the pilots strongly experienced the effects of fatigue. Fatigue can also affect the pilot for an extended period of time if he cannot attain adequate rest. The flight surgeons warned that chronic fatigue could eventually develop without adequate rest. Survey respondents commented that many times pilots did not desire to take an R&R (Rest and Recovery) break because they desired to fly their 100 missions and complete their tour in the minimum amount of time. 25

DISCIPLINE

Through discipline a pilot manifests "self control, orderliness and efficiency."26 Disciplined pilots adhere to common procedures and practices. This enhances teamwork by establishing a common baseline of expected behavior. Discipline allows squadron pilots to fly with various flight members on different occasions and still achieve the same high mission success rate. Colonel Michael C. Horgan, Commander of the 355th Tactical Fighter Wing, stated that the pilots achieved maximum effectiveness by maintaining discipline and flight integrity over the target area.27

MORALITY

The pilot manifests morality in "the character of being in accord with the principles or standards of right conduct."28 In order for a pilot to maintain an effective working relationship with other squadron members, he must exhibit satisfactory professional conduct. In Vietnam the F-105 pilots would meticulously prepare for the mission to enable themselves to handle multiple contingencies. Several respondents indicated that this practice occupied their minds and kept them from dwelling on the more negative aspects of combat. Some of the respondents who led strike missions implied that this practice allowed them to do all they could to preserve the lives of their flight members. Through morality these men strengthened their relationships with others based on personal expectations. Some drew on a relationship to God, while others strove to live up to expectations of others and of themselves.

Retired Air Force Colonel Jack Broughton, former 388th Tactical Fighter Wing Vice Wing Commander, Takhli Royal Thai Air Force Base, records in his book, Thud Ridge:

> Although I never bothered to inquire into the religious habits of my pilots, I was impressed by the numbers who made it to the chapel for one service or another, and I can tell you for sure there are very few atheists in the arming area. When you watch comrades fall from the sky day after day you realize that it is going to take some help and guidance from a level above your own to hack the course.29

DISTRACTIONS

Anything which diverts or draws the mind away from the primary objective distracts the pilot.30 The combat mission environment contains many distractions ranging from unexpected weather, to the appearance of an enemy aircraft attempting to disrupt the strike flight. When fatigue begins to thwart compartmentalization even situations on the ground can distract the pilot while flying.

IDEOLOGY

Ideology also governs conduct through "the doctrines, opinions, or way an individual thinks."31 Ideology, though seldom discussed among pilots, strongly influenced the survey respondents who indicated that they flew in Vietnam because they were expected to. They trained to fly and fight and now they would carry out the task. Their professional expectation superseded any other thoughts they had concerning the conflict. This corporate ideology fostered a positive working relationship among the pilots. Even when their attitude reflected bewilderment and anger toward the President and the Secretary of Defense, their behavior remained consistent with carrying out the combat mission based on principle.32

CONFIDENCE

A common belief holds that all pilots possess self-confidence. However, the survey respondents stated that some of the best talkers in peacetime did not live up to their bombastic pronouncements under wartime conditions. Yet, some of the more quiet pilots truly rose to the challenge of Vietnam. Confidence then consists of a "firm belief, the fact of being or feeling certain; assurance."33 Confidence strongly enables the pilot to maintain control. Most survey respondents expressed confidence in the aircraft and their personal ability to accomplish the mission.

CONTROL

Control "exercises authority over, directs or commands."34 All pilots must possess and maintain this element. This critical ability allows the pilot to employ the aircraft in the way he desires, precisely when he needs it to respond. The control of the flight leader extends to conducting the flight according to plan. The unit leadership exercises control over the individuals under their command to carry out the unit mission. By controlling immediate surroundings the pilot seeks to control the current situation. All behavior of the pilot in combat relates to control.

COHESION

Cohesive people tend to stick together.35 Pilots possess a high degree of esprit de corps, gained during training and longevity in the profession. Thus, sticking together naturally occurs.

MODEL ELEMENT INTERACTIONS

This study interestingly revealed that cohesion did not show a relationship to any of the other factors. Trust and competence appeared important, as expected, but not cohesion. One possible explanation relates to the nature of pilots flying in combat. Strike flight members must possess mutual trust and view each other as competent, especially

their flight leader. However, one does not necessarily need to prefer to associate with every member of the flight. The time interval covering mission accomplishment involves a realm much different than non-mission related ground operations. Cohesion logically helps flight members get along; however, trust and competence affect operations much more profoundly. Appendix B shows that cohesion did not correlate to any of the other model elements.

