

The Cult of the Lightweight Fighter: Culture and Technology in the U.S. Air Force, 1964-1991

by

Michael Wayne Hankins

B.A., University of North Texas, 2007

M.S., University North Texas, 2013

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of History
College of Arts and Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2018

Abstract

In the late 20th and early 21st centuries, military aviation technology grew expensive and politically divisive, and this is not without precedent. In the 1960s and 1970s, the F-15 Eagle and F-16 Falcon represented a controversial shift both in the cost of development and in tactical doctrine for the United States Air Force (USAF), yet the motivating factors that influenced their design are not fully understood. Most of the literature either has focused on a teleological exploration of technical evolution or has held to a “genius inventor” paradigm, lionizing individual engineers and planners. Other works have focused on these aircraft as factors that changed the Air Force's tactical approach to warfighting or have simply evaluated their combat performance.

Although these approaches are valuable, they do not account for the effect that institutional culture and historical memory had on the F-15 and F-16 programs. This dissertation argues that the culture of the fighter pilot community was based on a constructed memory of World War I fighter combat, idealizing a heroic, romanticized image of “Knights of the Air.” This fighter pilot community attempted to influence the F-15 and F-16 programs to conform to their vision of an idealized past. Furthermore, a smaller group of these pilots, calling themselves the “Fighter Mafia” (and later the “Reformers”) radicalized these ideas, rejecting the Eagle and Falcon as not representative of their ideal vision. Through public and political activism, this group affected the discourse of military technology from the mid-1970s to the present. Drawing on David Nye’s work on the connections between technology and cultural historical narratives and identity, this work will demonstrate that culture and institutional historical memory can be important factors in driving the development of military technology.

The Cult of the Lightweight Fighter: Culture and Technology in the U.S. Air Force, 1964-1991

by

Michael Wayne Hankins

B.A., University of North Texas, 2007

M.S., University of North Texas, 2013

A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of History
College of Arts and Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2018

Approved by:

Major Professor
Dr. Donald Mrozek

Copyright

© Michael Hankins 2018.

Abstract

Military aviation technology has grown expensive and politically divisive, and this is not without precedent. In the 1960s and 1970s, the F-15 Eagle and F-16 Falcon represented a controversial shift both in development cost and in tactical doctrine for the United States Air Force (USAF), yet the motivating factors that influenced their design are not fully understood. Most of the literature has either focused on a teleological exploration of technical evolution, or has held to a “genius inventor” paradigm, lionizing individual engineers and planners. Other works have focused on these aircraft as factors that changed the Air Force's tactical approach to warfighting, or have simply evaluated their combat performance.

Although these approaches are valuable, they do not account for the affect that institutional culture and historical memory had on the F-15 and F-16 programs. This dissertation argues that the culture of the fighter pilot community was based on a constructed memory of World War I fighter combat, idealizing a heroic, romanticized image of “Knights of the Air.” This fighter pilot community attempted to influence the F-15 and F-16 programs to conform to their vision of an idealized past. Furthermore, a smaller group of these pilots, calling themselves the “Fighter Mafia”(and later “The Reformers”) radicalized these ideas, rejecting the Eagle and Falcon as not representative of their ideal vision. Through public and political activism, this group affected the discourse of military technology from the mid-1970s to the present. Drawing on David Nye’s work on the connections between technology and cultural historical narratives and identity, this paper will demonstrate that culture and institutional historical memory can be important factors in driving the development of military technology.

Table of Contents

List of Figures	ix
Acknowledgements.....	x
Chapter 1 - Introduction.....	1
Defining the Knights of the Air	9
The Power of Belief	21
Chapter 2 - The Fighter Pilot with a Thousand Faces	24
We Could Be Heroes	26
Hypermasculinity.....	31
Lone Wolves	42
Wonderful Toys	49
Foolish Boys	51
The Pilot’s Journey	55
Conclusion	62
Chapter 3 - “I Can Conquer the World”: Knights of The Air in The Second World War	63
Victory Through Air Power.....	64
I’m The Best at What I Do.....	66
Wearing Your Plane Like a Glove.....	88
A Problem with Authority	91
Conclusion	95
Chapter 4 - “I Was Snoopy in My Dreams”: Fighter Pilots in Korea and Vietnam	96
SAC as Superior.....	97
Dogfighting Reborn: Korea	100
Redefining Air Superiority	108
The Phantom Menace	112
Mig-Killers in Vietnam.....	115
Conclusion	124
Chapter 5 - “The White Scarf Stuff”: Origins of the F-15 Eagle.....	126
Defining Air Superiority.....	126
Genghis John: Archetype of The Knight of the Air.....	134

Energy Maneuverability	145
Penetrating the System.....	158
Voices in The Wilderness	163
No True Fighter	175
Conclusion	182
Chapter 6 - The Eagle Has Landed: Finishing the F-15	184
The New Gospel	184
Under Pressure.....	194
Requirement Creep	198
Modification.....	204
Fly Before You Buy.....	209
Responding to A Bigger Crisis	212
Conclusion	219
Chapter 7 - The Lord's Work: Creating the F-16	220
The Fighter Mafia	224
Opening Doors	238
Statement of Work	242
Demonstrating New Technology	251
There Can Only Be One.....	262
Guerrilla Tactics	268
Many Pounds for Air-To-Ground.....	274
Conclusion	283
Chapter 8 - Drafting Scripture: The Canon of the Reformers	285
The Gospel of Boyd.....	287
Giants vs. Midgets	298
Mutually Exclusive.....	311
Buzzwords	318
Conclusion	323
Chapter 9 - Going Public: The Life and Times of the Reform Movement.....	325
Vietnam Syndrome and the Hollow Force	335
National Defense and Its Critics	343

Caucus.....	355
Growing the Movement	359
Blood for Money.....	364
Fierce Beliefs	368
Rise and Fall	375
Conclusion	381
Chapter 10 - Desert Storm: Reform or Revolution?	384
Be All You Can Be	385
Reforming the Marines	390
The Navy and USAF.....	393
A New Old Theory: John Warden	395
Trading Machines for Lives.....	404
The Box Score	406
You Say You Want a Revolution?.....	414
Taking Credit	417
Conclusion	425
Chapter 11 - Conclusion	427
Myths and Legacies	434
Bibliography	446
Appendix A - Abbreviations.....	468

List of Figures

- Figure 5-1 An example of an EMT chart showing the conditions in which an F-4 Phantom has an advantage over a MiG-21 (in green), as opposed to where the MiG has an advantage (in red). Courtesy of Major Daniel Chisolm, USAF Academy Department of Aeronautics. .. 155
- Figure 5-2 This chart shows the same comparison between and F-4 and a MiG-21, but specifically under conditions of a 5g turn. Courtesy of Major Daniel Chisolm, USAF Academy Department of Aeronautics..... 156
- Figure 5-3 These two images are Rutowski’s original depictions of energy maneuverability theory. Boyd borrowed the format of these charts for his own work. From Edward S. Rutowski, “Energy Approach to the General Aircraft Performance Problem,” Journal of the Aeronautical Sciences, 21 (March 1954), 190-191..... 157
- Figure 7-1 Using the imagery of dogfighting from the First World War, this cartoon expressed how many pilots felt skeptical about fly-by-wire systems disrupting the relationship between man and machine in the cockpit. From Sutherland, “Fly-By-Wire Control Systems,” 2. 258
- Figure 7-2 This cartoon demonstrates the idea that more advanced aircraft needed fly-by-wire controls, and that these were safer, simpler, and reliable due to redundancy systems. From Sutherland, “Fly-By-Wire Control Systems,” 36. 259

Acknowledgements

No academic work of any significance can be produced in a vacuum. I have been privileged to have received assistance and support from a variety of people and organizations. The largest thanks goes to Dr. Donald Mrozek, the adviser on this project. In addition to the valuable input from his previous scholarship, he provided critical guidance, instruction, and encouragement during the entire process, and went far above and beyond the call of duty in terms of frequent meetings with me that helped to shape my work. Some graduate students have inattentive or even hostile advisers, and the horror stories of toxic adviser/student relationships are rife in the graduate student community. I am lucky and proud to have had the opposite experience with Dr. Mrozek, who has been an enormous help every step of the way.

Dr. Michael Krysko has also been a wonderful instructor and supervisor. In his classes, he challenged my thinking, and his critiques of my writing pushed me to become a much better writer. Dr. Albert Hamscher also deserves recognition for challenging me to be a better writer, as well as helping to get my first article publication-worthy. This project would be far worse without their input. Andrew Orr and Joseph Unekis both deserve credit, not only for their input on this project, but also for agreeing to step in and help at the last minute with little notice. Their willingness to accommodate me has been much appreciated.

Dr. Kristen Mulready-Stone and her husband Dr. David Stone have been very encouraging as well, not only in terms of content and writing but in professionalization and career development. Dr. David Vail has been a close friend that has helped encourage and challenge me on every step of my doctoral student journey. His guidance, both on a professional, scholarly, and professional level has been invaluable.

I was able to conduct research in several fine institutions. The Air Force Historical Research Agency archives at Maxwell Air Force Base, Alabama was wonderful, and their staff was quite helpful in helping me find materials related to this project. The University of Texas at Dallas Special Collections at Eugene McDermott Library was a great place to work. The staff was helpful, and their World War I Aviation Collection deserves far more attention than it has received from scholars. The President Gerald Ford Library was also helpful. I emailed them a short, specific, "yes or no" question, and not only did they answer, but they dug into their archives and found nearly 200 pages of documents related to this project that I never would have thought to ask for. Special thanks are due to John O'Connell for his assistance there. The help I received from the Air Force Academy Special Collections Department at McDermott Library was perhaps the most praiseworthy. Due to my own mistakes, I found myself stuck in Colorado Springs for a research visit but without a car. Dr. Mary Elizabeth Ruwell not only helped me find materials for this project, but personally provided transportation for me so that I could visit the archives. It would be difficult to overstate how supportive she was during this process.

I have also benefited greatly from talking with other scholars and researchers throughout this process. Sometimes, the ability to talk through something and bounce ideas of other subject matter experts can be one of the most important parts of a project such as this one. In that regard, I owe a huge debt of gratitude to the late Robin Higham (who worked with me extensively before he unfortunately passed away), Mark Parillo, General Richard Myers, Brian Laslie (who also reviewed an early draft of this project), and Steven Fino.

I received significant financial support for this project from the Kansas State University History Department's funds from generous donors, including the Col. Peter Cullen Military History Fellowship, the Mark A. Chapman Military History Award, the James C. Carey

Research and Travel Award, the A. Bower Sageser Teaching Award, and the Robin Higham Military History Graduate Student Research and Travel Fund.

When I arrived at Kansas State, I was not sure what I would find, but I never expected to connect so deeply with the graduate students there. The entirety of the graduate student community at K-State deserves my deepest thanks, although a few stand out as having gone above and beyond in providing assistance with this particular project, in terms of direct feedback and research assistance. I would like to extend a special thank you to Ted Nagurny, James Tindle, Jennifer Zobelein, and Kate Tietzen.

The faculty of the history department at the Air Force Academy has also been nothing but encouraging, allowing me to both teach an incredible group of cadets and to get this project done at the same time. Special recognition is due to the head of the department, Colonel Margaret Martin, for her support.

Finally, I would like to thank my family and friends for their support. During the process of writing this project, I went through some deep personal loss, and they were there to help keep me afloat. I doubt I could have finished this project without their help.

However, if there are any mistakes in this work, the people listed above are not at fault, I take full responsibility. If any readers take issue with any of the material I have presented, they should be sure to blame me and me alone.

Chapter 1 - Introduction

In March 1970, the American Institute for Aerodynamics and Astronautics asked defense analyst Pierre Sprey to be a keynote speaker at a conference meant to celebrate McDonnell-Douglas' newest technological achievement: the F-15 Eagle fighter plane. Shocking his audience, Sprey began his speech with a furious attack against the F-15, calling for prototypes for a new aircraft that would stay true to his vision of a dedicated air-to-air combat plane designed for dogfighting (which later resulted in the F-16 Falcon). Sprey was not alone; he was part of a movement that called itself the "Fighter Mafia," which later grew into the group of political activists called "The Reformers." These advocates held up air-to-air combat as the main measure of success in military aviation. To succeed in air combat, in their minds, was primarily an issue of personality. These ideals had existed as a subculture long before Sprey and his associates were born.

The culture of fighter pilots has long been a point of interest both inside and outside of the military. During World War I, magazines and pulp novels celebrated the ace pilot as the new embodiment of the individualistic hero, in the mold of Greek myths, if not the gods themselves. Pilots from the First World War wrote poetry in which they described ascending to the heavens and touching the face of God. In the 1930s, when comic books became one of the most popular forms of media, many, such as *Blackhawk*, were based on fighter pilots. In 1941, *Wonder Woman* creator William Moulton Marsten made the heroine's love interest a fighter pilot named Steve Trevor. Films such as *Hell's Angels* (1930), *The Hunters* (1958), and *The Blue Max* (1966) presented air-to-air combat as fantastic, adventurous duels between heroic individual pilots. The relaunch of DC Comics' iconic character Green Lantern in (1959) presented test pilot Hal Jordan as an updated superhero for the space age, based loosely on real-life fighter pilot Chuck Yeager.

The central idea in Tom Wolfe's *The Right Stuff* was that fighter pilots were special at the very core of their being – heroes as much as the ancient Greeks Hercules or Achilles. The film adaptation of that work in 1983, in addition to the megahit *Top Gun* (1986) captured the popular imagination and confirmed the mythologized, idealized version of the air-to-air combat pilot as an American hero and icon. Many of the ideas associated with fighter pilots were transferred to science fiction and fantasy, especially through the *Star Wars* (1977) franchise. The heroic Luke Skywalker, whose very name conjures images of gallant pilots traversing the heavens, was presented first and foremost as a skilled air combat pilot, who saves a galaxy far, far away through the skillful use of his fighter aircraft. Other franchises, such as *Battlestar Galactica*, (in both the original version starting in 1978 and in the version beginning in 2003), emphasize the role of fighter pilots and the culture that those pilots celebrate.

These examples barely scratch the surface of the American fascination with fighter pilot culture. Yet despite all this enthusiasm for combat aviation, it has garnered little scholarly attention.¹ The first problem is defining culture. In a broad sense, when this work refers to

¹ The best scholarly work dealing with the culture of fighter pilots is the recent Steven A. Fino, *Tiger Check: Automating the US Air Force Fighter Pilot in Air-to-Air Combat, 1950-1980* (Baltimore: Johns Hopkins University Press, 2017). Other useful entries include C. R. Anderegg, *Sierra Hotel: Flying Air Force Fighters in the Decade after Vietnam* (Washington, D.C.: Air Force History and Museums Program, 2001); Carl H. Builder, *The Masks of War : American Military Styles in Strategy and Analysis* (Baltimore: Johns Hopkins University Press, 1989); Marshall Michel, *Clashes: Air Combat Over North Vietnam: 1965-1972* (Annapolis, Naval Institute Press, 1997); Mike Worden, *Rise of the Fighter Generals: the Problem of Air Force Leadership, 1945-1982* (Maxwell AFB: Air University Press, 1988); and Kenneth P. Werrell, *Sabres over MiG Alley: The F-86 and the Battle for Air Supremacy in Korea* (Annapolis: Naval Institute Press, 2005).

Other useful works for accessing fighter pilot culture are works based primarily on oral histories or memoirs. The number of fighter pilot memoirs available is massive and continually growing. Some of the most useful works include: Robert K. Wilcox, *Scream of Eagles: The Dramatic Account of the U.S. Navy's Top Gun Fighter Pilots and How They Took Back the Skies Over Vietnam* (New York: Pocket Star Books, 1990); Zalin Grant, *Over the Beach:*

“culture,” it is meant almost as a stand-in for *Weltanschauung* — the world view, philosophy, belief system, and assumptions about the world held by a particular group—in this case fighter pilots. But “culture” as used here also suggests identity—the way a group defines itself, especially in relation to other distinct groups. Organizational theorists Mary Jo Hatch and Majken Schultz have explored the connections between identity and culture through their “Organizational Identity Dynamics Model.” They posit that members of an organization form distinct identities “in relation to what others say about them, but also in relation to who they perceive they are.” Identity and culture are caught in a feedback loop, in which each continually reinforces the other, but culture is difficult to study because “organizational culture resides primarily in the unspoken assumptions and norms of an organization.” Theorist Edgar Schein goes as far as to describe culture as essentially “phenomena that are below the surface, that are powerful in their impact but invisible and to a considerable degree unconscious.”²

Schein also argues that a culture’s essence consists of “the commonalities that bind groups into a coherent whole.” These commonalities are the “habitual ways of seeing and thinking about the world” that are shared by members of the group, and they create modes of thinking that “are like automatic pilots.” Schein argues that charismatic leaders can have a powerful effect in creating a culture, and, once it is established, “culture becomes more of a cause than an effect. . . . Because culture serves an important anxiety-reducing function,

The Air War in Vietnam (New York: Pocket Books, 1986); Ed Rasimus, *Palace Cobra: A Fighter Pilot in the Vietnam Air War* (New York: St. Martin's Press, 2006); Robin Olds, *Fighter Pilot: The Memoirs of Legendary Ace Robin Olds* (New York: St. Martin's Press, 2010); Frederick C. Blesse, “*Check Six, A Fighter Pilot Looks Back*” (New York: Ivy Books, 1987); Randy Cunningham, *Fox Two: The Story of America's First Ace in Vietnam* (Mesa, Arizona: Champlin Fighter Museum, 1984).

² All quoted in Jonathan Riley, “At the Fulcrum of Air Force Identity: Balancing the Internal and External Pressures of Image and Culture,” Drew Paper No. 11 (Maxwell AFB: Air University Press, 2014), 13.

members cling to it even if it becomes dysfunctional in relationship to environmental opportunities and constraints.”³ In other words, charismatic leaders can create or at least shape cultures, which create common modes of thinking that become automatic, and members of a culture will cling to these ways of thinking in the face of adversity, even if they become destructive.

In scholarly discussion of culture and organizational theory specifically relevant to the Air Force, no voice is more prominent than Carl Builder. His 1989 book, *Masks of War*, argues that each of the American military services has a distinct culture, or “personality,” that guides its decisions. More specifically, he claims that “[t]he Air Force could be said to worship at the altar of technology,” especially the technology of the airplane. Furthermore, what matters most about these airplanes is not the number but the qualities specific to them. Builder goes on to argue that the Air Force is usually concerned mainly with the superiority of their planes in specific performance characteristics. Some characteristics are considered more important than others. Speaking at a time when the Cold War was still the dominant threat, Builder asserts: “New aircraft developments by the Soviets are of much greater concern if they reflect new flight envelopes than if they are being produced in large quantities. To be outnumbered may be tolerable, but to be outflown is not. The way to get the American flier’s attention is to confront him with a superior machine.”⁴

Builder’s later work *The Icarus Syndrome* argues that this love of airplanes specifically overshadows the Air Force’s identification with air power theory. He notes that throughout the

³ Quoted in Ioannis Koskinas, “Black Hats and White Hats: The Effect of Organizational Culture and Institutional Identity on the Twenty-third Air Force, CADRE Paper No. 24 (Maxwell AFB: Air University Press, 2006), 6-7.

⁴ Carl Builder, *Masks*, 19, 22.

Cold War, “[i]t became increasingly obvious that the concept of air power was not the *raison d’être* of the Air Force, it was airplanes and flying,” and that Air Force leaders “revealed—through their decisions more than their words—that their true affection was not for the theory of air power, but for the airplane.”⁵ But what kind of airplanes, specifically? Builder has pointed out that pilots tend to gravitate towards certain types of aircraft. As he states,

The Air Force is, by far, the most attached of the services to toys. Air Force pilots often identify themselves with an airplane: “I’m a 141 driver.” “I flew buffs [B-52s].” Sometimes this identification goes right down to a particular model of an airplane: “I fly F-4Cs.” The pride of association is with a machine, even before the institution. One could speculate that, if the machines were, somehow, moved en masse to another institution, the loyalty would be to the airplanes.⁶

This devotion to specific airplanes, and seeing pilots of different types of airplanes as “the other,” is perhaps the reason why subcultures formed within the Air Force. These subcultures centered broadly around the two main “families” of aircraft: large, multi-crew bombers, and single-seat fighters. There are, of course, other types of missions such as close air support (CAS), transport, intelligence, and a multitude of smaller support roles, but strategic bombers and tactical fighters made up the largest groups. Each subculture evaluates itself on a completely different set of performance characteristics; strategic bombers need to carry massive payloads and thus need to be large, less maneuverable, fast, and have crews that are trained for coordinated teamwork, while fighters emphasize maneuverability, smaller size, and the autonomy of the individual fighter pilot. Each group tends to see itself as important—if not paramount—to achieving decisive success in warfare.

⁵ Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force* (Somerset: Taylor and Francis, 1994), 35.

⁶ Builder, *Masks*, 23.

During and especially after the Second World War, the bombers ran the Air Force. The major air plans for the Second World War were built on the foundation of strategic bombing theory, and, after the war, the Air Force ran the Strategic Bombing Survey, which argued that the bombing effort had been decisive in achieving victory in Europe and Japan.⁷ U.S. defense policy, especially during and after the Eisenhower administration, was premised on the concept of massive retaliation delivered by the pilots of Strategic Air Command. The Air Force existed to bomb.⁸ Yet within the Air Force, the subculture of fighter pilots did not hold the strategic bombing theories of Douhet and Mitchell in nearly as sacred a light, looking instead to the “knights of the air” from the First World War such as Eddie Rickenbacker, Oswald Boelke, and Manfred von Richthofen (the “Red Baron”), as their inspiration.

The division between this bomber culture and the fighter culture was a hallmark of the Air Force for most of its existence, certainly during the Second World War and more so from its gaining institutional independence in 1947 through the late 1960s. The Air Force in those years

⁷ Although the dominance of bomber doctrine as the main identity of the Air Force during this period is hardly questionable, the Strategic Bombing Survey is a troublesome document. For a useful analysis of the survey and how it was used to create, uphold, and also attack strategic bombing doctrine (and how that doctrine defined the Air Force), see Gian Gentile, *How Effective is Strategic Bombing? Lessons Learned from World War II and Kosovo* (New York: New York University Press, 2001).

⁸ The dominance of Strategic Air Command and bomber culture broadly has been the subject of many works. Some of the best include Caroline F. Ziemke, “In The Shadow of the Giant: USAF Tactical Air Command in the Era of Strategic Bombing, 1945-1955” (PhD diss., Ohio State University, 1989); Benjamin Lambeth, *The Transformation of American Air Power* (Ithaca: Cornell University Press, 2000); Craig C. Hannah, *Striving for Air Superiority: The Tactical Air Command in Vietnam* (College Station: Texas A&M University Press, 2002); Marshall Michel, “The Revolt of the Majors: How the Air Force Changed After Vietnam” (PhD Diss., Auburn University, 2006); Earl H. Tilford, *Crosswinds: The Air Force's Setup in Vietnam* (College Station: Texas A&M University Press, 1993). Perry McCoy Smith has argued that the creation of an independent Air Force was built on the concept of strategic bombing, in *The Air Force Plans for Peace, 1943-1945* (Baltimore: Johns Hopkins University Press, 1970).

was dominated by the bomber culture; its leaders were mostly former bomber pilots. Maintaining this rigid view of the Air Force's purpose was important to maintaining independence. Air Force leaders in the years immediately following 1947 thought that they always needed to justify the existence of the Air Force as an independent service—if, at any point, they lost the argument that an independent Air Force was a key factor in winning potential future wars, the pervasive fear among most Air Force leaders was that Congress would fold the Air Force back under the Army. This meant the Air Force had two key characteristics at its birth: first, the Air Force has been marked by deep insecurity and suspicion of other services treading on its turf. Hence the bitter rivalry for air assets between it and the Army, as well as the deep reluctance to coordinate technological development with the Navy. Secondly, to maintain a bomber identity and prevent cultural shifts within the service, the Air Force style of leadership has tended to be “monarchic.”⁹

During the post-Second World War period, fighter pilots maintained a strong subculture. To the institution at large, fighters were necessary, but fighter pilots tended to be marginalized. Some scholars have referred to the intense “tribalism” between the two groups, dividing the Air Force into “clans.” In light of the “monarchic” style of leadership, some scholars have argued that the Air Force operates under a “caste system.”¹⁰ In a superficial sense, the conflict was typified by the split in the Air Force between its two largest subcommands: Strategic Air Command (SAC), which handled strategic bombing missions, and Tactical Air Command (TAC), which handled air superiority, interdiction, and close air support of ground forces (CAS). However, even TAC attempted to legitimize itself by focusing on bombing missions and adopting elements of the nuclear delivery mission, so that many fighter pilots (especially those

⁹ Koskinas, 18, 20.

¹⁰ Koskinas, 19.

that valued air-to-air combat) saw themselves as marginalized within their own branch. Until around 1970, Air Force leaders acknowledged that fighters were attractive, but were ultimately a diversion from the real work of the Air Force: strategic bombing from large, multi-man bombers (such as the B-29 Superfortress and later the B-52 Stratofortress). Or, as the first commander of SAC and later USAF Chief of Staff Curtis LeMay frequently noted, “Flying fighters is fun. . . . Flying bombers is important.”¹¹

These fighter pilots maintained a distinct subculture within the service, and that culture had a large effect on all aspects of the service: doctrine, training, organization, and, what this work is most concerned with, technology development. As the fighter subculture gained more of a voice and more influence within the Air Force, the service began to produce technologies that were more in line with that culture’s values.

Defining and understanding this culture is key, then, and is the focus of the first three chapters of this work. Because culture does so often encompass elements that are beneath the surface (unspoken assumptions, beliefs, or even subconscious attitudes), finding sources to explain this culture is a difficult proposition. This work relies heavily on memoirs, diaries, and oral histories, noting not just what these fighter pilots said, but how they said it. In these early chapters, the pilots will be allowed to speak directly for themselves as much as possible, providing a glimpse into the formation of the roots of the fighter pilot subculture and how that culture was transmitted to subsequent generations. Those roots stretch back to the earliest days of military aviation, World War I.

¹¹ Quoted in Koskinas, 19.

Defining the Knights of the Air

The First World War occurred at a time when America's military structure was changing. Just 15 years before, someone like Theodore Roosevelt could heroically volunteer to assemble his own all-volunteer force to charge up San Juan Hill—an event that came to symbolize the romance, heroism, and masculinity that many associated with patriotic military service around the turn of the century. A number of factors conspired to change this by the time America entered the First World War. Organized labor demanded that officers not be drawn exclusively from aristocratic, coastal elites. The Selective Service Act of 1917 seemed, in the minds of its critics, to attack the very foundation of American individualism, volunteerism, and military heroism. The horrific realities of ground combat in World War I also fundamentally altered how many people viewed the role of the individual soldier. Dying and decomposing in a muddy trench as thousands of lives were ripped apart with artillery and machine gun fire while not gaining any ground was the complete antithesis of heroic volunteers charging up San Juan Hill.¹²

But the public—and the war's participants themselves—craved images of heroism, to recapture a sense of nobility, masculinity, and honor in combat that they felt was being lost in the trenches. During the war, there was a new type of fighter who did—at least on the surface—appear to exemplify those values: the combat pilot. Often depicted in recruitment ads and stories (both non-fiction and fiction) as a new order of knighthood, fighter pilots—specifically those that engaged with other enemy pilots in aerial combat (also called “dogfighting”) were a potent alternative to the gloryless gloom of trench warfare. When the U.S. Air Service called for

¹² Linda R. Robertson, *The Dream of Civilized Warfare: World War I Flying Aces and the American Imagination* (Minneapolis: University of Minnesota Press, 2003), xiii-xv.

volunteers to become pilots, they were forced to turn men away due to the high number of applicants.¹³

Combat pilots came to represent something specific in the American (and the world's) imagination. In her study of this phenomenon, Linda Robertson concludes:

Whether presented as a selfless knight or as a man in search of personal glory, the ace emphasized individualism, the capacity of the individual to motivate himself to seek the enemy in a duel to the death, and the ability to control his destiny by bending the newest weapon of mechanized warfare to his will. . . . By the end of the war, a specifically American version of the ace had been formed from these various elements. The American ace, epitomized in the top-scorer from the top unit, Eddie Rickenbacker, borrow some elements from the British imagery of both the chivalric hero and the ambitious self-made man, and some from the German image of the "new man," motivated by a machine-like efficiency and subordination to the unit. . . . As a consequence, the role of the combat pilot wedded air wars with the image of civilized violence undertaken in the name of civilization, a connection between the mode of warfare and its purpose which was lost with the advent of brutal, mechanized warfare on the ground. . . . The image of the ace is one of hypermasculinity, an individual who both embodies the highest national ideals and who cannot be defeated by death—an impossible image, yet one that captures the reason for the long-lived romance associated with the aces of World War I. They were men who rose to the skies to answer the seductive siren call, the tune of the dance of death. It is not the reality of the very high death rates and the toll on the human spirit, but the image of them engaged in that deadly dance that endures.¹⁴

During the First World War, the fighter pilot was a symbol, a collection of ideas that may or may not have accurately reflected reality—but the romantic, heroic conception of the ideal fighter pilot meant a great deal both to the American public and to the pilots themselves. Many of these qualities did not originate with pilots but were a transfer of older ideas of heroic, masculine, civilized, noble combat that had captured the American mind in previous generations, regardless of how unrealistic such notions may have been.

¹³ Robertson, *The Dream*, xv.

¹⁴ Robertson, *The Dream*, xvi-xix.

This collection of ideas that became associated with World War I combat pilots establishes the “fighter pilot myth.” This myth has been identified and studied by others. Using philosopher Roland Barthes’s concept of myths as a “language” and “type of speech,” historian (and former F-15 pilot) Steven A. Fino has defined the fighter pilot myth as including three elements: “that air warfare represented honorable combat fought by honorable individual warriors; that it was the unique flying skill of the pilot that dictated success; and that the toll of aerial victories recorded by the pilot and reported in hometown college newspapers was an appropriate measure of success.”¹⁵ More broadly, extending beyond Fino, the mythic construction of an idealized fighter pilot consists of five basic elements:

1. Aggressiveness. This includes an eagerness for battle, a strong sense of competition and a need to define one’s self as better than others (both enemies and peers), and is tied to what many pilots refer to as a warrior ethos. This includes qualities that are typically coded as masculine, as in aggressiveness, dominance, and a lust for battle. Fighter pilots tend to throw caution to the wind, and are less likely to trust those who urge caution.

2. Independence. Fighter pilots (especially American ones) tend to worship the notion of individuality. This fascination expresses itself in a number of ways. For example, many pilots speak of the freedom they feel when flying—that they alone are in control of their fate as they soar through the heavens, reliant on their flying skill alone. Descriptions of combat flight as an adventure and as an escape from the dread of normal life are markers of this trait of independence. For this reason, fighter pilots have tended to prefer single-seat aircraft, and their disdain for large planes that require multiple crew members is an expression of independence. Similarly, fighter pilots value their ability to make their own decisions, especially in the air. They

¹⁵ Fino, *Tiger Check*, 18-19.

typically resist any infringement on how to engage an enemy in the air. By extension, many fighter pilots are distrusting, disrespectful, or openly hostile towards authority figures. Many fighter pilots disdain the chain of command, and fighting back against commanding officers can be seen as a badge of honor among other fighter pilots. The exception is the commanding officer who is also a fighter pilot and who has earned the respect of other pilots through combat. This kind of commander exemplifies the mythic qualities of the idealized fighter pilot myth, and such commanders are not only respected but worshiped.

3. Hero-Imagery. Certainly, many depictions of fighter pilots -- in fiction and non-fiction, in prose and poetry, and in visual imagery -- tend to emphasize romanticized heroic symbols. Yet part of the “fighter pilot myth” is that the pilots themselves are aware of these images and make extensive and purposeful use of them. They see themselves as embodying these stereotypes, comparing themselves to medieval heroes such as knights, or, as is often the case, ancient historical figures such as Julius Caesar, or mythological heroes (usually from Greek or ancient near-Eastern lore) such as Achilles or Samson, or even comparisons to gods themselves, such as Zeus.

4. Technology. Fighter pilots are typically advocates for specific technologies. The invention of air power itself is based on what was—at the time of World War I—advanced, state-of-the-art technology. Fighter pilots are wedded to that technology, which they see as an extension of themselves. They usually identify their aircraft with themselves, as an extension of their own bodies. Yet their love of technology is limited specifically to those types of aircraft that emphasize the elements of the fighter pilot myth. They desire and celebrate planes that enhance their sense of individuality and aggressiveness, and deride planes or technological

developments that intrude on those elements. Thus, fighter pilots need not favor technology in a general sense, but they passionately back technology that supports their values.

5. Community. Fighter pilots are certainly competitive with each other, but they also form a tight-knight community – bound by shared commitment to the fighter pilot myth. Among those who exemplify these qualities, there is not only mutual respect but also often a deep admiration, and this community jealously guards itself from outsiders. Those who are not “true fighter pilots” are viewed as unable to understand the realities of combat flying and are unworthy of that deep respect. In the aftermath of World War II, in which strategic bombing had been so visible an element, the even more vigorous advocacy of bombing with nuclear weapons seemed to pose a threat to the fighter pilot community, which developed a sense of persecution. They feared that their days were numbered, if not already gone. This was not an unwarranted fear. Yet the harder they were pressed and the more suspicious they became of outsiders, the more firm the fighter pilots became in the conviction that they were right.

These five elements—aggressiveness, independence, heroic imagery, technology, and community—make up the “fighter pilot myth.” These were the main qualities that most fighter pilots valued the most highly. Some pilots expressed all five, some only express a few to varying degrees. Although they were formed in the crucible of World War I, they remained and grew through the generations. They are also not accurate descriptions of reality but are abstractions. Fino describes this, again referencing Barthes, noting that shared myths such as the myth of the fighter pilot

are defined not by their type of message or even by their intended purpose but only by their construction. In a myth, an object with understood significance is presented but in an abstract or purposefully incomplete manner that implicitly separates the object from its detailed historical ‘richness.’ For Barthes... ‘[the myth] is neither a lie nor a confession: it is an inflexion’ that ‘transforms history’ into something that instead seems natural...

The Fighter pilot myth was not an outright lie but a purposeful opaquing of historical events.¹⁶

Although some instances exist of real life seeming to validate the mythological, overall, the myth of the fighter pilot does not accurately reflect history. It glosses over it, smooths the rough edges of the actual brutal, deadly dogfights into a cleaned-up image of gentlemanly knights maintaining their honor in glorious combat, the victor of which is determined by the skill and personality traits of the individual pilot “warrior.” This was not the actuality of dogfighting in many cases, but the idea became more important than the reality in defining fighter pilot culture. Those who adhered to this myth sought to replicate it in their lives, either by their actions in the cockpit (or in the officers’ club afterward). They also sought to create technologies, especially aircraft hardware, that could be used to replicate this myth.

The fighter pilot myth was created during the First World War, but did not end with it. The fighter pilot community lost status in the years after the war as the US Air Service modified its doctrine and culture. During the interwar period and into World War II, the US Army Air Corps wedded itself to strategic bombing doctrine at the expense of pursuit (fighter) aviation. Those who advocated strongly for air combat were systematically marginalized within the burgeoning community of airmen, and instead the ideas of bomber advocates such as Giulio Douhet and Billy Mitchell gained prominence.¹⁷ The fighter pilots serving during this time circled their wagons and formed a protective subculture that kept the myth of the fighter pilot alive. These fighter pilots of the Second World War expressed the same five elements present in the previous war (not in the least because some of them were the same people).

¹⁶ Fino, *Tiger Check*, 18.

¹⁷ These two officers formed the foundation for later air power doctrines based on the idea of strategic bombing, as seen in Douhet’s *Command of the Air* (1921) and Mitchell’s *Winged Defense* (1925).

During and immediately after World War II, the fighter community had little voice in shaping doctrine or in the technology that the doctrine dictated. After the war, few former fighter pilots gained leadership positions, the majority of which were held by former bomber pilots and crew members. Yet the fighter subculture remained steady and experienced a revival in the Korean War, in which air-to-air combat played a major role. That war had little immediate impact on the doctrine of the Air Force.¹⁸ During the U.S. war in Vietnam, many of the Air Force's missions were not performed by large bombers but by smaller interceptors and fighter-bombers.¹⁹

The Korean conflict and, all the more, the Vietnam experience provided a catalyst for change and opportunities for the fighter pilot community. Because of the nature of those conflicts, more roles were performed by fighter aircraft than by the much larger strategic bombers, so that more and more fighter pilots were able to rise through the ranks into leadership positions.²⁰ That change was simultaneous with a growing perception of deficiency, especially in the realm of air-to-air combat. As Air Force leaders sought to rectify those perceived (and actual) problems, they turned to the fighter pilot community, which thus experienced a growth in

¹⁸ The most complete examination of the Air Force in Korea is Robert F. Futrell, *The United States Air Force in Korea, 1950-1953* (Washington, D.C.: Air Force History and Museums Program, 1983). For briefer summation, see Conrad C. Crane, *American Airpower Strategy in Korea, 1950-1953* (Lawrence: University Press of Kansas, 2000).

¹⁹ The air war in Vietnam has been the subject of many monographs with a variety of arguments, as scholars and veterans have taken a wide variety of positions. The best single volume by far remains Mark Clodfelter's *The Limits of Air Power: The American Bombing of North Vietnam* (Lincoln: University of Nebraska Press, 2006). Other notable and useful entries aside from those already cited above include Wayne Thompson, *To Hanoi and Back: The United States Air Force and North Vietnam, 1966-1973* (Washington, D.C.: Smithsonian Institution Press, 2000); Jacob Van Staaveren, *Gradual Failure: The Air War Over North Vietnam* (Washington, D.C., Air Force History and Museums Program, 2002); and William W. Momyer, *Air Power in Three Wars: WWII, Korea, Vietnam* (Washington D.C.: Office of Air Force History, 1978).

²⁰ This shift has been explored in the most detail in Worden, *Rise of the Fighter Generals*.

influence. For the first time since before World War II, the fighter community had a strong voice in the creation of Air Force technology, and advocated the approval of technology they favored, such as fighter aircraft optimized for air combat.

Many in this community rejected previous approaches, which had emphasized speed and interception, to the point of removing guns from fighter planes. Instead, the fighter pilot community held to the five basic characteristics associated with the knights of the air myth, and sought to develop aircraft that held to those ideals. Emphasizing individuality and aggressiveness, these pilots advocated for a dedicated air-to-air fighter that could recreate the glory days of fighter combat—an idealized vision of World War I air combat, which they sometimes referred to as “the white scarf stuff.” It would need to be small, lightweight, single-seat, agile and maneuverable, and emphasize the role of man over machine, only using advanced technology in ways that enhanced its nimble air-to-air role.

One segment of the fighter pilot community began to push for extreme embodiments of this ideal, refusing to compromise on any measures, pushing with cult-like fervor for a lightweight fighter. This group, a mixture of pilots and engineers, began calling itself the “Fighter Mafia.” They attempted to change the direction of the F-15 program to suit their desire for a dedicated air-to-air fighter, but they were disappointed when Air Force leaders modified it into a multi-role aircraft. The Fighter Mafia took the knights of the air myth taken to radical extremes. Instead of distrusting or disrespecting authority figures, they became openly hostile. They were aggressive, competitive, and confrontational to extreme degrees not only in the cockpit but also in their everyday dealings with fellow officers and co-workers. They took protection of their small community of fighter advocates to such an extreme that they saw themselves as rebels within a corrupt organization, and they spoke of trying to tear down the

system using guerrilla tactics in the halls of the Pentagon. They spoke of themselves in heroic imagery, partly through references to mythological heroes. More often, though, they began to take a religious tone, referring to themselves as doing “the Lord’s Work” in trying to break a corrupt “orthodoxy,” seeing the leaders of their movement as messianic saviors of what they judged to be the “true” role of air power. In their advocacy for a “pure” lightweight fighter plane, they approached cult-like fanaticism. Many of these traits exaggerated, or extrapolated from, the original characteristics of the knights of the air mythology. It should also be noted that the Fighter Mafia did not represent the entire fighter community. It exaggerated it, almost to the point of caricature. In their zeal to fulfill the fighter pilot myth, in their self-radicalization, they left the rest of the group behind, and many former allies within the fighter community began to see themselves as opposing the Fighter Mafia’s work. Even so, that work continued.

After their disappointment with the F-15, this group worked underground to design and force through their vision for a “pure” air-to-air combat aircraft—a modernization of the “white scarf stuff.” That plane was the F-16. Although the Air Force did eventually adopt the F-16, the Fighter Mafia was disgusted when their “pure” fighter was distorted by adding weight, size, more advanced electronics, and air-to-ground bombing capability. In response, they gave up trying to create new aircraft and instead applied their guerrilla tactics further and attempted to reform the entire system of hardware procurement in the Defense Department.

Moving beyond their disappointment with the F-16, then, the Fighter Mafia pressed to affect the military as a whole during the late 1970s and throughout the 1980s. Expanding to encompass allies from all the military services, several journalists, and many politicians, some members of the Fighter Mafia began “the Reform Movement.” They argued that “complex” and expensive weapons were unreliable and ineffective and that American defense was in a state of

crisis. Only by gutting programs they deemed as too complicated (including the F-15 and F-16 fighters) could they obtain the cheaper weapons and different doctrines needed to protect the country. These weapons tended to exemplify the values stemming from their original cultural beliefs of agility, individualism, and superiority of man over machine. For example, they believed that the F-15 was too complicated and should be scrapped in favor of a larger number of older F-5 fighters that could theoretically defeat Soviet fighters in air-to-air combat duels.

After the Gulf War of 1991, this movement largely dissipated, but many of its members are still politically active, and their ideas maintain a strong hold on the discourse around American defense. Arguments about whether the F-35 should be canceled in favor of “simpler” craft such as the F/A-18 are remnants of the Reform Movement and can be traced to the Fighter Mafia and the knights of the air mythology. This fighter pilot culture still exists. For example, in 2017, when American F-15 Eagles shot down two Iranian-made Shahed 129 drones (unmanned aerial vehicles, or UAVs) flying above Syria, the fighter pilot community began an intensive argument over whether shooting down an unmanned drone counted as an official “kill” that could contribute towards “ace” status. Most of the arguments on both sides of the issue referenced whether shooting down drones did or did not exemplify the qualities of the fighter pilot myth of masculine, civilized combat.²¹

The development of these ideas and movements is revealed in sources different from those most typically used in histories of technology. Although records exist for the design

²¹ For a discussion of these issues, see Tyson Wetzel, “Changing the USAF’s Aerial ‘Kill’ Criteria,” *Balloons to Drones*, June 26, 2017 [<https://balloonstodrones.wordpress.com/2017/06/26/changing-the-usafs-aerial-kill-criteria/>], accessed June 27, 2017; and Shawn Snow, “What counts as an aerial victory? Drones change the face of aerial combat,” *Air Force Times*, June 24, 2017 [<https://www.airforcetimes.com/articles/what-counts-as-an-aerial-victory-drones-change-the-face-of-aerial-combat>], Accessed June 27, 2017.

process of aircraft, most of them are still classified at the time of this writing. However, this study is primarily concerned with is the attitudes of the designers, their beliefs, their biases, their assumptions. Official documents can obfuscate those underlying attitudes. There are precious fewer records kept of conversations had at bars, angry phone calls, discussions held over fast food, and arguments in hallways. Yet these may best reveal the attitudes and beliefs of the players involved. This study, then, relies extensively on oral histories, memoirs, and recollections. In many cases, these sources are likely inaccurate recollections of events; indeed at times the same individual has told the same story in different ways in different sources. However, even though some of these recollections may be inaccurate in the details, they still speak to the attitudes of the people involved—the way these individuals either remember events (or want events to be remembered) reveals their underlying attitudes. Thus, in this work, individuals speak for themselves as much as possible, as the particular language they use is often revealing.

Many of the individuals involved—especially figures such as John Boyd—have been lionized by popular writers, military professionals, and scholars.²² Although a few people have

²² Almost every work about Boyd presents him as a heroic genius, even a messianic figure. The most recent work is the best introduction to Boyd, his history, and his thought: John Andreas Olsen, “Boyd Revisited: A Great Mind with a Touch of Madness,” *Air Power History* (Winter 2016), 7-16. This work strives for balance but still presents Boyd in a heroic light. Much more so is Grant Hammond’s *The Mind of War: John Boyd and American Security* (Washington D.C.: Smithsonian, 2001), which presents Boyd as a genius and savior figure. Frans P. B. Osinga has produced works that praise Boyd and charge that his critics do not fully understand how comprehensive his theories were. These works include *Science, Strategy and War: The Strategic Theory of John Boyd* (London: Routledge, 2007); and “The Enemy as a Complex Adaptive System: John Boyd and Airpower in the Postmodern Era,” in John Andreas Olsen, ed., *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd* (Annapolis: Naval Institute Press, 2015). James Burton’s *The Pentagon Wars: Reformers Challenge the Old Guard* (Annapolis, Naval Institute Press, 1993) also treats Boyd as a heroic messiah figure, as it was written by one of Boyd’s close associates.

criticized the Fighter Mafia and the Reform Movement, most of the books about them praise them as heroes. This view requires some correction. If this study appears overly critical, it is only because so much of the previous literature has erred in the opposite extreme. This work is not mainly a detraction of Boyd or anyone associated with him. These men are neither messianic heroes nor are they dark villains. They are people—people with strengths and weaknesses, people who made valuable contributions as well as mistakes. Some of Boyd’s theories changed the way air combat was understood, and his importance is impossible to deny. Also, many of his ideas were rejected for good reasons, and that his aggressive personality limited his ability to serve in leadership roles and earned him enemies throughout his life. This study will attempt to acknowledge both.

The most hagiographic text by far is Boyd’s official biography, Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (New York: Little, Brown, and Company, 2002), which asserts in the prologue that Boyd was the best fighter pilot who ever lived, that he was the greatest strategic thinker in human history since Sun Tzu, and that he single-handedly “changed the world.” None of these charges, or many of the lesser claims, are proven in the book, and Coram relies almost entirely on oral histories from Boyd himself or from his friends and family—hardly unbiased sources. The book continues to be the most commonly used source on Boyd and it has appeared on several official reading lists for military organizations around the world, despite its complete lack of scholarly rigor. I often cite Coram’s work, usually when showing what Boyd and his followers said, revealing their attitudes or way of thinking. It is used for factual material only when other sources are lacking, and these occasions should be prefaced with the disclaimer that they are based on oral history and could be remembered incorrectly—indeed Boyd and others frequently told different stories of themselves in different interviews, often misremembering facts. One of the more useful counters to Coram’s work is David Mets’ review of Coram’s work, “Boydmania,” *Air and Space Power Journal*, vol. 18, no. 3 (Fall 2004), pp. 98-108. Mets systematically dismantles many of Coram’s arguments. Nonetheless, Coram’s book is a useful indicator of the level of reverence that many have for Boyd.

The Power of Belief

This work began as a study of the development process for the F-15 and F-16.²³ In the course of research, it became clear that the cultural beliefs of this element of the fighter pilot community exerted a large influence on the direction in which those airplanes were developed and that this subculture was worthy of a full study on its own merits. Although much has been written regarding the development of these airplanes, the literature tends to fall into a few broad categories. Most of the historical studies of these aircraft either focus narrowly on a linear explanation of technological progress, such as the work of Kenneth Werrell, or lionizes heroic designers, as in works by Grant Hammond and Robert Coram. Other historians have attempted a broader look, such as Carl Builder, who discusses the relationship between Air Force technology and institutional identity, and Brian Laslie, who situates the F-15 and F-16 within a narrative of the Air Force's shifting concept of warfighting.²⁴

²³ Many sources detailing the production of these two aircraft are still classified. This work will rely mostly on unpublished sources as well as memoirs, oral histories, and contemporary press reports to examine the development of these planes.

Most works on these aircraft have either presented "heroic inventor" narratives, in which an individual or small group of individuals is praised for creating a technological marvel, or presented teleological narratives of technological progress, destined to proceed along a linear path. Few works have thoroughly explored the role of culture or belief systems in the development of these aircraft.

For publicly available information on the development process, in addition to sources already cited above, the best single work is probably Kenneth P. Werrell, *Chasing The Silver Bullet : U.S. Air Force Weapons Development From Vietnam To Desert Storm* (Washington, D.C.: Smithsonian Books, 2003); See also, Jeff Ethell, *F-15 Eagle* (Shepperton: Ian Allan Ltd., 1984); and David C. Aronstein and Albert C. Piccirillo, "The F-16 Lightweight Fighter: A Case Study in Technology Transition," in Jacob Neufeld, George M. Watson, Jr., and David Chenoweth, eds., *Technology and the Air Force: A Retrospective Assessment* (Washington, D.C.: Air Force History and Museums Program, 1997).

²⁴ These sources cited above, with the addition of Brian Laslie, *The Air Force Way of War: U.S. Tactics and Training after Vietnam* (Lexington: The University Press of Kentucky, 2016).

Although these approaches are valuable, scholars have not fully addressed the role of culture and institutional memory on aircraft development. The current scholarship generally accepts a narrative in which individual inventors guided technological progress that changed the way the Air Force understood warfare. This dissertation adds the lens of culture and historical memory, demonstrating that the F-15 and F-16 are artifacts of an idealized historical memory of World War I aerial combat held by the fighter pilot community.

In that sense, although this is a history of Air Force hardware, it is perhaps more accurate to say that this work is a biography of an idea. It is the story of how a subculture with its own values grew to become one of the most influential voices within the United States Air Force and how it created multi-million-dollar weapons that are expressions of its own special beliefs. This is a work in the cultural history of technology. David Nye has argued that technologies are more than ways of solving problems; they are expressions of and symbols of culture.²⁵ In that sense, the F-15 and F-16 can be understood as expressions of the fighter pilot mindset stretching back to its earliest days of the First World War. The fact that many of the pilots who helped design these planes saw them as flawed reveals the extreme degree to which they chased that mindset.

This is not just a history of Air Force technology. This is a biography of a belief system. Such belief systems can have a powerful effect on military issues. As Williamson Murray and Mark Grimsley have argued, “The influence of *Weltanschauungen* [outlook, ideology, and culture] upon strategy is elemental, vast, and far stronger than another German borrowing, *Realpolitik*, would have one believe. . . . From a historical perspective, many, if not most, case

²⁵ He makes this case most forcefully in David Nye, *America as Second Creation: Technology and Narratives of New Beginnings* (Cambridge: MIT Press, 2004); See also similar arguments in *Technology Matters: Questions to Live With* (Cambridge: MIT Press, 2007).

studies of the making of strategy would make no sense without consideration of the role of belief systems.”²⁶ What they argue of strategy is also true for technology. And makers of technology ought to acknowledge that their belief systems and cultures guide their hands, consciously or not. This is the story of what guided the hands of the makers of the fourth generation of fighter aircraft: their desire to recreate an idealized vision of World War I air combat. In doing so their beliefs became radicalized, to the point of a fanatical cult, chasing a vision of “knights of the air.” But in their zeal, they went far beyond the role of knights. They became Templars.

²⁶ Williamson Murray and Mark Grimsley, “On Strategy,” in *The Making of Strategy: Rulers, States, and War*, Murray, Macgregor Knox, Alvin Bernstein, eds., (New York: Cambridge University Press, 1994), 13.

Chapter 2 - The Fighter Pilot with a Thousand Faces

In 1949, American scholar Joseph Campbell argued that most human mythology centers around archetypal hero characters, and that all such characters have particular traits in common, as do the stories about them. His book *The Hero with a Thousand Faces* asserted that humanity as a whole gravitates toward what he called the *monomyth*. From Achilles to Jesus to Superman to Luke Skywalker, all heroic characters share traits and similar stories, and those qualities give humanity some sort of insight into itself.

Similarly, the culture of fighter pilots—military aviators focused on air-to-air combat—have tended to see themselves in a similar way: as heroic individuals who fight not only for their respective countries but also for the shared set of values that are unique to their subculture. Of course, not all fighter pilots are the same, but understanding what that culture values and celebrates in terms of personality traits gives insight to their beliefs and desires. The key elements of the fighter pilot myth are: aggressiveness, independence, heroism, technology, and community. Most of these core beliefs and values coalesced during the First World War, and they formed the basis of a shared sense of fighter pilot identity.

As historian Linda Robertson has noted, this myth emerged not because it accurately reflected reality—instead, it was a “triumph of image over reality”:

A synergy of state-sponsored propaganda, press reports, industrial public relations hoopla, political speeches, and political rivalry wove for the American public a magical version of wars won from above, on the wings of eagles.... The glorious image of the ace originated in the dismal realities of the ground war... Concentrating on attention on what many regarded as the least important aspect of the war—the role of the combat pilot—satisfied the public’s longing for heroes and heroism in a way impossible to sustain by recounting experiences in the trenches.²⁷

²⁷ Robertson, *The Dream*, xiii, xv.

Other scholars, such as Robert Wohl, Peter Fritzsche, and Peter Hart, have noted the differences between the constructed image of the knights of the air and their more violent, usually fatal reality.²⁸

Even if these images failed to reflect the brutal realities of combat flying, pilots often believed that they were supposed to live up to expectations set by the myth, and those who did were celebrated as heroes to be emulated. In linking themselves to heroic images of myth, these pilots began referring to themselves as “knights of the air.”

This view became entrenched from the First World War through the US-Vietnam War. An examination of fighter pilot memoirs, diaries, and creative works illustrates how strongly these ideas gripped the minds of many pilots. Extended quotations from the pilots themselves reveals special language and tone conveying the degree to which the fighter pilot mythology had become embedded in the growing subculture of pursuit pilots.

In addition to the five traits named above that form the core of the myth of the ideal fighter pilot, other characteristics will become apparent. Aggressiveness often expressed itself as competition. As such, many pilots (and non-pilots) associated sports with combat aviation—being good at sports, in the view of many aviators, tended to correlate with success in air combat. Some went as far as to view air-to-air combat as just another game, and referred to it in those terms—as a fun, sporting adventure. This also helped to describe a particular version of masculinity. Since Western militaries did not permit women to fly in combat roles, air combat became increasingly associated with a stereotypical manliness. Fighter pilots were expected to be

²⁸ See Robert A. Wohl, *A Passion for Wings: Aviation and the Western Imagination, 1908-1918* (New Haven: Yale University Press, 1996); Peter Fritzsche, *Nation of Fliers: German Aviation and the Popular Imagination* (Cambridge: Harvard University Press, 2009); and Peter Hart, *Aces Falling: War Above the Trenches, 1918* (London: Phoenix, 2008).

rough, brash, violent, hard-drinking men of action, a stereotype which many pilots took to almost cartoonish levels. Although this chapter will focus on the establishment of these stereotypes in World War I, the 1986 hit film *Top Gun* portrays the “fighter jock” stereotype in a seemingly over-the-top manner, but that is hardly exaggerated. In these expressions of masculinity, some pilots used sexualized language or imagery to talk about their relationship with their aircraft.

We Could Be Heroes

One element that helped to unify elements of the fighter pilot mythology is simply that fighter pilots themselves believed that victory in air-to-air combat resulted from their own personality traits, specifically those of aggressiveness, individuality, and heroic spirit. For example, Kenneth W. Clendenin’s memoir from his time in the 147th Aero Squadron ends with this passionate exultation:

It should also be noted that BARON VON RICHTHOFEN did not “encounter” *one* American *pilot!!!* So, we shall never know what the outcome would have been. However, we *can* “conjecture” — according to the individual’s “make-up” — can we not? How can we “evaluate” our pilots of World War One? *Courage, “grit,” enthusiasm, “elan,” pride* — name it, they had it! (with “little experience” and no “planes”).²⁹

His frequent use of emphasis and quotation marks in this passage is a sharp break from the rest of the work, which is written in a plainer style. Clearly he wished to highlight how important these traits were to him, indicating that pure aggressiveness and spirit could overcome experience, leadership, and technology.

Non-fighter pilots sometimes reinforced the idea that fighter pilots were heroes because of their personality traits. Billy Mitchell, even after he became devoted to strategic bombing, associated fighter pilots with the type of mythological heroes to whom Campbell referred, and

²⁹ Kenneth W. Clendenin, “Who Said Rats,” 147th Aero Squadron, UTD Williams Collection, Ola Slater Collection, Box 17 Folder 10, 20. Emphasis in original.

agreed that the personality traits of the individual were the key to success. He argued that a fighter pilot must be

an individual who possessed the highest qualities of courage, judgment, intelligence, and endurance known to the human race. Horatius at the bridge and Leonidas at Thermopylae had no greater odds against them than these aviators. . . . The young men in America who answered the call of the air were those in whom the instincts of combativeness and daring bequeathed by warrior and pioneering ancestors showed in undiminished force.³⁰

Mitchell also reinforced the idea that playing sports gave a foundation in the skills used by pursuit pilots. He noted that the best fighter pilots grew up playing polo, tennis, football, and baseball, because these activities gave men “self-reliance, quick perception, [and] lightning reflexes.” Flying a fighter plane took these skills to another level. Speaking especially of pursuit pilots, Mitchell continues, “The discipline of the airman was of a much higher order. . . . He had to have the heart of a lion, the wisdom of a serpent, and the speed of thought of Mercury. . . . [They are] imbued with the spirit of ‘do or die.’”³¹ The individual fighter pilot is not like other soldiers, however gallant they might be. But pursuit airmen were on the level of the heroes of Greek mythology, or even the equal of the gods themselves.

As in ancient stories of mythological warriors, combat in modern times was seen as a source of glory and honor. Memorials of pursuit pilots tended to emphasize this concept of the glory of combat. For example, on February 28, 1920, the American Flying Club created a memorial to the fallen pilots of the 22nd Pursuit Squadron of the American Expeditionary Force, which was active in bringing down several German planes before and during the St. Mihiel Offensive two years earlier. The ceremony featured a speech by one of the surviving pilots, 1st

³⁰ Billy Mitchell, Introduction to “No Parachutes” by Alan Winslow, *Liberty Magazine*, February 25, 1933, 6, Ola Slater Collection Box 18 Folder17.

³¹ Mitchell, Introduction to “No Parachutes,” 6.

Lieutenant John G. Agar, who opened his speech with the Thomas Osbert Mordaunt poem *The Call*, written during the Seven Years' War:

Sound, sound the clarion, fill the fife
And to a sensuous world proclaim
One crowded hour of glorious life
Is worth an age without a name.³²

To cast the First World War in this light may seem out of place. Most commentators and participants often depict the Great War as destroying these older ideas of glorified combat. Much of the art, music, and literature produced in the wake of World War I emphasizes its brutality and a sense of meaninglessness.³³ In that vein, one of the books most closely associated with the memory of the war is *All Quiet on the Western Front*, the message of which is the opposite of Agar's use of the Mordaunt poem. Here, Agar specifically links the role of the pilot to maintaining this traditional concept of chivalrous battle, in spite of the brutal action on the ground which seemed to refute those seemingly obsolete ideas.

Agar's speech further emphasized this sense of glory in combat, going as far as to say dying in combat as a pursuit pilot was better than surviving. As he explains,

The glorious lives they led were eclipsed in their glorious deaths. Do we not envy them both the living and the dying? The eagerness with which they seized their first opportunity; the spirit with which they trained; the fortitude with which they said goodbye; the valor with which they fought; the courage with which they endured, and the glory with which they died! All their qualities single them out to be loved, admired, envied, and followed.³⁴

³² "Ceremony of Unveiling the Tablet to the Fallen of the 22nd Pursuit Squadron, American Expeditionary Force, American Flying Club, February 28, 1920," UTD Williams - Ola Slater Collection Box 17, Folder 9.

³³ To explore this point, one of the best studies of the literary response to the First World War is the classic Paull Fussell, *The Great War and Modern Memory* (London: Oxford University Press, 1975). Admittedly, the sense of existentialism and brutality generated by the war was significantly less in the United States, which participated for far less time and with a much smaller casualty figure than other belligerent nations.

³⁴ "Ceremony of Unveiling."

Beyond the celebration of glory, Agar also celebrates the personality traits seen as essential to fighter pilots: eagerness, spirit, fortitude, valor, courage, and glory. Most of these can be coded as aggressiveness.

Agar continues in a messianic tone, presenting pursuit pilots as moral heroes that sacrifice themselves for the betterment of all humanity. As he states, “They have left us a message and an example. . . . They died to benefit humanity. Can we not live for that high purpose? . . . The world needed them and they gave every force they had.” The living, Agar argues, deny this call to help the species, and become “self-complacent” and indifferent. But the pursuit pilots, in contrast, “had hoped that their example would save their country from this moral lapse as the dead of every war. . . must have hoped before them.”³⁵ Pilots are not remembered as typical soldiers, especially not compared to the infantry men of World War I; instead they are presented as messiah figures.

Written depictions of World War I fighter pilots tended to follow this model. In 1934, famous pulp fiction author William E. Barrett wrote a brief history of the 90th Squadron in World War I using similar language. “Ninety was in France. Let the air be quick now and bloody. Who was this Richthofen? . . . Ninety was chafing for heavy action and couldn’t get it.” In early fall of 1918, the squadron received a new temporary commander, 1st Lieutenant William Gallup, whom Barrett describes as “demanding bigger and better action for bloodthirsty pilots and observers.” In this type of story, combat was presented as glorious. For example, Barrett describes a dogfight between two Americans and eight German Fokkers as “one of the prettiest and most spectacular fights of the year.”³⁶

³⁵ “Ceremony of Unveiling.”

³⁶ William E. Barrett, “Squadron Parade: 90th Squadron,” *Warbirds*, September 1934, 109-116.

Pilots were sometimes memorialized in unusual ways, as was the case with Raoul Lufbery, an ace pilot who flew for both the French and American air services. The Simpson, Hall, Miller and Co. International Silver Company created a pattern of flatware in his memory. The catalog for this memorial collection included text similar to what appeared on other memorials and in memoirs, emphasizing the pilot's role as an individualized hero in line with mythological or literary figures. It begins, "If ever a man's deeds symbolized all that America expects of a soldier, Major Lufbery's did. By deeds alone he earned the most illustrious title which can be bestowed upon any man — 'American Ace.' Had we the pen of a Shakespeare, touched by the divine fire of genius, we might do justice to his memory. Years hence some Homer will add the epic of his deeds into immortal verse." The brief biography goes on to emphasize that Lufbery, like other pilots, valued independence as a lone gunfighter. Describing the final dogfight that ended his life, the memorial says: "Some of his [Lufbery's] comrades suggested a two-seater for the battle, in order that a machine gunner might accompany 'Luf.' But 'Luf' would not hear of it. In fact, he never would hear of such a suggestion. He preferred to fight alone. It was this preference which fixed upon him the sobriquet of 'Lone Star Luf.'"³⁷

First Lieutenant Paul Frank Baer was also remembered in a spectacular fashion as a hero of nearly mythological level dimensions. Baer was the first American ace pilot, achieving nine confirmed kills, claiming seven additional unconfirmed victories. After his accidental death in 1930, his funeral was held on January 3, 1931 in his hometown of Fort Wayne, Indiana. During the memorial service, six airplanes flew overhead, dropping wreaths. The town's major newspaper, the *Journal-Gazette*, described the event as "[o]ne of the most elaborate military

³⁷ "Major Raoul Lufbery: An Appreciation of our Former Associate," Simpson, Hall, Miller, and Co. International Silver, Wallingford, Connecticut, no date, UTD Williams Collections, Ola Slater Collection, Box 19, Folder 15, 1-3.

funerals Indiana has seen since the burial of President Benjamin Harrison.” The article went on to mythologize Baer, saying he was a “hero whose modesty equaled his greatness. . . . Baer was one of the modern adventurers, whose deeds pale the storied soldiers of fortune of the past.”³⁸

Hypermasculinity

One of the core components of the “knight of the air” stereotype is that of aggressiveness. This trait could manifest in a number of ways, from a general eagerness for combat in the pursuit (fighter) arm as opposed to other units, up to a longing for violence. Aggressiveness showed itself in analogies between flying and sports, games, or hunting—the last of these even dehumanizing the enemy, putting him in the place of a victim animal. This drive for violence was connected to a sense of masculinity, which was itself linked to the concept of civilization itself. As Robertson argued, “The desire to remain civilized thus makes those who kill in warfare members of a common fraternity, assuring that the warrior achieves and sustains his identity as a man. . . . To be a man requires the exercise of aggressive impulses.”³⁹ This sense of aggressiveness, its open expression, and even its celebration became a key component of the “knight of the air,” perhaps even the most central feature. According to the stereotypes of the myth, to be a fighter pilot, either in the First World War or in subsequent generations, was to have a lust for killing the enemy, but in a civilized, gentlemanly manner of an aerial duel. Robertson concludes, “The role of the combat pilot wedded air wars with the image of civilized violence undertaken in the name of civilization, a connection between the mode of warfare and

³⁸ Obituary, Paul Frank Baer, Fort Wayne Journal-Gazette, January 3, 1931, UTD George Williams Collection, Box 27, Folder 7.

³⁹ Robertson, *The Dream*, 170.

its purpose which was lost with the advent of brutal, mechanized warfare on the ground. . . . The image of the ace is one of hypermaculinity.”⁴⁰

Thus, many who held this sense of aggressiveness self-selected for the role of pursuit flying. They sought out the pursuit role, casting themselves not only in contrast to ground forces but in contrast to other types of pilots, whom they deemed inferior. For example, given a choice among delivering Sopwith aircraft across the English Channel, becoming a test pilot, or entering the pursuit arm, Colonel Livingston Irving said, “I’d rather take a chance with the Germans.”⁴¹

American pursuit pilot Alan Winslow expressed similar sentiments, longing for battle. Early in his Navy career, he became frustrated at the thought of not seeing direct action against the enemy. In the summer of 1917, he resigned from the Navy and joined the Lafayette Flying Corps. In a 1933 article, he described his tendency to put himself in dangerous situations in hope of drawing enemies into combat. For example, if he did not find enough Germans to fight in the air along the front, he would fly over enemy lines in the hopes of finding some. When he encountered heavy AAA (anti-aircraft artillery) fire, he said, “I hoped the black bursts would be seen by some German plane and would bring about a combat.” In his search for enemies, Winslow felt no need to stay in formation, often abandoning it to chase after single German planes.⁴²

In April 1918, allied fliers received an official tactical manual called *Fighting in the Air*, which emphasized aggressiveness, the necessity of the offensive attack, and connected those

⁴⁰ Robertson, *The Dream*, xviii.

⁴¹ Livingston Irving Interview, October 23, 1964, Cross and Cockade Bay Area Chapter, UTD Williams, Ola Slater Collection, Box 18, Folder 14, 3.

⁴² Alan Winslow, “No Parachutes,” *Liberty Magazine*, February 25, 1933, 9, 19, 21, Ola Slater Collection Box 18 Folder 17.

elements to single-seat aircraft. The manual defined the pursuit role clearly: “The sole mission of offensive patrols is to find and defeat the enemy’s aeroplanes.” To achieve this narrow role, the manual explained, “[o]ffensive tactics are essential in aerial fighting. . . . The aeroplane is essentially a weapon of attack and not of defense.” Writing about single-seat aircraft in particular, the manual stated, “The moment they cease to attack [they] are in a position of inferiority.”⁴³

Many pilots assumed that aggressiveness and eagerness for battle were the mark of a good pilot, and whether or not they felt it themselves, they tended to assume that their comrades all shared this trait. Fighter pilots judged each other by their perceived sense of eagerness and aggressiveness, and the suggestion that a pilot was not sufficiently aggressive was taken as an insult. French pilot Pierre de Cazenovoe de Pradines took great issue with the accounts of German ace Ernst Udet because they questioned the aggression and eagerness of his friends. In one instance, de Pradines countered Udet’s specific points, saying: “It is impossible for me to believe that my comrade, of great courage and to me an excellent friend, would have fled in a dive.”⁴⁴ To accuse a fellow pilot of lacking eagerness to fight was a smear on his character and his identity as a fighter pilot.

French pursuit pilot Lieutenant Colonel Fernand Chavannes focused on personality and emotion, particularly the traits of aggressiveness and courage. In his memoirs, he said:

Each man behaves in his own way when confronted with danger. Most people obey the reflex of flight dictated by their instinct for survival. But there are two ways of flight. The flight of retreat which cowards choose, and the forward flight chosen by the very courageous. There are probably more cowards than courageous people. Ever since the days of the earliest combat, the courageous men had an advantage over the coward. The

⁴³ Fighting in the Air, S.S. 591, April 1918, UTD William Collection. Henry Clay Papers, Box 1, Folder 18, 2-4.

⁴⁴ Pierre de Cazenove de Pradines, “Triumphs and Tribulations,” interview conducted and edited by Jon Guttman, no date [approximately 1978], 69.

same is true in aerial combat, but it is much more interesting because one can move in any of three directions. Thus, if two adversaries of equal courage confront one another, the victor will be he who pilots his plane the best and who is the better marksman. But there is a particular kind of courage which goes one step better. It is that which motivates the fighter pilot to deliberately initiate the attack. At that moment the emotional factor is of greatest importance. The move is commanded by a will which is like a taut steel wire attached to one's nerves. The closer one gets to the target, the more the wire stretches. When the tension is too great, as sometimes happens, the wire breaks. Then the instinct for self-preservation brutally regains the upper hand. Fear becomes unbearable and demands immediate flight.⁴⁵

This passage demonstrates several core components of the “knights of the air” mythology. The emphasis on personality traits such as courage and aggressiveness are emphasized, as is the connection between the fighter pilots and older forms of heroic combat, indeed relating back to the “earliest” times.

Quentin Roosevelt, the son of President Theodore Roosevelt, also fit the pattern of pilots who exhibited and valued aggressiveness. His colleagues noted that he “was quite anxious to see combat” and attributed this eagerness to the fact that his brothers often teased him, as they had been decorated for combat actions. He was so eager for air combat that he cheated his way into the pilot's seat. Quentin's eyesight was poor, and he could not have been qualified to fly. To get around this, he memorized the eyechart in the doctor's office. Once he finally engaged in air combat, he described the exhilaration he felt in a letter to his mother: “You get so excited that you forget everything except getting the other fellow, and trying to dodge the tracers, when they start streaking past you.”⁴⁶

⁴⁵ Lt. Col. Fernand Chavannes, “Memoirs of a French Fighter Pilot,” translated by Sandra Williams, Cross and Cockade Journal, no date, UTD Williams Collection, James Kerr Papers, Box 30, Folder 3, 236.

⁴⁶ Warrick L. Barrett, “Quentin Roosevelt: A Young Man's Story,” no date, UTD George Williams Collection, Box 27, Folder 4, 1-2.

Major General Frank O'Discoll Hunter, a member of the 94th Aero Squadron who achieved ace status with nine German kills in World War I, also displayed the aggressiveness and eagerness for battle common among fighter pilots, as well as a high degree of confidence that spills into braggadocio. As he recalled, "I was scared to death when people were shooting at me, but I'm ten times more dangerous when I'm scared." In expressing his enthusiasm, he differentiated the type of adventure found in war from a sense of boredom with other aspects of everyday life. "I was delighted when the war came along," he said. "I've never liked to work. I've always gotten other people to do the work." In this context of eagerness, Hunter also noted the dehumanizing effect of being a fighter pilot and the identification pilots have with technology: "You're not fighting a person. It's a machine."⁴⁷

As an outgrowth of aggressiveness, fighter pilots during the great war were competitive. Each tried to shoot down more enemy planes than their fellow pilots. Some pilots chose to exaggerate their performance either by mistake or by outright lying. This got to be such a problem that the US Air Service had to create policies to verify pilots' claims. As a service newsletter later explained, due to "abuses of confirmations or 'counting coup,' it became the custom not to confirm victories unless they had been witnessed by someone from an organization other than that of the victor."⁴⁸ Pilots were so competitive that the records of enemy military institutions were more believable than were the pilots themselves.

Henry Clay, a fighter pilot in the RAF's 43rd Squadron, expressed a similar sense of competition, valuing his kill count above his own life. Clay wrote in a letter home: "It is the

⁴⁷ Quoted in Margaret Minis, "High Flying: A World War I Flying Ace Remembers His Exploits with War and the Ladies," *The Georgia Gazette and Journal Record*, May 28, 1979.

⁴⁸ U.S. Army Air Corp News Letter, November 14, 1950, UTD Williams, Ola Slater Collection, Box 19, Folder 12, 321.

inexperienced pilots that go down. Here's hoping that before they do get me though that I can have about fifty to my credit. That is my first wish and then my second is that they do not get me at all!"⁴⁹

At times the sense of competing for kills was fierce enough that it overrode any sense of respect for or decency toward the enemy. As the "History of the 13th Aero Squadron" records after a September 1918 dogfight pitting three Americans against seven German pilots: "It really *wasn't bad*, and five men stepped in on credit for a splendidly inflicted sorrow for some Boche family fireside."⁵⁰ Chivalry only went so far, and did not stop some pilots—eager to claim high kill counts—from reveling in the sorrow of wives and children of the pilots they killed.

Also growing from aggressiveness and competitiveness was the stereotypical gender typing of the knights of the air. World War I pilots are often depicted as avatars of true masculinity—what Robertson terms "hypermascularity." In this conception, warfare and aggressiveness are linked to proving one's manhood, but the warfare had to be "civilized," in the sense of fairness, while also providing opportunities to show individual bravery and to acquire personal glory. Thus, the meat grinders of Verdun and the Somme, in which men were mowed down in industrialized killing fields or vaporized by artillery from beyond visual range, did not create glorious men of valor who could be celebrated. Yet the lone fighter pilot did create a sense of individual bravery. Winning a dogfight, or even seeking to start one, could create a sense of masculine aggressiveness. Robertson has argued that the camaraderie among those who engage in (and kill in) these types of combats forms a bond that civilization rests upon. These

⁴⁹ Letter, Henry Clay to Jas A. Clay, February 6, 1918, UTD William Coll. Henry Clay Papers, Box 1, Folder 10.

⁵⁰ E.F. Richards and Stephen M. Avery, "History of the 13th Aero Squadron," no authored-on date, entry for August 16, 1918, UTD George Williams Collection, Box 26, Folder 1.

expressions of “civilized” violence can make one a hero, fighting for (and perhaps saving) civilization, just as knights or ancient heroes did in myth.⁵¹

During the war, pilots, as well as observers and writers, thus associated successful pilots with masculine traits, and this even touched on sexuality. William E. Barrett describes fighter pilots as rugged, muscled men: “Prospective Aces became bulky across the chest and shoulders, brown in the face and tough—very tough.”⁵² Many aviators were superstitious, believing that good luck charms could protect them in the air or prevent them from catastrophe. Exactly what the pilots chose as charms speaks to the values of these pilots, especially their sense that hypermasculinity was associated with sexualization of their role. One of the most common good luck charms was lingerie. Attaching women’s stockings or other undergarments to one’s aircraft (or one’s own body, such as stretching stockings over the head so it flaps in the breeze during flight) was a common practice.⁵³

One of the most revealing and yet somewhat ambivalent expressions of air combat as masculine chivalry is found in songs. The 91st Squadron’s official song, “Sir Galahad,” identifies the pilots with the mythic memory of medieval knights and King Arthur. However, the song mourns the fact that this chivalry seems nonexistent in the days of the Great War, and it expresses longing for a return to the days of chivalry. The song is worth reproducing in its entirety:

1. The days of chivalry are dead
Of which in stories we have read
When knights were bold and acted sort of scrappy.
And fought all day to please their Janes
And if those Janes was tickled, they was happy.

⁵¹ This theme is present throughout Robertson’s *The Dream of Civilized Warfare*.

⁵² Barrett, “Squadron Parade,” 109.

⁵³ Winslow, “No Parachutes,” 22

But nowadays they're mild and meek
The[y] seem to have a yellow streak
They never hunt for other guys to flatter 'em.
They think they have done a darn fine thing
If they just buy the girl a ring
Of imitation diamonds and platinum.

Chorus: It makes me sorter sad
To think about Sir Galahad,
Sir Launcelot and all the guys today,
When to please a maid and charm her
They would climb into their armour
And jump into the fray.
To please a lady love
They always wore her little glove
And everything a girl said, went,
For them was the days when a lady was a lady and a gent was a perfect gent.

2. The knights of old in days of yore
Belonging to the flying corps
Led lives of ease when all their foes they'd mastered,
And every eve, so they relate,
The whole darn gang would congregate
In some swell bar and stick 'til they were plastered.
And when the bugler bug-ed at dawn,
They'd heave a show at him and yawn.
Snooze on 'til noon before they donned their armour.
But ancient customs don't survive
We now crawl out at half-past five
And answer reveille in our pajamas.

3. And when they all sit down to dine
Sir Claud would say, "That girl of Mine"
Makes every woman jealous when they see her."
Then someone else would shout, "Behave,
Thou malipurtenant knave,
Or I will smite thee one upon the beazer."
Then next morning, if you please,
They'd don their iron B.V.D's
And mount a pair of chargers highly metallated.
And when Sir Claud so fair and young
Was punctured in the leg or lung
They looked upon the argument as settled.

4. We leave our homes and come to France
To kick the dirty Dutchman's pants

And leave behind the girl that we've been rushing
And then some doughty dog of war
Who joined the Quartermaster Corps
Forsakes his desk and fares him for the mushing.
And while for mail we vainly hunt
This dashing Broadway lieutenant
Plays hell with all our hopes and aspirations.
And when we learn that little Nell
Is married, we just say, "Oh hell."
And immediately write out congratulations.

5. It used to be that when a lad
Spoke roughly to Sir Galahad
He ran him through the liver and forgot it.
It really made no difference then, he had to have some discipline
And when they pulled a bone, by God, they got it.
But now the army's sporting blood
Is changed to sickening yellow mud,
And when gross disrespect is manifested
They do not disembowel the guy,
As real men did in days gone by—
They simply have the dirty brute arrested.⁵⁴

This song reveals a number of presuppositions held by the pilots who sang it. First, the core theme of the song has to do with masculinity, primarily defined as being in a dominating relationship with a woman. The song implies that the best method for winning over these women is through heroic exploits, mostly through combat. Indeed, combat itself is held up as the preferred method of solving disputes, as puncturing a lung is seen as a valid form of argument. The ideal man described in the song also shows his individuality, not only in combat, but in his disrespect for typical rules associated with military life or for commanding officers themselves. Living an easy, carefree life, including the ability to ignore the bugler and sleep in, in order to fight on one's own terms, is presented as the ideal manly state, in contrast to the strict disciplined nature of military life in the Great War.

⁵⁴ "Sir Galahad: Song of the 91st Aero Squadron," no date, UTD George Williams Collection, Box 26, Folder 18.

The song clearly depicts life in World War I as something less than what the chivalrous manly ideal required, and pilots were portrayed as unwilling to settle for those craven terms. However, the song clearly indicates that this romanticized memory of medieval knights (not the historical reality, but a version primarily expressed through the mythology of King Arthur stories) was the ideal toward which these pilots were striving. They longed to be like their idealized mythological knights, seeing the traits of individuality, masculinity, chivalry, overt sexuality, and ritualized violence as their essence. The fighter pilots did not see themselves as living up to or achieving that ideal, but they did long to become like the chivalrous heroic knights of mythology.

Pilots linked pursuit flying to hypermasculine sexuality in other ways as well. Hunter took this to perhaps an extreme later in his life, by placing mementos of his flying career on one side of the entry hallway of his home, and lining the opposite side with mementos of women he had slept with.⁵⁵

If pilots were competitive in combat, they tended to associate such combat with sports, and they even viewed risking their lives in the skies as a game. Although the popular memory of the First World War is that of grim death, dreary post-apocalyptic landscapes, and a sense of hopelessness among the ground troops, pursuit pilots, by contrast, often depicted their lives as a welcome pastime. Many of these pilots longed to engage in combat and were “disappointed” when they could not find enemy planes to fight. Kenneth W. Clendenin described combat in these terms in his memoir in 1964. He described how most pursuit pilots in the Great War had “the hope of seeing something [an enemy pilot] someday,” and that engaging in air combat was

⁵⁵ Minis, “High Flying.”

“a bit gratifying.” When a patrol failed to encounter the enemy, he says the pilots were “disgusted.”⁵⁶

In the minds of these pilots, the amusing nature of this game did not necessarily contradict the concept of glorious death in combat. Clendenin describes one encounter in which an allied pilot was chased by a German plane. Another allied pilot then rammed his plane into the German in order to break the pursuit, killing himself in the process. For Clendenin, this was “a noble end of a brave and courageous pilot—giving his life for a fellow airman.”⁵⁷

Some pilots found that dogfighting had an almost drug-like effect. French pilot Pierre de Cazenove de Pradines described even the training exercises in this way, stating, “We had a simulated combat right near the field: looping, tight turns, renversements. It was intoxicating.”⁵⁸ John Stephen Doherty engaged in his first dogfight on October 5, 1916, and noted the sense of excitement it generated among spectator pilots. He recalls, “For a few minutes we kept it up. . . . We had come down to 600 feet—from 6500. Below I caught a sudden view of thousands of French *poiks* looking up at us and shouting. Sometimes I heard a snatch of their cheering.” His commanding officer, Colonel Ganter, commended the event:

On the fifth of October we saw your daring exploits in the sky. Our army was watching with passion and anxiety as we saw the enemy caught in the fire of your remarkable maneuver, so brave, so clever and skilled. When the enemy was caught, turned and fell, a terrific shout went up—a shout of joy and admiration for a hero. We were saluting not only a brilliant victory at combat, but the forerunner of certain and total victory for France.⁵⁹

⁵⁶ Clendenin, “Who Said Rats,” 4-6.

⁵⁷ Clendenin, “Who Said Rats,” 10.

⁵⁸ Cazenove de Pradines, “Triumphs and Tribulations,” 68.

⁵⁹ John Stephen Doherty, “The First Dogfight,” interview with Joseph Frantz, SAGA October 1961, UTD Williams Coll, James Kerr Papers, Box 30, Folder 3, 100.

The fact that the colonel associated air combat victories with total victory in the war is remarkable, but some of this praise might simply reflect a general hope for a French victory. Yet the event and the commendation reflect the effect on morale that pilots could have, even while reinforcing the vision of fighter pilots as heroes with a kind of courage impossible in the trenches.

The “History of the 13th Aero Squadron” depicts this sense of combat as an entertaining adventure through frequent uses of words like “game,” “show,” or “party” to describe air-to-air combat. The authors also express the camaraderie felt among pilots on opposite sides of the war. After a dogfight on August 16, 1918, “The victor landed beside the much-shot-up but otherwise intact machine, to find the observer dying and the pilot slightly wounded. A ‘Sprechen Sie Deutsche’ to which the captain replied ‘Nix’ and the two shook hands. . . . A splendid Holiday.”⁶⁰

Lone Wolves

Outside of aggressiveness, perhaps the most important component of the “knights of the air” stereotype involves independence and individualism. This is a product of both culture and technology. First, because the Great War began in the age of organized labor competing to limit the power of American aristocratic elites, including in the military sphere, the older image of privately funded volunteer units such as the Rough Riders was a thing of the past. But the *idea* of such warriors was transferred to combat pilots who could fit that role for the public. As Robertson puts it, “World War I brought with it the end to both the direct commission and all-

⁶⁰ Richards and Avery, “History of the 13th Aero Squadron.”

voluntary, privately funded units. The symbolic potency of the volunteer warrior, and the individualism he embodied, was transferred to the pilot who flew alone in the skies.”⁶¹

Secondly, technology fed and enhanced this sense of individuality. This was partly because the very act of being aloft in the air, so far above the mud and the muck of ground warfare, created a sense of separation, both physically, mentally, and in a sense, spiritually, from those on the ground. Even when the pilot was encased in an airplane, his sense of autonomy grew, even when flying in formation, when coordinating with other pilots, the sense of autonomy grew. Even when flying in formation and when coordinating with other pilots, the pilot enjoyed an individuality much more palpable than that of infantryman in a large group, shoulder-to-shoulder with others and taking more direct orders of movement. Many early reconnaissance airplanes, however, had a crew of two—a pilot and an observer who controlled the gun. A French pilot, Roland Garros, became so annoyed at having to rely on another individual to shoot down enemy aircraft that he worked with his mechanic, Jules Hue, to mount a machine gun directly in front of the pilot’s seat, protecting the propeller with metal deflectors. This single-seat design soon became the preferred aircraft of the fighter pilot, closely identified with the image of the knight of the air, as it represented the “promise of unprecedented aerial autonomy.”⁶² Oswald Boelcke, the celebrated German ace pilot and tactician, loved the design as well. “I believe,” Boelcke observed, “in the saying that ‘the strong man is mightiest alone,’ . . . I have attained my ideal with this single-seater; now I can be pilot, observer and fighter all in one. . . . My little

⁶¹ Robertson, *The Dream*, xiv.

⁶² Fino, *Tiger Check*, 20.

single-seater possesses the advantage of giving me complete independence; I can fly when, where, how long and how I will.”⁶³

This sense of individualism expressed itself in many ways. One of the major forms of this tendency was resistance to authority, which could include open disobedience. Some pilots in the First World War were resistant to command and they often criticized their trainers. This was most often due to a lack of respect for commanders who were not true pilots. Most combat flyers showed loyalty, respect, or even reverence to those leaders who had proved themselves as true fighter pilots first; and they disdained those who had not — to the point of questioning the legitimacy of commanders who had little flying experience.

Clendenin made this clear when decrying the “swivel chair tactics” of inexperienced commanders, contrasting them with his squadron leader Major Geoffrey H. Bonnell, who was “a real flying man” who knew “the flying game.” Clendenin argues that one of the reasons Bonnell should be respected is that he was able to circumvent or break through other command structures, like the “complicated Franco-American system of enforced idleness at Issoudun [the main pilot training facility in France].” Bonnell was eventually relieved of command, a decision that Clendenin denounced as an “injustice.”⁶⁴

Another key reason Bonnell was praised was that he advocated particular aircraft, in this case the Nieuport-28, as opposed to the SPAD-13 fighter. Clendenin saw this as evidence that Bonnell was a true fighter pilot, as the Nieuport in his mind was the superior machine in terms of air-to-air combat, although this was a minority view. Many other fighter pilots preferred the Spad. However, the fact that pilots judged certain aircraft as “true” fighters and that pilots

⁶³ Quoted in Fino, *Tiger Check*, 20.

⁶⁴ Clendenin, “Who Said Rats,” 7.

praised or condemned particular planes based on how well they performed specific pursuit tasks is important in itself, even if some pilots disagreed about which planes they liked.

In any case, William Barrett's 1934 retrospective on World War I combat aviation repeats the theme of only respecting commanding officers who had already proven their mettle as fighter pilots through combat, or who at least espoused similar values as those pilots. For example, discussing the 90th Aero Squadron, Barrett states, "On April 12, 1918 [Lieutenant Bill Schauffler] had made the first flight ever made across the German lines in a fully armed and equipped plane of the A.E.F Ninety reckoned that this was one C.O. who belonged."⁶⁵ Barrett implied that other commanding officers did not belong if they had not proven their bravery.

Leaders who did not understand technological needs were depicted as weak or unmanly. Often the very symbols of command became objects of ridicule. For example, when 90th Squadron was assigned the Spad fighter as a replacement for their Sopwith aircraft, Barrett described the decision as made by "some diplomat in a brass hat [who] spoke softly." The decision angered the pilots so much that they "decided that H.Q. didn't want this war won."⁶⁶ Here, the linking of technology with identity and masculinity also served to question the competence and motives of leaders. From the perspective of the pilot, the war was won or lost in the air, and, when leaders chose technology that was poorly suited to its purpose, pilots assumed that the whole war would be lost.

Independence also showed itself in a sense of individual freedom of action. Pursuit pilots in the air felt free to make their own decisions about what enemies to engage and when and how to fight them. Not only did this sense of individuality and freedom separate them from ground

⁶⁵ Barrett, "Squadron Parade," 111.

⁶⁶ Barrett, "Squadron Parade," 111.

troops, but it separated them from other types of fliers. Also, pilots often conceived of this individual freedom as a uniquely American trait. For example, Colonel Livingston Irving described the inherent advantage American pilots held. “It was fortunate,” he said, “that the Germans were so well trained as formation flyers that they were to follow the leader. They weren’t individuals like the Americans. I used to lose the leader, the hell with the bastard, go off by ourselves.”⁶⁷ Not only did Livingston revel in the sense of individual freedom, but he implied that too much training, or slavish obedience to leaders, can be detrimental to a pilot. A true fighter thus must be willing to use his instinct over his training and leader’s wishes. The stereotypical “knight of the air” trusted the individual man in the cockpit—himself—more than anyone or anything else.

The 1918 tactical manual *Fighting in the Air* asserted from the outset that the individual pilot was the key component to victory in air combat. Group formations and tactics were minimized, because, “[f]ighting in the air. . . even when many machines are involved on each side, tends to resolve itself into a number of more or less independent combats.” Emphasizing this individualized model of combat, the manual makes little effort to explain specific tactics or maneuvers, instead insisting that “[f]ighting tactics vary with the type of machine and with the powers and favorite methods of the individual pilots. No hard-and-fast rules can be laid down.” Thus, instruction is no substitute for a gifted fighter pilot relying on his own intuition. Indeed, as the manual explains, “[a] pilot who has full confidence in his own powers can put his machine in any position suitable to the need of the moment, well knowing that he can regain control whenever he wishes.”⁶⁸

⁶⁷ Livingston Irving Interview, 5.

⁶⁸ *Fighting in the Air*, S.S. 591, April 1918, Henry Clay Papers, Box 1, Folder 18, 5, 7, 14, 17.

Some pursuit pilots enjoyed not only the solitude, but also the sense of sport or escapism that was associated with single-seat flying. As American pilot Alan Winslow recalled: “At times I even forgot there was a war. My aerial acrobatic maneuvers—loops, rolls, vrilles, and spins—terrifying when I had first contemplated them, soon became sheer sport.”⁶⁹ French pilot Lieutenant Colonel Fernand Chavannes frequently volunteered for more missions, seeing them as exciting. “I continued to seek adventure alone,” he said, “in addition to my regulation missions.”⁷⁰

Henry Clay, a pursuit pilot with the 43rd Squadron of the RAF, wrote to his sister from the front lines, celebrating key elements of the fighter pilot mentality. In particular, Clay emphasized to her that pilots were a separate breed than the ground troops. The sense of individuality was key to winning and losing the war, expressing itself in a number of ways. Discussing of their brother’s wish to become a pilot as well, Clay wrote:

It wouldn’t be becoming of him [their brother] or me to be in the Air Service and not fly, now would it? . . . One thing that appeals to me about flying is the aristocratic way we live. We do not know what Army life is. But there is no reason why it should not be that way. The fliers over here are the pick of England, Canada, Australia, and South Africa. The work of the flier as an individual is more than that of any other, I think. In other branches one is just a small part of a big machine and the individual does not count for much. But in the Air Service the individual is something. The responsibility placed on one flier on contact patrol, for example, is so great that the fate of a whole portion of a front depends on that flier ‘coming through.’ But in scout work the individuality of the pilot shows up only in his fighting, that is his job. He attacks every enemy machine that shows itself. In these fights the pilot that is the best shot and the best flier usually comes out victorious. In these fights it is man against man instead of a division of an army against another division. That is why I like the Air Service. The individual counts for something.⁷¹

⁶⁹ Winslow, “No Parachutes,” 11.

⁷⁰ Chavannes, “Memoirs of a French Fighter Pilot,” 238

⁷¹ Letter, Henry Clay to Jas A. Clay, February 6, 1918, UTD William Coll. Henry Clay Papers, Box 1, Folder 10.

John W. Stuart Gilchrist, of the 104th Aero Squadron, also reveled in the emotional aspects of flight and the access it gave the pilot to another realm of existence, inaccessible to non-pilots. Recalling his early training flights, he said: “Within a week we were in the air and I began to realize a new world was unfolding—a world of great distances and a means of getting from one place to another in an incredibly short time, a three dimensional world, a world in which one might dive and zoom and turn at dizzy speeds, a world in which the earth bound people seemed smaller than ants. These were some of the emotions created by an old Curtis Jenny in 1917!”⁷² The emphasis Gilchrist places on maneuvers such as turning and diving reveals that fighter pilots, much more so than bombers, were able to experience this exciting new world. The ability to perform acrobatic maneuvers is a key component of the fighter pilot ideal.

Another characteristic of World War I air combat that sets it apart from ground warfare was the sense of respect, admiration, and gentlemanly camaraderie pilots felt for their enemies. This is evident in British commander Major James McCudden’s account of a dogfight that killed German Reserve Lieutenant Werner Voss. “As long as I live,” McCudden said, “my admiration for this man, who all by himself braved seven English planes for more than ten minutes, and actually harmed some of them, will never cease. He was the most courageous German flier I ever had the chance to fight.”⁷³ His diction reveals not only that he admired his adversary as a fellow gentleman warrior but also that he viewed combat with enemy pilots as something he “has the chance” to do rather than as something to avoid.

⁷² John W. Stuart Gilchrist, *The 104th Aero Squadron*, privately printed, Richmond, VA, 1968, found in UTD George Williams Collection, Box 27, Folder 7, 14.

⁷³ Floyd Gibbons, “The Red Knight of Germany” *Liberty*, November 5, 1927, 61, 65.

Pilots at times felt camaraderie with their enemies, even while fighting each other or after shooting each other down. American pursuit pilot Alan Winslow recalled his first dogfight, in which his guns became jammed. While attempting to clear the guns, he was vulnerable to a German plane bearing down on him. Yet the German saw the situation and allegedly simply waved and moved on. Winslow recalled: “By gallantry my life has been saved.”⁷⁴

In contrast to the horrifying image of trench warfare, aerial dogfights often drew crowds of spectators, not only thrilling them with exciting visual images, but demonstrating a sense of chivalry that seemed to be lost elsewhere. Winslow described a typical dogfight: “We fight no more than a few feet above the tree tops. The entire population of Toul [at the time, several thousand people] comes out to watch. One of my bullets actually pierces the ear of a startled peasant. (Afterward he was extremely proud of that bullet. It was his own personal war relic.) The fight is over in less than four minutes; I land, climb out of my cockpit and run toward the German pilot whose plane has just crashed to earth. He is surrounded by a chattering, excited crowd.”⁷⁵

Wonderful Toys

As much as pilots were defined by their personality traits of aggressiveness, individuality, and heroism, they also derived a strong sense of identity from specific aircraft. Pursuit pilots were particularly drawn to planes that performed better in fighter roles, emphasizing agility and maneuverability over other characteristics such as range, top speed, or payload. For example, in his memoir of his time in the 147th Aero Squadron, Clendenin criticized the problematic motors of the Spad, nicknaming the aircraft “the pooping Spad.” By contrast, he praised the Nieuport-28

⁷⁴ Winslow, “No Parachutes,” 7.

⁷⁵ Winslow, “No Parachutes,” 8.

as more true to the role of fighter pilots. “The success of the squadron in the month of July [1918],” he said, “was, in great part, due to the Nieuport plane, for its ability to maneuver quietly enabled us to ‘carry on’ with the type of fighting we had developed. Our style was the so-called ‘dog-fight,’ in which we stayed until the fight was over. We never favored the game of ‘shoot and dive for home,’ the style so popular among the French Spad pilots.”⁷⁶ Technology had become tied to the pilots’ sense of identity.