Another possible explanation may relate to the nature of their combat deployment. The F-105 pilots lived in an isolated location with no alternatives to continuous close association with each other. Many commented in the survey that the base Officers' Club, where everyone gathered, provided the only alternative to their quarters for relaxation. Cohesion among these pilots may have remained constant and therefore did not vary. In that case the survey may not have detected it. Some consider mutual trust and esprit de corps as part of cohesion.36 However, this broad assumption does not precisely define cohesion and therefore does not satisfy the requirements of this study. Another important discovery involves factor determination. SPSS revealed many more factors inherent in the survey than originally suspected. This analysis grouped related factors into the model elements and looked for interrelationships. Assumptions based elements on specific questions and, therefore, could not arbitrarily change after data interpretation without valid reasoning. This implies that more factors affecting pilot behavior exist, buried within this analysis. The evidence database thus provides fertile ground from which to glean these other factors and to develop a more robust model.

Based on the survey data and the logical construct from chapter 2, the following proposition demonstrates how the revised model illustrated in figure 6 explains the behavior of pilots in combat. The pilot motivated to fly encounters fear. Courage offsets fear and allows the pilot to compartmentalize it. Trust enhances, while fatigue tends to obstruct, the compartmentalization of fear. Distractions indirectly inhibit the compartmentalization of fear by increasing the effect of fatigue. Discipline helps maintain ideology, which in turn helps to mitigate the injurious effects of distractions. Ideology directly affects the pilot's ability to maintain control, the desired end state. Input indirectly enhances the pilot's control by strengthening morality which also enhances ideology. Input directly supports confidence, which enhances control. Finally, input directly affects control. In a balanced situation, the pilot maintains the initial input motivation and aptitude, which results in the desire and will to act. This desire and will manifest themselves in the pilots actions or behavior. Under stress the negative factors associated with fear, fatigue and distractions work to destroy the pilot's ability to maintain control. Any situation occurring where the pilot cannot compartmentalize fear, also jeopardizes control. This results from a severe decrease or total elimination of either the desire or the will to act.

SURVEY CRITIQUE

Several factors constrained this analysis.37 The survey size limited the number of questions asked. The question concerning alcohol, poorly written, confused many of the respondents. Aside from these responses, the evidence strongly supports the existence of a pattern of behavior manifested by the F-105 veterans. The model derived from the

survey analysis represents one interpretation of the data. Other empirical evidence corroborates these findings.

OTHER EMPIRICAL DATA FLIGHT SURGEON AEROMEDICAL REPORTS

These reports portray in detail some of the combat stresses in which the F-105 pilots endured. The flight surgeon monitored the physical and mental health status of the flying personnel. Specifically, he informed the unit commander if any abnormal trends developed among the pilots. Since he also investigated and debriefed any pilot involved in an ejection, these reports record the event accurately because flight surgeons wrote them immediately when the pilot returned. Therefore, these reports written closely in time to the actual event, serve as a highly credible information source. Some other pertinent themes discussed in these reports included pilots who responded adversely to the stressful environment, aircraft mishaps, deaths, pilots missing or killed in action, and overall pilot morale.

END OF TOUR REPORTS AND UNIT HISTORIES

These documents give the reader a chronology of events the unit experienced and the perception of the commander. Written during the war these documents serve as a source of primary information. They revealed useful insights explaining what specifically happened during the conflict.

MONOGRAPHS

Writings reconstructed from personal diaries give a perspective not usually accessible to individuals outside the unit. These first hand accounts record the perceptions of the individuals who experienced combat. The monographs provide an invaluable source of information.

The strong agreement between the survey data and the historical evidence indicates that the combat pilot motivation model explains what most strategists and decision makers consider imponderable. This survey allowed an analysis of the moral domain of war, not necessarily exhaustively, but rigorously. The more rigorous the analysis the more insightful and refined the results.

Notes

1 Michael C. Horgan, Commander 355th Tactical Fighter Wing End Of Tour Report 30 Jun 68 - 27 Jun 69 (Maxwell AFB, Ala.: USAF Historical Research Agency, 1969), HRA K717.131.

2 Brigadier General William S. Chairsell, Commander 388th Tactical Fighter Wing End of Tour Report Aug 1966 - Jul 1967 (Maxwell AFB, Ala.: USAF Historical Research Agency, 1967), HRA K717.131.

3 Refer to Appendix A for the survey.

4 Statistical Package for the Social Sciences (SPSS/PC+ 4.0), Chicago: SPSS.

5 John Hedderson, SPSS/PC + Made Simple (Belmont, California: Wadsworth Publishing Company, Belmont California, 1991), 4.

6 E.S. Pearson and C.J. Clopper, "The Use of Confidence Intervals or Fiducial Limits illustrated in the Case of The Binomials, Biometrika, Vol 26 (1934): 404 - 413.