William Barrett’s depiction of the 90th Aero Squadron emphasizes the role of particular aircraft as more useful for fighter pilots than others, emphasizing the sense of identity associated with particular planes. He describes the Salmson aircraft as “real busses that made a pilot’s eyes light up. . . . How they fought for them.” By contrast, the earlier Sopwith and Spad planes were “for pilots who didn’t live right.” He asserts that when German planes bombed the aerodrome of the 90th Squadron, the American pilots were disappointed that the bombs missed the older Sopwiths.⁷⁷

Colonel Livingston Irving went as far as to put his preferences for aircraft technology above his national identity. When given a choice to fly as a pursuit pilot for the United States or the French Air Service, he chose the French simply because they were using the Spad-VII aircraft, which he thought was a superior plane to the Nieuports used by the Americans at the time. His main criterion for this was speed. Livingston said that “the Spad itself on the level was the fastest thing on the front, 142 mph,” although he did concede that “[f]or maneuverability the FOKKER was superior to us in climb.” This agility was a valued trait, and pilots criticized planes that could not reliably perform complex maneuvers. Irving’s discussion of some of the

⁷⁶ Clendenin, “Who Said Rats,” 8.

⁷⁷ Barrett, “Squadron Parade,” 111-2.

various allied aircraft demonstrates this evaluation. As he stated, “The British SE5 was a peach of an airplane. . . . The Sopwith Camel was what the British termed as ‘a Split-[S]-ing Fool,’ it would turn on a dime. But it had a fallacy of doing inverted spins, and instead of the pilot being on the inside of the thing, he was upside down and his head going around on the outside.” He notes that many pilots lost their lives attempting to do dogfighting maneuvers in Sopwith Camels.⁷⁸

Winslow also recalled that pilots in his squadron had passionate opinions about which planes they wanted to fly. In his case, the pilots preferred the Spad, because it was more durable when attempting the type of difficult maneuvers associated with dogfighting. By contrast, the Nieuports’ wing fabric tended to tear off if a pilot turned too hard. Thus, dogfighting performance was much more highly valued than any other characteristic.⁷⁹

What is important about these arguments is not which airplane various pilots preferred. Rather, it was the simple fact that pilots had strong attachments to particular planes based on how those craft could perform specific air combat maneuvers. Regardless of which plane the pilots picked, their arguments always centered on which one was the best for air combat. This trend of wanting aircraft technology to perform specific tasks associated specially with fighter roles continued for several generations.

Foolish Boys

Not all pilots conformed to every element of the “knights of the air” mentality. The first and often broadest critique some pilots expressed was that the fight in the air had little to do with actually winning the war. For all the tactical successes made by aircraft, in the First World War,

⁷⁸ Livingston Irving Interview, 3, 6-7.

⁷⁹ Winslow, “No Parachutes,” 23.

they were incapable of being turned to operational or strategic effect. Thus, aircraft did not change the war in any drastic sense. The official 1918 “Fighting in the Air” manual admitted this, noting that air combat mostly affected morale, and the increase in troop morale that accompanied success in the air was greater than any physical effect that airplanes could produce.⁸⁰

Aside from practical concerns, others questioned the emerging construction of the “knights of the air” mythology, realizing even as it was forming that it did not represent the reality they experienced. For example, some pilots did not view combat as a heroic, glorious, or a game of skill. For some, combat was a frenzied, terrifying, cacophony. Second Lieutenant Albert Rhys Davids, the man who shot down the German ace Werner Voss, described combat in those harsher terms: “All you can think of is pumping lead into any machine you see, and looking out and avoiding collisions, just missing each other by perhaps a couple of feet.”⁸¹ This was hardly the stereotypically heroic image of the fighter pilot.

Some pilots did object to the tales of dogfights presented in pulp magazines or in film, but their specific objections are revealing. For example, Colonel Livingston Irving complained about popular depictions of air combat not because of the dramatic sense of heroism or the role that personality seemed to play in accounting for success but simply because the details of the fights were inaccurate. “There’s so much crap and romanticism in the magazine stories, especially in the movies,” he said, “where they go round, and round, and round. The fight never lasted more than a couple of minutes, and yet these movies have to keep the public interested, and make it as thrilling as they can and all.” He described a typical fight as a quick and simple

⁸⁰ *Fighting in the Air*, 1.

⁸¹ Gibbons, “The Red Knight of Germany,” 61, 65.

affair: “Maybe you make a few turns, but your basic combat, a Spad was very heavy. You make your pass, pull up, do a wing over, and down again and maybe another one. . . . By that time all the formations were broken up, and if you saw an individual, you’d go after him and keep an eye out behind you.”⁸² For Irving, although the movies and stories might exaggerate the length or ferocity of a dogfight for dramatic effect, the core conceptions of the “knights of the air” mythos went unchallenged.

For some, the war was not a game of adventure, but a terrifying game of chance that confronted fliers with their own mortality and made life seem fragile, cheap, and easily lost. Henry Clay was a pursuit pilot in the 43rd Squadron of the RAF. His series of letters to his brother James Ashton Clay is particularly enlightening. Henry Clay described the fact that, after a training flight, a close friend of his climbed into the same plane Clay had been flying and was almost immediately killed in an accident. Clay explained, “This game of war is the greatest game of chance you ever played. I’m a fatalist through and through. So is everybody else in this game.” His fatalism took him as far as to condemn the war itself, unlike other pilots who seemed eager for battle. “Sherman was right—it’s hell [war] and I don’t know the half of it at present. There isn’t any hell hot enough for those who contributed toward the beginning of it.”⁸³

These sentiments are particularly enlightening because of their contrast with his letters to his sister, examined above, in which he extolled the individuality of the fighter pilot and expressed a longing for combat with a high kill count. Writing to his brother around the same time, Clay admitted that pilots were preoccupied with death, and he countered the idea that pilots

⁸² Livingston Irving Interview, 7-8.

⁸³ Letter, Henry Clay to James Ashton Clay, December 22, 1917, UTD William Coll. Henry Clay Papers, Box 1, Folder 10.

must be fearless heroes. “I’ll tell you it isn’t all sunshine and flowers—more flowers than anything else though. We all joke about pushing up daisies but it is more of a reality than a joke. . . . I saw in the paper once that one must forget the danger to make a good flier. That person didn’t know what he was talking about. . . . The whole thing may be summed up in a few words ‘don’t be a damn fool.’”⁸⁴ For some reason, perhaps his belief in contemporary gender stereotypes, Clay described pilots to his sister and brother in opposite ways.

Although the concept of chivalrous combat was ubiquitous, some pilots expressed ambivalence about it. As French pilot Pierre de Cazenove de Pradines recalled of one dogfight, “My machine took, without stop, the volleys of my pursuers who did not let up, although it was obvious that I was in an impossible position to fight back. . . . It is impossible to speak of chivalry in that relentless pursuit that had hundreds of spectators from the two camps.” Yet de Cazanove also emphasized that he did not hate his enemies – it was “simply a rivalry.”⁸⁵ Clearly some pilots found it easier to ascribe honorable motives to themselves rather than to their enemies, especially when in a losing battle.

Nor were all pilots discussed in heroic terms. First Lieutenant Fletcher Ladd McCordic was an American pursuit pilot with two enemy kills. A biographical memorial tribute to him recalled some of the traditional aspects of fighter pilot culture but emphasizes the lack of the arrogant, brash, braggadocious attitude associated with many pilots. “He spent many hours waiting at headquarters or within calling distance so that he might be called upon when a special mission was to be dispatched. . . . He was characterized by all who knew him by his very quiet,

⁸⁴ Letter, Henry Clay to James Ashton Clay, February 22, 1918, UTD William Coll. Henry Clay Papers, Box 1, Folder 10.

⁸⁵ Cazenove de Pradines, “Triumphs and Tribulations,” 68-9.

gentlemanly and modest manner. No one ever heard him tell of thrilling experiences or what he could do or had done, but he was always an enthusiastic listener.” The squadron operations officer described McCordic this way: “Courage and judgment are the two words that epitomized the salient characteristics in Fletcher’s character. . . . There was nothing sensational about Fletcher’s work; even if there were, his account of the matter would not make it appear so.”⁸⁶

Some pilots expressed ambivalence about the mythology of “knights of the air,” while still upholding parts of the myth in their critique. John W. Stuart Gilchrist’s memoir of his time in the 104th Aero Squadron described his fellow pilots:

As I look back I see us as young kids, scared as hell, but still with the courage of ignorance. . . . Their story is not that of a company of knights in shining armor, but of a group of high-spirited boys and young men, intrigued by the fascination of flying and willing to accept additional risks—if there were any. There have been thousands like them in the United States Air Service.⁸⁷

The fact that Gilchrist felt the need to counter the chivalric imagery speaks to the prevalence of the myth. However, even in denying that his fellow pilots were medieval heroes, he upheld the other components of the stereotypical fighter pilot identity—namely, eagerness for combat, bravery, and courage, and the motivation in men excited by the prospect of flight.

The Pilot’s Journey

Many qualities of the idealized “knights of the air” might seem disparate, disjointed, or abstract when examined in isolation, as they have been in past studies. It may be instructive then, to examine a single pilot’s journey from trainee to decorated combat pilot in order to demonstrate how all the qualities coalesced in a single case. The diary of Lieutenant Walter L. Avery allows

⁸⁶ “Fletcher Ladd McCordic: 1st Lieut. 88th Aero Squadron A.E.F. 1891-1919: A Tribute,” Chicago: Privately Printed, 1921, UTD George Williams Collection, Box 26, Folder 16, 62, 82.

⁸⁷ Gilchrist, “The 104th Aero Squadron,” 1.

just such an analysis. Avery was an American pilot from Columbus, Ohio, who served in the First Pursuit Group of the 95th Aero Squadron, alongside Quentin Roosevelt. He was eventually credited with two aerial victories (one of which was against the German flying ace Carl Menckhoff who was credited with forty-four kills) and awarded the Distinguished Service Cross.

His diary was a gift from his mother, who inscribed it with a quotation from Phillip James Bailey's 1839 poem "Festus": "We live in deeds, not years; in thought, not breaths; in feelings, not in figures on the dial; We should count time by heart throbs. He most lives who thinks most, feels the noblest, acts the best." Then she adds her own admonition: "Be such a man, and live such a life, that if every man were such as you, and every life a life like yours, this earth would be God's paradise."⁸⁸ On the surface, this is simply an inspirational word from a mother to a son that is not unique to fighter pilots, although it does reinforce the idea of Avery as a chosen individual that can serve as an example of nobility and action to others—all traits associated with the "knights of the air."

Avery himself frequently included poems or songs in his diary, such as the early entry from October 8, 1917:

He was master of circumstances and of himself
And now to far adventuring, And take young dreams along,
For every pang the fortunes bring, Turns lightly into song.⁸⁹

Again, the verse is somewhat generic, but does still reinforce the idea that Avery envisioned the war he was entering as an adventure, as the fulfillment of the dreams of youth, and something worthy of celebrating in song.

⁸⁸ Diary of Walter L. Avery, print edition, 1980, UTD George Williams Collection, Box 27, Folder 4, inscription.

⁸⁹ Avery Diary, 5.

Part of the fighter pilot stereotype is a frustration with authority figures, even to the point of contradicting or even disobeying them. Almost all the cadets at his flight training school exhibited these characteristics when they were not given a commission as first lieutenants (along with a pay raise from \$36 to \$100), which they thought they had been promised. Their frustration grew throughout the training experience, and many cadets were moved to violence. On November 4, 1917, Avery recorded: "It almost caused a riot here. . . . We started busting up the barracks and Lt. Knight, commander of the school, tried to quiet us with more damn promises. . . . The whole outfit is disgusted with the U.S. Army and its failure to make good its promises; and don't care whether they ever fly or not. Personally I have lost most of my enthusiasm and don't care a damn one way or the other." The next day he explained that the sense of patriotism with which the cadets had entered the war had almost completely evaporated and that most of the cadets were attempting to switch to the French Army out of frustration. Avery himself was angry that some of the men who had performed worse than he had in stateside training had already received commissions and were now his superior officers. This angered him so much that he said he would rather have served in the British, French, or Canadian Corps rather than serve his own country.⁹⁰

Despite this disillusionment, Avery reveled in the flying itself, and he saw flight as an escape from those frustrations, a chance to enjoy quiet solitude. As he put it: "Some isolation for the hours altitude! Nothing but me and the sun and an endless sea of ice! Far from the maddening crowd."⁹¹ The idea that flight was an escape from the worries of life that gave him a chance to revel in independent isolation is a theme he repeated often in his diary. Just a few days later he

⁹⁰ Avery Diary, 6-8.

⁹¹ Avery Diary, 8.

posted another poem praising individualism and escape, touched with aggressiveness and almost a sense of disgust with the people and the life on the ground:

Clean quit of you all, down here in the street,
With your turmoil of hoofs and of wheels and of feet!
Clean quit of you all!
Only your call, like the beating of waves, in dim, half forgotten, subterranean caves,
Comes up to me here.
Comes up and I hear,
I look down and listen and watch you go by,
And am free of you all, alone in my sky!⁹²

These are the first few lines of “The Twelfth Floor” by Mary B. Mullett.⁹³ They express how intensely Avery, and perhaps other pilots, valued individualism, to the point of feeling disdain for the normal trappings of everyday life. Flight was an escape from this, a chance to be alone but also to express true individuality in an exciting adventurous way, unhindered by societal conventions.

A few months later, in April 1918, Avery included a song that captured much of the same sentiment. For example, after several verses describing a gloomy, rainy scene of depression on the ground, the following stanzas are especially revealing:

At a thousand-five hundred the dim gray space assumes a brighter hue
Where the sun’s pale disc of mist gold close above faintly fades into view.
In a few minutes more the tiny cell opens out into canõns high-
Up towering walls, thru glistening halls
I rise toward a brilliant sky.

The giant canõns drop below, at two thousand meters the dial;
On up two thousand meters more I joy-ride around for a while.
A mile below roll the mountains of mist, a dazzling, motionless sea;
No gloom! -- it’s clear, bright noon up here
Boy! This is the life for me!

Whoever would dream, twenty minutes ago, far below on that muddy old sphere

⁹² Avery Diary, 10.

⁹³ Originally published in *McClure’s Magazine*, Vol. 49, September 1917, 34.

That here there existed this beautiful world, right above our wet roof so drear;
So this is the place to spring the line, that “gloom is only skin deep”—
With a joyous loop and a downward swoop
I drop at an angle steep.

And just as the nose plunges into the fleece of a towering dome of white,
Close by to the left our shadow falls in a circle of rainbow bright.
The whistling wires slip down thru the sea, the bright light shades to gray --
Mists blacker grow ‘till just below
Appears the dark wet day.⁹⁴

The song continues, describing the pilot reentering the gloom of earth to discover that he was so excited by his flight that he is late for a meal. This untitled song describes a stark difference between the world of the ground — a rainy, depressing mist — and that of the sky — a world of shining sunbeams, rainbows and escapist adventure, accessible only to the pilot. The descriptions of “glistening halls” could be a religious allusion, attempting to equate flight with accessing the heavenly realm, or simply describe a paradise.

Also implied in the song is a sense of individuality. Not only does the pilot escape the gloom of the ground, but he escapes all contact with other people, becoming free to soar alone through this newly discovered shining realm. While in this heavenly space, he is not taking orders, not achieving a mission. He is isolated — and this isolation is presented as not only preferred, but liberating. This reinforces the sense of individuality valued by fighter pilots. Their desire is to experience this paradise but to do so on their own terms, alone, in sole control of their decisions and their time.

Avery also showed a fascination with particular aircraft that were built for air-to-air combat. He was excited to have access to both Nieuports and Spads, although by the summer of

⁹⁴ Avery Diary, 38.

1918, after getting some flying experience, he preferred the Spad fighter. He felt so strongly about this that he protested against his commanders when he was sent out in the Nieuports.⁹⁵

His eagerness for particular aircraft was overshadowed by an eagerness for combat itself. He complained on April 7, 1918: “Would be all to the merry if it were not for the disappointment of getting sidetracked form the real war work, possibly for all this year.” It was only a matter of weeks until he was in his first dogfight. On July 25, 1918, at 6:45 pm, he took part in a large battle. Eight planes flew on each side, dogfighting above Chateau Thierry in France. During this fight he shot down Oberleutnant Carl Menckhoff, who was only bruised. Menckhoff welcomed a meeting with the pilot who shot him down.⁹⁶

Avery and Menckhoff met after the battle, in a display that epitomizes the sense of chivalry, mutual respect, and camaraderie even among enemy fighter pilots. Avery took a few souvenirs from the battle, including the enemy plane’s compass, and a piece of the aircraft’s fabric painted with the letter “M.” Later Avery returned to the site to take the German telescope sight, altimeter, and name plate.

Avery included in his diary the account of the fight printed in the *London Daily Mail*, which wrote of the incident in the manner typical for “knights of the air” — emphasizing excitement, action, and chivalry between respectable gentlemen. The author explained: “The duel. . . was one of the most exciting I have ever seen. The two machines went at each other like two fighting cocks at 900 feet up. Lieutenant Avery’s mastery was incontestable, and he won more by maneuvering than with his machine guns.”⁹⁷

⁹⁵ Avery Diary, 38, 49.

⁹⁶ Avery Diary, 38, 63.

⁹⁷ Avery Diary, 63-66.

This description contrasts sharply with Avery's own accounts, which assumed a dry, matter-of-fact tone. This stylistic shift in his diary occurs after he encountered combat for the first time. After this combat, he also began to express more skepticism about the likelihood of his survival. On August 3, 1918, approximately one week after his dogfight, he wrote: "The odds are against an extended career for a pilot up against the crack Boche [German] outfits of this sector." On August 10, Avery scored his second aerial victory in another combat, and although he notes celebrating with champagne, his diary barely records the event, simply stating the basic facts in an encyclopedic tone. After this second fight, Avery did not mention any attempt to take souvenirs from the battle. The earlier talk of romance dissipated almost completely after his first combat. After this point, the most excited he became was when he wrote of eating ice cream.⁹⁸

Deaths among his fellow pilots seemed inconsequential. After one pilot was killed, he noted: "Funny, how things go along just the same." When his friend Bill Taylor was shot down while flying Avery's plane, Avery made no comment about his friend's life. He merely expressed frustration that one of the souvenirs from his Menckhoff battle was destroyed.⁹⁹

This extended example can serve as a microcosm for understanding the fighter pilots of World War I and the way in which the mythology of "knights of the air" formed and functioned. Avery expressed the sense of individuality in a number of ways—his frustration with and resistance to leadership, the autonomy of single-seat pursuit flying, and the pure escapism of flight, including the sense that combat was an exciting adventure to be welcomed. He expressed the aggressiveness and eagerness for combat associated with the stereotype of the "knights of the air," which included a sense of competition with fellow pilots. He strongly identified with

⁹⁸ Avery Diary, 68, 71.

⁹⁹ Avery Diary, 71, 21, 83.

particular aircraft technology as part of his identity as a pilot. His story shows a degree of respect for enemy pilots, the continuation of the concept of chivalrous combat between enlightened gentlemen. Finally, in his diary, Avery also shows the ambivalence felt by some pilots toward all of these ideas — and implies that the actual experience of combat might change how pilots thought and felt. This kind of change was far from universal, however, and many pilots did enjoy and revel in their dogfighting in a way that Avery did not.

Conclusion

The first generation of air combat pilots built their communal identity on aggressiveness, independence, heroic imagery, technology, and a sense of community. Other traits associated with these elements emerged as well, such as associating air combat with masculinity, competition, combat as a game, sports metaphors, and a lack of respect for leadership figures (to the point of disobedience). All contained the core assumption that a pilot's individual personality traits were the determinant of victory in the air. At times these sentiments reflected reality to some degree, at other times they were idealized versions of the truth. Although not all pilots ascribed to the “knights of the air” mentality, even those who opposed it on some level seemed to acknowledge that it existed, that it was the *de facto* posture of the fighter pilot community.

The “knights of the air” mentality did not end with the Treaty of Versailles. Many of these same individuals were active in crafting air power thought and doctrine during the interwar period, and many went on to fly in the next World War. These ideas were passed on to subsequent generations, and the myth of the “knight of the air” continued to grow.

Chapter 3 - “I Can Conquer the World”: Knights of The Air in The Second World War

In 1941, Royal Canadian Air Force pilot John Gillespie Magee, Jr. was killed in an accident, shortly after writing his now famous poem *High Flight*. The poem has gone on to be a favorite among many aviators, at least in part because it captures much of the romantic myth of the “knights of the air.”

Oh! I have slipped the surly bonds of Earth
And danced the skies on laughter-silvered wings;
Sunward I've climbed, and joined the tumbling mirth
of sun-split clouds, — and done a hundred things
You have not dreamed of — wheeled and soared and swung
High in the sunlit silence. Hov'ring there,
I've chased the shouting wind along, and flung
My eager craft through footless halls of air. . . .

Up, up the long, delirious, burning blue
I've topped the wind-swept heights with easy grace.
Where never lark, or even eagle flew —
And, while with silent, lifting mind I've trod
The high untrespassed sanctity of space,
— Put out my hand, and touched the face of God."

These words sound as if they could have been written in 1917, but more rightly they belong to the World War II generation. Despite the years, despite changes in aircraft technology and military doctrine, the elements of the knights of the air mythology remained a key feature among fighter pilots, who held to the romanticized image of chivalrous combat in the skies and the sense of individuality, freedom, and spirituality their profession engendered, as expressed in Magee's work.

Yet, there were subtle changes in the exact nature of the myth and its expression. The First World War had seen the creation of a culture of fighter pilots—their mythic identity as “knights of the air” had united them and given them a shared identity. In the interwar period in

the next major war, however, that identity became marginalized. The Air Force shifted to an identity based not on pursuit or air-to-air combat but on strategic bombing. The theory of strategic bombing called for different types of aircraft—large, multi-engine, multi-crew lumbering bombers that did not reflect the mythology tied to the “knights of the air.”

Despite this shift, fighter pilots maintained their shared cultural identity and beliefs as a smaller subculture. The fact that they were so marginalized led them to become increasingly protective of one another, but that community shared the same traits as it had during the First World War: aggressiveness and competition, individualism and resistance to authority, commitment to heroic imagery, advocacy for particular types of aircraft technology that fit their desired combat roles, and a growing sense of protection for their community. Partly because some of the pilots in the Second World War had also flown in the earlier world war, and partly because some of these characteristics had become tradition, these cultural traits were passed on to a new generation of fighter pilots, even during a period of bomber dominance.

Victory Through Air Power

In the First World War, air power evolved to include a large variety of roles, and the cultural identity associated with air power evolved with it. At first, planes had been used mainly for reconnaissance. As enemy planes attempted to destroy these reconnoitering aircraft, those craft attempted to defend themselves. This fostered air-to-air combat, which became a specialized role for pilots. Other roles emerged as well, as some pilots attempted to strafe trenches, or drop small explosives over ground forces, an early form of close air support (CAS). During this evolution, some theorized that air power held the potential to win wars by itself, by going past the battlefield to attack cities, civilian centers, or a nation’s leaders directly.

As World War I drew to a close, theorists sought ways of using aircraft to end wars quickly. The most influential of these theorists was Giulio Douhet who argued that air power alone, through heavy bombing attacks against civilians and their leaders rather than troops on battlefields, could win a war quickly, thus preventing the large death tolls of trench warfare. After the war, American leaders such as Colonel Billy Mitchell picked up on these ideas and attempted to spread them forcefully throughout the interwar period.

During those years, the American Air Service struggled to forge a new identity for itself by centering around a new doctrine for air power. The formation of much early Air Service doctrine occurred at the Air Corps Tactical School, located first at Langley Field, Virginia, before being moved to Maxwell Field in Montgomery, Alabama in 1931. In the early years at Maxwell, two schools of thought emerged among the instructors—those who focused on pursuit (with fighters specifically performing air-to-air combat) as the primary mission for air power and, opposing them, those who advocated strategic bombing. The leader of the fighter group was Claire Chennault, who was often at odds with bomber instructors, especially Haywood Hansell and Lawrence Kuter. Chennault was effectively forced out of ACTS, allowing the bomber advocates to shape what became the core doctrine of using air power during the next World War. The experience in that war provided the foundation on which what soon became the United States Air Force rested.¹⁰⁰

Hansell went on to command bomber operations in the Pacific, Kuter was a primary architect of the air war plan for bombing campaigns in Europe, while Chennault went on to lead one of the most celebrated fighter units of the war: The Flying Tigers. The relationship among

¹⁰⁰ Brian D. Laslie, *Architect of Air Power General Laurence S. Kuter and the Birth of the US Air Force* (Lexington: University Press of Kentucky, 2017), 29-36.

these instructors at ACTS serves as a microcosm of the larger shift in thinking within the air service, as fighter culture was pushed out and relegated to a side role while strategic bombing took center stage. Yet the fighter community maintained its identity, cultural values, belief systems, and began to build an institutional memory of the glory days of air-to-air combat in the previous war. Slighted as a subculture and limited in what it could do to shape their parent institution, the fighter pilot community still held fast to the “knights of the air” mythology, helping it to become even more entrenched.

I’m The Best at What I Do

By the time that the United States was engaged in the Second World War, American air war planners had settled on a concept of precision bombing, in which air assets were focused on bombing targets related to military production, such as factories, oil and petroleum refineries, and transportation networks. The technology of the time limited the effectiveness of this approach, as the much vaunted Norden bomb sight did not live up to the hype over its alleged “pickle barrel” accuracy. Furthermore, over the course of the war, the definition of a “military target” had expanded to include entire cities of civilians through firebombing and atomic bombing.¹⁰¹

Nevertheless, despite its flaws, by the end of World War II, air power had become closely associated with the concept of strategic bombing. When the Army Air Service fought to declare its independence as a separate military service equal to the Army, Navy, and Marines, its argument hinged on the fact that an independent air force could use strategic bombing to do what

¹⁰¹ Stephen Lee McFarland, *America's Pursuit of Precision Bombing, 1910-1945* (Tuscaloosa: University of Alabama Press, 2008); Conrad C. Crane, *Bombs, Cities, and Civilians: American Airpower Strategy in World War II* (Lawrence: University Press of Kansas, 1993).

the other services could not. The cultural identity of the US Air Force, then, was wedded to bombers and the idea of bomber crews from the moment of its birth.¹⁰²

This sense of cultural identity is evident in recruitment materials. Although posters still contained images that featured individuality and spiritual or angelic imagery, fighter planes appeared less frequently than images of bombs and the larger bomber aircraft. Films changed as well. Early aviation films such as Howard Hughes' epic *Hell's Angels* (1930) had emphasized the exciting acrobatic dogfights of World War I aviation. Films of air power in the Second World War and after more frequently followed the mold of 1955's *Strategic Air Command*, in which Jimmy Stewart gives up a career in America's pastime—baseball—in order to be part of a B-36 bomber crew and embraces the role of strategic bombing in deterring the outbreak of a third world war.¹⁰³

Despite this shift in Air Force identity from a fighter-force focusing on pursuit and dogfighting in World War I to a bomber-dominated air force based on strategic bombing theory by the end of the 1930s, fighter planes did still exist. Now, however, they were relegated to a lesser place as a subset within “tactical” air power, separate from “strategic” air power. The mythic image of “knights of the air” survived among groups of fighter pilots in the World War II generation. These attitudes come across strongly in oral history interviews with ace fighter pilots who served in World War II. They tend to reaffirm the long-established ideals of the “knights of the air”: aggressiveness (including eagerness and competitiveness), individuality (in resistance to

¹⁰² This is admittedly a bit of an oversimplification, a full narrative of how the Air Force gained independent, coequal status with other military services can be found in Herman Wolk, *The Struggle for Air Force Independence, 1943-1947* (Washington D.C.: Air Force History and Museums Program, 1997).

¹⁰³ A useful study of the relationship between film and air power advocacy is Steve Call, *Selling Air Power: Military Aviation and American Popular Culture After World War II* (College Station: Texas A & M University Press, 2009).

authority and in independence of action), a connection between identity and particular aircraft technology, heroic imagery, a sense of chivalry and respect for enemy pilots, and a connection to traditional conceptions of masculinity.

Major General John Alison, who had been a World War II fighter ace, noted later that flight itself, unhindered by rules or commanders, was a knight of the air's true goal. For many pilots such as himself, this had been the reason why they had joined in the first place. This eagerness, he asserted, was the key to making a good ace pilot. Recalling the end of his training in the years before World War II, he notes,

When I was in the pursuit section, there was not a one of the regular officers who went through, chosen to be pursuit pilots. They were a little more conservative I guess.... They are treated a little differently when they come out of the flying school. The first two or three years of a young man's life out of flying school should be finishing his education as a pilot; learning to fly that machine. Those are the years when he is absolutely the most perceptive and he is the most eager. That is when he wants to fly. When I got out of flying school the first year, I wanted to fly. I was so disappointed when I went into a pursuit squadron, and when I was not allowed to fly I was going to resign.

Once he was out of training and the war had begun, Alison longed for combat. He wrote letters continuously to General Henry "Hap" Arnold for six months, begging to be placed in a combat zone.¹⁰⁴

Alison also noted the eagerness and competitiveness that led him to be a pilot. "I had a reasonably competitive attitude and I wanted to excel in flying school. I had a lot of confidence that I would. It may have been misplaced confidence, but I had it. I think for a fighter pilot this is important." His sense of competition was ever-present. Even early in his training, he recalled, "I prided myself that I could outturn anybody in the group. I believed I could. I could take the

¹⁰⁴ Major General John Alison Corona Ace Interview, January 27, 1977, Air Force Historical Research Agency, K239.0512-1065 [hereafter cited as Alison CA Int.], 13-14, 38.

airplane off and land it in a shorter distance than anybody in the group.” He knew what sort of flying he wanted to do. “My heart would have been broken if I had been put in bombers,” he said. Part of his reluctance to join a bomber crew also related to his sense of male pride. He admitted that “I would have hated to be a bomber pilot because I would have hated to have my co-pilot see me tremble.” Although Alison himself felt very strongly about wanting to fly fighters, and viewed a place in a bomber crew as an inferior position, he did note that these roles were not necessarily mutually exclusive. He said: “There are plenty of bomber pilots that would make great fighter pilots. There are plenty of fighter pilots that would make great bomber pilots.”¹⁰⁵

A sense of aggressiveness was key, Alison argued, for the entire squadron to be successful as well. As he notes,

I wanted the pilots to know what they could get out of their own machine. Very important to understand this.... My squadron was a very aggressive squadron. A lot of esprit. A lot of enthusiasm for any mission even if it weren't a ground attack mission which fighter pilots generally did not like because you got shot down. Air-to-air combat was relatively safe. We had some almost unexplained losses on ground attack. You never knew who was shooting at you.¹⁰⁶

Pilots clearly longed for the excitement of combat. Alison seemed to say that combat was less risky than some other missions, suggesting that chivalrous battle between gallant pilots was safer than some alternatives, or at least that it was psychologically easier to handle than ground attack. The latter could produce unexplained losses that made no obvious sense and entailed no mutual respect.

¹⁰⁵ Alison CA Int., 6-9, 96, 15.

¹⁰⁶ Alison CA Int., 43.

He went so far as to argue that successful pilots could ignore the fear that most people naturally have before combat, letting their courage take over. What made this possible was the sense of sheer excitement in both flight and combat that Alison celebrated. The fact that he dehumanized his enemies and thought of them as airplanes, not men, further enabled him to revel in the inevitable destruction in air combat. He observed:

If you have fear, and like everybody else, you do, you usually have those apprehensions before the combat. Once the combat starts, there is no time for any apprehension. If you do have them, you are in the wrong business. . . . It [war] is the most exciting game in town. There is nothing that gets your adrenaline up so fast. In the air battle – I guess we had it pretty good because you did not – you were seldom wounded. You were either all in one piece or you were gone – instantly gone. You did not have to see your opponent. You did not really think of your opponent as a man. It was and airplane. You knew that you could lose your life and the stakes were awfully high but this made it very exciting. The kind of excitement that is hard to give up.¹⁰⁷

Although Alison emphasized the aggressiveness and eagerness that made fighter pilots successful, he noted other important factors as well, including the equipment at a pilot's disposal, as well as sheer luck. He recalled: "Equipment plays a hell of a big part. Equipment, luck, and timing play a big part in developing aces. Granted, you have to have a boy with the right motivation. And he has to be able to handle his machine. But he needs to be in the right place at the right time."¹⁰⁸ Alison upheld many of the core components of the "knights of the air" mythology, but admitted that success in air-to-air combat was not that simple, and that over time, other factors had begun to matter more. When asked, "What do you believe is the most vital aspect of air-to-air combat?" he answered:

That is a very hard question to answer because there are so many things that go into it. The fighter pilot still has to have the aggressive spirit and the eagerness to learn and the interest of going in and doing the job. More and more he is also to know how to manage the performance of his airplane and the performance of his weapon. . . . in the past the

¹⁰⁷ Alison CA Int., 53, 60.

¹⁰⁸ Alison CA Int., 31.

aggressiveness was tremendously important. The airplanes were far simpler and your management job, your technical job was less important.¹⁰⁹

The line between aggressiveness and foolhardiness can be a fine one, and Alison was careful to distinguish between the two. He noted: “Some very successful fighter pilots were reasonably cautious.” When pursuing that line of thought, Alison made a perhaps subconscious association between eagerness for combat and patriotism. The questioner asked Alison if he knew any fighter aces who had been reluctant about combat. Alison responded: “No. Also most of the fighter aces I know are tremendously loyal, patriotic, good Americans. Small-town fellows who believed in our country. That is not what makes them an ace but that seems to go along.” The questioner was not asking about the pilot’s sentiments toward their country, their patriotism, or what type of town they were from or their upbringing — yet Alison assumed that a question about a lack of eagerness to engage in air-to-air combat implicitly challenged the patriotism of his fellow pilots.¹¹⁰

Other ace pilots expressed similar views. When asked what qualities made a good fighter pilot, World War II ace Brigadier General Frank Gailer replied: “There is no question, you will find that the one word that will always run through all of the people that you talk to, I am sure, will be aggressiveness.... He has to be an aggressive individual. . . . I hate to use the term reckless, but to some degree, that’s what makes a successful fighter pilot. He was got to be willing to take a chance.”¹¹¹ He went on to emphasize the sense of individuality and the feeling of being a self-made man that came with being fighter pilots: “When the guy is young and full of

¹⁰⁹ Alison CA Int., 92-93.

¹¹⁰ Alison CA Int., 113.

¹¹¹ Brigadier General Frank L. Gailer, Corona Ace Interview, January 19, 1977, USAF Oral History Program, USAF Historical Research Agency, K239.0512-1061 [hereafter cited as Gailer CA Int.], 21, 32.

piss and vinegar and ambitious and everything, the fighter scene, that's it. He is his own man. It's the closest thing to being your own man, making your own decisions early. You can't do it in any other form of flying."¹¹² Gailer's assumption that successful fighter pilots needed a combination of aggressiveness and naivete is the reason he preferred a younger force. Describing eighteen and nineteen-year-old recruits, he said: "That's the age where, 'I can do no wrong. I can conquer the world.' That's the fighter pilot; he is that kind of a guy."¹¹³

When asked to identify the qualities that determine an ace, Gailer resorted first to both "the patriotism and spirit that is engendered, probably in no other arm of the services—I am thinking of the air services now—more than the fighter pilots have. It's a historic thing, and they have been able to build great legends where no other aircraft that we have has been able to do quite the same thing."¹¹⁴

Gailer, like others, focused on the individualism and glory of the fighter pilot: "The ace is kind of a magical thing.... He is kind of a glamorous guy, and he lives up to it. He is the only complete weapons system himself. He is the pilot, he is the copilot, he is the navigator, he is the bombardier, he is the gunner, he does it all. As a result of it, he comes out with a uniquely proud feeling of accomplishment and not a great deal of patience with the other branches in the air."¹¹⁵ Later, he continued this line of reasoning, arguing: "Most fighter pilots have strong feelings. I think that's the kind of the person they are, and they tend to be very self-reliant, independent thinkers, opinionated, egotistic. They have to be because they are many people rolled into one. . . . They have to be recognized for what they are and given credit for that." This idea of needing

¹¹² Gailer CA Int., 33.

¹¹³ Gailer CA Int., 48.

¹¹⁴ Gailer CA Int., 5-6.

¹¹⁵ Gailer CA Int., 6.

credit for their greatness is a recurring theme and speaks to the sense of competition, but also the self-importance that many fighter pilots feel. It is appropriate that without any irony Gailer refers to fighter pilots as “the glamour branch” of the Air Force.¹¹⁶

Gailer also spoke of German fighter ace Adolf Galland in particular as a positive example of the ideal fighter pilot. Gailer mentioned Galland’s memoir, *The First and the Last*, originally published in English in 1954, as showing the true fighter pilot ideal. Galland was a German fighter ace, flying mostly the Messerschmitt Bf 109, who achieved 104 aerial kills during World War II. Galland’s memoir reinforces the elements of the fighter pilot myth discussed above. He especially emphasizes aggression and independence, and a skepticism of leaders that have not proven themselves in combat. Galland often verbally sparred with *Luftwaffe* commander Hermann Göring. Galland noted: “Only the spirit of attack borne in a brave heart will bring a success to any fighter aircraft, no matter how highly developed it may be.”¹¹⁷ He also affirmed: “The fighter pilot who is not at all times and at any place offensive loses the initiative of action.”¹¹⁸

Like the American pilots of the Second World War, Galland also looked back to the Great War for inspiration on what successful pilots looked like. He described himself as the next incarnation of von Richthofen, with his colleague Werner Mölders as the new Oswald Boelcke.¹¹⁹ Also like his American counterparts, Galland emphasized the personality of the pilot as key to success, specifically citing aggression and independence. He said:

¹¹⁶ Gailer CA Int., 47.

¹¹⁷ Adolf Galland, trans. Mervyn Savill, *The First and the Last: The Rise and Fall of the German Fighter Forces, 1938-1945* (New York: Bantam, 1978, originally published New York: Henry Holt and Company, 1954), 15.

¹¹⁸ Galland, *The First and the Last*, 201.

¹¹⁹ Galland, *The First and the Last*, 30.

Orders to protect fixed objects were very much disliked by fighter pilots. Their element is to attack, to track, to hunt, and to destroy the enemy. Only in this way can the eager and skillful fighter pilot display his ability to the full. Tie him to a narrow and confined task, rob him of his initiative, and you take away from him the best and most valuable qualities he possesses: aggressive spirit, joy of action, and the passion of the hunter. The fighter army cannot be manacled, particularly when his fetters are determined by earthbound thinking.¹²⁰

Despite his association with the Nazi regime, Galland still emphasized a sense that his role was one of honorable, gentlemanly combat, in which enemy fighter pilots were to be treated with respect, again seeing himself as a continuation of the traditions established by fighter pilots in the First World War. Allegedly, Göring suggested that German pilots should target enemy pilots who ejected and were parachuting to the ground. Galland reported being horrified at the suggestion. He recalled telling Göring, “I should regard it as murder, Herr Reichsmarshal... and I should do everything in my power to disobey such an order.’ [...] In World War I similar thoughts had cropped up, but were equally strongly rejected by the fighter pilots.”¹²¹

Gailer linked success not only to aggressiveness but to confidence and a sense of competition. He noted that a pilot’s first air-to-air encounter was a formative experience. The outcome of that first encounter could be the result of any number of factors, including blind luck, but a success (shooting down an enemy) in that first encounter instilled confidence for the future and gave the pilot a sense of superiority in competition with his fellow pilots. Gailer argued that these qualities could override a person’s natural personality and thus success in the first encounter “can mean that somebody who you would least expect turns out to be a tiger of tremendous proportions.”¹²² He expanded on this theme when asked if ace pilots all have “a

¹²⁰ Galland, *The First and the Last*, 53-54.

¹²¹ Galland, *The First and the Last*, 72.

¹²² Gailer CA Int., 6.

killer instinct.” Gailer replied: “The taste of blood makes it greater. . . . Glory. Wanted to score more.”

Community, sometimes expressed in competition but also in fraternity, was also key for Gailer. He thought that it gave pilots a sense of belonging to something beyond themselves that had a rich heritage. Specifically, Gailer claimed, the sense of identity as being a fighter pilot among other fighter pilots, separate from others in the Air Force, was important in creating aces. He noted that “the peer group bit is important in the fighter business. He wants to do better because he knows everybody else knows how good he is or how bad he is or where his weaknesses are.”¹²³

He noticed that in World War II, American, British, and German air forces seemed to have sense of fighter pilot identity, but that, into the 1960s, that identification was lost. As he put it: “The thing that has hurt the fighter forces the most... has been a lack of identification. . . . The Germans when they arrived had a competitiveness, a desire to succeed.... They didn’t quite have elite outfits, but they were outfits that had a meaning and a history. . . . [The British fighter squadrons] had a history, it had a meaning, a part of belonging to something.” Arguing that the USAF had lost that sense, he explained:

They don’t teach it to the kids. They have lost a lot of that; there is no real pride. It’s there. The fighter pilot has it; he is proud of the outfit he is in at the time.... They are a part of just being fighter pilots. We have lost a lot of that. We have given short shrift to tradition. As a result, I think maybe the turbulent 1960s didn’t help us much in that regard either. We lost a lot of it even from within our services, a lot of that because of reactions by military people to political actions on the outside. I am afraid we have become a rather political military, and I think that is too bad.... Decisions are made now, major decisions, that are too politically based, and they affect the fighter force.¹²⁴

¹²³ Gailer CA Int., 34.

¹²⁴ Gailer CA Int., 7-9.

Although his argument that the 1960s generation lacked this sense of identity is debateable at best, his emphasis on the important of that sense of identity confirms his belief in the tenets of the “knights of the air” myth.

To some degree, Gailer expressed the common idea that the fighter community is tight-knit, but it has a persecution complex. Fighter pilots tend to see themselves as a minority within the Air Force that is not represented or supported by the Air Force leadership. As he described,

It [the fighter community] is not supported from on high. It is constantly coming down, “You can’t do it that way.” You are constantly being pushed aside. Instead of the Air Force being proud of its glamour boys... they are not. And they know it all the way down. . . . A guy has to feel like he is a part of an outfit. Most fighter pilots do. Most fighter squadrons even today are a close-knit group, very close-knit, and it is there while they are there. They retain it only because they have to retain it. It’s that kind of a life. It’s not really encouraged, however, from the higher-ups, from without the outfit. A lot of the wing commanders don’t encourage it.¹²⁵

Beyond this institutional persecution, Gailer thought that fighter pilots take on more risk than other types of pilots (especially bomber and transport pilots) in the sense that it is harder for them to have careers later in life. He argued: “The fighter pilot gives up a lot when he goes to fighters. He doesn’t get the number of hours that make the airlines particularly desire him and the type of equipment and things like that. He really takes a loss.”¹²⁶

The sense of being an outsider and being persecuted applied not just to the fighter community taken as a whole, Gailer argued, but also to fighters as individuals. He went so far as to say that the need to prove oneself is a major source of the aggressiveness that he argues is so necessary for ace pilots. As he described, the best fighter pilots are

trying to prove something, whether it is to himself or to his peers, or to whomever, trying to prove something. He is willing to do something to prove it, whatever it is. Maybe he doesn’t even know what it is, but whatever it is he has to have that ambition and

¹²⁵ Gailer CA Int., 28, 31.

¹²⁶ Gailer CA Int., 35.

aggressiveness and recklessness to a degree.... [They need] just to prove to others, to whoever it is, that he can do it and be far more successful than they ever envisioned. He is a nothing, he is too big, he is too tall, or he is too short, or he is too fat, he is whatever. He couldn't do it. They do it.¹²⁷

Linked to this sense of identity was Gailer's appreciation of pilot specialization. He argued against cross-training pilots for several roles, forcing them to be "constantly shifting from one aircraft to the other." (After World War II, this concept became institutionalized as the "Universal Pilot" model). Taking this idea further, he argued that pilots should all specialize in fighters, since in his mind, fighter could do "almost anything" that a bomber aircraft could do, but with more accuracy and less cost.¹²⁸

Gailer's argument here is multi-faceted and speaks to several of the major components of the fighter pilot stereotype at once. First, although he couches his argument for specialization in terms of cost savings, he does not provide much evidence for his claims that fighters can replicate the performance of bombers or that such an approach writ large would be cheaper. The cost argument is clearly a screen for his idea that pilots should be specialists and his claim that those who specialize in fighters are simply better — in terms of skill but also in terms of pure personality and spirit. His argument also emphasizes the degree to which fighter pilots identified with their role and created a separate community for themselves that casts bombers, transport pilots, and any non-fighter pilots as an "other" that does not understand reality as they see it. This fighter community conceived of itself as an oppressed minority that Air Force leaders did not understand and appreciate. Gailer is quick to tell anecdotes describing this relationship, such as an unnamed Major General whom he criticizes for not knowing the ranges of the F-4 and F-

¹²⁷ Gailer CA Int., 74.

¹²⁸ Gailer CA Int., 9-11.

100 fighters. To Gailer, this was evidence that “[t]he knowledge of the senior people of the problems of the fighter forces is almost nonexistent.” Regarding SAC, he said: “They have been too high on the hog for too long.”¹²⁹

Summarizing these issues, Gailer said:

[The Universal Pilot is] a rich man’s play toy. It’s a fantasy. It’s foolish. . . . The air-to-air and air-to-ground roles are absolutely different. They just are. . . . There isn’t all that much to [ground attack]. . . . He [the fighter pilot] is there to get up there in one hell of a hurry and get that guy and knock him down and get his ass on the ground and get right back up again. . . . A guy that goes into the fighter business ought to be a specialist in it because what he does he does by himself. . . . You need young blood, and the fighter force, of all of them, requires the youngest input because—it’s like a football player.

Comparing fighters to bomber and transport planes, he argued: “They are just a different breed of cat. A banker is just not the same kind of a guy as Evil Kenievel.”¹³⁰

Gailer summed up the fighter pilot’s sense of inherent superiority: “You can teach anybody to fly.... You can’t teach everybody to be a fighter pilot.”¹³¹ Gailer’s idea of the fighter pilot set him apart from and above the bomber pilot – even to the point of assuming that bomber pilots were envious of fighters. But he also expressed this in terms approaching the mythological. His point of reference was not medieval knights or mythological heroes but their American likenesses: cowboys. For Gailer, the promise of America’s “Manifest Destiny” — the nationalistic spread of American values and hegemony across the American continent — found its ultimate expression in fighter pilots. As he observed:

The fighter pilot probably has the best of it. I think most bomber pilots envy the fighter pilot because of his basic freedom. He doesn’t have the same kind of responsibilities. He has more laid on him in personal requirements to be able to do something because he doesn’t have as many people to help him. I think bomber pilots, from my experience with them, kind of look up to the fighter pilot. They like him. He is kind of like the cowboy.

¹²⁹ Gailer CA Int., 12, 14.

¹³⁰ Gailer CA Int., 13-17.

¹³¹ Gailer CA Int., 34.

He is manifest destiny. He is the pony rider going across the country delivering the mail. He is that kind of a guy. He has to think that way. His personality may not express it. I think that's the hardest thing to identify if you are selecting a guy. How do you ever find this bit of aggressiveness, this competitiveness? It is a competitive edge, especially the fighter pilots, because it's more easily identified in the fighter business where you fly with other guys. They know how you fly.¹³²

Gailer did qualify his statements, saying that one's reaction to combat was unpredictable and trying to identify which pilots would become aces might be impossible. Yet argued that eagerness and identification with the fighter community were key traits. He said: "As generalizations, I think desire. Esprit is a big thing that creates aggressiveness in itself. The rules, the heritage, the tradition, all of these things that make a man feel a part of something that makes him not want to fail in the eyes of his peers." Gailer also indicated that patriotism played a key role in fostering that eagerness for combat. Gailer suggested that these attitudes could be cultivated in recruits, to some extent, through rote repetition of nationalistic messages.¹³³ In Gailer's opinion, instilling nationalistic spirit was more important than education. "Educate him [potential fighter pilot] later on. Get him while he is still a little bit more naive perhaps, more willing to rah rah the flag and do all the things that play soldier that are a part of it."¹³⁴ For Gailer, education is an impediment to success as a fighter pilot, and should be discouraged. He argues, "I get the feeling most of them [famous aces]. . . are not an educated group either. . . . I am wondering if you become a little too sophisticated and a little too book learned at too early an age. Maybe you lose some of that."¹³⁵

¹³² Gailer CA Int., 17.

¹³³ Gailer CA Int., 22.

¹³⁴ Gailer CA Int., 48.

¹³⁵ Gailer CA Int., 74.

The person conducting Gailer’s oral history interview, Lt. Col. John N. Dick, Jr., made similar assumptions and reinforced these stereotypes. Clearly, he believed in the myth of the “knights of the air” and encouraged Gailer to continue in that line of thinking. Both Dick and Gailer equated successful aces with American nationalism and based this on the implicit assumption that other countries were doing the same. They linked this concept to an imagined past, specifically the U.S. in the 1940s. Gailer argued that this sense of hero-worship for fighter pilots was a universal norm and that America should embrace it as other cultures had and as America had once done as well. This nostalgic thinking was not limited to the older generation to which Gailer belonged. The younger Dick opened this line of discussion with Gailer not by asking questions but by making statements. For example, he said: “The Israeli culture and society is much like ours was in the 1940s. Their heroes are the fighter pilots who are the defenders of the country.” Gailer responded: “You name the country. Germany. You talk Luftwaffe, what are you talking about? Historically you are talking about the fighter pilots. You talk about Britain and their heroes, they are all fighter pilots. The Battle of Britain wasn’t fought by bombers or anything like that. You name it, the Russian—hell the Russians’ whole role up till recently has been fighter forces support for the ground forces, period.”¹³⁶

Gailer here ignores other elements that make up a successful military beyond the role of fighter pilots, such as geography, coastal defense, radar, ground personnel, political will, economic aid from allies, and a nation’s capabilities, among other factors. Moreover, Dick and Gailer both connected patriotism, nostalgia, and the image of the fighter pilot in ways that showed both the fighter pilots of the World War II generation and those of the Vietnam and post-Vietnam generation still committed to the myth of the “knights of the air.”

¹³⁶ Gailer CA Int., 43-44.

One of the most influential pilots of the Korean War, partly for his kill count but even more for his tactical manual *No Guts, No Glory*, was Frederick “Boots” Blesse. Although he did not fly combat missions until Korea, he could be considered a member of the World War II generation. He had repeatedly applied to West Point in the early years leading up to American involvement in that war before finally being accepted in the summer of 1942. He was heavily influenced by stories of previous aces and fictional heroic fighter pilots. He recalled: “I grew up reading *G-8 and His Battle Aces* and *Tailspin Tommy* in the funny papers, dreaming of the fighter pilot’s life. ‘Captain Eddie’ [Rickenbacker] was my hero, now joined by World War II aces like Gabreski, Mahurin, Bong, McGuire, Thyng, and others. The picture was always in the back on my mind—fighter pilots diving, climbing, turning, finally destroying the enemy aircraft; bringing honor and glory to themselves and their country.”¹³⁷

Other World War II aces showed a fascination, even a reverence, for their heroes from the previous war. One of the pilots Blesse mentioned, Walker Mahurin, also counted Rickenbaker as a personal hero. Ace pilot Robin Olds, who would go on to further fame in the Vietnam War, recalled being a child and meeting Rickenbacker in person but was “too awed to say anything.”¹³⁸

One of the most celebrated fighter pilots both in the service and in popular culture is Chuck Yeager. Famous for breaking the sound barrier as a test pilot in 1947, he first earned fame as a fighter pilot in the Second World War. In many ways, he is one of the most pristine examples of the knights of the air myth. Even training missions filled him with excitement. As he observed: “You’re whipping through a desert canyon at three hundred miles an hour... your hand

¹³⁷ Quoted in Fino, *Tiger Check*, 18.

¹³⁸ Robin Olds, *Fighter Pilot: The Memoirs of Legendary Ace Robin Olds* (New York: St. Martin’s Press, 2010), 6.

on the throttle of a P-39 fighter... The joy of flying—the sense of speed and exhilaration twenty feet above the deck—makes you so damned happy that you want to shout for joy. . . . You feel so lucky, so blessed to be a fighter pilot.”¹³⁹

Yeager embodied the idea of eagerness for combat, the individuality, the hypermasculinity, the role of individual personalities, the connection between man and machine, the sense of gentlemanly duels, and ultimately the romance of air-to-air combat. Describing encountering 150 Luftwaffe fighters, he recalled,

We couldn't believe our luck... We began to dogfight, happy as clams.... That day was a fighter pilot's dream. In the midst of a wild sky, I knew the dogfighting was what I was born to do. It's almost impossible to explain the feeling: it's as if you were one with that [P-51] Mustang, an extension of that damned throttle. You flew that thing on a fine, feathered edge, knowing that the pilot who won had the better feel for his airplane and the skill to get the most out of it. You were so wired into that airplane that you flew it to the limit of its specs, where firing your guns could cause a stall. You felt that engine in your bones, felt it nibbling toward a stall, throttle wide open, getting maximum maneuvering performance. . . . Maximum power, lift, and maneuverability were achieved mostly by instinctive flying: you knew your horse. . . . Up there, dogfighting, you connected with yourself. That small, cramped cockpit was exactly where you belonged. . . . With experience, you knew before a kill when you were going to score. . . . When he [the enemy pilot] blew up, it was a pleasing, beautiful sight. There was no joy in killing someone, but real satisfaction when you outflew a guy and destroyed his machine. That was the contest: human skill and machine performance. . . . The excitement of those dogfights never diminished. For me, combat remains the ultimate flying experience.¹⁴⁰

Yeager's closest friend, Clarence "Bud" Anderson, expressed similar sentiments, both about Yeager and himself. "Flying Mustangs in World War II was the top of the mountain for Chuck, and for me as well," he recalled. "If you're a military pilot, that's why you're there—to fight and fly." Describing Yeager's personality, Anderson said: "He was aggressive and competitive, but awfully skillful too. . . . When Yeager attacked, he was ferocious. . . . Yeager

¹³⁹ Chuck Yeager, and Leo Janos, *Yeager, an Autobiography* (Toronto: Bantam Books, 1986), 15.

¹⁴⁰ Yeager, *Autobiography*, 83-85.

was the best. Period. No one matched his skill or courage or, I might add, his capacity to raise hell and have fun.” He recalled that their friendship began because they were each

the two best pilots in the squadron, especially the two who were the most aggressive in combat and who had the keenest pairs of eyes. . . . You have to see the enemy to get them, or to want to get them. We’d see them coming from fifty miles away—the dimmest specks—minutes before anyone else. . . . Neither of us were war-lovers, but we loved to dogfight. We didn’t mind killing German pilots, but we didn’t relish it, either. The thrill was in shooting down his airplane. Combat was the high point of both our lives. Chuck made his mark on history breaking the sound barrier. But deep down I think his combat experiences and accomplishments in World War II meant more to him.¹⁴¹

Clearly the idea of aggressiveness, lust for combat, individuality, a sense of community with other pilots, a close connection to specific fighter technologies—all these elements were still very much alive in this generation of fighter pilots. Yeager’s emphasis on eyesight adds an important wrinkle to the element of technology. Later, when radar technologies threatened to replace (or improve upon) eyesight as a limiting factor in detecting enemy aircraft, those who clung to the fighter myth held to Yeager’s idea that eyesight was a critical component, rejecting large radars and emphasizing the role of the man—the individual combat pilot—as more important than machine.

Another characteristic that sets some of the pilots apart is their insistence that they are not war-mongers. Yeager, Anderson, and other air-to-air pilots did not see the killing of enemy pilots as a show of lust for unbridled violence—they emphasized that their goal was to kill the enemy machine, not the man. Thus, they attempted to maintain the veneer of civility – of gentlemanly duels that adhered to civilized norms – rather than a face of indiscriminate violence and bloodlust. They saw air combat as a test of skill, a contest in manliness, not in the same category as the brutal grim violence of ground warfare.

¹⁴¹ Quoted in Yeager, *Autobiography*, 53-54.

General Frank Everest was blunt in telling how fighter pilots of the World War II generation saw themselves. Everest served in various command positions throughout World War II and the Korean War, and he also served as commander of Tactical Air Command. He expressed a strong sense that fighter pilots were inherently superior to bomber pilots because of the judgment of individual single pilots. As he argued,

You have got to realize that a fighter pilot, a single man, with a multi-million dollar vehicle between his legs, has got to exercise judgment, a hell of a lot of it, because there isn't anybody there to tap him on the shoulder and say, "Son, I think you better turn right instead of left." I once had an argument with LeMay about the ability of SAC crews against TAC crews. I said, "I am not going to argue with you, but come down to Myrtle Beach sometime and stand there and watch young, 22 year-old kids take off with a ring of thunderstorms surrounding them with two over-the-sea refueling contacts to make and the first landing at some airbase in France. One man to do all of the instrument work, all of the refueling. Christ, you have a crew of eight to do the same job! Now tell me which is the better pilot..." There are different kinds of folks, you know. You get around Nellis around those young fighter pilots – they are just vibrant, smart people. They can do anything.¹⁴²

The sense of camaraderie among chivalrous pilots was not lost on the World War II generation. Colonel David Lee "Tex" Hill described the fact that much time in his later years was spent reuniting with other pilots that were his wartime enemies. Speaking not only to the sense of chivalry but the power of nostalgia as well, he noted that the former enemy pilots now "relive life" and "relive battles from maneuver to maneuver."¹⁴³

Hill described the fighter pilots of World War II as just as thirsty for battle as those of the previous generation. He said that having "six or seven combats in one day" against "as many as a

¹⁴² General Frank F. Everest, Oral History Interview, August 23-25, 1977, USAF Historical Research Agency, K239.0512-957, 364-365.

¹⁴³ Col. David Lee "Tex" Hill, Corona Ace Interview, January 20, 1977, USAF Historical Research Agency, K239.0512-1063 [hereafter cited as Hill CA Int.], 13.

hundred [enemy] fighters” was “just a fighter-pilot’s dream.”¹⁴⁴ He argued that the dangers of combat were a source of enjoyment for the true fighter pilot. Describing the harrowing dogfights in the Pacific, he said, “We only lost four pilots in aerial combat. Two of these were mid-air collisions with Japs. They began to dogfight with us and there were so many planes in the air that the chance of collision was pretty good. In those early days, it was really beautiful. We lost another eleven from ground fire.”¹⁴⁵ Describing a bombing raid against a Japanese airfield, Hill said: “I have pictures where you can see 37 airplanes burning in one frame. Boy! It was beautiful.”¹⁴⁶ His juxtaposition of death and destruction (of both his allies and enemies) with descriptions of beauty marks the degree to which he valued eagerness for combat. Hill takes this to such an extreme that he appears almost callous to the dangers and even the deaths of those around him.

Men who were not eager for battle were not identified as “true” fighter pilots in the eyes of other fliers such as Hill. He argued: “The real fighter pilots, who are good at anything, will try to think of ways to get there [into combat] instead of ways to not get there.”¹⁴⁷ Hill disparaged pilots who did not thrill at the thought of a fight. He questioned the masculinity of such pilots, calling them “weak sisters,” because, even though they were “damn highly-qualified guys, they would get actively sick at the very thought of combat.”¹⁴⁸ Yet, the threat of death could also make someone aggressive. Hill equates eagerness with effectiveness, but argues that danger, too, can be the catalyst for discovering that effectiveness, even if someone does not outwardly

¹⁴⁴ Hill CA Int., 28.

¹⁴⁵ Hill CA Int., 39.

¹⁴⁶ Hill CA Int., 53.

¹⁴⁷ Hill CA Int., 190.

¹⁴⁸ Hill CA Int., 54.

display the needed aggressive masculinity. “When you start facing death. . . . People who you would never suspect—some little guy who you think would be no good would become the tiger.”¹⁴⁹

This aggressiveness and eagerness were, for Hill, certainly tied to patriotism, allowing him to dehumanize his enemy to a large degree. When asked what his personal objective was when flying any given mission, Hill replied: “My objective was to get out there and kill as many Japanese as I could. . . . Because I knew that at the end of the line that when this was all over, we needed it for survival. We heard the stories and the propaganda about the Japs and what they were doing. They were our enemy, and I wanted to eliminate them.” He argued that this drive was “strictly patriotic. I don’t ever recall thinking of a Japanese as an individual who I wanted to kill. He was just a target.” Shooting down an enemy plane for Hill was not like shooting a person, it was “like a target. . . . Very exciting.”¹⁵⁰

Aggressiveness was the key for Hill, yet it was impossible to tell beforehand who would exhibit that trait in war. When he was asked for methods of identifying future aces, he argued, “They are all very aggressive. Usually anything they get into, they go whole hog. . . . I don’t know how you could tell much about one through an interview. You would have to see them in action or in a training program or something to see how he conducts himself. Maybe figure out something that would require people to do above and beyond on a volunteer basis or leave it open where he could do more if he wanted to.”¹⁵¹

¹⁴⁹ Hill CA Int., 55.

¹⁵⁰ Hill CA Int., 93-94.

¹⁵¹ Hill CA Int., 58.

Connected to this idea of aggressiveness were competitiveness and community, which Hill also emphasized as key for ace pilots. He claimed that there is no such thing as a noncompetitive fighter pilot. “I think you could develop better fighter pilots if guys were able to get some kind of competitive spirit going among the units,” he said. “This is really a key factor because they begin to take a lot of pride in their outfit. . . . When people become competitive, your esprit de corps really goes up.”¹⁵² This sense of community was centered on the fighter pilots differentiating themselves from other fliers. Hill emphasized that in World War II “nobody” wanted to fly air-to-ground missions; instead they longed for air-to-air combat in the vein of the “knights of the air” stereotype.¹⁵³ This sense of community, according to Hill, “is one of the biggest factors” in creating successful fighter pilots. But he quickly emphasized that a sense of esprit de corps and community should not override a pilot’s sense of individuality. Hill recalled that, when General William Momyer – himself a former fighter pilot – took command of the Seventh Air Force in 1966, he insisted on a strict uniform and forbade pilots from wearing distinctive items to express their distinctiveness. Hill argued that “it had a hell of a morale factor on them” in a negative way, reducing effectiveness.¹⁵⁴

Other pilots of this generation, even if they generally agreed with Hill, have emphasized that luck played an important role in determining an ace as well. Perhaps in a display of stereotypical brashness, Hill argued that luck did play a factor – but not for his own kills. He insisted that his own victories were due to his eagerness and skill, enabling him to maneuver into place so he found more combat action than others—at the same time, he allowed that for others it

¹⁵² Hill CA Int., 59.

¹⁵³ Hill CA Int., 174.

¹⁵⁴ Hill CA Int., 107.

was just a matter of chance.¹⁵⁵ The assumptions he made typify what many fighter pilots thought about themselves and their peers. They assumed that their success resulted from their own independent skill. Even more, they assumed that they had a decisive role in bringing victory in any given war and that they played the most important role in the entire Air Force.

Wearing Your Plane Like a Glove

In addition to independence and aggressiveness, the World War II generation also exhibited the same emphasis on technology—but only the particular technologies that enhanced air-to-air combat roles. They even disparaged technologies that did not contribute to air combat. Tied to this focus on particular types of hardware was the insistence that man was more important than machine. If the aircraft were made too complex, then it would take something away from the pilot and somehow make the experience of flying the fighter aircraft less pure and even less effective.

For many airmen, their decision to become pilots resulted simply from fascination with and enthusiasm for the fighter aircraft themselves. Major General John Alison, a World War II ace fighter pilot, noted that his enchantment with fighter planes was what had drawn him to flying. Describing a boyhood encounter with a Curtiss P-1 Hawk, he said: “When it [the P-1] went into a dive, the propeller revved up and that exhaust just made a beautiful sound. He [a pilot who lived in town] buzzed the city. I never will forget that. In high school I was sitting in study hall. I heard that sound. I never saw the airplane. I said, ‘This is what I want to do.’”¹⁵⁶

General Gailer’s attitude toward technology not only reflected his conception of the individual pilot as superior—as evidenced in his argument that aircraft should be simplistic

¹⁵⁵ Hill CA Int., 60.

¹⁵⁶ Alison CA Int., 3.

machines—but he extended this argument to all of American society. Showing a concern for historical precedent (even while making obvious errors in invoking it), he claimed that true fighter pilots

don't need all that sophisticated an airplane.... I think we try to make the state of the art much too complicated, and war just is not all that complicated. When you go back to Jackson, what did he say? 'He that gets there the 'fustest' with the mostest is the guy that is going to win.' That means it has got to be simple and easy to use. We have lost the simplistic approach, which used to be one of the great strengths of this society. Good, simple, effective equipment and great pride in it, and he will do the rest.¹⁵⁷

This argument reflects the degree to which nostalgia for an imagined past had an influence on the fighter community. It is both ironic and pertinent that Gailer had his facts wrong. He seems to have thought that the saying he used had come from General Andrew Jackson. It actually came from Nathan Bedford Forrest at the time of the American Civil War. Moreover, Andrew Jackson's approach to warfare in the early nineteenth century was by no means the most appropriate doctrine for designing fighter aircraft in the second half of the twentieth century. Gailer not only missed the true origin of the saying he quoted – he missed the likelihood that it was a misquotation, too. Nor was it obvious that one wanted Forrest – not only a rebel general but also an early leader of the Ku Klux Klan – as the air service's inspiration. Secondly, this argument ignores that the fighter planes of the previous wars—although they might seem simple compared to modern jet fighters—were still complicated, carefully engineered state-of-the-art machines for their time. Perhaps at the time of this interview in the mid-1970s, Gailer found the fourth generation of fighter aircraft more “complicated” than the planes he was used to flying in World War II, but new recruits just learning to fly an F-15 do not have a point of personal comparison to previous generations of planes. Furthermore, Gailer's

¹⁵⁷ Gailer CA Int., 42.

desire for “simple” equipment ran parallel to his ideas about what was happening to the nation as a whole. He imagined an idealized past America that had been built on “simple” equipment, and he felt nostalgic for it. Perhaps the frustrations of Vietnam and other issues in the mid 1970’s were weighing on him at the time he made these statements, prompting him to see the past through rose-colored glasses. He may have longed for a time that seemed simple to him now, even though it would be folly to describe World War II and the fighter aircraft of that period as “simple” in any absolute sense. This attitude, of assuming that one’s past and the aircraft one flew in the past are inherently better because they are “simpler” is one that elements of the fighter community later embraced to an extreme degree.

Just as he thought fighter pilots should be specialized, so did Gailer expect that the fighter planes purchased by the military should be specialized as well. He argued: “You are not going to have an elite fighter-pilot type group unless you are going to buy an awful lot of one kind of an airplane. Let’s say it’s the F-15.” Pilots of this specialized plane should have an intimate connection with it. Dick, the questioner, suggested a comparison to clothing, saying a key factor for a good pilot is “knowing your airplane and putting it on like a coat—” Gailer interrupted to complete the thought, saying “Or a glove.” Gailer went on to suggest a gender-based connection between individual pilots and their specific airplanes. He said of the aircraft that “they are all different, just like women, just as ornery.”¹⁵⁸ There is a sexual connection as well as objectification implicit in the associating aircraft with women, especially with the pilot placing the vehicle, as General Everest described it, “between his legs,” guided by a phallic “joystick.” The clear implication is that flying a fighter plane was a hypermasculine act.

¹⁵⁸ Gailer CA Int., 54-56.

A Problem with Authority

For pilots in training during World War II, such as Alison, flying exciting acrobatic maneuvers was the true draw of flying in the first place. But flying that way sometimes required disobeying orders, or working against safety rules. As Alison recalled the training he had 1937, many pilots viewed their commanders as a hurdle to overcome in achieving their dream of exciting flight. “Penalties were pretty severe if you were caught doing acrobatics in the airplane. So I practiced my acrobatics at night. Then I wouldn’t get caught.”¹⁵⁹

In the years of a bomber-dominated air force, community and solidarity among fighter pilots became important. Alison noted the exclusive nature of the fighter community and explained that leadership figures needed to prove themselves as fighter pilots and to show that they could lead from the front, much like their World War I counterparts.¹⁶⁰

Gailer also expressed the fact that leadership figures in the World War II era did not understand the needs of fighter pilots, and by extension, those leaders did not understand the Air Force in general. Gailer argued that people who had never flown fighter planes should not be able to make decisions that affect the fighter force. In recalling an argument he witnessed years later between General Daniel James, Jr. against Pentagon officials who wanted to block the addition of “little black box” flight recorders in fighter planes, Gailer quoted James as saying: “Well I have had my black ass up in that black night boring holes in that black sky, and I am telling you that we need it. If you haven’t done it, you don’t appreciate the need.”¹⁶¹

¹⁵⁹ Alison CA Int., 11.

¹⁶⁰ Alison CA Int., 43.

¹⁶¹ Gailer CA Int., 20.

Gailer repeated the idea that fighter pilots did not respect leaders who had not proved themselves to be worthy fighter pilots. He said that a fighter pilot was unwilling to show deference to someone unless “they can fly his ass off.” He argued that leaders must be fighter pilots first, otherwise, “How does he know what they ought to be able to do? He has never been in the airplane. It’s wrong, basically wrong.” Gailer named General William Momyer as a positive example: “Here was a guy that flew the airplane; he was an ace himself. He was a fighter pilot’s fighter pilot, and they looked up to him.”¹⁶²

For Gailer and some other fighter pilots, higher rank was inherently poisonous, and leaders should always be questioned. He observed: “Well, the wing commanders are big stuff guys. They have gotten up there, and they have begun to believe their own reviews. That’s the problem with senior rank, people begin to believe they are all that everybody tells them they are. It’s bad. Once they begin to believe it, they are no longer of any use to anybody. They have lost their effectiveness. The higher they go or the more responsible the job, it’s a very common disease.”¹⁶³

Media and popular culture artifacts related to air power often had a powerful effect in shaping how pilots conceived of themselves and their role within the Air Force. Gailer explained the reasons he wanted to become a pilot in the first place. He said: “The movies probably had as much of an initial impression as anything. . . . I always wanted to be a fighter pilot. . . . Most of my classmates wanted to be fighter pilots, not because we knew anything about it, but just because from movies and things like that, it seemed to be the thing to do or want to do.”¹⁶⁴

¹⁶² Gailer CA Int., 24-26.

¹⁶³ Gailer CA Int., 31.

¹⁶⁴ Gailer CA Int., 1-2.

Hill also pointed to the powerful effects film could have in creating and maintaining the fighter pilot stereotypes. Hill was critical of the accuracy of most aviation films, noting that “*12 o’clock High* is the only one that even came close. It was a good flying show.” Each of his three interviewers, all significantly younger than Hill, emphasized the role that *Twelve O’Clock High* played in their lives even in the 1970s. One noted, “They used it in Military Academy Leadership.” Another added, “They used it for all the Air Force.” The third questioner went so far as to say: “I’ve seen it a hundred times and every time it comes on, I stay up and watch it again.”¹⁶⁵

Pilots such as Hill, Gailer, Alison, and Chennault all to some degree self-selected into fighter roles. They assumed that their personality traits, specifically ones that aligned with the “knights of the air” myth, allowed them to be especially well suited to air combat roles. However, the Army Air Corps also went out of its way to screen recruits, and it shuffled potential pilots that exhibited these traits into fighter roles. Determining whether fighter pilots of this generation displayed these traits because the leaders divided them up that way to being with or because they self-selected for the role is comparable to the chicken-and-egg problem.

While many pilots tended to self-differentiate and choose fighters over bombers or other types of flying due to their own preferences, the air arm at various times preemptively screened pilots for traits that matched the stereotypical knights of the air. In the years before and during World War II, for example, the Army Air Service relied on psychologists to construct tests that could discriminate between ideal bomber pilot and fighter pilot candidates. As former Air Force officer and historian Mike Worden described: “Bomber pilots needed to be more deliberate and orderly in their thinking, with slower, but dependable decisions and actions. Also, they were

¹⁶⁵ Hill CA Int., 157.

expected to be more mature team players. On the other hand, the air arm wanted fighter pilots to show more alertness, respond quicker, and display higher motivation and controlled aggressiveness than other single-engine and multiengine pilots.” Although the tests were never perfected, even without them, flying instructors tended to make their assignments based on instinctual judgement of these traits. General Henry “Hap” Arnold insisted that fighter pilots be “individualists... with quick agility and facility.” The single-engine aircraft schools emphasized similar traits, stressing “the handling of maneuverable, speedy training planes and the development of instantaneous control reactions in students.”¹⁶⁶

Psychologists working with the air service studied the differences between bomber and fighter pilots by observing them during the Second World War. According to Worden, they noted the inculcation of many of the traits associated with the knights of the air myth. He added, while quoting one of the psychologists, that “the [fighter] squadron had its own value system... ‘[It’s] status system pervades everything [a pilot] does, as there is no way to get away from it.’ . . . Fighter pilots were cliquish combat elites, self-reliant and aggressive, who valued technical knowledge over education. . . . They [the fighter pilots] took pride in being men of action and of decision.”¹⁶⁷ The “knights of the air” myth thus became a self-reinforcing feedback loop. Incoming pilots were told that to be an effective fighter pilot, they needed to have certain traits. Those who had these traits were both selected for the fighter role by the Air Force and self-selected to attempt to be placed into that role. All of this perpetuated the stereotype and ingrained them even more in an official and systemic way, as well as unofficially through the sharing of cultural values.

¹⁶⁶ Worden, *Rise of the Fighter Generals*, 7.

¹⁶⁷ Worden, *Rise of the Fighter Generals*, 13.

Conclusion

The attitudes, beliefs, and culture of the knights of the air that were originally formed in the First World War carried over into the second. By the time the United States entered the war, however, the air arm had organized itself and its culture around the doctrine of strategic bombing. Although the organization that would become the US Air Force based its identity around large bombers with multi-person crews going on strategic missions against enemy industrial targets, the fighter community nonetheless endured. Centered primarily around air-to-air combat, the fighter pilots formed a subculture that continued to lionize the knights of the air mythology and the beliefs associated with it: aggressiveness, independence, disdain for authority figures, a focus on specific technologies that aided their air-to-air role, and heroic imagery. Their sense of community and camaraderie grew across a scale ranging from being a protective fellowship to having a persecution complex. The fighter community saw themselves as an unappreciated, misunderstood subculture of outcasts that had little voice in directing of the air service as a whole. To some degree, this was true, and in the early years of the Cold War the Air Force's emphasis on strategic bombing became even more pronounced, pushing the fighter community into even smaller corners. This dynamic between bomber and fighter advocates continued to shape the myth of the knights of air as the fighter community attempted to assert itself in the conflicts in Korea and Vietnam.

Chapter 4 - “I Was Snoopy in My Dreams”: Fighter Pilots in Korea and Vietnam

Technology advanced quickly during the early Cold War. The Korean War saw the first large-scale use of jet aircraft, and, just a few years later in Vietnam, the battlefield had become a dizzying maze of electronic warfare in which engineers played a cat-and-mouse game of developing electronic countermeasures and counter-countermeasures for advanced weapons technology.

Despite this technological advancement, the general culture among the fighter pilot community did not change. The emphasis on the “knights of the air” mentality remained strong. Fighter pilots still celebrated aggressiveness, independence, disdain for authority, and heroic imagery. They still complained loudly about new technologies that seemed to diminish the role of men in relation to the machine—however, they actively sought advanced technologies if they enhanced their ability to perform air-to-air combat roles.

The dominance of bomber theorists in the Air Force reinforced the concept of the fighter community as a small, misunderstood, under-appreciated minority in the service, and fighter pilots fought against their perceived oppression in more overt ways. They were frustrated that the emphasis on bombing had seemed to produce a generation of aircraft that were “fighter planes” in name only and were not properly suited for that role. They began to demand technology that focused on agility and maneuverability instead of what had become the usual focus – namely, top speed to help in intercepting enemy bombers. They showed disdain for guided missiles, especially those designed to be fired from medium or long ranges, since these did not fit the mold of close-turning, gentlemanly dogfights of the knights of the air. In the era of bomber dominance, fighters struggled to create a place for themselves and shape the Air Force according

to their own beliefs. This was difficult in the early Cold War when the military deemed the nuclear mission the most important. But by the late 1960s, a shift in favor of the fighter community was underway.

SAC as Superior

The dominance of bomber doctrine in the Air Force since the interwar period did not mean there was not a place for fighters at all, but the precise nature of what those fighters were supposed to do had changed. The emphasis on dogfighting had, by the early years of the Cold War, been overtaken by a focus on interception. According to early strategic bombing doctrine, theorists and planners held to their prevailing faith that “the bomber would always get through” despite the intensity of defenses against it. But, for bombers to be able to operate effectively and minimize losses, they needed open skies, free of enemy fighters intending to shoot them down. Thus was born the concept of “air superiority.” Fighter planes were to clear the air of enemy forces, freeing the bombers to do the real work of air power.

This doctrine seemed logical until the late 1940s. Atomic bombs delivered by a single aircraft brought a quantity of destruction equivalent to 1,500 conventional bombers. The cataclysmic potential of atomic weapons led some planners to believe that the promises of air power theory to obviate conventional war might finally become reality. The Air Force especially seized upon this view. In 1952, the Air Force service journal *Air University Quarterly Review* clearly expressed the expectation that, in the event of an outbreak of war, atomic retaliation must be instant. This went far toward making the intercontinental jet bomber the most important

weapon in the atomic era. Air war planners believed this ability to deliver atomic weapons was the sole determinant in winning a future war.¹⁶⁸

The Air Force achieved independence in the years after World War II, its identity tied to the delivery of a growing number of nuclear bombs. The Strategic Air Command (SAC), the largest of three separate command elements in the air service, was created for this exact purpose on March 21, 1946, a year and a half before the Air Force was officially founded. SAC consisted of a large force of land-based, long-range bombers which, under the leadership of General Curtis LeMay, dominated the Air Force. Under President Dwight D. Eisenhower's "New Look" defense policy, the Air Force, led by SAC, was to provide delivery of atomic bombs to protect the US's allies. In the hypothetical case of a feared next war with the Soviet Union, SAC intended to "replay" an idealized version of the ending of World War II, lobbing nuclear bombs on the Soviet Union's vital centers before it could retaliate.¹⁶⁹

However, most planners hoped that SAC would simply act as a strategic deterrent, preventing war through the threat of massive retaliation. Thus, conceptual links developed, directly connecting SAC's size and reach to the prevention of World War III. For decision-makers in Washington concerned with defense spending, using SAC's power as a threat was also the most cost-effective defense plan for the U.S.¹⁷⁰ The doctrine of massive retaliation and all its assumptions took on almost religious overtones. As historian Caroline Ziemke stated: "Strategic bombing, independent of surface campaigns, was the one mission that air power alone could

¹⁶⁸ "Jet Strategic Bombardment," *Air University Review Quarterly*, v. 5, Spring 1952, 19

¹⁶⁹ Earl H. Tilford, *Crosswinds: The Air Force's Setup in Vietnam* (College Station: Texas A&M University Press, 1993), 20-22.

¹⁷⁰ Craig C. Hannah, *Striving for Air Superiority* (College Station: Texas A&M University Press, 2002), 28.

fulfill, and it was to be the foundation of the Air Force's identity... its advocates took on all the zeal, inflexibility, and myopia of the 'true believer.'"¹⁷¹

SAC completely dominated the Air Force. All other aspects of air power bent to the needs and nature of the strategic bombing mission. Tactical air concerns, such as air superiority, supply interdiction, and ground support (Close Air Support, or CAS), declined in importance, and they were viewed either as irrelevant, or as missions which could be easily accomplished by SAC as a matter of course. The line between tactical and strategic missions blurred. Air superiority, the realm of fighter planes, diminished, becoming perceived as almost worthless.¹⁷² The Air Force did not escape criticism for this approach. For example, in 1949, the Vinson committee conducted hearings when the Navy bristled at cancellation of its advanced aircraft carrier and the implied deference to the Air Force that the cancellation implied. But some Air Force commanders also saw problems, albeit different ones. There were deficiencies in strategic bombing doctrine. Some commanders noted that air superiority purchased by high performance fighters was still a necessary component of sound strategy. Yet as Ziemke noted, "less than six percent of Air Force research and development resources went into tactical and fighter aviation."¹⁷³ The Air Force clung to its doctrine and did not heed such criticism. SAC's budget continued to grow not only at the expense of the Army and the Navy, but also that of other

¹⁷¹ Caroline F. Ziemke, "In the Shadow of the Giant: USAF Tactical Air Command in the Era of Strategic Bombing, 1945-1955" (PhD diss., Ohio State University, 1989), 7.

¹⁷² Tilford, *Crosswinds*, 8-9.

¹⁷³ Ziemke, "Shadow of the Giant," 99-100.

specialized subdivisions within the Air Force. As a result, several tactical fighter wings (TFWs) disappeared in the late 1950s.¹⁷⁴

Secondary air missions of interdiction, ground support, and air superiority had been made the responsibility of a separate Air Force command: Tactical Air Command (TAC), which competed with SAC for funding. Air Force leaders regarded TAC – and the entire concept of fighter escorts to establish air superiority – as out of date, irrelevant, and, as Ziemke termed it, “a functional and organizational anachronism.” TAC and the air superiority mission were in an existential battle for their survival.¹⁷⁵ In order to justify itself and earn precious funding, TAC attempted to overlap with SAC's mission by focusing on two main roles: delivery of nuclear weapons using tactical aircraft, and the interception of enemy nuclear bombers. As one historian has noted, in an attempt to keep itself alive, “TAC had become 'SACercized' as its traditional . . . mission gradually gave way to its role as part of USAF's massive retaliatory capability.”¹⁷⁶ Essentially, TAC abandoned its traditional role of air superiority, once deemed necessary to set the stage for bombers but now regarded as irrelevant to a hypothetical next war.¹⁷⁷

Dogfighting Reborn: Korea

While the Air Force was still adjusting to these changes and going through these debates, the service was forced to deal with unexpected crises. The first major test of the new Air Force was the Berlin Airlift, which demonstrated the ability of the Air Force to achieve a variety of missions, including humanitarian ones. Yet that crisis did not directly challenge bombing

¹⁷⁴ Mark Clodfelter, *The Limits of Airpower: The American Bombing of North Vietnam* (New York: The Free Press, 1989), 28.

¹⁷⁵ Ziemke, “Shadow of the Giant,” 10, 76-8, 114.

¹⁷⁶ Ziemke, “Shadow of the Giant,” 249-50.

¹⁷⁷ Hannah, *Striving for Air Superiority*, 30, 22.

doctrine, focus on the tensions between bomber and fighter advocates, or spark debate over the changing nature of the air superiority mission. The crisis that did all of those things began in Summer of 1950 when North Korea invaded South Korea in an attempt to unite the peninsula under Kim Il-sung.

The Korean War (1950-1953) gave the Air Force a chance to test its doctrine. However, the strategic bombing mission rested on the assumption that the target nation was a modern, industrialized country with vulnerable vital centers. This was the case when U.S. bombers had attacked Germany and Japan and made plans for attacks on the Soviet Union. North Korea was not nearly as developed. Thus, SAC found itself limited by the lack of appropriate targets. With a paucity of factories and little infrastructure to destroy, the strategic mission gave way to CAS and supply interdiction.¹⁷⁸

After the coalition of United Nations forces led by the United States broke out of the Pusan Perimeter, aided largely by General Douglas MacArthur's amphibious assault at Inchon in October 1950, a new aircraft appeared in the skies to harass coalition bombing efforts: the MiG-15. This Soviet fighter could easily out-perform any of the aircraft currently in the coalition's inventory. Realizing the threat this posed to the air campaign and yet unable to bomb MiG-15 bases because they were located in China, the United States took swift action. The Air Force was in the last stages of testing a new air-to-air fighter that had been in development for over a decade: the F-86 Sabre. The first of these began flying over Korea on December 17, 1950. The American F-86 Sabres became entangled in massive dogfights with Russian and Chinese MiG-15s over the southwest bank of the Yalu river – an area that earned the nickname “MiG Alley” for the remaining two and half years of the war. This brief era of fierce jet-on-jet dogfighting

¹⁷⁸ Tilford, *Crosswinds*, 14-15.

took on an almost mythical status in the fighter pilot community. Historian Alan Stephens has called it “one of the great rivalries in the history of air warfare.”¹⁷⁹ Once again, newspapers celebrated the exploits of ace pilots in exciting stories of air-to-air combat. Like their counterparts in previous wars, these pilots continued to believe in the fighter pilot myth, and to exhibit the stereotypical fighter pilot traits, especially those of individualism, aggressiveness, competitiveness, a lack of respect for leaders whom they felt were out of touch, comparisons to heroic imagery, and advocacy of technology that enhanced air combat.

Historian and former F-15 pilot Steven Fino has argued that although the technology used by fighter pilots in Korea differed from pilots in earlier periods, the fundamental “knights of the air” attitude remained in place. “Leaders of the 4th Fighter-Interceptor Group (FIG) implored their pilots, ‘When in doubt, attack—be a determined, aggressive killer—that’s [sic] what you’re flying a fighter for.’ In another Sabre unit in Korea, the 51st FIG, pilots were told, ‘Every man’s a Tiger! The aggressive spirit must always be foremost if the pilot and his organization are to enjoy a successful career in the fighter business.’”¹⁸⁰

One reason for the continuity of shared values among pilots of both World War II and the Korean War was simple: many of the pilots were the same people. In Korea, 355 coalition pilots scored official kills against MiGs—fifty-six of those individuals had also scored kills in World War II, and seven pilots earned ace status separately in both wars. The top five highest scoring aces in Korea had all flown in the Second World War.¹⁸¹ With the leaders and most inspirational

¹⁷⁹ Alan Stephens, “The Air War in Korea, 1950-1953,” in John Andreas Olsen, ed., *A History of Air Warfare* (Washington, D.C.: Potomac Books, 2010), 98-99.

¹⁸⁰ Fino, *Tiger Check*, 3.

¹⁸¹ Kenneth P. Werrell, *Sabres over MiG Alley: The F-86 and the Battle for Air Supremacy in Korea* (Annapolis: Naval Institute Press, 2005), 145.

fighter pilots having that same history, it is no wonder that the fighter pilot traditions from one war were passed on to the next war, which undoubtedly affected the younger pilots who also served.

The top scoring fighter ace in Korea was Joe McConnell, a B-24 pilot in the previous war. Assigned to command first the 16th, and later the 39th Fighter Squadrons in Korea, McConnell shot down sixteen MiGs between January and May in 1953. Adhering to the traditional knights of the air mentality, McConnell expressed utmost self-confidence and eagerness for battle. Before the war began, when a colleague told him that he would consider shooting down just one MiG enough to make a combat tour a success, McConnell scoffed and replied, "I wouldn't even want to go if I didn't know I was going to make ace. I *know* I'm going to make ace." This aggressiveness was more than just bluster, he adhered to it in the air. For example, when engaging a large group of MiGs over the Yalu, his wingman called out, "My God, there must be thirty of them!" To which McConnell simply responded, "Yeah, and we've got 'em all to ourselves." That aggressive spirit led him to take risks including disobeying orders such as one time when his hydraulic system failed. Although official policy was to return to base immediately if such a failure occurred, McConnell spotted numerous MiG formations nearby and disobeyed orders in order to attack them. His habit of luring MiGs in so that he could attack them was another high-risk maneuver, albeit one that paid off for him. However, historian Kenneth Werrell has noted: "In his eagerness for combat and MiG kills, [McConnell] violated policies and certainly put himself and his wingmen in peril." At the same time, McConnell did seem to put less conscious attention on himself as an individual. For example, he asserted: "It's the teamwork out there that counts; the lone wolf stuff is out. I may get credit for a MiG, but it's the team that does it... not myself alone." However, he could not help but lace his humility with a

touch of fighter pilot braggadocio, as he did in one article he wrote with an opening line that had no pretense of modesty: “I’m just a guy doing a job. I’m just another guy in spite of this triple jet-ace title.”¹⁸² If he seemed to question the sense of deep individualism that motivated many fighter pilots when he gave credit to teamwork, he also validated it by his repeated disobedience of orders in flying damaged aircraft and frequently violating Chinese airspace.

The first pilot to achieve ace status in Korea was former P-51 Mustang pilot James Jabara. Part of what led to his success was a deliberate effort on the part of the Air Force. Recognizing the public relations value of ace fighter pilots with the general public, Air Force leaders hand-picked several pilots—including Jabara—who had already achieved two or more kills and who might be good enough to achieve ace status. These pilots only flew missions likely to encounter large numbers of MiGs, thus increasing the chances that one of them would achieve ace status quickly. Jabara also had a habit of disobeying orders. On one mission, for example, when Jabara engaged a group of MiGs, one of his aircraft’s external fuel tanks did not properly jettison. A hanging tank severely impeded the performance of an aircraft, and official policy was that if a tank failed to drop, the pilot must return to base immediately. Jabara refused, instead flying into the fray and attacking several MiGs with a hanging tank placing severe limitations on his maneuverability. That dogfight was the one in which he achieved ace status. For his actions, he received both a stern reprimand and a Distinguished Flying Cross.¹⁸³

If McConnell evidenced some, but not all, of the stereotypical traits of the fighter pilot, Jabara more than made up for this with his expressions of individuality in everything from discipline to fashion. His competitiveness led him to dispute kill credits. In one case, he fired at a

¹⁸² All quotes and information from Werrell, *Sabres*, 146-149.

¹⁸³ Werrell, *Sabres*, 153-154

MiG and missed—the still-alive Soviet jet nearly crashed into Jabara’s wingman, who barely managed to avoid collision. The MiG crashed immediately after the near miss, and the wingman claimed the victory, arguing that his jet wash pushed the MiG out of control. Jabara insisted that he deserved the credit because he had initiated the attack and been the true aggressor. Jabara, lower in rank at the time, did not get the credit. This aggressiveness played out in other ways as well. His reputation marked him as having a discipline problem – for being cocky and aggressive. His colleagues described him as an “aggressive scrapper” and an “arrogant little bastard.” His commander labeled him a “hot shot Charlie type... the guy who sang the loudest in the club and made more noise than the other people and dressed on the extreme side for the military.”¹⁸⁴

If many of these fighter pilots seemed read to disobey orders, this was never clearer than in their habit of violating Chinese airspace to hunt for MiGs. Crossing the Yalu River and flying over China was officially forbidden, since Washington feared direct attacks in Chinese airspace, or especially against Chinese targets on the ground, could escalate the war. However, many F-86 pilots routinely disobeyed this standing order, at times under the insistence of their commanding officers. For example, Frank Everest, a former World War II fighter pilot and then a commander in Korea, recalled: “I told these lads that if they were really on the tail in the killing position they could cross the Yalu to make that kill and they didn’t need to make any official report of it. I didn’t want to know about it.”¹⁸⁵

¹⁸⁴ Werrell, *Sabres*, 155.

¹⁸⁵ General Frank F. Everest, Oral History Interview, August 23-25, 1977, USAF Historical Research Agency, K239.0512-957, 182.

The most common measure of success or failure in air combat is the “kill ratio,” a measure of enemy planes shot down for every loss of one’s own. In this regard, the Air Force’s performance in the Korean War was one of its most successful ratios at the overall rate of approximately ten MiGs killed for every one Sabre lost. This record was only an average, as the kill rate was not steady. Starting with more modest success, the performance by American pilots and their aircraft improved over the course of the war. From January through April 1953, coalition pilots achieved a kill rate of 16:1. Looking at only the last three weeks of May 1953, F-86 pilots reported 56 MiGs killed with only one loss. In June, records indicated 77 MiG kills, unverified “probable” kills on eleven more, and 41 others damaged, all without a single friendly loss to air-to-air combat.¹⁸⁶ These rates were impressive by any standard, and were a source of deep pride for the fighter pilot community. However they also set a high bar that American pilots had trouble matching—to say the least—in later wars.

The rift between air-to-air combat pilots and other types of fliers remained intact and continued to grow. A close look at fighter-bomber pilots shows differences both in attitude and fame between air-to-air combat pilots and those doing ground attack. Air power historian Conrad Crane has noted: “Although the F-86 interceptor pilots got all the publicity and glory and did much to restore the interest of American youth in jets and flying, the fighter-bomber pilots in less glamorous aircraft had more dangerous and less rewarding missions and suffered from far more

¹⁸⁶ Conrad Crane, *American Air Power Strategy in Korea, 1950-1953* (Lawrence: University Press of Kansas, 2000), 166. Although the vast majority of air assets and pilots were American, the term “coalition pilots” is used, due to the fact that the South Korea, Great Britain, Australia, and South Africa sent air assets into combat roles during the war. Greece, Canada, Thailand, and the Philippines supported these operations with airlift units. For a brief overview, see also, “Korean War 1950-1953 Teacher Resource Guide,” National Museum of the United States Air Force, no date (after 2010), [http://www.nationalmuseum.af.mil/Portals/7/documents/education/teacher_resource_korean_war.pdf], accessed February 10, 2018.

fear of flying and other symptoms of combat stress.”¹⁸⁷ Most combat pilots of all types self-medicated with alcohol, and the Air Force supplied pilots with one fifth (almost 26 ounces, or 757 milliliters) of whiskey per month. However, the stresses associated with fighter-bomber missions in Korea were so harrowing that the 18th Fighter Bomber Squadron began distributing shots of bourbon after every sortie. The practice was short-lived, as pilots flying several sorties per day could not stay sober long enough to fly in the afternoon.¹⁸⁸

Marine ground attack pilots saw the risk of their jobs as so great that the following song became popular by 1953:

On top of old Ping Pong [derogatory slang for Pyongyang]
All covered with flak
I lost my poor wingman
He'll never come back.

Though flying is pleasure
And crashing is grief
A quick-triggered Commie
Is worse than a thief

A thief will just rob you
And take all you save
A quick-triggered Commie
Will lead to the grave.

Now come all ye pilots
And listen to me
Never fly over Sinanju
Or old Kunari.

The moral of the story
Can plainly be seen
Stay east of San Diego
Be a stateside Marine.¹⁸⁹

¹⁸⁷ Crane, *Strategy in Korea*, 103-104.

¹⁸⁸ Crane, *Strategy in Korea*, 104.

¹⁸⁹ Quoted in Crane, *Strategy in Korea*, 104-105.

This sentiment is quite distinct from the air-to-air combat pilots who spoke of glorious, chivalrous combat.

Redefining Air Superiority

The Korean War tested Air Force doctrine and found it wanting in several respects. First, nuclear massive retaliation was not the only option in a conflict. Second, not every country was vulnerable to strategic bombing to the same degree. Korea, with less industrial development than other nations and lacking modern infrastructures, was far less vulnerable to strategic bombing than, for example, Germany had been in the Second World War. Third, the war in Korea demonstrated that the air superiority mission was still valid, especially in the context of a limited war against a less developed nation. Ultimately, the Korean conflict revealed deep flaws in the American strategic bombing concept. Air Force planners, who did not intend to waver from their devotion, summarily ignored these flaws. These “true believers” argued that Korea had little relevance to doctrine, and they chose not to look closely at the conflict, casting it as a unique exception. Thomas K. Finletter, who served as Secretary of the Air Force for most of the war, later said: “The Korean War was a special case, and airpower can learn little from there about its future role in United States foreign policy.”¹⁹⁰

Their devotion, however, was not blind. The decision to marginalize the Korean experience masked a reluctance to overthrow five long years of detailed planning and growth in response to events of a few isolated months.¹⁹¹ By this point, the Air Force was a massive vessel that could not easily alter its course. Thus, thinking continued along the same tack it had before, dominated by the all-encompassing strategic bombing mission.