7 Stanley J. Rachman, Fear and Courage (San Francisco: W. H. Freeman and Company, 1978), 59; David R. Jones, MD., U.S. Air Force Combat Psychiatry (Brooks AFB, Texas: USAF School of Aerospace Medicine, Aerospace Medical Division (AFSC), January 1986), DTIC Report AD-A165 011, 12 March 1986,3.

8 Hedderson, SPSS/PC+, 117-118.

9 Appendix B contains graphs illustrating the factor interrelationships for this study.

10 Rachman, Fear and Courage, 59.

11 David B. Guralnik, ed., Webster's New World Dictionary: Of The American Language, Second College Edition (New York: The World Publishing Company, 1970), 511.

12 Rachman, Fear and Courage, 2, References Peter Lang's three system model of fear.

13 Major Dana King, Flight Surgeon Aeromedical, Korat RTAFB (Royal Thai Air Force Base), Thailand Report, RCS 1-HAF-M7 (31 August 967), 2, Pacific Air Force Flight Surgeon Aeromedical Reports 1963 - 1973. David R. Jones Personal Paper Collection. Maxwell AFB, Ala.: USAF Historical Research Agency.

14 Brigadier General Kenneth H. Bell, 100 Missions North (Washington D.C.: McLean, Virginia, 1993), l44h.

15 King, Aeromedical Report, RCS 1-HAF-M7 (Korat RTAFB, Thailand, 31 Dec 1967), 11 in David R. Jones Personal Paper Collection.

16 No rigorous theory concerning compartmentalization exists. In his flying safety lectures to aircrews Commander Frank Dully a US Naval Flight Surgeon uses this term. It originates from stress coping mechanism stated by Major George T. Brandt, MD, of the Uniformed Services University of the Health Sciences, F. Edward Herbert School of Medicine, Bethesda, Maryland, during a 1 April 1993 telephone interview. It is also not unique to pilots, others involved in high stress professions exhibit the same characteristics.

17 Webster's, 325.

18 Aeromedical Report, (Korat, 30 April 1967), 1 in David R. Jones Personal Paper Collection.

19 Aeromedical Report, (Korat, 31 August 1967), 1 in David R. Jones Personal Paper Collection.

20 Webster's, 1527.

21 Chester W. Griffin, (Experienced F-105 Vietnam veteran), During a follow-up telephone interview 10 Mar 1993.

22 Webster's, 509.

23 Aeromedical Report (28 Feb 73, 1-HAF-M7), 4 in David R. Jones Personal Paper Collection..

24 Lieutenant Colonel Joyce Teters, telephone interview on 21 January 1993 MD., Chief Aviation Psychologist, Headquarters Air Force Safety Agency. She mentioned a swing in personality sometimes indicates the presence of fear. The change is most often transparent to the individual, who must be told by another individual.

25 Chester W. Griffin, Jr., telephone interview.

26 Webster's, 401.

27 Horgan, End of Tour Report.

28 Ibid., 925.

29 Jack Broughton, Thud Ridge, (Philadelphia, Pennsylvania: J.B. Lippincott Company, 1969), 234.

30 Webster's, 409.

31 Ibid., 696.

32 Jack Broughton, Going Downtown, 12 - 13; Gene I. Basel, Pak Six (La Mesa, California: Associate Creative Writers, 1982), 175.

33 Webster's, 297.

34 Ibid., 309.

35 Ibid., 276; General Charles G. Boyd, (F-105 veteran and former prisoner of war in North Vietnam), interview 17 May 1993 at Maxwell AFB. When I questioned him concerning this finding he said, "It doesn't matter what you call it, but presently we have a military culture where men will fight.

They don't fight for the government, for the military or for their commanders. They fight for each other."

36 Major General James E. McInerney, (F-105 pilot in Vietnam) telephone interview, 25 May 93.

37 Refer to the threats to validity table in Appendix C for a list of analysis constraints which effected this study.

CHAPTER 5

CONCLUSION

Airmen who desire to attack the will of the enemy directly and bypass the preliminaries of battle may find that such a goal is not conducive to changing enemy behavior. The means to successfully attack will still eludes them. To date, the cause and effect relationship between military force and desired outcome remains a subject of heated debate. An accurate view of man's nature lies at the center of this debate. In the past arguments developed from a "social Darwinian" perspective.1 Airpower theorists during World War II held this viewpoint and postulated that bombing cities would cause an enemy to capitulate due to the collapse of the will of the people. This assumption, however, proved inaccurate in the cases of Germany and England.