¹⁹⁰ Tilford, *Crosswinds*, 17.

¹⁹¹ Ziemke, “Shadow of the Giant,” 174-6.

TAC continued on its path of developing into a smaller version of SAC. Although TAC could not compete with SAC as the main instrument of massive retaliation, it could focus on delivering smaller, tactical nuclear weapons with its own high-speed, long-range fighter/bombers. In theory, these planes could drop nuclear bombs quickly on tactical targets while intercepting and destroying enemy bombers that threatened U.S. soil. Because war planners considered enemy bombers the biggest threat to the United States, air defense revolved completely around the creation of high-speed interceptors, designed to demolish these bombers from long range, even beyond visual range (BVR) if possible. This led to the idea that guided missiles should replace guns as the interceptor's primary weapon. The concept of the fighter plane thus mutated from agile dogfighter to fast interceptor designed to kill with a missile in one single pass without maneuvering or engaging other fighters at all.¹⁹²

Despite a resurgence of fighter combat in Korea, Air Force leaders, even within TAC, were still committed to bombing as their primary mission and as their common cultural identity. Regardless of how many MiGs the Sabres blew out of the sky, when the Korean War ended, the Air Force assumed that the limited conditions of that war had been a fluke and that their doctrine of strategic bombing did not need to be reexamined. Air superiority fighters became more and more overlaid with capabilities and became less specialized. Missiles replaced guns as the main weapons. Under the bomber advocates' assumptions that bombers were the more important aspect of air power, fighters became increasingly designed not for nimble air-to-air duels but for high-speed, straight-line vector interception of large, non-maneuverable enemy bombers. An ace pilot in World War I, Major General John Alison said of the F-105 Thunderchief that saw its first service in 1958: "We [the fighter community] lost; after World War II we went from the fighter

¹⁹² Frederick H. Smith, "Current Practice in Air Defense," *Air University Review* 6, Spring 1953, 31-39.

airplane to the fighter-bomber.”¹⁹³ Even further, by the time the F-105 was ready for service, the US military had adopted as its main view that the age of dogfighting and traditional air combat was over.

Through a series of shifts and redefinitions designed to reinforce the religion of strategic bombing, the very definition of air superiority changed. Previous conceptions of air superiority involved swarms of fighter planes that cleared the skies of enemy fighters and interceptors through dogfights, faithful to the “knights of the air” myth, opening a path for bombers. In the Cold War context, such fighters were obsolete. Nonetheless, Air Force leaders still used the term “air superiority,” redefining it to mean the interception of enemy bombers, whose tactics presumably resembled those of American bombers as the presumably followed a similar doctrine. By redefining “air superiority,” the Air Force was left with no doctrinal niche for air-to-air combat against enemy fighters and interceptors, yet the continued use of the term itself created the illusion that this role was still covered. This redefinition of the mission went further, incorporating preemptive bombing strikes against enemy aircraft on the ground as part of the “air superiority” objective. Air Force Chief of Staff Hoyt S. Vandenberg testified to Congress in 1953 that “[t]he main defense of the United States lies in the strategic air arm's ability to destroy the bases. That is the only efficient way to knock a possible air force out of the air and get air superiority.”¹⁹⁴ In other words, air superiority was a job for bombers.

¹⁹³ Major General John Alison Corona Ace Interview, January 27, 1977, Air Force Historical Research Agency, K239.0512-1065, 89-90.

¹⁹⁴ United States. Congress. House of Representatives. “Department of Defense Appropriations for 1953.” 82nd Congress, 2nd session. (Washington D.C.: 1952), pg 2-3, 10, 1028-9, as quoted in Ziemke, “Shadow of the Giant,” 235.

The definition of air superiority in this way appeared mangled beyond recognition. The re-purposing provided a pretext for the Air Force to invest further in bombers and interceptors while allowing it to claim that it was investing in the air superiority mission. But this meant moving away from agile fighters such as the Sabre in Korea, focusing instead on larger aircraft designed for speed and altitude at the expense of maneuverability. To these ends, in 1950, TAC requested proposals for a supersonic interceptor designed to shoot down Soviet bombers and able to carry its own tactical nuclear warheads. This led to a long line of fighters known as the “Century Series,” which included the F-100 Super Sabre, F-101 Voodoo, and F-105 Thunderchief.¹⁹⁵ The Air Force version of the F-4 Phantom, as it was later re-designated, originated as a part of this series as the F-110 Specter.¹⁹⁶

These planes and others of the Century Series, differed from the slow, heavy bombers that populated SAC, yet they did not resemble the agile fighter planes of previous wars. Instead, they excelled primarily at speed, and they were designed to drop tactical nuclear weapons on a target and then escape immediately. Even so, their ability to intercept enemy bombers was more important. To succeed in this defensive role, a fighter had to take off quickly, cruise at 40,000 to 60,000 feet at supersonic speeds, and disable an enemy bomber in a single attack pass by firing a long – or medium – range missile. While previous air superiority craft in TAC’s arsenal of fighters emphasized the maneuverability and agility essential to dogfighting, these characteristics disappeared in favor of speed, altitude and climb rate.¹⁹⁷ TAC's transformation over these years left it hardly capable of performing some of its traditional key roles, especially that of air-to-air

¹⁹⁵ Hannah, *Striving for Air Superiority*, 23.

¹⁹⁶ Amy E. Williams, *The American Fighter Plane* (New York: Barnes and Noble Books, 2004), 154.

¹⁹⁷ Hannah, *Striving for Air Superiority*, 46.

combat. In both hardware and doctrine, TAC left itself unprepared for what it found over the jungles of Vietnam. Historian Caroline Ziemke summarized the problem: “Like Dorian Gray, TAC had sold its soul in exchange for vitality, and in Vietnam, the world got a look at its aged and decrepit conventional structure. . . . The Air Force seemed to have dismissed nearly three years of combat experience in Korea – not to mention the three years of World War II operations in Europe and the Pacific – as irrelevant to its present needs and had done little to incorporate them into its institutional memory.”¹⁹⁸ The Air Force sacrificed TAC and the air superiority mission on the altar of strategic bombing doctrine.

The Phantom Menace

The fighter plane used most widely during the Vietnam War was the F-4 Phantom II, and it reflected the long focus on strategic bombing doctrine and a lack of commitment to air-to-air combat during this period. Air Force doctrine in the early Cold War showed a quasi-religious devotion to strategic bombing that minimized all other roles of air power, especially air superiority. War planners designed planes either to deliver nuclear weapons, or to intercept enemy bombers, which they assumed had characteristics similar to those of American bombers. Air superiority was dead. Thus, the F-4, although it was called a fighter plane, had few characteristics of traditional fighters. It was large and cumbersome, built around the concept of long-range attacks, and it sacrificed the agility and armament that true air-superiority craft needed. Technical problems also plagued the plane, such as its notoriously faulty radios, high risk of departure, and tell-tale black smoke trails. The F-4 was not even the best performing plane for its intended roles. During its design process, it proved inferior to Vought's upgraded

¹⁹⁸ Ziemke, “Shadow of the Giant,” 303.

Crusader prototype in every tested category. It originated as a project the Navy did not solicit but funded anyway in order to save McDonnell, a contractor it regarded as too big to fail. The F-4 avoided joining the pile of discarded prototypes only because Navy leaders had a preexisting preference for dual-seat, twin-engine aircraft. Finally, the Air Force adopted the Phantom largely because the craft proved more versatile than its other interceptors at a time when Defense Secretary Robert McNamara was pushing a concept of commonality that emphasized multi-role planes used by more than one service branch.

The F-4 was exactly the plane the military wanted it to be: a high-speed, poorly maneuvering interceptor based on long-range attacks that could also service ground attack and support missions. While the Phantom would undoubtedly have performed extremely well in its designed role of intercepting enemy bombers, it ironically never had to. Instead of saving the world from nuclear Armageddon in the hypothetical World War III, the F-4 instead flew in a limited war over the jungles of a tiny third world country that many Americans had trouble locating on a map. The enemies it faced were not large lumbering bombers threatening nuclear annihilation, but missiles, ground fire, and maneuverable MiG fighters much more adept at air combat. The deadliest enemy for the Phantom, one of the most powerful and expensive planes in U.S. history to that point, was an individual on the ground with a small machine gun.

Air-to-air combat, although not the most prevalent threat in Vietnam, highlighted the shortcomings of the Phantom and of Air Force doctrine. Judging the F-4 in this role depends largely on how one chooses to measure success. Raw combat statistics favor the F-4, although by a narrow margin. Depending on the sources used, Phantoms killed two to three MiGs for every loss during the entire war as a whole, although incorporating unconfirmed North Vietnamese claims places the ratio closer to an even 1:1. Looking closer at the war as it unfolded, the F-4

sometimes achieved rates as high as 5:1, at other times swinging into a negative exchange rate. Kill ratios are revealing, but a more accurate metric for the achievement of air superiority is the ability to execute bombing missions freely over enemy territory. By this measure, the Phantom also struggled. MiGs proved quite adept at interrupting U.S. bombing strikes, and although the F-4 occasionally racked up impressive kill counts, it was unable to prevent such interruption until late in the Linebacker campaign.

What success the Phantom did achieve was in spite of the plane, not because of it. Ultimately, the F-4 Phantom II was a jack-of-all-trades and master of none. Upon closer inspection, it was actually a “jack of only some trades,” sacrificing excellence in any one role in order to have versatility in several. Strategic bombing, although controversial, made sense when warring against fully industrialized modern nations, the concept was highly flawed in limited wars against less developed societies. The Korean War had shown this, but war planners ignored its implications, and the United States thus entered war in Vietnam with an air power doctrine completely unsuited to the type of warfare it found there. The F-4 Phantom II was the child of this doctrine. The plane itself was not inherently deficient. Its design accentuated particular characteristics, in which the plane excelled. However, similar to the doctrine that spawned it, the F-4 was the right plane for the wrong war.¹⁹⁹

¹⁹⁹ For a full exploration of the F-4 in the air-to-air role during this period, see Michael Hankins, “The Phantom Menace: The F-4 In Air Combat In Vietnam,” (Thesis, University of North Texas, 2013); For more on the design of the Phantom, see Glenn E. Bugos, *Engineering the F-4 Phantom II: Parts Into Systems* (Annapolis: Naval Institute Press, 1996); for slightly less scholarly but still useful works on the Phantom, see Anthony M. Thornborough, *The Phantom Story* (New York: Arms and Armour Press, 1994); Anthony M. Thornborough, *USAF Phantoms: Tactics, Training, and Weapons* (New York: Arms and Armour Press, 1988); Walter J. Boyne, *Phantom in Combat* (Washington: Smithsonian Institution Press, 1985).

Mig-Killers in Vietnam

Like the Korean War, which saw an attempt to apply a doctrine of air power that was not well suited to that particular enemy, the Vietnam War was also a major test bed for air power. President John F. Kennedy and, even more, President Lyndon B. Johnson sought to use air power as a tool to resolve conflicts in Vietnam. However, the doctrine of strategic bombing against industrial targets was difficult to apply to a small, third-world country of opponents strongly motivated by ideology, the majority of whom were guerrilla fighters hiding among non-combatant civilians. Nor was interception of large, cumbersome enemy bombers a feature of that war. Thus, America entered Vietnam with an Air Force that was not designed well for the type of conflict it experienced there. Nevertheless, fighter pilots flying in the Vietnam War continued to exhibit many of the same traits associated with the “knights of the air” myth. Again, this is partly because many of them were the same people who had flown in Korea, or in some cases, even in World War II. Although air-to-air combat against MiG fighters (in this case, the MiG-17, -19, and -21) was much rarer than it had been in Korea, air combat was still highly sought after by many pilots, who continued the fighter pilot beliefs of aggressiveness, independence, disdain for leadership, competitiveness, a focus on particular technologies that enhanced air combat, and use of heroic imagery.

This ethos of the knights of the air can be found in statements and actions of many fighter pilots in the Vietnam War. For example, C. R. Anderegg, a graduate of the F-4 Fighter Weapons School who flew Phantoms in over 170 combat missions in Vietnam, later noted the sense of competition and aggressiveness: “Fighter pilots are not happy unless they are stirring the pot.” Their sense of braggadocio was also true to the stereotype. Anderegg recalled that an old joke in the fighter pilot community insisted there was no difference between a fighter pilot’s war story

and a fairy tale, except that the fighter always began with “There I was...” instead of “Once upon a time.”²⁰⁰

Fighter pilots in Vietnam generally lived up to the reputation of knights of the air for being hard flying, hard drinking, hard partying mavericks who held little regard for superiors. Anderegg recalled, “Many crews were nonconformist and frequently disregarded regulations about uniforms, flying, and social behavior.” F-4 pilot Captain J. W. Smith, after switching to fighters from previously flying C-130s, reveled in the sense of freedom. His mother asked him: “Tell me, J.W., what’s it like being in one of them thar fighter squadrons?” He replied: “Well, momma, it’s like bein’ paid \$30,000 a year to be a Hell’s Angel.” A hard-partying lifestyle pitted against authority was not the only similarity fighter pilots shared with the infamous motorcycle club. They also continued the tradition of operating as a close-knit, protective community, even down to the squadron level. He concluded: “The supreme lesson from combat was that the only people one could trust were the other members of the flight and squadron peers.”²⁰¹

The most skilled fighter pilots during and immediately after the Vietnam War, known as “good sticks” or “good hands,” tended to be the students and graduates of the F-4 Fighter Weapons School at Nellis Air Force Base, Nevada. The school had a reputation for dogmatically emphasizing fighter pilot skills and attitudes, with the instructors known for being “overbearing and egocentric.” Anderegg wrote of one student’s complaint that the instructors “‘were just so damn intimidating’ with their cocky attitude and seeming indifference to standard grooming practices.” When a new operations officer, Major Larry Kieth, began work at the school in July

²⁰⁰ C. R. Anderegg, *Sierra Hotel: Flying Air Force Fighters in the Decade After Vietnam* (Washington, D.C.: Air Force History and Museums Program, 2001), xii.

²⁰¹ All quotes from Anderegg, *Sierra Hotel*, 47.

1974, he was appalled at “their whole attitude.” Anderegg summarized: “It was clear that the instructors were more concerned with proving that they were better than the students than they were in teaching them how to be weapons officers.”²⁰²

Anderegg argued that the pilots who flew in Vietnam had a level of competitiveness, confidence close to arrogance, and individualism that far overshadowed even that of the previous generations of pilots from World War II and Korea. Pilots arrived in theater convinced that “I’m good, and I know it. I can learn anything quickly and well. There is no challenge too great, and no task I cannot master. I prefer that you teach me, but if you will not or cannot teach me, then I will teach myself. I seek only one reward: Someday someone will say of me, ‘good hands.’”²⁰³

F-4 pilots in Vietnam frequently disobeyed orders in the name of showing off, such as the occasional “bubble checks,” in which pilots flew over ground control radar stations as low as possible, or range dispenser checks, in which tower controllers needed to inspect the bottom of an aircraft to make sure the practice bomb dispenser doors were closed—a practice during which many pilots flew incredibly close to the tower and rocked their wing up to display the underside of their aircraft. These maneuvers were both dangerous and illegal, yet common. Equally commonplace were mock dogfights staged between American and British pilots. If Phantom pilots received little in formal air-to-air training during this period, they attempted to make up for it on an ad-hoc basis by brazenly ignoring that air-to-air practice was strictly forbidden by USAFE rules. Nevertheless, many pilots, who had little to no training in such maneuvers, attempted them anyway. Captain John Jumper, one of these pilots, recalled, “We had no idea

²⁰² Anderegg, *Sierra Hotel*, 51-52.

²⁰³ Anderegg, *Sierra Hotel*, 46.

what we were doing. It was just a free-for all. Sometimes it was so dangerous it wasn't even fun. It was just plain stupid.”²⁰⁴

The sense of competition, disrespect for authority, and of tying their habits to a sense of masculinity all carried over into the lifestyles of pilots when outside of the cockpit. Their social lives revolved around the officers' club and around drinking alcohol. During the Vietnam War, and in many previous wars, all officers' clubs included a “stag bar” that women were forbidden to enter—to the point that any man there who as much as received a phone call from a concerned wife was then expected to buy a round of drinks for the room. Competitive games were also common, with losers often having to buy rounds for the room, in many cases, each pilot in the room stacking up lines of drinks in front of the bar they were expected to consume quickly. Games often turned physical, as entire squadrons conducted “MiG Sweeps” of the bar, which included tossing over chairs, tables, and people as they ran through the room. The more physically dangerous a game was, the more fighter pilots tended to like it. Anderegg summarized, “Flying hard and drinking hard were expected among the peers of the fighter squadrons. Those who did not do both were suspect, and those who did were expected to be perfect the next day on the mission, following a fighter pilot's breakfast—a Coke, a candy bar, and a cigarette.”²⁰⁵

One of the most celebrated fighter pilots of the Vietnam War was General Robin Olds, who had earned double ace status in World War II. During the Vietnam War, he commanded the 8th Tactical Fighter Wing, which earned a reputation for a high number of air-to-air victories. One of the squadrons under Olds' command, the 555th “Triple Nickel” Tactical Fighter

²⁰⁴ Anderegg, *Sierra Hotel*, 49.

²⁰⁵ Anderegg, *Sierra Hotel*, 49-50.

Squadron alone shot down thirty nine MiGs and produced two of the three Air Force aces of the war. The squadron's motto called the unit the "World's Largest Distributor of MiG Parts."²⁰⁶ In Olds' autobiography, simply but revealing titled *Fighter Pilot*, he described what he saw as the necessary traits of fighter pilots:

Fighter pilot is not just a description, it's an attitude, it's cockiness, it's aggressiveness, it's self-confidence. It is a streak of rebelliousness and competitiveness. But there's something else; there's a spark. There's a desire to be good, to do well in the eyes of your peers and your commander, and in your own mind, to be second to no one. The sky is your playground and competitiveness if your life. You don't understand it if you fly from A to B straight and level, or merely climb and descend. That's moving only through the basement of that blue playground. A fighter pilot is a man in love with flying. A fighter pilot sees not a cloud but beauty, not the ground but something remote from him, something that he doesn't belong to as long as he is airborne. There's something in the eyes. . . . For pilots... flying is not just a job, it's a love affair. No pilot calls his plane an aircraft, any more than a sailor calls a ship a boat. The names he uses are many, some even profane, but to him and to him alone, they are terms of endearment. . . . The use of most of these names by any outside the brotherhood can easily earn a bloody nose. Pilots and mechanics are like that. Even within the fraternity there are certain taboos. . . . A pilot is a man in love, a man whose emotional ties with a piece of machinery run deep. His bluff expressions are protective devices meant to hid the tenderness in his heart when talk turns to flying. Man merges with machine; he doesn't simply use it. You strap the machine to your butt, become one with it. Hydraulic fluid is your blood; titanium, steel, and aluminum, your bones; electrical currents, your nerves; the instruments, an extension of your senses; fuel, the food; engine, the power; the control surfaces, the muscle. You are the heart, yours is the will, yours the reasoning power. You are something more than earthbound man. You are augmented and expanded by the miracle of the machine. You are tied to it physically and you are a part of it emotionally. Together you conquer the bonds of earth.²⁰⁷

This passage could have been written in 1917; it certainly bears a striking similarity with the types of poetry and writing produced by the first generation of fighter pilots. In it, all five

²⁰⁶ Factsheet, "555th Fighter Squadron 'Triple Nickel,' 31st Fighter Wing Public Affairs Office, [<https://web.archive.org/web/20131217184107/http://www.aviano.af.mil/library/factsheets/factsheet.asp?id=4353>], accessed Nov 18, 2017.

²⁰⁷ Robin Olds, *Fighter Pilot: The Memoirs of Legendary Ace Robin Olds* (New York: St. Martin's Press, 2010), 291-293.

traits of the “knights of the air” are clearly present: Individualism, aggressiveness, heroic images, the love of airplanes as a technology, and the sense of community with other pilots. He also assumes that being a fighter pilot is a type of personality that cannot be taught. Pilots are individuals first, who have a personal, individual connection to the sky and a spiritual, physical, almost sexual connection their aircraft—but they are also a close-knit community, a fraternal order, separate from the larger Air Force and from the military in general—a sub-culture with its own mores and value system.

Olds went on to insist that these were not just romantic feelings about aviation in general, or universal among pilots of all types, but instead that combat—specifically close-quarters, high-maneuvering air-to-air combat—enhances all of these aspects. As he described,

To some, these feelings seem utterly inappropriate in relation to military flying and the grim purposes of war, but for combat pilots there is no such ambivalence. The realities of danger and the tensions of conflict serve only to heighten the bond between man and machine. . . . When you’ve rushed headlong at treetop level into a storm of flak, when the tracers from an enemy’s guns flick past your canopy and your bird shudders as others strike home; when you twist and turn in mortal combat, outnumbered and far from help; when you strike with savage, thunderous power and wheel in white-hot anger toward another foe; when your bird responds to your impossible demands, slamming you into near unconsciousness with crushing g-force, leaping like a cat when you unleash the full energy of 40,000 pounds of thrust, beating the earth below with on rolling thunderclap as you exceed the speed of sound, hurtling iron bolts of destruction with deadly accuracy, and then quietly, serenely lifts you home, physically battered, emotionally spent, and numb with weariness, then that bond is as solid and as personal as any relationship you will ever experience.²⁰⁸

In a revealing juxtaposition, Olds immediately followed this passage with a paragraph about how he and his wife were drifting apart and their marriage ended.

Speaking to the sense of competitiveness and aggressiveness that he claimed was essential to fighter pilots, Olds sought to explain why he did not achieve ace status during the

²⁰⁸ Olds, *Fighter Pilot*, 293-294.

Vietnam War. By Spring 1967, Olds had four MiG kills to his credit. Yet despite several more months of flying, he did not shoot down a fifth. He claimed that he had “nine or ten more opportunities to get a MiG, sometimes so easy I could have closed my eyes and hosed off a Sidewinder, but I just sat there and looked at him. I let my wingman take him.”²⁰⁹ In his autobiography, Olds was adamant that the reason for this was that he purposefully and consciously chose not to shoot down five MiGs—his failure to achieve ace status was not due to his lack of ability or opportunity, but because he would have been taken off duty if he achieved ace status. He recalled: “There was a bunch of hoopla about my fourth MiG. Everyone was lathered up that I would get number five, become the first ace of the war, and summarily be sent home.”²¹⁰ According to Olds, the Air Force was anxious to produce an “ace” whom they could promote for public relations purposes. Secretary of the Air Force Harold Brown and Secretary of Defense Robert McNamara had allegedly ordered that the first ace would be taken off duty in Vietnam, brought home for press conferences and parades, and eventually given a safer assignment in Systems Command at Wright-Patterson Air Force Base. Olds claimed that he told the Air Force information office what to say to Brown and McNamara: “Tell them both to go screw themselves! They can court-martial me. I just won’t get number five! It means more to me to command my wing than to satisfy their childish exploitation of me for PR purposes!”²¹¹

This reasoning could be accurate. Moreover, whether what he said was exactly true or not, Olds’ insistence on needing to keep flying at all costs demonstrates how strongly the “knights of the air” mythology was ingrained in him. The first Air Force ace of the war, Richard

²⁰⁹ Olds, *Fighter Pilot*, 319-320.

²¹⁰ Olds, *Fighter Pilot*, 318.

²¹¹ Olds, *Fighter Pilot*, 319.

S. Ritchie, was not taken out of duty for parades and press tours, but the first ace pilot of the war from any American service was actually Navy pilot Duke Cunningham, who was taken off duty and toured for weeks after his fifth kill. Olds was also allegedly worried about the propaganda value for the North Vietnamese if he achieved ace status and was somehow captured as a prisoner of war. It should be noted, however, that he put the matter somewhat differently towards the end of his life. When interviewed about not gaining ace status after his fourth kill, Olds did still say that he did not want a fifth kill because it would have meant the end of his command; yet he also noted that he did not purposefully avoid shooting down a MiG when opportunities arose. He simply stated: “I was only in nine more fights. Unfortunately nothing worked.”²¹² Even at his advanced age, the interviewer connected Olds with the stereotypes of World War I fighter pilots. He observed: “I realized Olds didn't just look the part of a fighter pilot; he was a fighter pilot through and through. It was in his DNA... He also defi[n]ed the image of a solitary knight stalking the skies by the way he led his men.”²¹³

Most of Olds' sentiments showed continuity with the past, tracing back to the earliest days of combat aviation. But the new technologies of the 1960s introduced new elements into the self-image of the fighter pilot. In particular, the fighter pilot rejected certain specific technologies that did not aid the role of air combat, and pilots showed even keener disdain for bureaucracy—

²¹² Fox News, *War Stories*, “The Fighter Aces,” aired September 2009, interview conducted on unknown date in 2007. Footage of the interview available: [<https://www.youtube.com/watch?v=w0ezJLuUsdI>], information about the episode available here: [<http://www.foxnews.com/on-air/war-stories/2009/09/25/fighter-aces>], both accessed Nov 18, 2017.

²¹³ Martin Hinton, “Producer's Perspective: Life and Times of Robin Olds,” July 6, 2007 [<http://www.foxnews.com/story/2007/07/06/producer-perspective-life-and-times-robin-olds.html>], accessed Nov 18, 2017.

the latter sentiment is an extension of the older tendency of fighter pilots lacking respect for those who had not proven themselves in air combat.

This is most evident in Old's reaction to the AIM-4 Falcon guided missile. For the missile to be effective, many switches had to be set and timed precisely. The heat-seeking warhead had to be cooled, after which the missile was considered ready only for a precise amount of time. After that, the seeker head warmed, and the missile could not be used. When firing the missile, pilots had to look down into their cockpits and away from the enemy out the window. Olds' allegedly chewed out the civilian expert instructing him on the use of the missile, saying: "I don't give a rat's ass where or by whom it's [the AIM-4] been tested and accepted. I'm telling you the switchology you describe doesn't fit our situation. Whoever thought up that gadget didn't know a damned thing about air-to-air fighting, and didn't ask anyone who ever had."²¹⁴ Olds became more frustrated when he realized that the Air Force was pushing the AIM-4 because the other main missile used at the time, the AIM-9 Sidewinder, was a Navy design, and USAF was loath to use a Navy product. Olds thought that the warrior mentality that he and other fighter pilots shared should not be undercut by infighting among the services. He recalled: "We were the warrior victims of an ongoing battle between the Air Force and Navy. Our Sidewinder was a Navy missile that had been thoroughly tested and proven in actual combat. That meant the Air Force procurement people had to go hat in hand to obtain a share of the production, and it also meant the operators had little or no control over any future changes and improvements. Bureaucracy! What the hell did I know about such things?"²¹⁵

²¹⁴ Olds, *Fighter Pilot*, 305.

²¹⁵ Olds, *Fighter Pilot*, 306.

Complaints about technology were not limited to missiles—the more important piece of hardware was the aircraft itself. Like many other pilots, Olds respected the F-4 Phantom to some extent, but he often complained about its abilities in air-to-air combat, arguing that its characteristics were not designed for that role, especially compared with the Soviet fighters of the time. He recalled,

I knew the MiG-17 to be a vicious, nasty little beast. As marvelous as our Phantoms were in air-to-air combat, they were no match for the MiGs... Our first hard turn put us at the speed where the MiG-17, as old as it was, was at its best. He could intercept and close with us. Once he did that, his wing loading was so light that his turn capability was fantastic. There was no way to turn an F-4 with a MiG-17 and no way to battle with it in a classic World War II dogfight. I liked to think that if I'd been a North Vietnamese pilot, I would have been an ace ten times over. Give me a little plane with a great big gun; Snoopy flying alone on his doghouse shaking his fisted paw at that sky, shouting, "Curse you, Red Baron!" I was Snoopy in my dreams, but only in my dreams.²¹⁶

In determining air-to-air victory, the traits that mattered in selecting an aircraft were maneuverability, the quality of guns on board, and a smaller overall size. Many in the fighter community began to press the Air Force to design aircraft with those traits in mind—chasing those characteristics became the cornerstone of a larger movement.

Conclusion

Fighter pilots in Vietnam used language that carried forward the ethos of the “knights of the air” of World War I, translating it into contemporary language. Technologies had been upgraded, but the attitudes of many in the fighter community remained much the same. They still valued and celebrated individualism and aggressiveness as the two main personality traits that were essential for fighter combat. The belief that air-to-air pilots were some sort of superhuman, heroic figures was still present. The sense of a community of like-minded and mutually

²¹⁶ Olds, *Fighter Pilot*, 313-314.

protective pilots with an implicitly understood code of behavior was also present. The deep connection with specific aircraft was also as clear as it was in 1917. However, the list of specific technologies that fighter pilots advocated had been updated. For example, the pilots of the Vietnam generation seemed to reject guided-missile technology, preferring gun combat. Technologies that interrupted the man-machine connection, or the role of the pilot in chivalrous combat were rejected. Larger airplanes were seen as detrimental to air combat, and smaller, lighter, more maneuverable, simpler aircraft were seen as more conducive to air-to-air fighting, and true to the original fighter pilots of the First World War. These attitudes and arguments continued outside of the raging skies of Vietnam and into the halls of the Pentagon.

Chapter 5 - “The White Scarf Stuff”: Origins of the F-15 Eagle

As America became more involved in conflict in Vietnam, the Air Force began to experience a cultural shift. Fighter pilots, having long seen themselves as a discarded minority within the service, began to assert a louder voice as more former fighter pilots gained positions of leadership than they had previously. The “space race” with the Soviet Union gave some pilots leverage to push the boundaries of state-of-the-art technology, and, since many test pilots were former fighter pilots, they were able to advocate more strongly for an emphasis on traditional fighter roles when designing new aircraft. More so, the perception of failure in Vietnam, particularly in the air-to-air role, gave fighter pilots significant space to push the “knights of the air” mythos into the mainstream discussion of Air Force doctrine, force structure, and technological planning. Air Force leaders began listening to former fighter pilots, seeking them out, and allowing them to influence the development of new aircraft technology in the 1960s.

Throughout this time period, a small, tight-knit community of fighter advocates gained a significant amount of influence on the future direction of the Air Force. The eventual result was the F-15 Eagle fighter, which itself was the result of a long and tumultuous development process in which fighter advocates fought not only against the Air Force establishment, but among themselves, while the more extreme among them pushed for a plane that would be the ultimate expression of their “knights of the air” culture.

Defining Air Superiority

In October 1957, a small metal sphere floated 350 miles above the United States. Sputnik not only heralded the beginning of what would later be termed the “space race,” but it also prompted America’s military aviation community to shift away from traditional roles of military

aircraft. As pilot and astronaut Neil Armstrong stated: ““No event since Pearl Harbor had such a profound effect on our country and our industry.”²¹⁷ According to Navy test pilot Lieutenant Charles “Chuck” E. Myers, Jr., after Sputnik, neither the Air Force nor the Navy was interested in manned aircraft at all, especially that of tactical aviation.²¹⁸ This is likely an overstatement, since both services had large inventories of manned craft and were in the process of acquiring a substantial number of new F-4 Phantoms throughout the second half of the 1950s.

Other pilots felt the same way. In 1955, a group of seventeen civilian test pilots created the Society of Experimental Test Pilots (SETP) which was “dedicated to assist in the development of superior aircraft.”²¹⁹ Shortly after becoming president of this organization, Myers went to San Diego, California in 1960 to speak at a symposium held by the Institute of Aeronautical Science. As a test pilot, Myers had flown most of the United States’ fighter and attack aircraft. He argued that, with some slight modifications, most of these craft could be made much more effective at a variety of roles. Myers thought that these planes had not been used to their full potential. For example, he insisted that the F-106 Delta Dart was actually a much better fighter aircraft than the newer F-4, but had simply not been properly exploited. He found a cold reception to these ideas, recalling that “people weren’t really much interested in that in 1960,”²²⁰ although he was not yet fully clear as to the root cause of this lack of interest.

²¹⁷ Quoted in Frederick A. Johnsen, “Astronaut Armstrong Recalls the Origins of Test Pilot Society,” NASA Public Affairs Office, October 1, 2005 [https://www.nasa.gov/missions/research/armstrong_speech.html], accessed June 14, 2017.

²¹⁸ Charles E. Myers Oral History Interview, by Jacob Neufeld, USAF Historical Research Agency, K239.0512-971, 18 July 1973 [Hereafter cited as Myers OHI], 1.

²¹⁹ “The History of SETP,” [<http://www.setp.org/about-setp/history.html>], Accessed June 14, 2017.

²²⁰ Myers OHI, 3-4.

After this disappointing experience, Myers took a position at Lockheed and was given the responsibility of selling F-104 Starfighters to the Air Force. When he again encountered a lack of interest from his potential customers, Myers discovered that the Air Force (and the Navy's aviation element) had, in his mind, given up the concept of air-to-air combat, which he identified with the romanticized image of World War I pilots. As he summarized,

The basic problem I found in Washington, in the aerospace community, the DOD community, in Congress and within the Air Force and Navy itself, was that people had forgotten about the mission of air fighting. That was a thing of the past; it was "white scarf" stuff. It was fun to sit around barrooms and talk about it with the few guys who had done it. But the DOD experts and whiz kids were convinced it had never really contributed to the outcome of any military activity and was something primarily useful for publicity. A greater burden was the fact that a number of generals/admirals felt the same way. If you're going to sell a fighter airplane, first of all people have to understand what you mean when you say "fighter" airplane and somebody has to recognize that there's a mission and recognize that the air-to-air portion of a limited war might be important.²²¹

Myers may not have realized it yet, but he was stepping into an ongoing conflict, one then happening on ground that was in the midst of a large shift. Incoming President John F. Kennedy insisted on a new military philosophy that had been championed by General Maxwell Taylor, one of "flexible response."²²² This approach called for a wide spectrum of military options that could enable the military to engage in conventional and even unconventional conflict without resorting to nuclear war. Theoretically, this helped Myers' cause, because the new doctrine created a need for various types of aircraft that could perform missions other than

²²¹ Myers OHI, 5.

²²² For an introduction to the difference of this approach, see John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of American National Security Policy During the Cold War* (Oxford: Oxford University Press, 2005); for more in-depth analysis, see Walter S. Poole, *Adapting to Flexible Response, 1960-1968* (Washington, D.C.: Historical Office, Office of the Secretary of Defense, 2013).

interception of Soviet bombers. However, Myers recalled that “the immediate response was only token.”²²³

The problem, Myers thought, was that the very understanding of the term “fighter” had changed. Myers thought of a fighter plane as one that excelled in the “white scarf stuff,” meaning air-to-air dogfighting at close range. Yet the Air Force and Navy had skewed this definition. In the Cold War context, air superiority meant, for the most part, interception of large, non-maneuvering enemy bombers. Especially in the Air Force, if enemy fighters were considered at all, doctrine held that air superiority would not be achieved through air-to-air attrition but by destroying enemy planes and bases on the ground. Thus, ground attack was key, and effectiveness in ground attack was marked by fast planes that could accurately deliver heavy bomb loads quickly. Any air-to-air attacks, according to USAF doctrine in the 1950s and early 1960s, were not dogfights. They were acts of interception, in which the prized characteristics were top speed and the ability to deliver a single guided missile from long range.

USAF studies done around this time tended to confirm these conclusions rather than question them. In 1963, the Air Force initiated Project Forecast at the direction of General Bernard A. Schriever, Commander of AFSC. This was a massive effort uniting almost 500 researchers not only from USAF but from 63 other federal agencies, 26 institutions of higher education, 70 business corporations and 10 non-profit organizations. The goal of the project was to predict future directions in the development of technology and how those developments would apply to the Air Force’s needs through the 1970s. The project covered a significant number of issues in its 25 volumes, but one conclusion of special pertinence to fighter pilots was that a new fighter aircraft was unnecessary. The report asserted that air superiority was achieved through

²²³ Myers OHI, 6.

destroying enemy aircraft on the ground, that air-to-air combat would be done with missiles only, and that dogfighting was a relic of a bygone era.²²⁴

Myers—along with a large segment of the fighter pilot community—rejected these doctrines. Myers specifically began advocating for a redefinition of the fighter role to emphasize close-range dogfighting – the “white scarf stuff.” In order to be convincing, he had to do more than just speak romantically about the glory days of gentlemanly duels in the air with scarves flapping in the breeze. He needed data and hard evidence for why the role of traditional dogfighting was necessary. He traveled across the United States and Europe, meeting with pilots and engineers and with a wide variety of leaders. At times these meetings were research-oriented. Myers interviewed pilots about fighter combat and especially about the capabilities of new weapons such as the F-4 Phantom and the AIM-7 Sparrow radar-guided missile. Other meetings were purely about advocating his position. His advocacy was met with significant resistance, especially considering that the Air Force and Navy had just committed to the shift away from gun-based air combat. Both services were in the process of buying large numbers of F-4s, which had no guns and were not optimal for the dogfighting role. The F-4 was primarily an interceptor that could also excel in ground attack. Myers pushed ahead anyway. By his own recollection, he was so adamant in his arguments that he was nearly thrown out of the offices of several generals. For Myers, this was a holy cause that went far beyond the United States. As he

²²⁴ Michael H. Gorn, *Harnessing the Genie: Science and Technology Forecasting for the Air Force, 1944-1986* (Washington, D.C.: Office of Air Force History, U.S. Air Force, 1989), 5-7; Major General John J. Burns, Oral History Interview, March 22, 1973, USAF Historical Research Agency, K239.0512-961 [Hereafter cited as Burns OHI], 17.

recalled: “The whole ‘free’ world had to be re-educated about the possibilities of air-to-air combat.”²²⁵

In 1964 this research and argumentation resulted in the creation of a briefing document entitled “The Requirement for an Air Superiority Fighter in Limited War.” Myers continued to travel, giving this briefing to approximately 500 civilians, military officers, Department of Defense (DOD) personnel, and Congressmen. Essentially, he gave this talk to “whoever else would listen.”²²⁶ The entire point of this briefing was to convince policy-makers that the US Air Force inventory in 1964 could not handle close-turning dogfights in the style of the First World War—all-weather interceptors were, by design, not capable of handling these kinds of fights, and thus should not even be called “fighters” to begin with. Myers recalled how he explained this problem to his audience:

One of the best illustrations was the one I used to explain to generals and Congressmen why you needed a gun in a fighter airplane that was going to engage in close air-to-air combat with other fighters. The scene is two adversaries in a telephone booth, one has a rifle and the other a hand gun. It illustrates the dilemma of the all-weather interceptor pilot with his long-range weapon engaged in close combat against a fighter equipped with a cannon. That really did it; it busted the whole story wide open.²²⁷

To push against what he felt was an inaccurate use of the word “fighter,” he explained,

One of the things I did was to build this little chart which says “F” designates what? Fighter, Interceptors and Attack Airplanes. There were only two fighter airplanes in the United States inventory. One was the Navy’s F-8 and the other the Air Force’s F-104. In the all-weather interceptor category we had F-101’s, F-102’s, F-106’s, F-4B’s and F-4C’s. These interceptors were designed to kill nuclear bombers in low visibility conditions primarily from a head-on attack position. That’s what the F-4 was optimized for. . . . I’m discussing about a different task [from interception] while DOD was saying,

²²⁵ Myers OHI, 6-8, quote on 8.

²²⁶ Myers OHI, 8-9.

²²⁷ Myers OHI, 9.

“It’s the greatest fighter in the world.” I was saying, “It’s not a fighter at all; it’s an all-weather interceptor and there’s a hell of a difference.”²²⁸

Myers recalled that many DOD analysts struggled to translate his concepts into the numbers they usually used to gauge performance, but he rejected these measurements as inapplicable to fighters. He argued:

The Washington community measure of the merits of a fighter airplane was simply “What is its maximum Mach number and how high will it go?” These considerations, as you know, have of course little to do with air warfare. . . . The point I was trying to make is that “Mach 2” has no relevance to air combat. Telling me that you have an airplane that can go Mach 2 doesn’t mean anything to me. . . . This requirement for very high speed was a myth; it is of very little value. The other “popular” feature of a fighter airplane was the capability to fly Mach 1 on the deck. . . . There’s no combat usefulness attached to that speed for a fighter airplane. Now what should we be asking for instead of saying we want a Mach 2 airplane, and want it to go 1.2 on the deck? Not speed. We *should* be asking for *quickness* and *agility*. We want to be able to accelerate rapidly, and maneuver and have good flying qualities.²²⁹

The problem for Myers was that, as of 1964, he had no way to translate the then-abstract concept of “agility” into a specific, measurable operational requirement. Little did Myers know that this problem was in the process of being solved elsewhere.

Myers was not a lone voice in the wilderness. Others within the Air Force shared his view that traditional fighter roles had been ignored and that the Air Force had little appreciation for “true” fighters. Lieutenant General Arthur C. Agan was one of the most prominent voices along those lines. Agan had a rich history centered around fighter aircraft. During World War 2 he had served as chief of tactical operations at Headquarters Eighth Air Force. Then he became assistant air chief of staff in the Mediterranean Theater before becoming the commander of the First Fighter Group in Italy, where he flew the P-38 Lightning in 220 hours of combat missions.

²²⁸ Myers OHI, 10-11.

²²⁹ Myers OHI, 12-15.

Even though Agan had been shot down and held as a prisoner of war, he was still convinced that “[s]hooting from a fighter is the greatest sport,” and that quick, maneuverable fighters had been the key to the success of the bombing campaigns of that war.²³⁰ He shared Myers’ view that the Air Force had so corrupted the meaning of the word “fighter” that it no longer described what they really needed to do—mainly, the “white scarf stuff” of dogfighting. Apart from its commitment to the F-4 Phantom in the early 1960s, the Air Force was in the midst of developing a new fighter, the Tactical Fighter Experimental (TFX), which eventually became the F-111 Aardvark.²³¹ Agan was not impressed with either plane, arguing that in the early Cold War years, “[w]e didn’t have fighters in development. We weren’t putting the money there. . . . So we showed up [in Vietnam] without any fighter aircraft under development. That is really what it amounted to.”²³²

In addition to Myers and Agan, another former fighter pilot was working elsewhere on a new way of thinking about fighter combat. Not only would these new theories come to play a large role in the development of new fighters in the years to come, but this brash pilot would himself go on to lead a movement to attempt a complete reform not only of the Air Force but of the entire US military. That man was one of the most controversial and polarizing figures in Air Force history—Colonel John Boyd. Before examining his influence on the fighter community, it is worth exploring the ways in which he was an exemplar of the “knights of the air” stereotypes.

²³⁰ Lt. Gen Arthur C. Agan, Oral History Interview, April 19-22, 1976, USAF Historical Research Agency, K239.0512-900 [Hereafter cited as Agan OHI], 70, 84, quote on 446.

²³¹ The F-111 was the only aircraft in the Air Force inventory to not receive an official name. It’s common nickname, “Aardvark” was retroactively made official upon its retirement in 1996. The electronic warfare variant, the EF-111, was officially named “Raven” when it first entered service in 1983

²³² Agan OHI, 398.

Genghis John: Archetype of The Knight of the Air

The Japanese winter of 1946 was especially cold and damp. It was not as hard on the US Army Air Corps officers, who were provided with heated quarters, beds, and cooked meals. The enlisted men, however, had only tents to protect them from the cold while they slept on the floor and ate rations. Private John Boyd, who had only been in the theater for a matter of weeks, had had enough of this and incited his fellow enlisted men to pick up whatever tools they could find and rush to two nearby wooden aircraft hangars. They destroyed the hangars and burned the wood in order to stay warm. The Army later discovered that two of its hangars were missing and quickly found out that Boyd had led the revolt. He was brought up on charges, but, before the court-martial could begin, Boyd told his investigators that according to general orders, an officer's first duty was to protect his men, yet his officers were thus failing in their duty. He threatened to report the officers to higher authorities if the charges were not dropped. They were. Allegedly.

There are no records of this incident or a threatened court-martial. But Boyd—also known as “Genghis John”—liked to tell the story to as many people as he could, including his friends, enemies, reporters, yet, strangely, it is not in his official interview for the Office of Air Force History.²³³ Whether the story is true or not almost does not matter. What does matter is that Boyd used the story as a symbol of himself and his attitude. He thought of himself as living true to the spirit of the story, if not to its historical details. Clearly the story shows him as representing many of the key elements of the fighter pilot ethos. Here he certainly expressed aggressiveness and eagerness for confrontation. He showed his tendency to resist authority and

²³³ Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (New York: Little, Brown, and Company, 2002), 31-32.

his willingness to challenge his superiors as well as his general lack of respect for superiors who did not share his own experiences. He expressed fierce independence by deciding to take action himself even before becoming official leader of the group, and he showed kinship and connection with those who shared his experiences, namely his fellow enlisted men. He exemplified the myth of the fighter pilot even before he became one.

This story became the first of many similar “Boyd stories” that his friends – and enemies – spread throughout the years. Biographer Robert Coram describes these stories as achieving the status of Holy Scripture: “Among the Acolytes, Boyd’s most dedicated followers, the story achieved almost ecclesiastical weight.”²³⁴ To his followers, some of his enemies, and perhaps even to himself, Boyd became an almost mythical figure who single handedly changed the Air Force, if not the entire concept of warfare itself. Certainly many of his biographers have lionized him this way. In fact, Boyd did exert a relatively large influence over the design of the F-15 Eagle and the F-16 Falcon, and he and many of his “acolytes” went on to be key members of the Reform Movement, a group of activists who advocated for technologies that they judged as more “simple” and “cheap” than what the military pursued at the time. Thus, understanding his background and motivation is key to a thorough understanding of those developments. However, Boyd is but one element of a larger movement, as much a product of his times as a shaper of them.

Like many other fighter pilots, Boyd participated heavily in athletics as a child, and he felt strongly that the sense of competition and drive in sports was the same as that needed to be a successful fighter pilot. For him, the competitiveness and challenge were purely an individual

²³⁴ Coram, *Boyd*, 31.

enterprise. Even in team sports, he thought victory or defeat was up to the individual. Boyd recalled what attracted him to being a fighter pilot:

You know, you get in there and the whole load is on you alone—"Can you or can you not do it?" I was convinced I could do it, and it triggered a lot of excitement within me. I really believe it was a carry-over from competing in sports. I guess it is a bad thing to say, but to me it was like a different kind of a sport or a continuation of that kind of competitiveness. . . . The passion and the drive to try to win and come out on top are very much there. Granted, you are going to work with your teammates, but a lot of it depends on how well you do, how well you are trained, how well you think, how well you move.²³⁵

He tied this sense of individuality not only to competition but a sense of freedom, and asserted that other types of flying did not have these same qualities. He recalled, "I did not even think about being any other kind of pilot; I just wanted to be a fighter pilot. . . . Bomber pilots are a bunch of truck drivers or Greyhound bus drivers. I did not want to be up here instead of down here and have a bunch of crowded buses and people continually telling me what to do. . . . There was a kind of esprit, some freedom about being a fighter pilot."²³⁶

His sense of individuality (fueling his competitive drive) brought him into frequent conflict with his superior officers, a fact of which he was proud and about which he often bragged. Although his official interview omitted the destruction of hangars in Japan, he did not shy away from recounting other instances of challenging his superiors and being on the verge of court-martial. These conflicts started as early as flying school. For example, he told a story of how his instructors forced him to practice "stupid gliding turns" that he felt were boring, so he allegedly found a copy of an air combat textbook and taught himself how to do Immelman turns. In this basic combat maneuver, named for World War I German fighter ace Max Immelman, a

²³⁵ John Boyd Corona Ace Oral History Interview, Jan 22, 1977, K239.0512-1066 [Hereafter cited as Boyd CA Interview], 6-7.

²³⁶ Boyd CA Interview, 6.

pilot reverses direction quickly by going vertical, then flips the plane to go the opposite direction at a higher altitude. He claimed that his instructors had found this very impressive, even though he refused to learn some of the more basic maneuvers they tried to teach him.²³⁷ Later, when training for air-to-air combat, Boyd claimed that he did not need an instructor at all because fighter tactics came to him intuitively, and that he could just “feel” them.²³⁸

Boyd outright refused to train for bomber aircraft – or any multi-engine aircraft at all. He described his response to his instructor asking him to switch to multi-engine planes: “I said, ‘No, I don't want to fly those. . . . I do not want to drive a truck, I can tell you that right now.’ I asked him, ‘Am I not good enough for fighters?’ He said, ‘You are good enough.’ Anyway, we had a big argument. He wanted me to go to multi-engines and I said, ‘Bull shit, I will not go to multi-engines. I will resign, I'm telling you.’”²³⁹ Later he described a cross-country flight he had to make by himself in which he deviated from his planned route to go to a different base to spend hours practicing air-to-air combat maneuvers, fully intending to lie to his superiors about the detour after the fact. He said he was caught for this because another instructor happened to be at that base, although this unnamed instructor was apparently breaking his own orders, so he and Boyd covered for each other. He summarized the whole period, saying: “I tended to violate a lot of regs. . . . I have always been a risk taker. I frequently found myself in trouble; in fact, they were threatening me with Article 15 while going through flying school.”²⁴⁰

These early experiences formed a pattern that was repeated throughout Boyd's life. Certainly he was brash, held little regard for his commanders or the chain of command in

²³⁷ Boyd CA Interview, 9.

²³⁸ Boyd CA Interview, 12.

²³⁹ Boyd CA Interview, 10.

²⁴⁰ Boyd CA Interview, 11, quote on 9.

general, and expressed his individuality in the form of disobedience, his predilection for single-seat fighters, and his fascination with one-on-one air combat. He also displayed perhaps the most extreme version of the typical fighter pilot's confidence spilling into arrogance. In these stories, and in other stories Boyd continued to tell throughout his life, he repeated the same self-glorifying themes. In any of the stories, Boyd had to be the smartest person in the room—especially if there were others present that were “supposed” to be smarter such as scientists, researchers, and engineers. Boyd had to be the most impressive person involved in any incident. He allegedly repeatedly shocked his instructors with his skills and later bragged that he was a better pilot than any of his instructors and that he defeated all his combat instructors in simulated dogfights. He insisted that few people could believe the extent of his intelligence, prowess, and flying skills. Certainly, some people were impressed. Many of his colleagues began speaking of him in the same hallowed ways, but for others who had opposing views, Boyd's braggadocio grated on them and created bitter enmity.

None of Boyd's feelings about flying or about himself changed after his first real combat experiences, some of which were dramatic, large dogfights during the Korean War. One of his early battles involved over a dozen planes swirling and firing on each other in deadly combat. Boyd not only said the experience was “exciting,” but years later he recalled the event with hand gestures and sound effects. “Jesus Christ,” he said, “I really like this stuff. If I could only get five on a mission (ping! ping! ping! ping! ping!).”²⁴¹ Although some of his fights were harrowing, Boyd never got the chance to achieve that dream. Not only did he not get a single kill credit during the Korean War; he never even got in position to fire his gun.

²⁴¹ Boyd CA Interview, 19, 21.

In 1954, after the war ended, Boyd was transferred to Nellis Air Force Base in Nevada, where he again refused orders that took him away from fighter aircraft. When he was originally assigned to a maintenance squadron, he replied, “Bull shit on maintenance! I don't want anything to do with it.”²⁴² He began working as an instructor at the Fighter Weapons School at Nellis and claims to have “started [a] revolution” there in terms of teaching air combat tactics based on his notes from the Korean War.²⁴³ Holding to his notion of true fighter pilots, Boyd insisted that his students must be treated as individuals, with their training experiences matched to their personality. Perhaps ironically, when Boyd trained students who displayed a cockiness much like his own, his competitive drive kicked in. He targeted those students, going out of his way to show them how much better he was at combat. Using gestures and sound effects when telling the story years later, he recalled, “as soon as I would spot him [a cocky student], I would cut his balls off in 10 seconds, and I would do it (bing!bing!bing!bing!bing!) five in a row, then the guys would be ready to learn.”²⁴⁴

Boyd earned the nickname “forty-second Boyd,” for claiming that he could defeat any student in air-to-air combat inside of forty seconds.²⁴⁵ It should be noted that Boyd fell into the category of instructors that Anderegg criticized for being more concerned in showing students that they were better pilots, rather than actually teaching the students the techniques they needed for their own improvement. Of course Boyd could defeat his students. As an instructor, being a better pilot than the students was part of his job description. His need to continually prove that to incoming students did little to educate, but it does illustrate the drive of competitiveness

²⁴² Boyd CA Interview, 22.

²⁴³ Boyd CA Interview, 22-24.

²⁴⁴ Boyd CA Interview, 29.

²⁴⁵ Coram, *Boyd*, 5.

stereotypical to fighter pilots. Furthermore, his “forty second” reversals may have shown less pilot skill than rote memorization of a few maneuvers that he could use repeatedly against a succession of less experienced students. How well his skills could translate to a live combat environment remained untested, as Boyd never once in his life fired his guns in combat.

When training new fighter pilots, Boyd identified certain elements of the fighter pilot myth as key, particularly that of aggressiveness. Independence of action and the ability to reject rote learning and replace it with individual initiative and flexibility were also important.

Although he admitted that some of the shy students were skilled, they became better pilots if they were made more aggressive and independent, conforming better with the stereotype of the fighter pilot. Boyd went so far as to say that the fighter pilot’s personality was so important to victory that it actually overrode a pilot’s actual skill set—he viewed tactics and flying ability as details that could be taught, while the true determinant of victory was attitude and lust for battle.

He explained:

There would be the other guys who reeked with the essence of flying. They knew when to move, how to move, they were very confident, very outgoing and very aggressive. I would say these guys tended to be better—leading back to your question—even though other guys could perform the maneuvers, they would do it in a passive fashion, which meant the end result was not too good. I think the fighter pilot has to be very competitive. He has to want to win. He has to have—well, blood in his eyes. So much of it is attitude. If a guy has a real good attitude (wants to win), he doesn't necessarily have to be a real good pilot initially, you can teach him to be. I am convinced of that and I always have been. Sometimes you get some good pilots in and all that rat shit and all they are is a bunch of defeatists; good cocktail and pussy circuit officers! Yes, I really think it is the attitude.²⁴⁶

When asked how he could tell the difference between someone who merely had good gunnery skills as opposed to someone who had the potential to be an ace, Boyd again identified

²⁴⁶ Boyd, CA Interview, 55.

aggressiveness. “They like to get in there,” he said. “That is the aggressive part of the game. . . . you see guys in combat and all of a sudden they become different people. It is like they are reborn. They are killers, and they love it. I could sense it in other people, guys who like war.”²⁴⁷ He specifically disparaged the role of ground attack because it diminished the level of individuality and the direct control the individual pilot had in any situation. It also supposedly took away from the competitiveness of man-on-man dogfighting—the latest version of the gentlemanly duel of the First World War. Boyd was so adamant on this point that he interrupted his interviewer:

Air-to-ground is bull shit! One of the big reasons why people don't like air-to-ground is because a person tends to feel he is not in complete control of the situation as he would be in air-to-air. . . . [In ground-attack,] I just do not feel that I am in control of the situation. . . . In the air, I can kind of mark the cards. You understand what I am saying? You have a marked deck because you know you are on top of the situation. You are in direct competition with the other guy, and you know when you are better than he is. But with air-to-ground, some guy out there is pumping something at me and I don't even know if he is near me. . . . I have always liked air-to-air better than just flying a gunnery at 6 by 30. . . . I like to challenge that other guy. We are working one another; who is the best man?--that is what it is about. Air-to-ground really doesn't come through. I mean if you think like an air-to-air pilot; who is the best man?—the fighter pilot knows all the time because he can beat the other guy no matter what the situation.²⁴⁸

For Boyd, air-to-air combat was a throwback to ancient forms of mythical combat, like the duels between heroes in Homer's classics, air combat was about individual men, acting independently of outside controls, competing with one another for dominance. It was an individual challenge that must be personally rewarded, mostly by the fact that the winner lives to own the glory of defeating another in one-on-one combat. Boyd himself compared air combat to Paleolithic hunting. The fighter pilot faced conditions like those in

²⁴⁷ Boyd, CA Interview, 58.

²⁴⁸ Boyd, CA Interview, 58-59.

. . . more primitive times when the hunter had to go out there with a spear and track down that animal knowing he might even lose his own life if he did not do it right, but he knew he was going to do it right. We could bring that forward and put the guy in the airplane, same thing--stress, reward, and penalty based upon his own skill. . . . [A true fighter pilot] wants to do it. What does a hunter want to do? He does not want to lay back in the goddamn weeds. He wants to go out there and track, right? He wants to go. . . . if you are a competitive sportsman, isn't the desire there? If you are a real true competitor, doesn't the desire just come naturally. . . . The fighter pilot has the hunter instinct, the desire. He is the hunter. . . . He is a hunter using all the cleverness, guile, strategy, every scheme he can throw in to come out on top; the mechanisms for keeping score. Whatever he is hunting, whether it is an animal, shooting down an airplane, or whatever the case is, he will get it.²⁴⁹

Boyd was later transferred to the school's department of Training Analysis Development, where he got the opportunity to fly the then-new F-100 Super Sabre. Following his earlier pattern, Boyd bragged about how he was the best pilot in this new plane: "I could beat the best instructors only after four rides in the F-100s because I figured out how the ailerons worked. I figured out how they rolled off one way. . . . I was the first guy to accomplish that, to develop those techniques. The company engineers said it could not be done. I told them, 'I do not care what you say, this will work.'"²⁵⁰ As part of his work there in the late 1950s, Boyd started circulating the *Fighter Weapons Newsletter* through which he published articles on tactics. Differing from previous fighter tactics manuals (such as the then-popular *No Guts, No Glory* by Frederick "Boots" Blesse), Boyd emphasized adaptability and being able to change formations according to circumstance. He wanted pilots free to show individuality in the tactics they employed, allowing them to make snap decisions in the air to change their approach if they felt it necessary. This brought him into conflict again with his superiors, who preferred standardization of tactics. Boyd recalled: "we did not want it to be standardized. . . . Right away, the goddamn

²⁴⁹ Boyd, CA Interview, 68-69, 78.

²⁵⁰ Boyd CA Interview, 34.

inspectors are getting into it. They started going out and watching us do the various maneuvers and telling us that we could not do them that way. I said, "That is bull shit! You cannot tell us how to do a maneuver. Those things vary according to circumstances."²⁵¹

By 1959, Boyd was growing restless and sought a change in his life. He considered being a test pilot, braving the cutting edge of new technology and new aircraft capabilities along with the likes of Chuck Yeager, but he decided against it primarily because he thought that the trial-and-error and evaluation process of test flights lacked the excitement of true fighter combat flying. He explained: "I did not want to read all those fucking gauges and all that stuff; it did not sound like much fun."²⁵² Instead, Boyd, who had long ago earned his undergraduate degree in economics, decided to pursue a second undergraduate degree, this time in industrial engineering—though most people might not consider industrial engineering to be much “fun” either, it appealed to Boyd because of its breadth and how it integrated multiple other fields, such as physics, math, and production. He was accepted at Georgia Tech for a two-year program to begin in the summer of 1960.²⁵³

Before he could leave, Boyd recalled, some of the students at Nellis were concerned that, when he left, his tactical approach would disappear. They urged him to write out his approach to tactics and to reproduce his notes on combat. Primarily using a dictaphone so typists could transcribe his speeches, Boyd produced a tactics book called *Aerial Attack Study*.²⁵⁴

²⁵¹ Boyd CA Interview, 36.

²⁵² Boyd CA Interview, 42.

²⁵³ Boyd CA Interview, 42-44.

²⁵⁴ This document, and many of Boyd's works are available online at a variety of sources, including [<http://www.ousairpower.net/APA-Boyd-Papers.html>], accessed December 26, 2017.

Although Boyd himself was not interested in history, others who read *Aerial Attack Study* recognized that many of the tactics it presented resembled those developed by fighter pilots of the First World War. Boyd claimed that he had no knowledge of anyone doing his tactics and maneuvers before he developed them independently.²⁵⁵ Whether he intended it or not (or was aware of it or not), Boyd was continuing in the long line of fighter pilots adhering to a particular ideology that could be traced back to the First World War.

In any case, Boyd's new tactics manual had not been created under any special order or instruction; he had done it on his own without asking or even notifying anyone in command. This caused two separate fights with his superiors. First, they sought to classify the study because it contained detailed information about fighter tactics and weapons capabilities. Boyd was furious at this because he wanted the document to remain unclassified so as many pilots as possible could use it. The eventual solution was that in 1960 a classified version was released, and four years later, after removing particular sections of the book, an unclassified version was released that did keep most of the tactical maneuvers.²⁵⁶

The second fight over the study had to do with whether or not the FWS adopted the manual as an official textbook. Unknown to Boyd, the school had previously been assigned a charter to create a new tactics textbook, one that was already complete by the time Boyd finished his own work. Feeling that his own study was being passed over, he gave a copy to a friend of his, LeCroy Clifton, who worked in the tactics division of TAC and asked him to conduct an independent review of both books. TAC decided to use *Aerial Attack Study* as the official training prospectus at FWS. Allegedly Boyd could not help rubbing this in the face of his

²⁵⁵ Boyd, CA Interview, 49-50.

²⁵⁶ Boyd, CA Interview, 45.

commander and told him: “You ought to be glad. This way you are ending up with the better book. It is a better reflection on you as the commander. Why are you protecting a bunch of goddamn losers over there for who cannot even do their homework? You know they did not do as good of a job as me. They are losers.”²⁵⁷ This quote is likely apocryphal, as it was recalled by Boyd almost two decades after the fact. Yet it represents a tendency that became a habit for him and his acolytes over the years – a binary view of the world in which everything and everyone was divided into “winners” and “losers” depending on how much they agreed with Boyd’s own view.

Energy Maneuverability

It was during his studies at Georgia Tech that Boyd developed the concept that came to define the remainder of his career and exerted a huge influence on the development of future Air Force fighter aircraft and pilot training. That concept was his “Energy Maneuverability Theory” (EMT). Boyd’s recollection of how he came up with EMT again demonstrates how emblematic of the stereotypical fighter pilot myth he had become. As he recalled it, he had really struggled with his electrical engineering courses because he did not have the patience to spend time solving those types of problems. As he described it: “I was bored by all those circuits and fields, and trying to get that stupid 8-digit answer after looking at the problem for a whole goddamn minute. Bull shit! I don’t want to spend a lot of time on something.”²⁵⁸

To help him through these courses, he partnered with several other engineering students who helped Boyd learn the material. In exchange, they asked him for help with thermodynamics—a field with which they struggled while Boyd seemed to have no trouble with

²⁵⁷ Boyd, CA Interview, 51-52.

²⁵⁸ Boyd, CA Interview, 93.

it at all. One night in Spring 1962, while this group was studying together, Boyd suggested that they take a break and go get hamburgers and beer. He recalled that, at the restaurant, the other students began asking him what it was like to be a fighter pilot. Because they had just previously been discussing thermodynamics and the transfer of energy from one state to another, Boyd suddenly began using that as an analogy for air-to-air combat. When interviewed about the event over a decade later, the thought of this particular conversation caused Boyd's hair to stand on end as his hands shook with excitement. He recalled it this way:

I said, "Let me explain it this way. What have we been talking about?" I used an analogy—you know how I like to use analogies. "We have been talking about the transfer of energy from one form to another, whether it's chemical, mechanical, or electrical—there is always some kind of energy transformation." I wanted to get that through to them. I said, "There is always an energy transformation. Now when you are in the air, what is altitude? Isn't that potential energy?" I said, "What about airspeed? Isn't that kinetic energy?" They said, "Right." I had never said this before. "Fine," I said, "Let's maneuver. You might have to give up a little altitude, a little airspeed or both. If you have a lot of power and you soften a maneuver, you can gather in altitude, gather in airspeed or both." Then it hit me, "Jesus Christ, wait a minute! I can look at air-to-air combat in terms of energy relationships. I can land equations. I can do it formally now." I had never realized that before. The guys noticed that I became very excited. One of them said, "What do you mean, sir?" I said, "Jesus Christ, you guys do not know what you have done for me. In fact, I am not even sure what you have done for me." I only knew that something different had taken place right at that moment and it happened as a result of my conversation with these guys. I was very excited.²⁵⁹

That night, Boyd allegedly stayed awake until three in the morning working on equations for how to describe air-to-air combat maneuvers through the language of thermodynamics principles of energy transfer. At this point, EMT consisted of some scribbles on one of Boyd's legal pads. Upon finishing his degree at Georgia Tech in 1962, he once again got into a conflict with one of his commanding officers regarding his next assignment. Boyd had wanted to return to Nellis, but he was instead assigned to Air Force Systems Command at Eglin Air Force Base in

²⁵⁹ Boyd, CA Interview, 95-96.

the Florida panhandle. Boyd claimed that a general (whom he does not name) from Systems Command threatened to court-martial Boyd if he did not stop his insistence on returning to Nellis. The general did give him a choice of location for his next post, and Boyd himself chose Eglin.²⁶⁰

At Eglin, Boyd was assigned to maintenance work, and it is at this point in his interview with the Office of Air Force History that Boyd exceeded even the stereotypical arrogance that is associated with “fighter jocks,” going so far as to begin refer to himself in the third person. He recalled:

When I arrived at Eglin, they put me in maintenance again. People love to put John Boyd in maintenance and John Boyd does not like maintenance. . . . I said, “Bull shit! I did not come down here to spend 4 years in maintenance.” . . . I looked at the colonel and said, “I am going to be out of this job in 6 months and I am going to get the job I want.” I said, “I want to let you know it so that you will know ahead of time. If you write me a bad OER (Officer Effectiveness Report), it makes no difference to me. I am going to show you how to get out of a job if it is controlled or not.”²⁶¹

Whether he actually said these words to his commanding officer is impossible to verify, but his recollection speaks to how fully he exceeded the stereotypical fighter pilot image of expressing individual will through conflict with command, or simply a lack of respect for command officers who they feel have not earned a warrior’s reputation through air combat.

Boyd did not express frustration and lack of respect only for his commanding officers, but also for scientists and academics generally. Again, he showed the bent of fighter pilots to withhold respect from those who, they felt, had not earned it through combat. Research, lab work, and academic pursuits gave no evidence of the warrior ethos that stereotypical fighter

²⁶⁰ Boyd, CA Interview, 93.

²⁶¹ Boyd, CA Interview, 99.

pilots tended to value. Throughout his career, Boyd was preoccupied not only with confronting those experts but also with proving himself superior to them.

This became evident when he arrived at Eglin in October 1962 and began showing his early notes on EMT to some of the researchers there. Boyd recalled: “I have gone all over the base and the people here think I am kind of a nut. I showed them the yellow pad, drawing diagrams, et cetera, and they said, “That is bull shit.” All these scientific types, see. They said, “It won't work. I have a Ph.D. and I say you have to be kidding.” . . . I said, “What do you mean, it won't work? I know it will work.” So then I got pissed. . . . I was doing this in my head. Don't forget I have a tremendous background.”²⁶² Boyd did not specify exactly what elements of his background were so tremendous that they gave him more expertise than the scientists he encountered.

In early 1963, Boyd met an academic whom he did like: Tom Christie, who had a Master's degree in mathematics and who was then working as an analyst in the Ballistics Division at the Air Proving Ground Command at Eglin. After being introduced by a mutual friend, Boyd allegedly began telling Christie about his preliminary work on EMT. As Boyd remembered the meeting: “I cleaned the shit off the tablecloth and began writing all over it. I said, ‘We are going to work.’ This was happening just like in the movies. I started laying out all these equations and shit.”²⁶³ Because of Christie's position, he had access to one of the Air Force's room-sized supercomputers, the IBM 7094. The computer was prized and protected, since few of them existed in 1963, and many parties sought time to spend using the machine for a variety of projects. Using this computer without proper authorization was certainly against

²⁶² Boyd, CA Interview, 100.

²⁶³ Boyd, CA Interview, 101.

regulations—essentially it was theft of valuable government computer time, and, like Boyd’s earlier episode of destroying the wooden hangars in Japan, this was an unauthorized use of government property. Certainly it could easily have gotten both men court-martialed. But through subterfuge, Christie and Boyd began using the computer to help with the complex equations involved, trying to move EMT from an ill-defined concept to a more systematized method of analyzing planes. Christie recalled the process: “Just about all the work had to be done ‘under the table.’ . . . We had access to a large computer system at Eglin which, quite frankly, we had to cheat to get to use, you know, charge it to other ‘projects.’”²⁶⁴

The early computer programs these men developed at that time were a measure of a particular set of characteristics that, previously, could only be discussed in an abstract way. Up to this point, aircraft statistics involved set points, such as top speed, rate of climb, or thrust-to-weight ratios. Christie explained what it was like before EMT:

We tended to look at aircraft with so-called “point-analysis.” Aircraft could fly and fly so high. Seldom did we ever look at what actually happens in a maneuvering situation. We just didn’t have the techniques of examining that aspect in an ordered fashion, so to speak. . . . [Before] you always had an aircraft’s capability described in terms of “it will go so far, so high and so fast.” . . . As far as designing an aircraft, it didn’t tell you anything unless your aim was to fly faster and higher which might or might not have anything to do with your ability to do the mission.²⁶⁵

Although measuring these characteristics is valuable, none of them truly get to the heart of what the fighter pilot myth valued in aircraft: maneuverability, agility, and dogfighting capability. Some characteristics, such as wing loading, can give an imprecise sense of how quickly an aircraft can perform basic turns, but that measurement does not give a full picture of an

²⁶⁴ Mr. Thomas Christie Oral History Interview, October 3, 1973, USAF Historical Research Agency, K239.0512-962 [Hereafter cited as Christie OHI], 7.

²⁶⁵ Christie OHI, 2-3.

airplane's capabilities in a dogfight—how quickly it can slow down and accelerate, climb and dive, how agile it is across a wide range of maneuvers. Energy Maneuverability Theory is an attempt to measure those characteristics—how well an aircraft can change energy states and maneuver through them. As Boyd succinctly stated: “It allows you to define maneuverability. The ability to change altitude, air speed and direction in any combination. It turns out by playing back to that definition you use energy to measure any one of those three changes, or any of those changes in combination. You are able to display it in a very concise fashion and as a result develop great insight as to what one airplane can do versus another or vice versa.”²⁶⁶

Essentially, EMT was a tool fighter pilots could use to easily measure, quantify, and compare the qualities they found most desirable in an aircraft. Boyd's close friend and test pilot Everest Riccioni summed it up this way: “While many pilots desired maneuverability in their fighters, they never really bothered or managed to define the term. Only in Major John R. Boyd's work on Energy Maneuverability is the subject treated in such an analytical way that an aircraft designer might find the aerodynamic engineering parameters to provide ‘fighting parameters.’”²⁶⁷

Christie, in an interview several years later, emphasized that this method of analysis was not completely new. Even Boyd admitted that his ideas were influenced by others. Although in interviews Boyd frequently misremembered the names of authors and titles of papers, a number of scholars had applied thermodynamic ideas to aircraft performance. The most prominent was Edward S. Rutowski, an aerodynamics engineer who worked for Douglas, who published a paper

²⁶⁶ John Boyd, Oral History Interview, May 23, 1973, USAF Historical Research Agency, #859: K239.0512-859 [Hereafter cited as Boyd '73 Interview], 1.

²⁶⁷ Everest E. Riccioni, FR 39919 "The Air Superiority Fighter, A Modern Analysis," Research Report, Air War College, Air University, Maxwell AFB, Alabama, April 1968, 41.

called “Energy Approach to the General Aircraft Performance Problem” in the *Journal of the Aeronautical Sciences* in 1954. In this work, Rutowski argued that aircraft performance should be measured not by static measurements such as speed, climb rate, or range, but by their ability to shift from one characteristic to another in the shortest amount of time. Rutowski created a series of equations to measure this exact characteristic. This was almost identical to Boyd’s work, differing mostly in its application. As a fighter pilot, Boyd was using his version of Rutowski’s ideas as a way to measure maneuverability and thus to create a way to talk with engineers about the performance characteristics that were important to him as a fighter pilot and strong adherent of the “knights of the air” image. Rutowski had no such connections. Rather, he used the energy concept as a way to solve problems regarding the relationships between minimum fuel use and range when analyzing aircraft performance.²⁶⁸

What mattered most, and what made Boyd and Christie’s work so useful, was its presentation. The output of their computer programs was nothing more than a long list of numbers cataloging how a particular aircraft reacted to certain conditions. Boyd and Christie turned these into a visual representation that allowed pilots and engineers to easily and quickly “see” how aircraft performed across a variety of situations. Christie explained:

The key was how the presentation of results was made... of applying pure physics. We looked at aircraft maps, so to speak. I’m talking about the diagrams wherein you are able to look across an aircraft’s performance envelope which in the past might have included just lines depicting maximum speed and altitude. We looked at what went on inside those limits when an aircraft maneuvers. Could it sustain maneuvers? What could it do against the enemy? Could it turn tighter? . . . Now we had enough of a map across the whole aircraft steady state and that’s really what was new about it. . . . The newness was in the application.²⁶⁹

²⁶⁸ Edward S. Rutowski, “Energy Approach to the General Aircraft Performance Problem,” *Journal of the Aeronautical Sciences*, 21 (March 1954), 187-195.

²⁶⁹ Christie OHI, 3-4.

It should be emphasized that although Christie is correct in saying that the new element of his and Boyd's work was the application of the energy issue specifically to air-to-air performance, the visual aspect of these presentations had also been lifted from Rutowski's article. The concept of having a visual layout to see the conditions under which aircraft were the most maneuverable had been developed in Rutowski's 1954 paper. In a 1977 interview, Boyd admitted that he liked the way Rutowski's charts looked, so he "borrowed them."²⁷⁰ Boyd claimed that his work raised Rutowski out from obscurity, but Rutowski does not appear in the bibliography of any of Boyd's publicly available work. Christie also emphasized that the only reason why such analysis was possible was the impressive computing power available to them due to advances in computer technology. This powerful processing capability was not commonplace at the time, and it was available for this project only because Boyd and Christie were stealing access to the Air Force's expensive, state-of-the-art equipment.

Boyd's and Christie's earliest analysis was done exclusively on American aircraft, but Boyd wanted to use his new method to compare the US fighters with their Soviet counterparts. Fortunately for him, some of his former co-workers from Nellis had since moved to Wright-Patterson Air Force Base in Ohio and worked in the Air Force Technical Intelligence Center. Boyd paid them a visit and convinced them to give him data regarding Soviet aircraft. Boyd recalled getting "thrust curves, drag curves, weight fuel flows, the whole 'nine yards,'" for the MiG-17, MiG-21, Su-17, and Su-9²⁷¹ (It is possible that Boyd is remembering this incorrectly, as the Su-17 was still in development at the time—it's first flight was not until 1966. However, it is possible that Boyd was given some preliminary data on the plane's then-untested design). It is

²⁷⁰ Boyd CA interview, 87.

²⁷¹ Boyd '73 Interview, 12; Boyd CA Int., 102, 105.

unclear exactly what data he was given access to or how accurate it was, as at this point, in 1963, the Air Force had not been able to examine the then-latest generation of Soviet aircraft. Certainly some data may have been available from informants or observation. Boyd recalled that his colleagues were “optimistic” about the accuracy of their data, although it could not likely have been gleaned from measurements done on actual aircraft.

When Boyd and Christie used their computer programs to run comparisons of these Soviet planes against American ones, they were surprised. Boyd recalled: “I expected to see our airplanes, like the F-4 and all of those, look a lot better than the Soviet airplanes. I was really convinced in my mind—the way the writing went—that we were much better. Then we ran our first plots off. I said, ‘Gee, Tom, wait a minute. The Soviet airplanes are better. I think we made a mistake.’ . . . It never even occurred to me at that particular moment that the Soviet airplanes could actually be better than ours.”²⁷²

Boyd was initially worried that he had been given faulty data from the technicians at Wright-Patterson. He traveled back to Ohio and was assured that the data he had were correct, and he retrieved more recently updated information. When flying back to Eglin in a T-33, Boyd approached the runway to find a B-52 taking off. He could not resist his fighter pilot impulses and decided to engage the B-52 in mock combat, flying head-on at the giant nuclear bomber before inverting and sweeping under it, then swinging around for a second pass from behind, swirling tightly around the B-52. During both passes Boyd broke through the radio, shouting, “Guns, guns guns!” After the incident, Boyd was grounded.²⁷³

²⁷² Boyd CA Interview, 102, 103.

²⁷³ Coram, *Boyd*, 160-161.

Boyd happened to have a job at Eglin as a supervisor of the base graphics shop. This was a position he used to his advantage in creating the graphs that displayed energy maneuverability for various aircraft. It is unlikely that the technicians who reported to him at the graphics shop were happy with how he ran the place, forcing them to come in without advance notice in the middle of the night to work long, unapproved overtime shifts making graphs of Boyd's EMT data and then remaking them if they did not meet with Boyd's exacting standards. In any case, with the data for Soviet planes in hand, Boyd decided to make graphs that could "match up" American planes against their Soviet counterparts. He did this by taking the energy maneuverability charts for each plane and overlaying them. This gave a visual representation of the situations in which one plane had an energy advantage over the other. The graph showed that at particular altitudes and speeds, one plane might have a higher energy potential than the other—it could potentially accelerate faster or turn tighter in order to gain an advantage in a dogfighting situation. Boyd used color to drive his point home. Areas of the graph representing situations in which American fighters had an advantage were shaded blue, and areas where Soviet planes had the advantage were shaded red.²⁷⁴

²⁷⁴ Coram, Boyd, 158.

F-4 vs. MiG 21 at 1G

Differential Specific Excess Power Contours

Clean Configuration -- 50% Fuel -- Full Ammo -- Max A/B

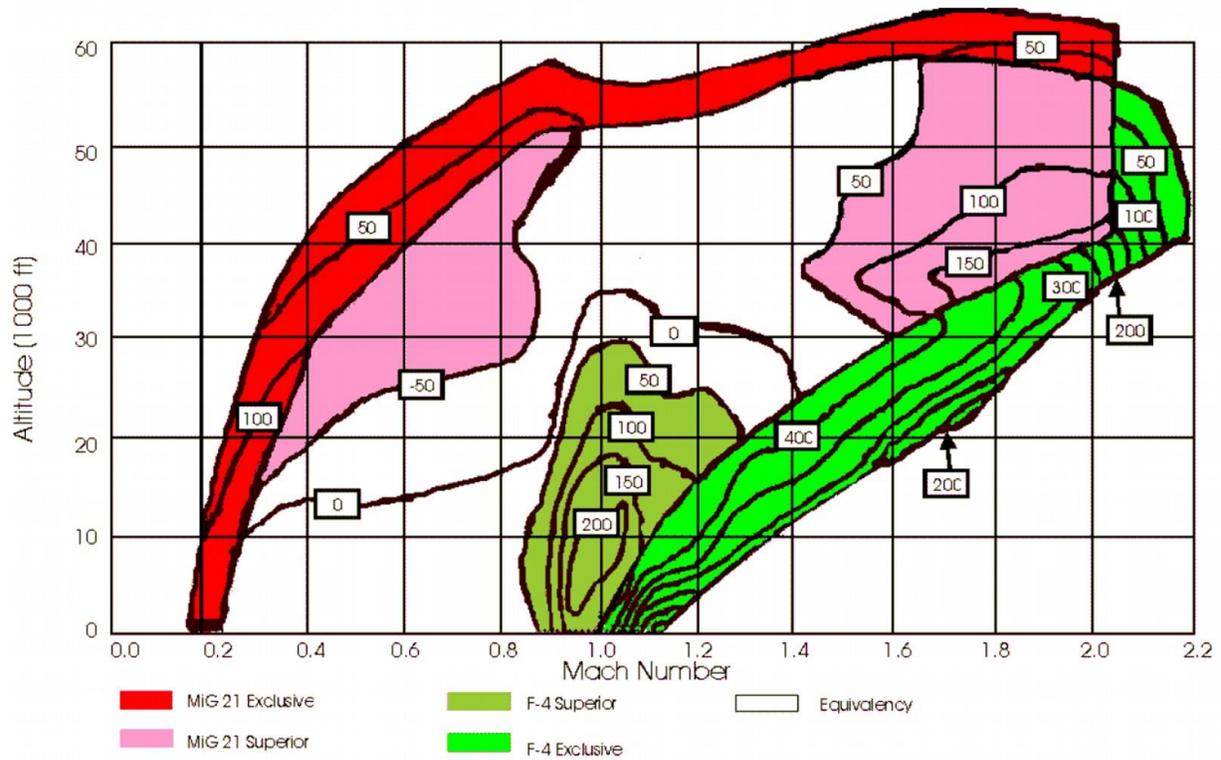


Figure 5-1 An example of an EMT chart showing the conditions in which an F-4 Phantom has an advantage over a MiG-21 (in green), as opposed to where the MiG has an advantage (in red). Courtesy of Major Daniel Chisolm, USAF Academy Department of Aeronautics.

F-4 vs. MiG 21 at 5Gs

Differential Specific Excess Power Contours

Clean Configuration -- 50% Fuel -- Full Ammo -- Max A/B

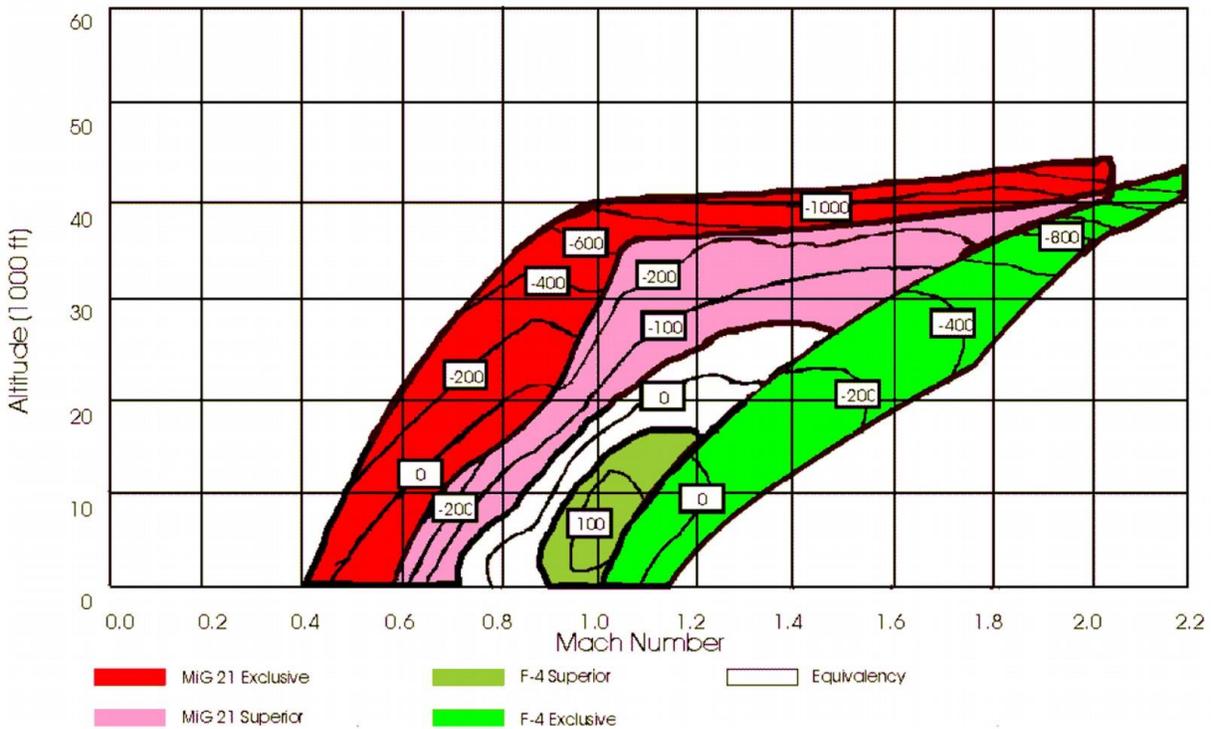


Figure 5-2 This chart shows the same comparison between and F-4 and a MiG-21, but specifically under conditions of a 5g turn. Courtesy of Major Daniel Chisolm, USAF Academy Department of Aeronautics.

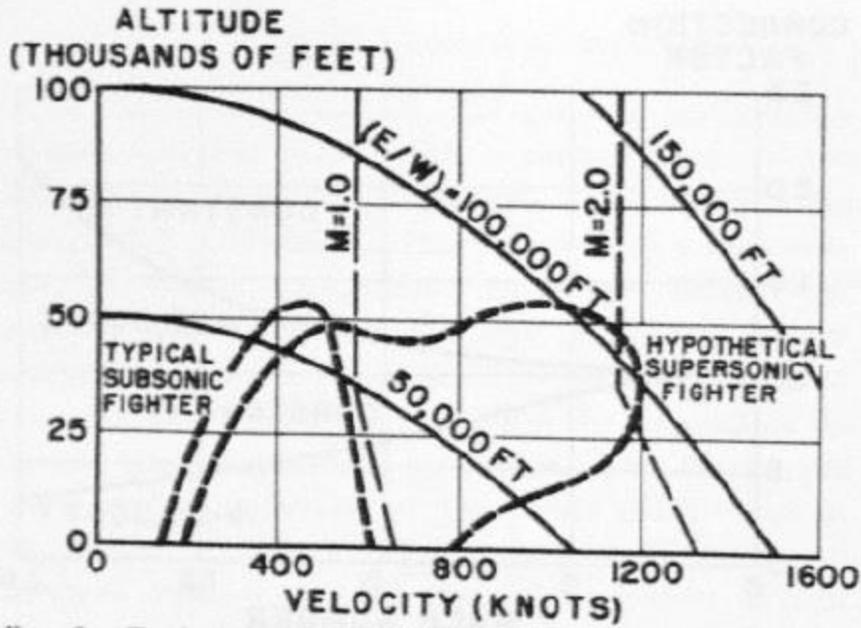


FIG. 2. Typical fighter speed-altitude envelopes superimposed on contours of constant specific energy.

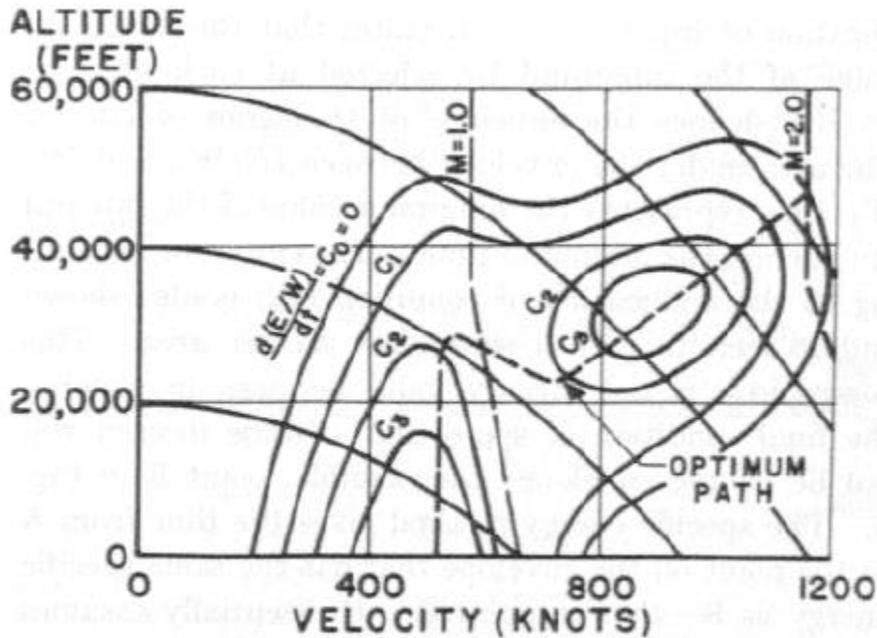


FIG. 4. Minimum time path by energy method for hypothetical supersonic fighter.

Figure 5-3 These two images are Rutowski's original depictions of energy maneuverability theory. Boyd borrowed the format of these charts for his own work. From Edward S. Rutowski, "Energy Approach to the General Aircraft Performance Problem," *Journal of the Aeronautical Sciences*, 21 (March 1954), 190-191.

While Boyd was developing EMT, other fighter pilot advocates, especially Myers and Agan, began using it to push for their own ideas. They sought a return to classic air-to-air combat fighters that could perform the “white scarf stuff,” and EMT gave them a mathematical language to express that stuff in a way that could be measured and visually charted. Their efforts would result in a program for a new aircraft that, unbeknownst to him at the time, Boyd would have a large hand in developing.

Penetrating the System

On July 1, 1964, around the time that Myers was developing his briefing to educate the free world about the necessity of “true” fighters, Agan became the Director of Plans, Deputy Chief of Staff for Plans and Operations at the Pentagon. That fall, Agan commissioned a committee of experienced fighter pilots, especially aces, to study the state of tactical aviation capabilities at that time. The chair of the group was Brigadier General Harrison Thyng, and included Brigadier General William Dunham, Colonel Francis Gabreski, Lieutenant General Winston Marshall, Colonel George Laven, Colonel Woody Davis, Lt Colonel John Burns, and Lt Colonel Jack Holly. The majority of these men had earned “ace” status in air-to-air combat in either World War II or Korea. Only Davis, Burns, and Holly were not aces, but Davis and Burns had extensive experience both flying fighter aircraft and commanding fighter groups, squadrons, and wings. Thyng and Gabreski stood out further—they were two of only seven pilots to achieve ace status in both wars. The assembly of this panel clearly reflected Agan’s interest in dogfighting expertise, and it may also have possibly reflected the ongoing pattern of fighter pilots looking to heroic individuals of the past to help define the future. Myers recalled that Colonel Jim Hagerstrom, a fighter pilot who had earned triple-ace status during the Korean War,

was also instrumental in this effort. Agan hoped the prestigious group could give serious leverage to his arguments both for placing a gun on the F-4 Phantom and, more optimistically, for starting development on a new fighter plane that would embody Agan's concept of a true fighter.²⁷⁵

The panel listened to a variety of briefings from Pentagon officials and others. Burns recalled that this panel was one of the first formalized efforts to make use of Boyd's EMT.²⁷⁶ Throughout this period, Boyd and Christie had been taking their ideas about EMT to almost anyone who agreed to an audience. When pilots passed through Eglin Air Force Base, where Boyd and Christie were stationed, Boyd attempted to schedule briefings with them. He traveled to Nellis Air Force Base to share his ideas with the fighter pilots there, and he even met with famed fighter pilot Chuck Yeager. During these briefings, Boyd tended to roam the room as he spoke, to the point of appearing to bounce as he waved his arms in excited gestures. Christie began referring to Boyd as "the Sugarplum Fairy," and eventually many of his friends used the same nickname, shortened to "Plumb."²⁷⁷

In early December of 1964, Myers presented his briefing to Agan's panel. Like Agan, Myers hoped the group could provide weight to their shared vision for a new fighter plane. Myers recalled,

The primary purpose of that panel, as I recall it was to sit and discuss and try to define out situation and our problem, like, it's one thing for a couple of civilians to run around and put together a briefing like that which pretty well defines our problem. But that really doesn't carry much weight. What we needed was a panel of Air Force officers to corroborate and describe a problem. That's what they did, define the problem and try to

²⁷⁵ Myers OHI, 31-32; also, Jacob Neufeld, "The F-15 Eagle: Origins and Development, 1964-1972," Office of Air Force History, November 1974, 6-7.

²⁷⁶ Burns OHI, 1.

²⁷⁷ Coram, *Boyd*, 163.

give General Agan some advice and recommendations on paper that he could use to try to launch a program.²⁷⁸

The fighter assessment panel did come to the conclusion that Agan and Myers hoped they would—that there was an urgent need for a new fighter plane that could handle newly developed Soviet fighters. However, the politics of the situation kept them from being vocal in their recommendations. Knowing that the Air Force was in the midst of its commitment to the F-111, the committee merely recommended further study. Burns recalled:

We concluded that we were diverging from the Russians in some very important parameters mostly having to do with fighter maneuverability. . . . The foundation on which fighter capability lies—the performance of the airplane itself—was become rapidly more deficient as time went on. . . . We concluded that a new tactical fighter was required that emphasized air combat. When the study was approaching final form we were very seriously concerned that this would not be well received in the Air Staff and also could have an adverse impact on the F-111 program which was then getting under way. So the recommendation of the study group was changed to request a study of the need for a new tactical fighter to be instituted immediately. The study expressed concern for the status of our air superiority capability.²⁷⁹

Myers claimed that the only reason the panel went as far as it did in recommending further study of new fighters was the impact of the “objectivity” and “pragmatic views” of Thyng and Gabreski. In the minds of fighter advocates such as Myers, they were simply being objective pragmatists, and it may not have occurred to them that their opponents were, in their own minds, attempting to be the same. In any case, the Office of the Secretary of Defense (OSD) received a copy, but took no action.

Myers blamed the lack of action on the Commander of Tactical Air Command (TAC), General Walter C. Sweeney, Jr., and on the general “SAC-ization” of TAC. Myers asserted that

²⁷⁸ Myers OHI, 31-32; also, Neufeld, “The F-15 Eagle,” 6-7.

²⁷⁹ Burns OHI, 1.

Bill Dunham, Director of Operations for the 12th Air Force, “had been instructed by General Sweeney to support the F-4 and cease making waves on the air superiority issue. That’s absolutely true! General Sweeney was commander of TAC, but he was really SAC-oriented. He didn’t understand these things we’ve just talked about. He had little interest in conventional weapons.” Speaking to Sweeney’s forceful nature, Myers underscored: “If you’re a brigadier general or a colonel and you’re working for Sweeney, baby, you adopt the party line.” He argued that resistance to a new fighter was essentially a bureaucratic problem because the decision-makers had to defend their commitment to purchasing certain aircraft, and those who worked further down the chain could not openly question their superiors. He explained: “It’s built into the system and there’s nothing you can do about it. You’re working for General Sweeney, he has just proclaimed to the world and the Congress that the F-4 is the greatest thing since moonshine. . . . Now you’re going to go into Washington as a member of an ad hoc group and sign your name to a paper that says that the F-4 was a mistake? Not on your life; there’s nobody around here who’s going to do that!”²⁸⁰

Sweeney, however, seems to have had at least some openness to new ideas, since he asked to hear Boyd’s briefing regarding the details of EMT towards the end of 1964. Before that meeting could happen, Boyd had to give the briefing to General Bernard Schriever, head of Air Force Systems Command. During that meeting, General Allman Culbertson, Boyd’s commander at Eglin, noted that there was no official project listed for Energy Maneuverability research. Boyd, in one of the more ostentatious displays of the fighter pilot’s stereotypical lack of respect for authority, not only admitted to stealing computer time, but bragged about it: “I can steal computer time on any computer you have in this whole command and you would never know it

²⁸⁰ Myers OHI, 33-35.

if I did not want you to.”²⁸¹ According to his recollection, he was threatened with a court-martial yet again, depending on how his upcoming meeting with Sweeney went.