This study investigated the F-105 pilot in Vietnam to discover what motivated those airmen in that very stressful conflict. Observing what actually occurred provides the foundation for useful theories for future use. Instead of postulating what constitutes man's motivation and then looking for evidence, this study sought to look at what happened first and then determine why. For that reason, in my results, I differ with Martin Van Creveld concerning the primary motivations of the combatant. Granted that he focused on ground combatants, he concluded that the high level of unit cohesion in the German Army enabled it to achieve superior performance in World War II. This investigation of the F-105 pilots in Vietnam suggests that many other factors more profoundly affected the airmen's success in combat. To correctly investigate and substantiate this difference, an analysis of the Luftwaffe during World War II contrasted against the German Army would be necessary. This study provides a rigorous method of accomplishing this type of analysis.

FINDINGS

In this study the SPSS analysis revealed the presence of 12 of the original 13 pilot combat motivation model elements. Also, the analysis showed that the factors related to each other in a different fashion than originally postulated. The principal component factor analysis also revealed that many more factors may in fact exist than originally theorized. Fear, a critical element, revealed multiple factors which might mean that there exists a much finer definition of fear's components than known at this time. Unexpectedly, cohesion did not manifest a strong relationship to any of the analysis variables. The possibility exists that cohesion may have been so high that the analysis could not detect it.

RECOMMENDATIONS

The survey served as an excellent information-gathering tool. Without the survey a researcher would not find much of the information necessary to conduct this type of study. The survey contained some problems that a researcher should correct before using it again to gather information. For example, the researcher should rewrite the question concerning alcohol. The desire to collect as much data as possible within the confines of the survey resulted in a confusing

question. I would suggest a simpler question that determines if drinking started, increased, decreased or completely stopped during the combat tour. I would also suggest that more questions concerning the particular job that the pilot held in the unit during the combat tour might prove useful. Also, for Vietnam, questions concerning the rules of engagement would give some very useful insights.

An in-depth investigation of why cohesion manifested itself in the study in this manner is necessary. The implications of such a study may reveal a key difference between ground and air combatants. Martin Van Creveld provided a useful illustration of how the essential element of cohesion enabled the ground forces in World War II to achieve success.2

A study concerning the attitudes of the F-105 pilots as portrayed in the additional comments made on the survey and in section VIII is definitely appropriate. Researchers can glean much from these comments concerning training for combat, employment, and actual combat operations. Such lessons learned as the lethality of large volume anti-aircraft fire should help develop effective strike aircraft employment tactics. The tactics should then influence weapon development. This data contains insights which may improve Air Force operations by decreasing the width of the information gap mentioned in the introduction. Though uncertainty prevents reaching the ideal of "perfect" information, a better understanding of how combatants function in war will certainly allow a more constructive approach to combat planning and training. Some survey respondents commented that the first F-105 instructors with combat experience did not necessarily pass on lessons learned during the early phases of the war.

This study on the basic level requires expansion. To progress from the particular to a general theory of the moral domain, other studies from the Vietnam War ought to take place in order to determine general principles. Investigate other weapons systems to determine if the same variables apply. Investigate other services' aircraft as needed. A study of other types of aircraft, to include aircraft with multiple crew members, should enhance this area of study. Such an effort would establish the basis for a macro/moral domain of war model for airmen. To assist in this process, the US military should as soon as possible prepare, implement and organize--in continuously updated real-time--a survey to collect the best data possible. This survey could prove invaluable during war when the Air Force could collect data during hostilities. This method would resemble the Stouffer Studies accomplished during World War II.3

In parallel with this effort, the development of general moral, physical, and cognitive domain of war models for an entire military should occur. They would constitute a comprehensive macro analysis. First accomplish this task for each combatant arm: Air Force, Army, Navy, Marines, etc., and then for a composite military force with a combined arms concept. Questions for investigation may explore functions unique to each service and determine overlaps in capabilities. Thus the US could determine resultant domains of war models for the composite military force. The interactive model elements and unique or mutually exclusive relationships would readily manifest themselves. Accomplishing this task could maximize the use of the physical, cognitive and moral forces. This proposal effectively fulfills Sun Tzu's proposition "Know yourself."4

The US ought to also accomplish this task for allies and potential adversaries. In the case of ourselves and our allies, it will demonstrate relative strengths and weaknesses which will allow different nations to complement each other's capabilities. This useful information could enhance the success of future coalition wars. Knowing capabilities beforehand will enhance coalition building and operations. In the case of adversaries, this process will allow the US to maintain vigilance over likely threats to our national interest. It will also allow us to keep our superior capabilities continually analyzing the threat. With the long lead times for fielding new weapons systems and the complex task of developing new processes, this important effort should help to minimize surprises. Finally, in our volatile world our friends today might become our enemies tomorrow--as in the case of Iran and Iraq. Therefore, we must remain ever-vigilant. This process fulfills Sun Tzu's proposition of "Know your enemy."5