Boyd himself told two different versions of the meeting with Sweeney. In a 1973 interview, Boyd referred to arguments against his work that were said during that meeting as an issue of “dirty linen” before lumping Sweeney in with those who “didn’t think it—the EM concept—was any good.”²⁸² Four years later, in his Corona Ace interview for the Office of Air Force History, Boyd recalls that Sweeney was “pissed” at the meeting but not at Boyd himself. Rather, Sweeney was angry that the Air Force’s planes seemed inferior to Soviet planes. Boyd’s biographer Robert Coram, basing his narrative on oral interviews done much later, reports that Sweeney was in fact convinced, especially by Boyd’s critique of the F-111—a plane that was supposed to provide air superiority through the next decade. However, when asked for his analysis of the plane, Boyd simply said: “General, I’d pull the wings off, install benches in the bomb bay, paint the goddamn thing yellow, and turn it into a high-speed line taxi.”²⁸³ Both of these sources indicate that Sweeney was in fact convinced by Boyd’s arguments, not only approving of his conclusion but also directing him to brief more officials in command. These included a series of four-star generals, the USAF Scientific Advisory Board, the President’s Scientific Advisory Board, the Air Force Science and Engineering Symposium, and the Secretary of the Air Force. As Boyd remembered, “the whole thing started penetrating the system.”²⁸⁴

²⁸¹ Boyd CA Interview, 112.

²⁸² Boyd ‘73 Interview, 8.

²⁸³ Coram, *Boyd*, 176.

²⁸⁴ Coram, *Boyd*, 176; Boyd CA Interview, 118-119, quote on 119.

Voices in The Wilderness

Yet the fight for traditional air-to-air fighters was not a completely internal matter—external forces and other individuals also pushed the Air Force in this direction. Early problems in Vietnam caused the Air Force to look closely at the state of its inventory. First, in March and April 1964, two T-28 Trojans experienced wing failure—meaning their wings peeled off in mid-flight, killing the pilots. Second, the RB-26 aircraft in the theater showed signs of wing failure, and were grounded as a result. That December, Secretary of the Air Force Eugene M. Zuckert requested \$50 million to expand and update ground attack and reconnaissance planes. The next month, Secretary of Defense Robert McNamara granted \$10 million. However, McNamara also instructed the Air Force to consider developing a new aircraft that would be specialized for ground attack, and that they could “assume” that the US would have tactical air superiority in Vietnam.²⁸⁵

Zuckert and many other members of the Air Staff found this assumption disturbing. They also thought that consideration of a new fighter must be based on how that potential fighter would impact the current structure of tactical forces. Luckily, this was a question that the Air Staff began studying in August 1964. Lieutenant Colonel John W. Bohn, Jr. had been leading this study, which concluded in February 1965 yielding the report “Force Options for Tactical Air.” Boyd was at least tangentially involved in this study. In 1964 he had briefed Agan and Burns about his EMT concept, and they may have incorporated those ideas directly into the Bohn study.²⁸⁶ In any case, the basis of the study was that the new, expensive planes that the Air Force was pursuing – especially the F-111 – were too costly to be risked in limited war scenarios and

²⁸⁵ Nuefeld, “The F-15 Eagle,” 7-9.

²⁸⁶ Boyd '73 Interview, 7.

should be saved for the higher stakes situation of larger nuclear wars. For smaller conflicts, the Bohn study examined low-cost alternatives, including modifications that stripped existing planes of costly features, making them cheaper and, by implication, more expendable. The study examined stripped down versions of the A-1E Skyraider, the A-6 Intruder, the F-104 Starfighter, and even the F-4 Phantom. The study rejected all of these options. It argued that the low-cost aircraft (such as the A-1) did not meet performance standards, but they also claimed that the higher performing planes were too expensive to risk in a limited war. Instead, the Bohn study recommended a mix of high and low cost airplanes, suggesting that the Navy's A-7 Corsair II or Northrop's F-5 would be suited for the support role. The A-7 could handle a larger payload, but the F-5 was considered more effective in the air-to-air role.²⁸⁷ This marked the beginning of a long, fierce debate regarding procurement of the A-7 versus the F-5, an argument that later influenced the direction of development for the F-15 Eagle.

The Bohn study was released on February 27, 1965, only a matter of weeks after General John P. McConnell took over as Chief of Staff of the Air Force. Agan had convinced McConnell to agree with his view of the need for a dedicated air-to-air fighter. McConnell was concerned that new Soviet interceptors were more than a match for USAF's current inventory, although he was also very concerned with the ability of US planes to survive anti-aircraft (AA) fire. This was especially so after March 2, when three F-105 Thunderchiefs and two F-100 Super Sabres were shot down over North Vietnam. Zuckert mostly agreed with McConnell, and on March 16, he forwarded the Bohn study to the Office of the Secretary of Defense (OSD) and asked for authorization to purchase two wings (which could amount to several dozen aircraft). However, Zuckert also specified that these F-5s were only to serve as a temporary placeholder while the

²⁸⁷ Nuefeld, "The F-15 Eagle," 9.

Air Force pursued a medium cost tactical fighter. In April, Zuckert made this request more clear when he told McNamara that this new fighter should have “significant air-to-air fighting capability.”²⁸⁸

In April 1965, work on a new fighter began in earnest, and interest in a new fighter sprang up from other departments as well. To some degree, this was spurred by Lieutenant General James Ferguson, who had extensive fighter experience both as a pilot and as a group commander during World War II before serving as Vice Commander of the 5th Air Force in Korea. In 1965 he was working at Air Force headquarters as deputy chief of staff for research and development. During this time he talked with Dr. Harold Brown. Brown was a physicist who had been active in the defense community for many years as a consultant and served on many advisory committees for the Air Force, the Department of Defense, and the US government as an expert on nuclear physics. In 1961 he became Director of Defense Research and Engineering (DDR&E) for the Department of Defense. In April 1965, Ferguson convinced Brown of the need for dedicated air-to-air fighters. Brown agreed to a purchase of F-5s as a place holder and also authorized the development of a new fighter, the Fighter-Experimental, or F-X.

Ferguson established a “working group” in the Air Staff led by Brigadier General Andrew J. Evans, Jr., the Director of Development, and science advisor Dr. Charles H. Christenson. This group conducted a series of studies on a possible new fighter, envisioned as a single-seat, twin-engine craft that emphasized maneuverability as more important than speed, that included superior air-to-air and all-weather (radar) capability, but that could still excel in a ground attack role with assistance of a ground-looking radar system. Representatives from Brown’s office warned Ferguson, as well as the Director of Operational Requirements, Major

²⁸⁸ Neufeld, “The F-15 Eagle,” 7, 10, quote on 10.

General Jack J. Catton, that funding such an experimental fighter would be difficult if the craft was too specialized. Catton and Ferguson quickly surmised that the Air Staff indeed generally frowned on designing planes for specialized roles. Their solution was—as historian Jack Neufeld termed it—to “disguise” the F-X as a “close support fighter” that gave top billing to its ground attack capability, although the working group intended to make a dedicated air-to-air fighter.²⁸⁹

Burns remembered this period a bit differently, noting that there was a “contradiction,” a “dichotomy” between the Air Staff and TAC in 1965. The Air Staff—specifically Ferguson—asked Systems Command to look at low-cost planes that were “optimized for visual ground attack but with air-to-air capability against Soviet fighters,” but for the Air Staff air combat was essentially a side show. Burns alleged that Ferguson and the rest of the Air Staff considered air-to-air fighting “frivolous,” especially in light of the emphasis that the OSD Systems Analysis team placed on measurability. He noted: “They [the Air Staff] were very concerned that an airplane that did the ‘frivolous’ thing of air-to-air fighting would not be saleable in the Washington environment and that with the OSD SA guys being as powerful as they were in that kind of an analysis—aggregated target arrays, so many sorties, so many bombs and rockets, you can measure that sort of thing—so that RDQ Air Staff activity was aimed at producing a lower cost airplane” it would be “primarily an air-to-ground attack airplane.” TAC took its position clearly: “No. We need an air-to-air airplane. Then whatever air-to-ground capability falls out, okay.” Over time the issue became more polarized.²⁹⁰

This battle between ground attack and dedicated air-to-air fighting became the defining debate not only for this aircraft but for those that followed it. Although fighter advocates had

²⁸⁹ Neufeld, “The F-15 Eagle,” 11.

²⁹⁰ Burns OHI, 27-29.

won both authorization and funding for their new project, they had not yet succeeded in redefining the role of the fighter and convincing other leaders of their view that “white scarf stuff” was important to winning wars. Burns recalled of his group of fighter advocates: “We were voices in the wilderness in those days.”²⁹¹

The growing conflict in Vietnam, however, helped push others to agree with the fighter advocates and had important effects on the battle for a dedicated air-to-air fighter. Only two days after Brown authorized studies on the F-X, on April 4, 1965, a group of forty-eight F-105s raced toward Thanh Hoa bridge, intending to destroy it, escorted by four F-100s. Because some elements of the strike were late, many of the Thunderchiefs, organized into flights of four planes, were hovering around the target. Suddenly, four small gray aircraft emerged from the mist and pounced on a group of F-105s. They were MiG-17s. The MiGs dove towards two F-105s who apparently did not hear the warnings shouted at them from their wingmen. Bullets tore through the F-105s. As this was unfolding, two flights of four F-100s each were dispatched to the area and became tangled in their own dogfight with the MiGs. One of the enemy planes maneuvered into firing position behind an F-100 and nearly destroyed it before another US pilot was able to fire warning shots to frighten the MiG away. The rescued F-100 was able to maneuver into a straight vertical dive, achieving zero-g while firing on the MiG and damaging it before barely being able to pull out of the dive in time. While twirling through the mist with other MiGs, one of the F-100s did achieve missile lock with a heat-seeking AIM-9 Sidewinder, but did not fire for fear of the missile possibly tracking a friendly F-105. At the same time, a group of Navy F-4 Crusaders approached during the fight and fired a missile into the fray that did not hit any target.

²⁹¹ Burns OHI, 17.

After all was said and done, one MiG was damaged and two F-105s were lost, both of the pilots killed.²⁹²

When recalling the event, the pilots reported a number of problems. Some stemmed from technical issues such as the large number of switches necessary to switch the airplane to air-to-air mode, which, for example, caused one F-105 pilot to miss the opportunity to fire on a MiG. There were issues of discipline – the radio frequency was filled with chatter from the entire strike group, causing significant confusion and missed calls. Still other problems came from the lack of air-to-air training and experience of the F-105 crews – the F-100 pilots were all highly trained and experienced in air combat. Still other problems were caused by the haze that covered the battle area and made tracking and identifying aircraft difficult. Some pilots also noted that their aircraft fell short of the MiGs in maneuverability or air-to-air performance. One F-100 pilot reported that his “F-100 could not match MiG turn.” Another elaborated: “Day fighters not too effective over enemy GCI [Ground Controlled Intercept] environment. MiGs easily slipped around small number of MIGCAP [Combat Air Patrol] aircraft.”²⁹³

Although the pilots involved in the strike mourned the loss of their fellow pilots, Myers had a different reaction to the news. “I was in bed on the West Coast when that happened and as rapidly as the news could get back somebody called me from Washington to say; ‘It happened. . . . Just like you said it would happen. A flight of guys in ‘tac’ fighters carrying a lot of advance were jumped by Migs, they flailed around and the Migs shot a couple down and escaped scot-

²⁹² Weapons System Evaluation Group Report 116: Air-to-Air Encounters in Southeast Asia, hereby cited as “Red Baron Report 1,” Vol. 2: F-105 Events Prior to March 1967, September 1968, 35-38; Red Baron Report 1, Vol 3: Events From 1 March 1967 to 1 August 1967 and Miscellaneous Events [This report does contain events outside that date range, including the event described here], February 1969, 37-43.

²⁹³ Red Baron Report 1, Vol 3, quotes on 38, 41 respectively.

free.’ That helped.” He elaborated, “Up to this point there had been no air combat in SEA [Southeast Asia]. . . . Suddenly there was a rebirth of the air fighting mission.”²⁹⁴

Ferguson in particular was concerned and worked with Air Force Systems Command (AFSC) to conduct studies on yet another potential new fighter with STOL (Short-Takeoff and Landing) capability. Colonel Burns, who had been a member of the Thyng fighter panel as well as a member of the Bohn study, pounced on this as an opportunity to use the interest in STOL to push his fighter concept. He immediately drafted a position paper on the necessity of an air superiority fighter. He recalled: “This was the opening that we needed. That night we prepared a wire saying that we didn’t need a vertical takeoff and landing airplane. . . . What we needed was an improved combat maneuvering fighter with total air combat performance. . . . What we needed, therefore, was a STOL fighter airplane. That was a euphemism to cloak it under the V/STOL program.”²⁹⁵ Sweeney, then commander of TAC, did show more interest in the proposal than he had earlier, yet he still refused to issue any formal requirement for a lightweight fighter. Burns recalled that he thought Sweeney accepted his proposal for a new fighter, the F-X. This new aircraft would be 30,000 to 35,000 pounds and emphasize agility and air-to-air capability. According to Burns, in April 1965, Sweeney even wrote out the official requirement for it, yet he refused to officially sign off on it because he was set to retire shortly. Historian Jack Neufeld has argued that Sweeney’s lack of commitment to major changes could be from his deteriorating health. The commander had been struggling with cancer, which at the time of this incident was only a few months away from claiming his life.²⁹⁶

²⁹⁴ Myers OHI, 36, 25-26.

²⁹⁵ Burns OHI, 4.

²⁹⁶ Burns OHI, 4; Neufeld, “The F-15 Eagle,” 12.

It should also be noted that Burns claims that his plan (and that of other fighter advocates) all along had been to create a plane like the F-15 – “a very highly maneuverable airplane with outstanding combat maneuverability that would have somewhat less, or approaching the radar and missile capabilities of the F-4” – and it was to be ready for service in 1970. But that this would be followed up by another new fighter, which he called the F-X2, “which would have more emphasis on avionics and missilery.”²⁹⁷ Although it is possible that Burns was placing this concept earlier than it actually arose or may have been conflating later events, it is also possible that, as early as April 1965, certain members of the fighter community were thinking of a mix of two types of fighters, planning to follow up the F-15 with another new fighter. Even if that is the case, the program later called F-XX (that led to the F-16 Falcon) was much different from what Burns described here.

Yet Burns’ efforts were not completely unrewarded. In June 1965, TAC created a panel to study the threat of new Soviet fighters. This panel might have been expected to toe the line, typical at that time, that multi-purpose fighters and interceptors emphasizing speed were the key to victory. But they did not. The panel matched Burns’ views closely, arguing that to defeat emerging Soviet threats, the Air Force needed a small, lightweight day fighter that emphasized maneuverability instead of speed.²⁹⁸ Their recommendation also paralleled the early F-X working group studies, arguing for a single-seat, twin-engine craft of between 20,000 and 25,000 pounds. For comparison, a completely empty F-4 Phantom weighs over 30,000 pounds, with a

²⁹⁷ Burns OHI, 6.

²⁹⁸ The “day” designation meaning that it did not require extensive radar and avionics equipment designed for low-visibility conditions

maximum takeoff weight more than twice that number. The panel's report was not circulated, but does serve as a summation of TAC's position regarding what they wanted the F-X to be.²⁹⁹

Although this early encounter with MiG fighters provided ammunition for fighter advocates, its effects were not immediately felt; nor could they overcome other, more bureaucratic forces at work. At the time, Air Force leaders were still embroiled in the argument about procuring either the A-7 or the F-5. After the Bohn study, Zuckert had recommended the F-5. However, another pertinent study, called "Tactical Fighter Ground Attack Aircraft," led by Colonel Bruce Hinton, was completed in June 1965. This team argued that the A-7 would be the preferred airplane for ground attack, but only if air superiority could be assumed. Hinton's study noted that this was a dangerous assumption to make and thus recommended the F-5. Some members of the Air Staff resisted the F-5 because of its increased cost—the A-7 was simply cheaper, although Hinton noted that costs could be offset by selling more F-5s to allied nations.³⁰⁰ Burns recalled that Hinton's work, although it was based on creating a ground attack plane, was very concerned with achieving air-to-air capability that he thought was lacking in the Air Force at the time. Burns also remembered Hinton's study as including the first official use of the F-X designation.³⁰¹

OSD was committed to the concept of commonality, and it wanted both the Air Force and Navy to use the same (if slightly modified) aircraft; thus McNamara's office was pushing for the A-7.³⁰² Pierre Sprey, working as a consulting statistician at Grumman at the time, recalled that the Air Staff was not happy with either option. He recalled: "The Air Force didn't want either

²⁹⁹ Neufeld, "The F-15 Eagle," 12.

³⁰⁰ Neufeld, "The F-15 Eagle," 10.

³⁰¹ Burns OHI, 32.

³⁰² Neufeld, "The F-15 Eagle," 13.

airplane. They didn't want the A-7 because it was a 'goddamn Navy' airplane and they didn't want the F-5 because it was too cheap and not fancy and glamorous enough and it didn't go to Mach 2."³⁰³

Tempers flared about which aircraft to buy, and fighter advocates such as Zuckert emphasized that either craft was simply a placeholder until a fuller study for a new medium fighter could begin. In the midst of this, in July 1965, General Gabriel P. Disosway took over as the commander of TAC. That same month, McNamara called for a joint study between the Air Force and OSD to settle the A-7 versus F-5 issue and, at the same time, endorsed the effort for studies for a medium fighter, now designated as F-X for "Fighter Experimental."³⁰⁴

Just what that fighter would look like was still a matter of fierce contention, since TAC and fighter advocates generally pushed for a dedicated air-to-air platform while the Air Staff was still generally sold on a ground attack concept in mid-1965. Contractors, eager to get ahead on potential future sales, began preliminary designs on up to six types of planes in order to cover the wide range in what the new F-X could become. For each of the two "families" of aircraft (ground attack and air-to-air), contractors designed three options based on price: low- (\$1.2 million), medium- (\$2 million), and high- (\$3.2 million) cost options. TAC and the Air Staff were fiercely debating each other about performance measurements, especially top speed. TAC wanted a slower plane, under Mach 2, that could emphasize maneuverability, while the Air Staff wanted Mach 2.7, which introduced structural engineering requirements that were anathema to TAC's concept of a light, agile fighter. As a result, contractors had to design several options within each

³⁰³ Pierre Sprey, Oral History Interview, June 12, 1973, USAF Historical Research Agency, K239.0512-969 [Hereafter cited as Sprey OHI], 34.

³⁰⁴ Neufeld, "The F-15 Eagle," 13.

of the six categories. Burns recalled that this “ended up with each company producing several thousand designs.” Faced with the Air Staff’s insistence, TAC and the fighter advocates became even more hardened in their own contrary view that a dedicated air-to-air platform was necessary. Some in the fighter community began to think that, if they caved to the Air Staff on this plane, there would be no hope to achieve their goals in the future. Burns claimed to express the sentiment at TAC when he said: “Godammit, it’s time we got the message across to people that air combat is a very serious business and we’ve got to prepare for it. We’ve got to have it recognized. We might win *this* airplane by sneaking it in, but we’ve got the future to think about.”³⁰⁵

That Fall, Brown was named to be the next Secretary of the Air Force. When this was announced, Brown changed his position on the A-7/F-5 debate. He had formerly backed the F-5 but switched to fully endorsing the A-7. This disappointed some fighter advocates who wanted to procure the F-5 for the air-to-air role. But others judged that procuring the A-7, which tended toward more ground attack roles, could create an opening for a new dedicated air-to-air fighter – the F-X. Indeed, on September 30, 1965, the day before he took office as Secretary of the Air Force, on his last day as DDR&E, Brown approved a request from the Air Force for \$1 million to go towards further F-X studies. Disosway, a former fighter group commander during World War 2, was influenced by Burns’ work and on October 6, 1965, he did what Sweeney had previously refused to do: He issued a Qualitative Operational Requirement (QOR) for an air-to-air fighter. Whether it was based on one that Sweeney himself had originally written is unclear, although Burns claimed to have written the QOR himself.³⁰⁶ Although he clearly did not agree with

³⁰⁵ Burns OHI, 29-30, emphasis in original.

³⁰⁶ Burns OHI, 31.

Catton's and Ferguson's assessment that the Air Staff would not properly fund a specialized plane, Disosway did change certain previous recommendations that some fighter advocates had found objectionable. For the most part, these originated largely with Burns, who by this point, was serving as Disosway's operations advisor, a position shared with Colonel Gordon M. Graham. Specifically, Disosway increased the weight requirement by 10,000 pounds, included radar capability, and specified that the plane carry guided missiles (both infrared and radar-guided).³⁰⁷ Despite these additions, which were not in line with the "white scarf stuff" that some fighter advocates wanted to pursue, the Air Force now had a requirement to develop a dedicated air-to-air fighter that emphasized maneuverability and dogfighting capability over speed and interception.

The next month, the embryonic F-X received a further boost in the wake of the F-5/A-7 debate. On November 5, 1965, McConnell and new Secretary of the Air Force Harold Brown proposed the Air Force purchase 264 A-7s. Some viewed this as blatant appeasement of OSD, and Sprey went so far as to accuse the authors of the USAF/OSD joint study of falsifying their data.³⁰⁸ Disosway recalled that his decision to recommend the A-7 had been motivated simply by cost. However, the A and B models of the A-7 did not meet the Air Force's desired performance standards, so Disosway ordered 42 specific modifications to the "engine, seats, guns, everything." The A-7's cost more than tripled, from \$609,000 per plane to \$1,900,000. The decision also galvanized frustration with the Navy. Disosway recalled: "The Air Force was pretty

³⁰⁷ Neufeld, "The F-15 Eagle," 13-15.

³⁰⁸ Neufeld, "The F-15 Eagle," 14; Sprey OHI, 36.

damn sick of getting the Navy aircraft, the F-4 and the A-7 and whatnot, and they just had a thing about it.”³⁰⁹

This discussion of the A-7 is important for two reasons. First, the idea of using F-5s to fill the air-to-air role is one to which fighter advocates returned in earnest a few years later. Second, the fact that the Air Force now had an upgraded plane that was stronger in the ground-attack role left an opening. As Lieutenant General Glenn A. Kent, who worked in the Air Force Directorate of Requirements at the time, recalled: “The decision was made to go ahead and buy an A-7, an aircraft designed primarily for air-to-ground. With that decision behind us, there was immediately, and rightly so, greater emphasis on an aircraft designed primarily for air-to-air combat. . . . There was a push toward ‘now let’s get on with an F-X.’”³¹⁰

No True Fighter

The first step in “getting on with it” happened on December 8, 1965, when the Air Force sent thirteen aircraft companies the service’s call for proposals for design studies for the F-X.³¹¹ This was a sign that the Air Force was serious about moving forward; the only question was what type of aircraft the new fighter would be: Would it be truly dedicated to air combat in the way fighter advocates wanted, or would it be a multi-purpose, jack-of-all-trades craft like OSD and many members of the Air Staff wanted?

³⁰⁹ General Gabriel P. Disosway, Oral History Interview, October 4-6, 1977, USAF Historical Research Agency, K239.0512-974 [Hereafter cited as Disosway OHI], 274-275.

³¹⁰ Lt Gen Glenn A. Kent, Oral History Interview, August 6, 1974, USAF Historical Research Agency, K239.0512-970 [Hereafter cited as Kent OHI], 3.

³¹¹ Neufeld, “The F-15 Eagle,” 17.

Agan, one of the loudest voices among the fighter advocates, took his arguments to a wider audience in December 1965, when he published the article “Tactical Airpower Criteria for the Future” in *Air Force/Space Digest International*. In the article, Agan argued:

A smaller aircraft than the F-111, and possible than the F-4, is needed—and needed now. It can be smaller because we can plan to use it for air superiority and close air support and thus can accept less range and payload in order to get superior agility. We can accept less range because the majority of the targets which we expect in close air support will be within 250 miles (400 km) of the forward edge of the battle area. We can accept less payload because of improved ordnance and more accurate delivery of weapons. Such an aircraft may be able to win the air superiority fight over the battlefield. It should be a medium cost aircraft, because we will need many.³¹²

Here he made several of the arguments key to fighter advocates that became refined in the following years, while attempting to dismantle arguments that were “conventional wisdom” in the Air Force at that time. Agan emphasized that lighter weights and increased maneuverability were superior to speed, range, and payload. However, he still felt the need to emphasize multi-role capability, as the Air Staff was still reluctant to fund specialized aircraft.

Meanwhile, Boyd and Christie continued to brief various figures of influence within the Air Force, Navy, and the Pentagon regarding EMT. Specifically, throughout the remainder of 1965 they continued to speak against the F-111 but also disparaged the F-105 Thunderchief and the F-4 Phantom as inadequate for the roles they were assigned. The Phantom, they said, was especially ill-suited to air-to-air combat because of its size and weight, and they asserted that guided missiles were useless in a dogfighting scenario. Boyd’s and Christie’s influence grew as they drew supporters to their cause, which in late 1965 came to include Dr. John S. Foster, Jr., then the Director of Defense Research and Engineering at the Pentagon, essentially the third-

³¹² Quoted in Neufeld, “The F-15 Eagle,” 14.

highest ranking position in the DOD. Foster was, according to Boyd's biographer, "shaken" by Boyd's briefing.³¹³

Yet as Boyd grew more influential, he also created many enemies, both because his ideas stepped on the toes of many others in the DOD and USAF, and because some people found his personality off-putting. Boyd's "fighter pilot" mentality, which went beyond even the stereotype, often expressed itself as a penchant for confrontation. His tendency to view interpersonal interactions the way he would a dogfight (and express the typical fighter pilot traits of competitiveness, arrogance, and aggressiveness) earned him many enemies. For example, in late 1965, while on a coffee break at Eglin, Boyd happened to run into the man who had been in charge of the computer shop, a civilian employee who had originally been skeptical of Boyd's research. Boyd could not resist confronting the man, listing off the names of important people and groups that he had been invited to brief with his ideas. While slamming his hand into the man's chest with almost every syllable, Boyd accosted the man, saying: "You didn't think my work was important enough for your goddamn computer and now I got four-stars calling me for briefings. Everybody in the Air Force has heard of energy-maneuverability. You. Don't. Know. Shit." As the man tried to calmly walk away from the encounter, Boyd stopped him, pulled the smoldering cigar out of his mouth and pressed it firmly against the man's tie. The man pushed Boyd away and tried to leave, but Boyd, ever eager to display the most extreme version of the fighter jock mentality, chased after the man, shouting, "You're a loser. A fucking loser. Go on, get out of here. Run. You're a fucking loser!"³¹⁴ This was but one example of Boyd's legendary attitude, and it created many enemies for him. By the end of 1965 his influence had grown, but

³¹³ Coram, *Boyd*, 178.

³¹⁴ Coram, *Boyd*, 179-180.

so had the list of people who nursed a venomous hatred for him. At Eglin, Wright-Patterson, and various other places throughout the Air Force, anti-Boyd coalitions formed and grew, many of which would attempt to block his influence in the years to follow.

It could be that the man Boyd accosted, who was the head of the computer shop at Eglin, initiated an investigation of Boyd's illegal computer use. Regardless of whether this was the person who initiated the complaint, the Inspector General of AFSC arrived at Eglin to investigate allegations that Boyd had stolen approximately \$1 million worth of computer use. At stake was certainly a court-martial, and if convicted, Boyd could not only have been thrown out of the Air Force and forced to repay that amount but also have faced a term in prison. The conclusion of the investigation was that no charges were filed. The issue was dropped because, the investigator argued, Boyd's work (specifically, his EMT studies) was significant to national defense.³¹⁵

In 1966, one of Disosway's goals in his new position was to increase the perceived importance and influence of TAC compared with other major commands (SAC and MAC). To do this, he had regular conferences with TAC theater commanders, specifically, General Bruce Holloway, who commanded USAFE (US Air Forces Europe) at the time, and General Hunter Harris, who then commanded PACAF (Pacific Air Forces). These conferences often resulted in official position statements, called the "Twelve Star Letters" in reference to the three four-star generals coming together. The first of these letters came in February 1966 and argued that a dedicated air-to-air fighter was needed. Burns claimed to have written this letter himself. Whether he did or not, it certainly reflected his views, arguing that air superiority would be "seriously jeopardized" by designing the F-X as a multi-role plane. Instead, the letter urged that

³¹⁵ Coram, *Boyd*, 181-182.

the F-X be dedicated solely to air-to-air combat.³¹⁶ This battle over whether the F-X should be a multi-purpose craft or should be dedicated solely to air combat raged inside the Air Force for over two more years.

Concern that air-to-air capability in the Air Force was degrading went far beyond paper studies. Beginning late in 1965 and continuing into early 1966, the Air Force conducted a study called “Feather Duster,” an attempt to analyze the air combat capability of USAF because of a widespread sense that there was a deficiency in that area. The project report states this directly, noting: “The enemy has the capability to meet us in the air at any time under conditions of his choosing. To meet this threat it is imperative that we analyze the enemy capability and develop tactics which will favor our aircraft and armament systems over his.” The Air Force conducted two studies using F-86 Sabres – which had nearly identical characteristics to the older MiG-15 – to simulate the MiG-17 and MiG-21 in air-to-air combat against several USAF planes at various altitudes with both planes taking offensive and defensive roles. In these tests, little effort was made to simulate enemy tactics, and both sides used American fighter doctrine.³¹⁷ The accuracy of the simulation was questionable, as the F-86 was inferior to the newer generation of Soviet fighters. However, these aging planes were the best tools the Air Force had available.

The most important conclusion of Feather Duster was that “The MIG-15/17/21 will all out-perform any of our fighters at Mach numbers below .9 at any altitude.” The study emphatically advised against engaging in dogfights: “Above all, do not enter into a shin-kicking, G-pulling contest with a MIG. He has more G's available to him at the lower Mach numbers (below .85) and any turns will cost you speed, forcing the battle to be fought in his advantage

³¹⁶ Neufeld, “The F-15 Eagle,” 15, Burns OHI, 33.

³¹⁷ PACAF Tactics and Techniques Bulletin: Counter-Air Tactics Bulletin #45, 26 July 1966, 1.

envelope.” The tests also emphasized the importance of early detection, determining that success often depended on seeing the enemy before he attacked.³¹⁸

Sprey thought that the Feather Duster tests were instrumental in revealing the need for a dedicated air-to-air fighter, because according to his (and other fighter advocates’) definition, the Air Force did not even own a fighter that could handle the “white scarf stuff.” He stated:

Featherduster revealed to the people involved... that neither the tactics, nor the hardware, nor the Air Force were in very good shape. The hardware certainly wasn’t well-suited to air-to-air combat and they had no single airplane that kind of stood out and did well. . . . There was a dawning awareness that they [the Air Force] were in trouble, that anybody who even threw a few antiquated fighters against them was going to do pretty well despite all the high technology in their own so-called fighters which weren’t fighters, they were bombers.³¹⁹

While the Feather Duster tests were still ongoing, in March 1966 the Air Force granted contracts to three companies to begin preliminary studies for their designs of a possible F-X: Boeing, Lockheed, and North American. Grumman also participated in the study, but at their own cost; they received no funding from the Air Force. These studies were dominated by the desire to have a multi-purpose craft that could challenge Soviet aircraft in terms of maneuverability, but also have long-range and ground-attack capability.

Kent described the process of requirement creep, in which more and more capabilities became required of the F-X, driving up its size, weight, and cost. He recalled,

The requirements got piled on by a process that says: if thrust-to-weight of 1.1 is good, why isn’t 1.2 better? [. . .] In aircraft you can have large thrust-to-weight, you can have low wing loading, and you can have an aircraft that goes a long way, but you can’t have all of those things in the same aircraft and keep it within reasonable weight limits. You see, the weight just grew. If someone says I want a low wing loading. . . . you’re going to have a large aircraft. If you now demand that it have a large thrust-to-weight, you’ve got to have a big engine. If you now demand that it go a long way, you’ve got to have a lot of

³¹⁸ PACAF Tactics and Techniques Bulletin: Counter-Air Tactics Bulletin #45, 26 July 1966, 5.

³¹⁹ Sprey OHI, 28.

fuel. If you put all these together, pretty soon you find that you have an aircraft that weighs a lot more than you anticipated.³²⁰

To satisfy these divergent goals, the studies emphasized an airplane with state-of-the-art avionics and radar equipment, a variable sweep wing (meaning the wings can change position from perpendicular to the fuselage to a pulled back, swept state, entailing a mechanism that required adding significant weight), and a high-bypass engine ratio of 2.2:1. Engine bypass ratios are important in determining range, power, and speed of an aircraft. High-bypass engines are usually reserved for civilian or transport aircraft; they have better mileage for increased range, but less acceleration and overall speed, which is why most high-performance combat planes usually have lower engine bypass ratios, usually of around 1.5:1 or less. The studies also called for the ability to carry up to 4,000 pounds of bombs. The final proposed F-X, then, had a wing loading of 110 pounds per square foot. High wing-loading is associated with increased speed but decreased agility, while low-wing loading reduces a plane's top speed but increases maneuverability. A prospective 110-pound wing load was significantly higher than the F-4 Phantom's 78 pounds per square foot. The thrust-to-weight ratio (measuring the acceleration of the craft) of .75 was much lower than the Phantom's, which was over 1, or .86 when loaded. The total weight of the prospective aircraft was over 60,000 pounds, nearly triple Burns' original concept.³²¹

The "requirements creep" drove this process. As Kent explained: "People just didn't realize the impact of some of these 'requirements' that they were laying on that aircraft. Finally someone says, 'Woah, this aircraft now weighs over 60,000 pounds. What have we done?'"³²²

³²⁰ Kent OHI, 7-9.

³²¹ Neufeld, "The F-15 Eagle," 17-18.

³²² Kent OHI, 9.

In almost every measurable factor, the F-X proposal was less like the “true fighter plane” that the fighter advocates longed for than the Phantom, which they already derided as not being a true fighter. At least they could take some comfort in the fact that the F-X proposal included a gun. Historian Jacob Neufeld summarized: “The F-X then, promised to be a very expensive aircraft resembling the F-111 but which, in no sense, would be an air superiority fighter.”³²³ Sprey summed up his attitude toward these studies, saying they were done, “without any clear concept of what a fighter is. It was just the general idea the Air Force usually has of some airplane that has high enough performance to tangle with enemy airplanes and also carry bombs.”³²⁴

Ferguson and his development planners, Major General Glenn A. Kent and Brigadier General F. M. Rogers, were not happy with the studies. In October 1966, they decided to have a fresh set of eyes take a look at the designs up to this point. They brought in John Boyd.

Conclusion

The fighter pilot community within the Air Force had grown in influence enough that the service was now dedicated to building a new fighter aircraft. But influence of the fighter pilots was not enough to make that airplane what they truly wanted: a dedicated air-to-air combat plane that could recreate the “white scarf” aerial duels as in the days of the First World War. Old habits were still ingrained in all levels of the Air Force, and the F-X on the drawing board in 1966 did not look much different or reveal concepts much different from the F-111 or even the F-4 Phantom before it. The desire to make the plane a versatile jack-of-all-trades was not a malicious one. In fact, it showed a desire to maximize effectiveness. But the fighter community wanted

³²³ Neufeld, “The F-15 Eagle,” 17-18.

³²⁴ Sprey OHI, 6.

more specialization—effectiveness for their favored role of air combat even if that meant losing effectiveness at other roles that they did not value as highly, especially ground attack. Trying to break the design process out of this stalemate, the Air Force turned to the controversial young officer known as “Genghis John.”

Chapter 6 - The Eagle Has Landed: Finishing the F-15

Boyd attempted to infuse the F-X program with his and his followers' ideas about the ideal air-to-air fighter that could recapture the constructed memory of the glory days of gentlemanly dueling of the knights of the air. But, other pressures worked on the plane as well. Internal forces included service culture and inter-service rivalry. External considerations such as the state of the Soviet Air Force also created concerns. The F-X program became a battleground for those who wanted a small, austere, dedicated air-to-air fighter, or a versatile multi-role aircraft. While this battle was being waged, the Air Force was undergoing major changes that influenced the direction of the program as well as the possibilities available to Boyd as his growing group of acolytes.

The New Gospel

Late 1965 and early 1966 had been a frustrating time for John Boyd. Although his concept of EMT had spread around the Air Force, and he had been awarded the Air Force Systems Command Scientific Achievement Award (the top scientific honor in AFSC), he had also been passed over for promotion. Boyd's biographer Robert Coram claims that this was because the many enemies Boyd had made over the years by taking his stereotypical fighter pilot independence and aggressiveness to extremes had used their influence to block him. In any case, in Spring 1966, Boyd received orders that he had wanted for quite some time: he was to fly F-4 Phantoms in Vietnam. Boyd was excited, bragging to anyone who would listen that he would finally become an ace pilot. Coram noted: "He [Boyd] told everyone he met that the first five

enemy aircraft he sighted would be history. Forty-Second Boyd was going to wax some communist ass.”³²⁵

As Boyd was packing for his move to Southeast Asia, he received a call that those orders had been canceled. Instead, Boyd was to work at the Pentagon in Washington D.C. to help with the F-X program. Boyd’s frustration at this played out in an episode Coram records that reveals how wedded to the stereotypical fighter pilot image Boyd was – an image connected with the fighter pilots of World War I – and how media played a role in shaping that image. In Summer 1966, a few months before Boyd was to report to Washington, he and Christie went to see the newly released film *Blue Max*, a film about fighter pilots in the First World War. The film tells the story of a young German fighter pilot from a commoner background who lacks empathy, but truly exemplifies the qualities of a ferocious warrior. He is competing for the “Blue Max” medal, given to German pilots who shot down twenty enemy aircraft. His main competition is a gentlemanly pilot from an aristocratic background. In some ways the film is a deconstruction of the myth of chivalrous pilots, emphasizing, as Boyd’s career itself did, the extremes to which one can be driven in the name of war and an aggressive warrior ethos.

Yet Boyd seemed much less concerned with any of this deeper symbolism and instead focused entirely on the accuracy of the air-to-air combat scenes, going as far as to place himself inside them. He began shouting at the screen, yelling when a film character missed a shot, or maneuvered in a way that Boyd thought was ineffective. As the film wore on, Boyd allegedly stood up in the crowded movie theater, waving his arms wildly, shouting, “You missed the

³²⁵ Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (New York: Little, Brown, and Company, 2002), 183-184, quote on 184.

goddamn shot! Hose him, you stupid bastard!”³²⁶ Coram celebrates this episode as an example of Boyd’s warrior spirit. He was simply expressing his fighter pilot nature. To Boyd’s acolytes and to other fighter pilots who admired him, episodes like this one were simply more evidence that he was a “true” fighter pilot and showed well the values and qualities a fighter pilot should have.

Boyd joined the Tactical Division of the Air Staff Directorate of Requirements and began work on the F-X program in October 1966. He was immediately frustrated with the existing designs. He looked at the requirements for a variable-sweep wing, 60,000-pound plane with its high wing loading, high engine-bypass-ratio, and low thrust-to-weight ratio. It was the opposite of everything Boyd valued in an aircraft. After his first look, he concluded: “It looks like we’re building another F-111.”³²⁷ One of Boyd’s supervisors was Colonel Ricci, who Pierre Sprey recalled was the person who had changed Boyd’s orders because Ricci specifically wanted Boyd to apply his EMT ideas to the F-X. Allegedly, after two weeks of analyzing the F-X designs, Boyd told Ricci: “Sir, I’ve never designed a fighter plane before. But I could fuck up and do better than that.”³²⁸

³²⁶ Coram, *Boyd*, 187.

³²⁷ John Boyd, Oral History Interview, May 23, 1973, USAF Historical Research Agency, #859: K239.0512-859 [Hereafter cited as Boyd ‘73 Interview], 15.

³²⁸ Ricci’s identity is unclear. Hammond refers to him as “Colonel Ricci” with no first name, Coram simply refers to him as “the colonel for whom Boyd worked” (193). It is likely that this is the same individual Boyd refers to in his 1973 Oral History Interview with Jack Neufeld, which the transcription spells as “Ritchie.” If this is the case, Boyd refers to him as Bill Ritchie, the acting chief of the TAC division in General Purpose Forces—which is still an unclear reference.

The quote is from Coram, *Boyd*, 194-195. The same story is told in Burton, *Pentagon Wars*, 14, and Hammond, *Mind of War*, 77. Note that Pierre Sprey recalls a slightly different wording, that Boyd said, “I could screw up...” in Sprey OHI, 8, although Sprey was not present for this meeting so must be reporting the story second-hand. It is possible this dialog is apocryphal.

Coram notes that Boyd, later in life, repeatedly told a story of being fired from the F-X program shortly after he arrived, because of his confrontational nature. Allegedly an unnamed colonel not only fired Boyd, but did so in front of a group of his co-workers. Boyd claims that he was banished to another office until the chief of staff ordered the colonel to bring him back to the F-X program. Boyd insisted that he would only do it if the colonel publicly rehired him in front of the same audience. Boyd typically concluded this story with a laugh, claiming, “I got my pound of flesh.” Coram notes that there is no record of this event happening, and it seems highly improbable given the nature of Boyd being asked to join the project. Yet Coram concludes, “None of this matters. Because this story, like the story of tearing down the barracks in Japan, is more revealing if it is not true.”³²⁹ Coram is correct on that point. The fact that Boyd revealed in the story, despite its veracity, reveals how much he luxuriated in his aggressiveness, competitive drive, confrontational nature, and lack of respect for authority. By repeating this story, he was outwardly claiming the mantle of the ultimate fighter pilot by claiming to be the ultimate expression of those traits associated with the fighter pilot myth. This would be even more significant if the story were not true.

In any case, Boyd began modifying the F-X design, incorporating as much data as possible on different variations. This information was primarily supplied to him from Aeronautical Systems Division (ASD) at Wright-Patterson. For some time, Boyd kept the variable-sweep wing as part of the design, although it increased the plane’s weight. He did not observe a difference in performance by switching to a fixed wing. However, Boyd did start to look at data from other sources, particularly NASA, and particularly in the area of drag polars—graphs that measure the relationship between lift and drag. Sprey explained: “Drag polars are

³²⁹ Coram, *Boyd*, 195.

very very central to designing these airplanes and being able to say how far they would go and how well they would turn because of the lift versus drag curves of an airplane.”³³⁰ Sprey thought the researchers at ASD were “never very competent” and claimed they were using standardized drag polars that were not unique to the specific designs Boyd was studying.³³¹ This issue of the ASD data not matching NASA data caused Boyd quite a bit of confusion for the next two years. As Sprey recalled, Boyd periodically received new data from ASD, “and he’d look at them and the data wouldn’t be credible. . . . He’d go back and ‘beat on’ the people that had submitted it, both the contractors and Wright-Patterson, and they’d adjust a little and make it a little less optimistic and they’d go back to do some more tradeoffs.”³³²

Around this time, late in 1966 into early 1967, Boyd met Pierre Sprey, then a civilian consultant working in Systems Analysis, a group that researched specific problems and reported directly to the Office of the Secretary of Defense (OSD). Because this group focused on rigorous data-driven research, they were often referred to colloquially (and sometimes derogatorily) as the “Whiz Kids.” Sprey was an eclectic man to say the least. He began studying at Yale when he was fifteen, with a double major in mechanical engineering and French literature. Much like the stereotypical fighter pilot, Sprey valued his independence and enjoyed pushing back against authority figures. He tended to think that the higher one’s rank, the less one’s intelligence. He also tended to take extremist, all-or-nothing positions on many of the issues he researched. As Coram noted: “He [Sprey] is an absolutist in all things.”³³³ In other words, he exhibited many of

³³⁰ Pierre Sprey, Oral History Interview, June 12, 1973, USAF Historical Research Agency, K239.0512-969 [Hereafter cited as Sprey OHI], 9.

³³¹ Sprey OHI, 9.

³³² Sprey OHI, 12.

³³³ Coram, Boyd, 195-197, quote on 196.

the same personality traits that were the hallmarks of the stereotypical fighter pilot, especially aggressiveness and independence. This attempt to think and act like the stereotypical fighter jock is the more remarkable considering Sprey was a civilian, as was Christie. This extremist, absolutist way of thinking marked this group's approach to problem-solving for the remainder of their careers, as well as affected the character of the organizations they led later.

Sprey had been preparing a report on plans for interdiction bombing in Europe, in the case of a Soviet invasion. In this report, he argued that the entire interdiction mission was useless—that the Air Force simply could not destroy all the roads, bridges, and railways to stop Soviet forces from entering all of Western Europe. He argued that interdiction should thus be no more than a minor mission, if not abandoned completely. Instead, he argued that the Air Force should focus on close air support (CAS) of ground troops and on air superiority to allow CAS to perform unhindered by enemy aircraft. The Air Force felt threatened by this report, which was essentially a complete repudiation of Air Force doctrine and thus its budgetary priorities. Sprey's main sources of data for these conclusions were targeting information provided from the Joint Chiefs of Staff and data on bombing effectiveness that had been computed by Tom Christie at Eglin—likely on the same computer used to develop EMT.³³⁴

Sprey claimed that authorities within the Air Force had put out an order to “declare war on both the report and the civilian who wrote it.” He accused Air Force leaders of using deliberately falsified information to discredit him. Describing an unnamed colonel who led this effort against him, Sprey said he was a “slimy creature” who “oozed mendacity.” Sprey allegedly met this colonel during a conference and told him “your numbers are a lie.”³³⁵ This same colonel

³³⁴ Coram, *Boyd*, 196-197.

³³⁵ Coram, *Boyd*, 198.

then set up a meeting with Sprey and Boyd, allegedly so that Boyd could shut down Sprey's report. Instead, the two men found that they shared common interests, especially in the area of air-to-air combat, which both men thought was necessary, even a key ingredient to military success. They discussed Boyd's plan to change the F-X in ways that emphasized the air-to-air combat role. Instead of Boyd shutting down Sprey's report, Boyd found a kindred spirit. As Coram describes the meeting, "Sprey could help him hone the E-M Theory into a tool for designing the finest fighter aircraft the world had ever known. . . . Sprey was not the sort of man who followed other men, but he could follow Boyd. Boyd had met the second of the Acolytes."³³⁶

Both men were unhappy with the plans for the F-X as they existed when Boyd joined the project. Sprey recalled that "the airplane was practically useless for anything except flying in a straight line because it didn't have enough wing area to provide the lift to make maneuverable turns."³³⁷ He agreed that the Air Force had redefined the word "fighter" in a way that did not connote the "true" fighter that he envisioned as dedicated to air-to-air combat. As Sprey later said, studies on the F-X had been conducted up to this point "without any clear concept of what a fighter is. It was just the general idea the Air Force usually has of some airplane that has high enough performance to tangle with enemy airplanes and also carry bombs."³³⁸

Boyd continued to work closely with Ricci and maintained contact with Christie, who was handling most of the computer analysis that Boyd relied on for evaluating his designs. The two spoke on the phone several times a day to talk about various changes to the design and how

³³⁶ Coram, *Boyd*, 199.

³³⁷ Sprey OHI, 8.