FUTURE IMPLICATIONS

Accomplishing this task requires an iterative process necessary for continual refinement and improvement of accuracy. The core ideas of the domains of war, once established, will probably remain the same. However, the possibility of gaining new insight into the foundation from which these factors originate now exists. This process would aid strategy in developing force structure based on a more accurate view of present capabilities, instead of allowing technological innovation to serve as a main driver for force structure. This macroscopic foundation allows useful analysis of past wars to guide strategy development for fighting future wars. However, no comprehensive analysis ensures victory in war, but without such an analysis a greater probability of defeat exists. This process would suggest courses of action based on reality instead of false premises--like the bankrupt theory of "social Darwinism". Accuracy in investigation should result from reality instead of adopting only the facts which satisfy preconceived notions based on flawed logic. As Solomon the wise king once said, "What has been will be again, what has been done will be done again; there is nothing new under the sun."6

Notes

1 Francis A. Schaeffer, How Should We Then Live? The Rise and Decline of Western Thought and Culture (Old Tappan, New Jersey: Fleming H. Revell Company, 1967), 148-151. Dr. Schaeffer explains how Neo-Darwinian Evolution Theory developed into social Darwinism and its subsequent influence on some of the atrocities of World War II and its aftermath.

2 Martin Van Creveld, Fighting Power (Westport, Connecticut: Greenwood Press, 1982), 170.

3 Samuel A. Stouffer, et al., The American Soldier: Adjustment During Army Life, Vol I (Princeton, New Jersey: Princeton University Press, 1949), ix.

4 Sun Tzu, The Art of War, trans. Samuel B. Griffith (London: Oxford University Press, 1963), 84.

5 Ibid., 84.

6 Ecclesiastes 1:9.

APPENDIX A

COMBAT PILOT SURVEY EXAMPLES

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65 - 68 Basic Survey.

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73 - 76 Survey of experienced pilot entering combat.

77 - 80 Survey of a prisoner of war.

If you desire to obtain the actual surveys used in this study, contact the Air University Library Maxwell Air Force Base (AFB), Alabama 36112. The information may also be obtained from the Air Force Historical Research Agency (HRA), Maxwell AFB, Alabama 36112-6678.

APPENDIX B

SPSS PRINCIPAL FACTOR COMPONENT ANALYSIS

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Interpreting SPSS Graphs

The following graphs illustrate the SPSS Principal Factor Component Analysis interrelationships between the survey variables. The numbers located at the bottom of the page under each plot represents the pertinent statistical information. The values of interest for this study are the second number in line 2, following "R Squared". Multiplying this number by one hundred yields the percentage that the two variables account for variation in each other. The higher the value the stronger the relationship is between the two variables. The next value of interest is the last number in line 2 following "Sig." This number represents the statistical significance. The closer this value is to 0, the stronger the interrelationship is between the two variables. On the plot itself, the steeper the line the stronger the variable interrelationship. Note that the lines on all of the cohesion plots are fairly horizontal.

APPENDIX C

THREATS TO VALIDITY TABLE

Table C-1: Threats to Validity.

1.	This study did not use a control group.
2.	No rigorous evaluation of each question to see if in fact it measured what it intended to took place. Expert testimony established the basis for the questions.1
3.	This study was not constructed as a rigorous scientific study with a null hypothesis.
4.	Questionnaire size limited the number of questions asked.
5.	All questions carried equal weight in the analysis process.
6.	The elapsed time period, approximately 25 years, would tend to make survey respondents embellish past events. However, monographs, end of tour reports and unit histories, and Flight Surgeon Aeromedical Reports written during the war, helped to offset this influence on the analysis process.
7.	The survey did not include question reversals to eliminate mechanical responses from the respondents.

The author, a test pilot with 3200 hours of flight time, has extensive experience in over 25 different aircraft.

Dr. David R. Jones, MD, a retired USAF Flight Surgeon who continues to consult with pilots, reviewed the survey for logic and completeness.

Lieutenant Colonel Albert Mitchum, a political and military affairs specialist serving on the staff and faculty of the Air Command and Staff College, Maxwell AFB, Alabama, supervised construction of the survey.

Mr. Pat Dowd, of Air Force Aeromedical evaluation division, Brooks AFB Texas, reviewed the survey.

Anthony Kellett, author of Combat Motivation: The Behavior of Soldiers in Battle, reviewed the survey.

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