³³⁸ Sprey OHI, 6.

they affected performance in accordance with the EMT analysis. Typically, Air Force requirements listed specific performance goals, such as a certain top speed, or a specific range. Boyd's goals were far less exact. The only specific requirement he noted was that he wanted to be able to pull enough G-force in a turn to "roll down your goddamn socks."³³⁹ He simply wanted a plane that could out-maneuver an enemy—that could win in a dogfight similar to the dogfights of his constructed memory of the First World War. He needed a high thrust-to-weight ratio so the plane could accelerate quickly. A large wing with a low wing-loading ratio made a plane more maneuverable. A low engine bypass ratio might mean less efficient fuel consumption, but it also meant a much smaller engine that brought down the weight of the entire plane. Light weight was perhaps the most important point. This was important not just to Boyd, but to the fighter pilot myth itself. Lightweight planes were more maneuverable and more agile, and they seemed more adept for dogfighting. This was a sticking point for the fighter community. As Sprey explained, "fighter pilots have always felt rather emotionally on this—felt strongly about lighter weight airplanes."³⁴⁰

Boyd, Sprey, Christie, and, to some extent, Ricci, were attempting to fit the F-X into the mold of a fighter pilot's ideal, but they met significant resistance, mostly from other forces in USAF who wanted to add features to the plane or who had a different vision. Some of these were small suggestions, such as the addition of a built-in ladder. Some argued that a ladder would be useful in forward areas that lacked fully equipped air bases, and a ladder weighed only about 20 pounds. Boyd argued that incorporating all the elements to make a twenty-pound ladder useful while maintaining the same performance could increase the added load to 200 pounds. Increasing

³³⁹ Coram, *Boyd*, 204.

³⁴⁰ Sprey OHI, 13.

range and top speed could mean increasing the amount of fuel a plane holds, or the overall engine size, either of which increased the size of the airplane as well. A larger battle was fought over the radar system. Some experts in USAF pushed for a radar that could find and track enemy airplanes at long distances, up to forty nautical miles. Although this could seemingly help in air-to-air combat, Boyd and other fighter pilots were strongly against it, mostly because the size of the radar dish determined the size of the fuselage. Thus, the overall size of the entire airplane was tied to the radar system. A larger dish meant a much larger airplane.³⁴¹ Boyd and other fighter pilots not only wanted a smaller airplane; they also believed that because dogfighting was a close and personal type of combat such long distance detection was unnecessary.

Boyd and his Acolytes frequently used religious imagery to describe themselves, and, in describing them and their goals and methods, Coram frequently used ecclesiastical terms. Coram alleged that when meeting with “his congregation” of defense contractors, Boyd stood on a platform and “preached a new gospel” about his “vision of the promised land” of lightweight air-to-air fighters designed based on his EMT principles. If contractors or others he briefed on an issue disagreed with him, he became irate and confrontational, physically jabbing his opponents and shouting insults. “You are the dumbest son of a bitch God ever made,” he would say. Or “you don’t know what the fuck you’re talking about.” Or simply, “you stupid fuck.” Often these accusations were tied to a contrived sense of masculinity. If a contractor disagreed with Boyd about aircraft design, Boyd accused them of masturbation while making profane gestures. If he found a point in the data that seemed to prove someone wrong, he did not refer to it with the typical analogy of a “smoking gun” but spoke, rather, of “the dripping cock.” His sense of competition led him to brag about having accomplished all that he had in light of his below

³⁴¹ Coram, *Boyd*, 205.

average IQ (90).³⁴² His sense of aggressiveness, individuality, and competition were clearly tied to his sense of masculinity—taking a textbook expression of the fighter pilot myth to the realm of caricature.

Perhaps the most revealing element of this personality was Boyd’s resistance to Air Force training practices that emphasized safety. Training exercises in the early 1960s did not include dangerous realistic air-to-air combat scenarios or complicated maneuvers, part of an effort to limit training accidents. By that metric, USAF training in that period was successful. Training accidents were uncommon, deaths during training even less common, and USAF was determined to keep it that way. While the dangers of more intense, realistic training cannot be completely overlooked, historian Marshall Michel has noted the irony in this stance: “The Air Force during this period was obsessed with flying safety,” he said, and “one of its official slogans was, 'Flying safety is paramount to the completion of the mission' – even if that mission was training to go into real combat.”³⁴³ Boyd encountered this attitude while working on the F-X and specifically in briefing a USAF commander in Europe about his vision for a true fighter plane. The unnamed general was skeptical because of the type of dangerous training that such an aircraft would require, and he emphasized that his safety record was exemplary—no training accidents had happened under his command for years. Boyd was angered by this, and he argued that training that emphasized air-to-air combat in the way he felt was necessary would, by its nature, put pilots at risk of injury or worse. He concluded by shouting “Goddammit, General, you need more accidents. You need to kill some pilots.”³⁴⁴

³⁴² Coram, *Boyd*, 206-207.

³⁴³ Marshall Michel, *Clashes: Air Combat Over North Vietnam: 1965-1972* (Annapolis, Naval Institute Press, 1997), 165.

³⁴⁴ Quoted in Coram, *Boyd*, 211.

Boyd continued his work on redesigning the F-X, working closely with his supervisor, Colonel Ricci. By Spring 1967, Boyd had worked up a design of a lighter aircraft to weigh 40,000 pounds. At first, the wing loading had been 110 pounds, but, in an attempt to increase the maneuverability of the plane, he lowered it to 80 pounds (even while arguing for a slower but more agile 60 pounds). To make the plane more capable of quick changes in velocity, he lowered the engine bypass ratio to 1.5, although he advocated lowering it much further, all the way down to 0.6. He originally called for a thrust-to-weight ratio of .97, but in the interest of having a bigger wing to increase maneuverability, the ratio was lowered to .9.³⁴⁵

Under Pressure

This version of the plane was presented to the Air Staff and then to the Defense Science Board Summer 1967. At this point, then, the battle over creating a dedicated air-to-air fighter was no longer an internal one within the Air Force. It expanded to include USAF's major domestic adversary, the US Navy. The Navy also presented designs for a new fighter, code-named the VFAX. (This project eventually resulted in the F-14 Tomcat.) A fear spread throughout the Air Force that Congress would approve the Navy's VFAX and reject the Air Force's F-X, forcing them to adopt a Navy-designed plane yet again. That was a prospect that the Air Force did not want to consider under any circumstances. They had to prove to Congress that the F-X was worth developing and purchasing. One way to compete with the VFAX was to bring down the weight of the F-X, perhaps making it lower than that of the VFAX, thus stressing that it would be better for air-to-air combat. The VFAX design emphasized effective dogfighting, and it even made use of many of Boyd's EMT concepts in its design process. But it also needed a

³⁴⁵ Jacob Neufeld, "The F-15 Eagle: Origins and Development, 1964-1972," Office of Air Force History, November 1974, 20; Boyd '73 Interview, 16-18.

strong air-to-ground attack capability. Boyd, in contrast, tried to focus the F-X purely on the air-to-air role. As he explained, “Clearly, we had a higher thrust to weight and a lower wing loading. Thrust to weight gives you better climb and acceleration; lower wing loading gives you better turn. So we could out-climb, out-accelerate and out-turn them—the Navy VFAX.”³⁴⁶ This pressure from similar developments in the US Navy continued to influence the design of the F-X throughout its development—pushing the Air Force to move quickly and to find metrics in which their aircraft could be shown as superior to the Navy’s new fighter and thus necessary.

Aside from battling the Navy, the F-X program faced external pressures as well. Air Force tests indicated that American planes might be in trouble against their Soviet counterparts. On 16 August 1966, an Iraqi Air Force captain defected to Israel and was nice enough to deliver his MiG-21. After Israel conducted its own tests on it, the plane arrived at Area 51 for a series of USAF evaluations code named “Have Doughnut.”³⁴⁷ In over 100 sorties, the MiG flew against all major U.S. aircraft, including the four main models of the F-4 Phantom, with the purpose of “defining optimum air combat maneuvers (ACM) to be employed by US tactical aircraft in defensive or offensive situations to defeat the FISHBED E.”³⁴⁸ The MiG did outperform the American planes, but only in medium and high altitudes. F-4s proved superior at low altitude and high speeds – by maneuvering vertically, the Phantom could maintain its advantage. The Soviet plane also had significantly limited visibility, especially to the rear.³⁴⁹

³⁴⁶ Boyd ‘73 Interview, 16-19, quote on 18;

³⁴⁷ John Lowery, “Have Doughnut,” *Air Force Magazine* (June 2010), 64-5.

³⁴⁸ “Have Doughnut: Volume II (U), Tactical,” Defense Intelligence Agency, FTD-CR-20-13-69-INT Vol. II, 1 August 1969, 1-7.

³⁴⁹ “Have Doughnut,” 1-15, 16, 24.

After the Air Force completed its tests, the Navy conducted its own investigation of the MiG-21. It found many of the same results, demonstrating that “[t]he F-4 and F-8 series airplanes have a tactical disadvantage in the ACM environment because of their large size and prominent smoke trails.”³⁵⁰ The Navy emphasized the need to maintain visual contact, attack in groups, and avoid one-on-one engagements with the Soviet fighters. Neither service was confident that American fighters possessed an advantage in air-to-air combat with the MiG-21, except under very particular circumstances.

Another external factor influenced the development of the F-X in Summer 1967 and pushed the Air Force further to adopting the idea of a pure air-to-air fighter: A Soviet air show in Moscow. The revelation of the variable sweep wing MiG-23 (which was similar to USAF’s F-111) drew little worry from fighter pilots. The new MiG-25, however, was a different story. The fast interceptor, with the NATO codename “Foxbat,” was projected to be superior to all existing American planes, including the projected F-X. The MiG-25 could fly higher and faster, and senior members of USAF worried that their forces were inadequate to stop it—especially given the fact that the less advanced MiG-21s were shooting F-4s out of the sky in record numbers throughout 1967. Air Force Phantoms struggled against North Vietnamese MiG-21s, trading kills at a nearly one-to-one ratio throughout the next year.³⁵¹ Clearly the F-X needed to be designed to handle the increased threat from air-to-air combat the Foxbat represented.

In Summer 1967, the F-X proposal, as it had been modified by Boyd, underwent further modification both by the Air Staff and by Anser Analytical Services, Inc., a non-profit Air Force contractor. By August 1967, Air Force Secretary Harold Brown presented this version—a

³⁵⁰ "Have Doughnut," 2-62.

³⁵¹ Neufeld, “The F-15 Eagle,” 25; Michel, *Clashes*, XX

slightly modified version of Boyd's changes—to OSD, emphasizing the role of air-to-air combat. Brown argued that, unless air superiority was decided first, no other tactical air missions (such as interdiction and CAS) could function properly. He spoke highly of the F-4's capabilities as a fighter. But he also argued that it could not stand up to air-to-air combat against newer Soviet planes. Brown and other fighter advocates thought that the air superiority achieved in the Korea conflict and maintained up to that point in Vietnam had been possible because American pilots were better trained as well as because US aircraft had better weapons and avionics equipment. Fighter advocates, as well as Brown, believed that the North Korean and North Vietnamese Air Forces were less capable than the Soviet Air Force, which could negate any advantages the US might have held in training and equipment. Thus, the CFP for the F-X itself stated that the Air Force could not “rely on pilot skill alone to offset any technical inferiority of U.S. aircraft.... To win an air war against Soviet forces it is essential that U.S. pilots be given the best aircraft that technology can afford.”³⁵²

Another external factor appeared in Summer 1967: The Six-Day War. That conflict opened with an Israeli preemptive attack called Operation Focus, in which the Israeli Air Force (IAF) destroyed 380 Egyptian aircraft—most of them hit on the ground before they had a chance to take off. Some Egyptian planes did get airborne, but twenty of them were shot down, costing the IAF only two losses. Most of the air-to-air losses were most likely the result of poor training on the Egyptian side. The Arab pilots repeatedly fought at altitudes and speeds in which their

³⁵² CFP (S/NOFORN), Advanced Tactical Fighter (F-X), AFRDQ/ANSER, Rev 1, 1 Aug 67, p 1-56., quoted in Neufeld, “The F-15 Eagle,” 22.

MiG-17s and MiG-21s did not have an advantage, using tactics that were not suited for the strengths of those planes.³⁵³

Although air superiority had been achieved almost entirely through a bombing attack, fighter advocates and pilots saw the war as evidence for their arguments that not only were air combat and the “white scarf stuff” essential—but the myth of the lone fighter pilot winning aerial victories based on personality traits seemed to be reinforced. One Israeli flight leader, recalling the events, argued that the reason the Egyptians performed poorly was that they lacked “the high degree of our [Israeli] pilots’ personal identification with their assignments, plus their handling of their craft and weapons [which] produces the combination that gets positive results.” Going on to describe the other ways in which Israeli pilots were superior, he argued that culture was essential to air combat victory: “A good pilot,” he said, “is not merely a mixture of skill, resourcefulness, discipline and good judgement, but also, even primarily, an outgrowth of the spiritual values and the cultural level which have nurtured him. Inside the fighter plane, all of your emotional forces are compressed into concentrating on your objective; everything else becomes secondary.”³⁵⁴

Requirement Creep

These external factors all increased the desire to focus the F-X on the air-to-air combat role. However, other factors pushed against this, the largest being the drive from OSD in the 1960s for “commonality,” or the ability to have separate services use the same equipment to cut costs. The F-4 had become a symbol for this—a “jack of all trades” that could be modified to suit

³⁵³ Brereton Greenhous, “The Israeli Experience,” in Benjamin Franklin Cooling, ed., *Case Studies in the Achievement of Air Superiority* (Washington D. C., Air Force History and Museums Program, 1994), 563-601.

³⁵⁴ Quoted Greenhous, “The Israeli Experience,” 580.

the needs of the Air Force, Navy, and Marines. It was not specialized for any one particular role. The Air Force and the Navy both realized the threat that McNamara's quest for "commonality" presented to their new programs and to any attempt at specialization. To stiffen resistance to what McNamara wanted, both services agreed to create a joint working group of senior officers who could agree to disagree and stand together against OSD's efforts to push commonality. Air Force Chief of Staff John P. McConnell sought additional protection and streamlining of the F-X program, and, to that end, he created an F-X study and analysis group under General Glenn A. Kent, who at that time was the AFSC Deputy Chief of Staff for Development Plans.³⁵⁵

McNamara was not quick to back down from his "commonality" principle, and, in late 1967, he began what became an eighteen-month long review of both the F-X and the Navy's VFAX to determine if they could be combined. The study concluded that the Air Force's emphasis on maneuverability could not be reconciled with the Navy's desire for versatility and long loiter time. However, the review drastically increased the sense of rivalry and competition between the services. General Ferguson (then head of Air Force Systems Command) and General Disosway (then commander of TAC) were especially sensitive to this. They, and other leaders in the Air Force, became convinced that the Navy was only pretending to participate and compromise their design in the name of commonality, getting the Air Force to do the same. But they feared that the Navy was secretly preparing an airplane that would not fulfill any of the Air Force's requirements, yet be far enough along in the process to gain Congressional approval and force the Air Force to buy a Navy plane yet again. By March 1968, Ferguson and Disosway were

³⁵⁵ Neufeld, "The F-15 Eagle," 23.

so convinced of this imminent betrayal that they warned McConnell of an impending “double cross” by the Navy.³⁵⁶

Despite these external pressures, there was still significant disagreement within the Air Force regarding the F-X’s primary mission—whether it would be dedicated and optimized for air-to-air combat, or designed as a larger, heavier, multi-role plane. Beyond this basic argument was the more mundane process of requirement-creep: the practice of making small additions that creep up, pile on, and eventually add up to major changes in an aircraft’s design, sometimes unintentionally. Most aircraft go through a similar process, but it was particularly pronounced on the F-15. Kent explained how the process could get carried away, saying,

In aircraft you can have large thrust-to-weight, you can have low wing loading, and you can have an aircraft that goes a long way, but you can’t have all of those things in the same aircraft and keep it within reasonable weight limits. You see, the weight just grew. If someone says I want a low wing loading—and incidentally the first design of that aircraft had a 90 pounds, a very high wing loading because of too much attention to this Ps business—well, if you demand low wing loading, you’re going to have a large aircraft. If you now demand that it have a large thrust-to-weight, you’ve got to have a big engine. If you now demand that it go a long way, you’ve got to have a lot of fuel. If you put all these together, pretty soon you find that you have an aircraft that weighs a lot more than you anticipated. And people just didn’t realize the impact of some of these “requirements” that they were laying on that aircraft. Finally someone says, “Woah, this aircraft now weighs over 60,000 pounds. What have we done?”³⁵⁷

Many such changes were applied to the F-X. TAC instituted further requirements, especially in terms of top speed and range, in addition to requiring all-weather radar, specifically radar sophisticated enough to “look down shoot down.” This meant a radar of increased sophistication that could interpret the more cluttered signals that came from looking at the ground and attack ground targets. These two visions of the F-X consolidated around two leaders.

³⁵⁶ Neufeld, “The F-15 Eagle,” 24.

³⁵⁷ Kent OHI, 9.

Commander of TAC Disosway championed the push for a dedicated air-to-air fighter, while the Vice Chief of Staff of SAC, Bruce Holloway, argued for a multi-role plane.³⁵⁸ It seems natural that a commander in SAC argued for an airplane that could perform ground-attack missions, yet this was an interesting position for Holloway to take, given his background. Many TAC commanders had come from a SAC background, but Holloway was among the first in a new wave of leaders whose background was mainly in fighters. Holloway had been the first commander of an American jet fighter group in 1946, and he had co-authored the 12-star letter, arguing for an air superiority fighter. But in his role at SAC, he pushed for the F-X to adopt multi-role capability.

Disosway took a hard line in trying to push Holloway and other multi-role advocates towards his point of view. Describing the infighting, he recalled: “We wanted an air superiority fighter, and we didn’t want any air-to-ground stuff mixed up in it because you get air-to-ground stuff mixed up in it, and they [multi-role advocates at the Pentagon] want a bunch of hard points on there to carry a bunch of bombs, and you end up with an airplane that is not superior in either the air-to-air or the air-to-ground.” He went on to describe how he pressured others to agree:

Then the next thing that happened was, of course, all the air-to-ground guys wanted to get in on the airplane, too, and they were going to spoil it. I used to go up there and see Bruce Holloway and [USAF Chief of Staff] McConnell, and I would say, ‘Now look, let’s have an air-to-air airplane, nothing else. Remember, air-to-air airplane.’ I would make them repeat it, “Air-to-air airplane, and don’t let any of these guys get into it.’ So we designed really the F-15, and we were going to have a single cockpit, two engines for security, safety, and that was the result of all this—the F-15—but it was a terrible fight. [The Chief Scientist of the Air Force, most likely Robert H. Cannon, Jr.] came down to see me and explained to me how much better off the Air Force would be with an airplane that could do both missions. There were pressures from everybody you could think of to mess that airplane up, but we wanted to keep it pure air-to-air, knowing full well after awhile that

³⁵⁸ Neufeld, “The F-15 Eagle,” 25-26.

they would use it air-to-ground, but at least we didn't want it designed for that. It had to be designed for just air-to-air, and that's what it was.³⁵⁹

The chief interest uniting these disparate voices was the need to compete with the Navy. The VFAX program was further along in development and had a clearer vision than the F-X. Arguing that unity against the Navy was necessary in order to prevent USAF from being forced to purchase another Navy aircraft, McConnell won over many multi-role advocates to his side. On May 28, 1968, McConnell testified to the Senate Armed Services Committee: "We had a very difficult time in satisfying all the people who had to be satisfied as to what the F-X was going to be. . . . There were a lot of people in the Air Force who wanted to make the F-X into another F-4 type of aircraft. We finally decided—and I hope there is no one who still disagrees—that this aircraft is going to be an air superiority fighter." When asked if the plane would be used for ground attack missions, he retorted: "It would be over my dead body."³⁶⁰

Burns recalled what a coup this decision was, especially at a time when the Air Force had previously been wedded to strategic bombing doctrine and interception. He argued,

Well, the F-X... represented a fundamental change in Air Force doctrine in fighter aviation. After World War II, and even during World War II, our airplanes emphasized speed and range, quite often at the expense of maneuverability. What we did with the F-X was to establish levels of performance that we were to require, and then let the airplane and the engines appropriate to that airplane grow. . . . It returned to somewhat of a European philosophy of very high maneuverability, a very high performance airplane.³⁶¹

Yet the battle was not as finished as McConnell's statement seemed to indicate. The fighter advocates had "won" in that the F-X was to be a dedicated air superiority fighter. Yet, in

³⁵⁹ Disosway OHI, 295-296.

³⁶⁰ Testimony of General McConnell, 28 May 1968, in Hearings before Senate Armed Services Preparedness Investigating Subcommittee, 90th Congress, 2nd session, U.S. Tactical Air Power Program, 92-93, 103, quoted in Neufeld, "The F-15 Eagle," 26.

³⁶¹ Burns OHI, 10.

a sense, the F-X was a victim of its own success. Although the plane was now envisioned as a dedicated air-to-air fighter, that change in purpose brought the realization that the new plane was no longer going to be a complement to the F-4 Phantom but a replacement of it. To some planners, this meant that the F-X needed to match or exceed certain capabilities of the F-4, especially a large radar and avionics systems.³⁶² This was problematic, because the size of a radar dish could effectively control the overall size and weight of an aircraft. A larger radar in the plane's nose meant the fuselage needed to be larger to accommodate it. The issue of radar size and capability was one of the more fiercely debated points during the F-X's development and after. Factions within the Air Force continued to attack the design of the plane from both sides. On one side were those who wanted to add more and more features, making the plane larger, while increasing its range, speed, and the amount of sophisticated electronics packages it could carry. On the other side were the more extreme fighter advocates who thought the F-X was already so big, bulky, and loaded with features they deemed unnecessary as to be completely broken.

Boyd and Sprey especially became increasingly frustrated with the addition of any features that were not directly related to shooting down enemy planes—such as a boarding ladder, a tail hook, and nose wheel steering. Historian Grant Hammond described the situation:

Everyone even remotely involved had a pet idea, new concept, favorite piece of hardware, or technical gadget to affix to the F-X. Disagreement on the basics was bad enough, but every new notion, however silly or improbable, had to be beaten down or accepted in the long, arduous process of shaping the F-15 conceptually... One proponent wanted a trainable gun. Another wanted a helmet sight. New highly maneuverable short-range missiles vied with long-range BVR kill capabilities. Without some actual data provided by Boyd's assessment techniques, the plane would have been reduced to the

³⁶² Burns OHI, 11-12.

lowest common denominator of agreements on a wide range of engineering and political pet rocks.³⁶³

In Spring 1968 Boyd and Sprey attempted a last-ditch effort to save their vision for the F-X: a “true” fighter plane in which every pound of weight was dedicated solely to shooting down enemy planes—stripped of everything they considered extraneous, or as Sprey recalled, “all the nonkill horseshit—everything not necessary to kill another aircraft.”³⁶⁴ The result was a model of the F-X, taken down to 33,000 pounds. They called this version of the plane the “Red Bird.” Boyd presented this to the Air Staff. Then, on July 18, 1968, Sprey wrote a scathing letter to General Ferguson, then head of Systems Command, outlining their reasoning for the Red Bird, while accusing the Air Force of lacking any sort of design discipline or responsibility in developing the F-X to that point. According to their recollection, Ferguson agreed with Boyd and Sprey’s vision, but they also thought that all the three-star generals who worked under him could not be convinced to abandon the larger, heavier version (around 40,000 pounds) that included many of the features, colloquially and disparagingly referred to as “gold plating,” that Boyd and Sprey considered anathema.³⁶⁵ Despite these setbacks, Boyd, Sprey, Christie, and the network of connections they had built were not finished fighting for their vision.

Modification

In theory, by Spring 1968, the design work on the F-X was complete, and what remained was carrying out that vision through contractors. Yet throughout this process there was a continuing battle between those who wanted to stay true to the vision McConnell had outlined—

³⁶³ Hammond, *Mind of War*, 79.

³⁶⁴ Quoted in Coram, *Boyd*, 228.

³⁶⁵ Coram, *Boyd*, 228.

that of a dedicated air superiority fighter, even if it was not the pure, stripped down fighter that Boyd and Sprey wanted—or that of a larger airplane with many useful extra features that, taken individually, seemed perfectly reasonable to those who pushed for them. To guide the process of taking the F-X from paper to a fully functional aircraft, the Air Force turned to Major General Roger K. Rhodarmer, who had been working as a deputy assistant in the Office of the Deputy Chief of Staff for Research and Development. In June 1968, Rhodarmer became deputy director of operational requirements and developments plans, and was placed in charge of the F-X program. Rhodarmer's role fulfilled several purposes—he served in the Pentagon as the focal point for the F-X program in Washington, D.C., but also worked as a liaison among the various locations, both military and civilian contractors, spread throughout the country. His chief priority, however, was to gain Congressional approval of the program by January 1, 1970. To that end, much of his work was simply promoting the merits of the program. He considered this especially important given the Navy's VFAX program, which he interpreted as “a threat to our concept of the F-X.”³⁶⁶ Thus, his next year and a half consisted of moving the program along with manufacturers to a place of readiness while simultaneously proving to Congress that the F-X was superior to the VFAX.

Rhodarmer was aided by a large team. Colonel Robert White led a group of researchers at Wright-Patterson to produce data regarding various designs. Interviewed later, Rhodarmer recognized the work of four other individuals who had a large hand in shaping the F-X and promoting it. John Boyd was one of them. He continued to work on analysis, collaborating closely with Kent, who took over Studies and Analysis at the Headquarters of the Air Staff. The

³⁶⁶ Major General Roger K Rhodarmer, Oral History Interview, USAF Historical Research Agency, March 29, 1973, K239.0512-972 [Hereafter cited as Rhodarmer OHI], 1-5.

other two key members of Rhodarmer's team were also fighter pilots, although they had a mix of experience both in ground attack and air-to-air combat. Colonel John Axley, after obtaining a Master's degree in electrical engineering from MIT, went on to fly F-105s in Vietnam.³⁶⁷ Brigadier General Gary Willard had extensive experience in fighter aircraft in two wars. In Korea, he flew 100 combat missions in an F-86 and was credited with shooting down one MiG-15 and damaging four more. In 1958, Willard was the winner of the Annual U.S. Air Force Conventional Fighter Weapons Meet at Nellis. He also served in Vietnam as commander of the first Wild Weasel Squadron, flying over 250 combat hours before being assigned as a project officer on the F-X.³⁶⁸

Rhodarmer also worked closely with other officials in other departments, such as Dr. Alexander H. Flax, Assistant Secretary of the Air Force for Research and Development. John Foster, the Director of Defense Research and Engineering (DDR&E), along with his agent Robert O'Donohue, composed a Development Concept Paper (DCP) for the F-X.³⁶⁹ Just as these groups were coming together, a wealth of new data from civilian manufacturing contracts poured in. The previous year, in August 1967, the Air Force had requested another round of studies to examine various design specifications such as propulsion requirements, armament and avionics packages, and crew size. These studies also included wind-tunnel testing. The Air Force funded

³⁶⁷ John Henry Axley Obituary, The Palm Beach Post, April 4, 2015, [<http://www.legacy.com/obituaries/palmbeachpost/obituary.aspx?pid=174575094>], accessed June 4, 2017.

³⁶⁸ Rhodarmer OHI, 8; Brigadier General Garry A. Willard Jr. Biography, [<http://www.af.mil/About-Us/Biographies/Display/Article/105256/brigadier-general-garry-a-willard-jr/>], accessed June 4, 2017.

³⁶⁹ Rhodarmer OHI, 10.

studies by General Dynamics and McDonnell-Douglas, but Fairchild-Hiller, Grumman, Lockheed, North American also participated in these studies at their own cost.³⁷⁰

These disparate sources of information came together in August 1968, with the release of the F-X Concept Formulation Package (CFP). This document demonstrated just how committed the Air Force had become to looking back to the dogfights of the past as a guide for future development. The CFP stated: “It is sometimes held that air combat of the future will assume an entirely different complexion than that of the past. The Air Force does not share that contention. To the contrary, tactical applications of air superiority forces will remain essentially the same for the foreseeable future.”³⁷¹

Another paper that went further in specifying the details of this version of the F-X, its Development Concept Paper (DCP, written by DDR&E), represented some small victories for those who shared Boyd’s point of view, in that some of the requirements that TAC had previously insisted on had been pared down. These were mostly fuel-related, and the range and length of time the plane could spend in a top-speed dash were decreased as was the overall combat time. The top speed was lowered, too, down to Mach 2.3 with a 2.5 “burst” capability. The original TAC requirement for 2.7 “burst” would not only have necessitated heavier parts but would also have required much more titanium, which would have driven up the weight and the cost. Lowering the burst speed took 3,000 pounds off of the airplane. Boyd called for the elimination of variable intake ramps (computer controlled ramps in front of the engine that automatically move to control the flow of air into an engine to maximize engine power) and the bellmouth mechanism (which directs air into a jet engine) on the engines—both were

³⁷⁰ Neufeld, “The F-15 Eagle,” 28.

³⁷¹ Quoted in Neufeld, “The F-15 Eagle,” 29.

complicated features that had allowed the F-4 to achieve its high top speeds. Boyd thought they were unnecessary for combat maneuvering. They were eliminated. Yet there were many losses for Boyd as well. Boyd had called for wing slats, extra surfaces placed on the leading edge of a wing in order to allow it to operate at more extreme angles. McDonnell Douglas argued for a less complicated (and less expensive) solution in a high camber (curved) wing. Both solutions increased maneuverability, but high camber wing increased the plane's drag. Despite Boyd's objections, the leading-edge slats were not used.³⁷²

In the interest of survivability and the ability to function in rougher forward areas, the DCP called for many features Boyd and Sprey hated, including an auxiliary power unit, soft-field landing gear, a tail hook, a drag chute, an auto-pilot system, self-sealing (foamed) fuel tanks, armor, and bullet-proof glass. The DCP also insisted on a large radar and extensive avionics equipment. The argument for these systems was that recent tests, specifically the Feather Duster and Have Donut programs, had demonstrated that early detection of enemy fighters was one of the most important factors determining air-to-air victory. Essentially the Air Force needed to choose between building a very small plane that was difficult for the enemy to detect, or a larger airplane that could carry the sizeable equipment needed to detect the enemy first. The Air Force chose the latter.³⁷³ Both could easily be defended as necessary for success in air-to-air combat, yet Boyd was firmly against the Air Force's decision. He did not deem early, long-distance detection to be worth the cost of building a larger airplane. True to the fighter pilot stereotype, he preferred a smaller, more agile plane that emphasized close combat, not long-range detection.

³⁷² Hammond, *Mind of War*, 78.

³⁷³ Neufeld, "The F-15 Eagle," 30-31.

Fly Before You Buy

On September 30, 1968, the process of choosing manufacturers and competing for contracts formally began. At this point, the F-X received its official numeric designation. The Air Force considered naming the F-X the F-13 but rejected this due to a superstitious fear of the number 13. Instead, the F-X was now officially known as the F-15.³⁷⁴ The Air Force awarded \$15.4 million to Fairchild-Hiller, North American, and McDonnell-Douglas to develop design proposals and production schedules by June 1969. The F-15 development process happened to occur when the Air Force was in the midst of a shift about its procurement process. When McNamara had begun his tenure as Secretary of Defense, he instituted a policy known as Total Package Procurement. That process called for contractors to bid for the near-entirety of full weapons systems, including design, development, production, and various subsystems—hence, a “total package.” Prior to this, contractors had only bid for particular components separately, and at times they sought to underbid on the design and development phase and gain the spent resources back during production phases, since production contracts usually went to the same companies who did the design. McNamara’s office thought that the production phases were thus not truly competitive and that their costs tended to become inflated. Thus, Total Package Procurement theoretically placed the entirety of the procurement process under competition. If it worked, it could help the Air Force predict and manage long term costs and production schedules more effectively. It also placed more of the responsibility for a program’s cost and success on the contractors themselves, ideally encouraging them to be more competitive in their pricing.³⁷⁵

³⁷⁴ Neufeld, “The F-15 Eagle,” 32.

³⁷⁵ For a full explanation of Total Package Procurement, see Code of Federal Regulations. Washington, D.C.: U.S. Government Printing Office. 1 January 1969, 63

A number of weapons platforms in various services experienced major problems using this model, most notably the Air Force's C-5 Galaxy, designed by Lockheed. Misunderstandings about the level of coordination needed between contractor and government and, even more, the inability to predict costs of developing the extremely complex weapons systems of the time led to massive cost overruns on the C-5 project.³⁷⁶ The F-15 happened to be entering the contractor competition phase during the shift away from this model. Maj Gen Harry E. Goldsworthy, Commander of the Aeronautical Systems Division (ASD), was assigned to come up with a new approach for the F-15. He thought that emphasizing cost instead of performance was a mistake. He also wanted to place most of the risk on the government, rather than on the contractors, in order to encourage a high level of quality in their work. In January 1969, the incoming administration of Richard Nixon brought a new group to the Department of Defense, including a new Deputy Secretary of Defense, David Packard, who was an electrical engineer and co-founder of Hewlett-Packard. Packard immediately began an effort to reform what he as well as many in the military saw as the failed policies of McNamara. Speaking to a group of defense managers in August of 1970, Packard stated: "In defense procurement, we have a real mess on our hands."³⁷⁷ Nixon's newly appointed Secretary of the Air Force was former Deputy

[<https://books.google.com/books?id=POY6AAAAIAAJ&dq=%22Total%20Package%20Procurement%22&pg=PA63>], accessed June 7, 2017

³⁷⁶ For an account of the C-5, see Jerry V. Poncar, and James R. Johnston, III. "History and Analysis of the C-5A Program: An Application of the Total Package Procurement Concept," (Thesis, Wright-Patterson Air Force Base, Ohio: Air Force Institute of Technology, October 1970); for an evaluation of Total Package Procurement as related to other systems that came afterward, see Joseph R. Busek, "A Historical Analysis of Total Package Procurement, Life Cycle Costins, and Design to Cost," (Master's Thesis, Air Force Institute of Technology, Air University, June 1976).

³⁷⁷ Quoted in Shannon A. Brown, *Providing the Means of War: Historical Perspectives on Defense Acquisition, 1945-2000*, (Washington, D.C.: Government Printing Office, 2005), 145.

Administrator of NASA and MIT professor of Aeronautical Engineering Dr. Robert Seamans. Seamans developed a method of creating “demonstration milestones” that could measure a program’s development and ensure cooperation and mutual faith between contractor and government. However, John Foster of DDR&E was concerned about price overruns and wanted to save money on the F-15. As a result, some air-to-ground capabilities were cut from the F-15.³⁷⁸

Rhodarmer served as the focal point of the F-X program in the Pentagon. His office received much of the press attention and functioned as a liaison among departments, but the details of the design process were directed mostly from the Air Force Special Projects Office (SPO) at Wright-Patterson. On July 11, 1969, Brigadier General Benjamin N. Bellis became the director of the SPO. Bellis had an extensive background developing weapons systems. He had worked on the programs for the Matador and Atlas missiles, he had managed the development program of the F-12 (which became the SR-71 Blackbird), and he had earned advanced degrees in both aeronautical engineering and business administration. For Bellis, the F-15 program was about much more than simply developing a new fighter. For him, the reputation of the entire Air Force was at stake. Historian Jacob Neufeld summarized Bellis’ goal as an attempt to “reestablish the Air Force’s credibility as a manager of major weapon system program and regain the confidence and support of the Congress and the taxpayer.”³⁷⁹

Bellis centered the F-15 program around himself and exercised strict control. As he described his own role, “I am the single individual who must account for the progress, expenditure of funds, problems and solutions that will make the F-15 a successful part of the Air

³⁷⁸ Neufeld, “The F-15 Eagle,” 34-36.

³⁷⁹ Neufeld, “The F-15 Eagle,” 40-41, quote on 41.

Force inventory. . . . I can hold down changes that might only add higher costs and complexity without increasing the true capability of the F-15 fighter. I am the single source of decision for integrating all elements of the system. . . . With this type of control, there can be no excuses for uncontrolled changes.”³⁸⁰ Bellis’ superiors also thought that the procurement process needed to be centralized. General Ferguson (commander of AF Systems Command), Lieutenant General Marvin L. McNickle (Deputy Chief of Staff Research and Development), and the new Air Force Chief of Staff General John D. Ryan formed a “triumvirate” that exercised strict control over the F-15 program. Any further changes to the F-X had to be approved through them. Bellis’ reporting chain went first directly to Ferguson, then up to Ryan and Seamans. In addition to adhering to this strict, centralized structure, Bellis also thought that the F-15 faced too much scrutiny and he wanted to protect it from “outside interference.” His ultimate goal was to ensure that the F-X was truly “a fighter pilot’s plane.” To that end, he created a panel of former TAC pilots to evaluate the plane.³⁸¹ Thus, once the plane’s design had been tentatively agreed on by the end of 1968, the remainder of the development process was much more tightly controlled than what had gone before, and it was led by men who were interested in creating something closer to the orthodox fighter pilot’s vision for a dedicated air-to-air fighter.

Responding to A Bigger Crisis

As the F-15 program was moving from its initial design phase and into modification and eventual production, the Air Force was in the midst of a large shift in its thinking—a shift that brought more attention to the role of tactical air power broadly and to fighters specifically. Air-

³⁸⁰ Quoted in Neufeld, “The F-15 Eagle,” 40.

³⁸¹ Neufeld, “The F-15 Eagle,” 42-43.

to-air combat began to receive greater focus as more and more young officers, known as the “iron majors,” pushed for a complete cultural, technological, and training overhaul in the service.

Much of this shift was a reaction against perceived shortcomings of the Air Force’s performance in the Vietnam War, especially in the realm of air-to-air combat. Fighter pilots in the Korean War had enjoyed a 10:1 kill ratio against enemy MiG fighters, but in Vietnam, the overall 2:1 ratio seemed like a black mark against the service. Planners took steps to address this in a number of ways, including focusing the F-15 program on air combat, but they also instituted changes in leadership, reevaluated pilot training procedures, and looked to the history of the service for inspiration.³⁸²

In looking at their service history, one step the Air Force took in reaction to the perception that fighters had performed poorly in Vietnam was the creation of Project Corona Ace, a series of oral history interviews with former ace pilots. As the introduction for every Corona Ace interview states, the project was an “attempt to develop an *ace profile* for the selection and training of future fighter pilots.”³⁸³ The questions asked by interviewers working on this project suggested that the Air Force tended to assume that the measure of good fighter pilots was to be found in their core personality. This project demonstrated that at least some segment of the Air Force leadership believed in the “knights of the air” myth—first, in thinking that the service was deficient in air-to-air combat and that part of the solution to that problem

³⁸² For more on this period, see Marshall L. Michel III, “The Revolt of The Majors: How The Air Force Changed After Vietnam,” PhD Diss., Auburn University, Dec 15, 2006; For a broader look at general changes in the post-Vietnam years, see Donald J. Mrozek, *The US Air Force After Vietnam: Postwar Challenges and Potential for Responses* (Maxwell AFB: Air University Press, 1988).

³⁸³ John Boyd Corona Ace Oral History Interview, Jan 22, 1977, K239.0512-1066. The same introduction precedes each Corona Ace interview.

was to identify aces and, second, in thinking that aces could be defined by their personalities. Many of the questions asked during these interviews showed that the questioners believed in many of the core components of the “knights of the air” myth, especially aggressiveness and competitiveness.

For example, in Major General John Alison’s interview, the questioner, Lieutenant Colonel John Dick, Jr., asked many leading questions: “Are you a fatalist at all?” “It was something else then?” “Competition, to be better than anybody else? To match your skills against someone else?” “Why if you got four you want five; you got five and you want six. You become a single ace and you want to get ten?” “If there is a kind of personality that you and other aces have is there some basic personality for whatever reason, aggressiveness or competitiveness. And if we can identify those kinds of people, aren’t they still the most important ingredient in this weapons system?”³⁸⁴ Some pilots agreed with these sentiments and others dissented, yet the majority of interviews were conducted under the implication or even the assumption that the personality of the pilot—especially the qualities of competitiveness, aggressiveness, and individuality—were the most important determining factors in creating an ace.

General Frank Everest, who commanded the Fifth Air Force in Korea and later served as Deputy Commander of TAC, recalled the fighter pilot mindset and the sense of individualism it engendered in Korea. He specifically contrasted it with the team mentality of bomber crews. He argued:

You have got to realize that a fighter pilot, a single man, with a multimillion dollar vehicle between his legs, has got to exercise judgment, a hell of a lot of it, because there

³⁸⁴ Major General John Alison Corona Ace Interview, January 27, 1977, Air Force Historical Research Agency, K239.0512-1065, 107-110.

isn't anybody there to tap him on the shoulder and say, "Son, I think you better turn right instead of left." I once had an argument with LeMay about the ability of SAC crews against TAC crews. I said, "I am not going to argue with you, but come down to Myrtle Beach sometime and stand there and watch young, 22 year-old kids take off with a ring of thunderstorms surrounding them with two over-the-sea refueling contacts to make and the first landing at some airbase in France. One man to do all of the instrument work, all of the refueling. Christ, you have a crew of eight to do the same job! Now tell me which is the better pilot."

At this argument, Dick exclaimed in agreement: "Hear! Hear!" This prompted a dialog, beginning with Everest stating: "I have to tip my hat to those gentlemen. One guy and he does the whole goddam bit."

Dick replied: "And loves doing it."

"Loves to do it, yes."

"There is the perfect authority and responsibility stuck together – flying is just something else. If you are good, you want to do the toughest thing there is to do and the most fun."

"Yes," Everest confirmed.

Dick concluded: "There are different kinds of folks, you know. You get around Nellis around those young fighter pilots – they are just vibrant, smart people. They can do anything."³⁸⁵

This was far from an unbiased assessment. The interviewer agreed heartily with everything Everest was saying, possibly encouraging him to draw these points out even further. Clearly both parties firmly believed in the "knights of the air" mythology and celebrated the traits associated with it, proud of their view that fighter pilots were inherently superior to other types of fliers.

³⁸⁵ General Frank F. Everest, Oral History Interview, August 23-25, 1977, USAF Historical Research Agency, K239.0512-957, 365-366.

Another shift occurred as Vietnam unfolded, beginning as early as 1965 and certainly in full swing as the war drew to a close: a shift in what kinds of officers achieved leadership positions. No longer was the Air Force led just by former bomber pilots and bomber commanders but mostly by former fighter pilots. Tactical aviation now enjoyed greater favor, and there was increasing support for air-to-air combat and for the fighter community in general. This was more than simply a cosmetic change. In *The Rise of the Fighter Generals*, Colonel Mike Worden has explored this idea further, arguing that some fundamental personality traits separate bomber and fighter pilots, and that these traits had a powerful effect upon leadership decisions made from 1965 until the 1990s. As Worden argued: “The issue here is not whether pilots should dominate the Air Force—the fact is they do. Rather, a more interesting phenomenon is that persons who sit on top of the world’s most powerful air force are almost exclusively fighter pilots.”³⁸⁶

The fighter pilots running the Air Force in the early 1990s not only celebrated this, but associated their role as fighter pilots with their sense of masculinity, adhering to the concept of the “knights of the air.” A satirical essay spread discreetly around the Air Force in 1991 titled “TAC-umcizing the Air Force,” explicitly referred to fighter pilots as “manly men” that should dominate every aspect of USAF leadership. In 1992, when fighter pilots took a more dominant role after Air Force restructuring, a second satirical essay wormed its way through the Air Force entitled “ACC Back to the Future: The Second Coming of the Manly Man.”³⁸⁷

This was in stark contrast to the Air Force in the two decades after the Second World War, in which SAC and the doctrine of strategic bombing were dominant throughout the service.

³⁸⁶ Worden, *Rise of the Fighter Generals*, ix.

³⁸⁷ Quoted in Worden, *Rise of the Fighter Generals*, ix-x.

Those who valued tactical air power and a larger role for TAC – especially air-to-air combat pilots – were marginalized. When Curtis LeMay, former commander of SAC and ardent believer in the gospel of strategic bombing doctrine, was promoted to the Air Force Chief of Staff in 1961, he quickly promoted bomber generals to key command positions, replacing former fighter pilots, even in command of TAC. Worden explained: “By 1 October 1961 all major operational commanders, and the vast majority of the Air Staff leadership, had become ardent bomber generals—most of them SAC absolutists. SAC’s methods became Air Force methods.”³⁸⁸

In light of the frustrating experience in Vietnam, in 1965, Air Force Chief of Staff General John P. McConnell sought a change in leadership, seeking to spur more tactical air power-minded leaders into providing insight on the war. At that point, the only former fighter pilot in a high command position was USAFE commander General Gabriel Disosway. McConnell promoted him to commander of TAC in August of that year, and replaced him with General Bruce Holloway, who had been a fighter pilot. In 1966, former fighter pilot General William Momyer became the commander of Seventh Air Force—the senior Air Force commander in the Southeast Asia theater—and, in 1968 he took command of TAC. Also in 1966, McConnell brought Holloway in to be his vice chief of staff, before assigning the fighter general to be the commander of SAC. McConnell did not place only former fighter pilots to major commands, but he did seek a balanced group, especially compared with what had previously been the case. He sought to nurture people whom he thought could one day replace him. For example, he placed the former SAC commander and bomber general John D. Ryan as PACAF commander and then as his vice chief of staff. Although these moves did put fighter generals in positions of power and influence in the Air Force, they did not overturn the service’s

³⁸⁸ Worden, *Rise of the Fighter Generals*, 89.

doctrine, which remained based on strategic bombing, primarily through delivery of nuclear weapons.³⁸⁹

Nonetheless, the role of tactical air power rose sharply during this period, even outside of key leadership positions. By 1966, tactical air forces received a larger budget share than strategic forces. The fighter force had doubled in size by 1965. By 1969, fighter generals in leadership positions outnumbered bomber generals two to one. Because promotions often depended on combat experience, the simple fact that more tactical sorties in fighter aircraft were flown in Vietnam meant that those pilots most eligible for promotion in those years happened to be mostly fighter pilots. Thus, “[f]rom 1971 to 1982 fighter pilots on average outnumbered bomber pilots by four to one. . . . By 1982 there were no bomber generals in key Air Staff positions, and fighter generals outnumbered bomber generals in the major commands by five to four.”³⁹⁰

The Air Force also dramatically changed its training procedures in the years immediately after the Vietnam War. Air Force Chief of Staff General John Ryan, working with Momyer, conducted surveys of pilots who had flown in Vietnam and concluded that they had been woefully under-trained for air-to-air combat. By 1972, the Air Force created the “Aggressor” squadron—a group of pilots flying aircraft and tactics meant to mimic Soviet tactical air forces in simulated air combat against American pilots. A series of exercises known as “Red Flag” soon became a normal practice for training top USAF pilots in advanced air-to-air combat techniques.³⁹¹

³⁸⁹ Worden, *Rise of the Fighter Generals*, 168, 171-173.

³⁹⁰ Worden, *Rise of the Fighter Generals*, 189-190, 223, 226.

³⁹¹ The best work on the origins of Red Flag is Brian Laslie’s *The Air Force Way of War: U.S. Tactics and Training after Vietnam* (Lexington: University Press of Kentucky, 2015); See also Michel, “Revolt of the Majors.”

Conclusion

For the fighter community, all these changes meant greater influence, an increase in procurement of fighter aircraft, and an intensified interest in fighter roles within the Air Force, which impacted the development of both doctrine and hardware. However, many of these “fighter generals” were not air-to-air pilots as much as they were tactical air power advocates—they had flown fighter planes, but in missions such as CAS or interdiction. Air-to-air combat advocates certainly had more leverage than they had had in previous years, and they had much more in common with the new crop of leaders in terms of values, beliefs, and personality. However, even the fighter generals were not easily convinced that air-to-air combat alone was (or should be) the dominant role for the Air Force or that new aircraft devoted solely to that mission were necessary. Support for those positions was not unanimous, but did grow. As the mix of leaders changed and as they grew more sympathetic to such views, air combat advocates found enough leverage to give momentum and force to their ideas.

Yet for the more extreme branch of fighter advocates, the F-15 was not enough. Although Boyd and his acolytes had succeeded in pushing the F-15 program into the more specialized direction of air combat, it was not the dedicated air superiority fighter they wanted—that could effectively recreate the soaring duels of the “white scarf” era. As they became increasingly frustrated with what they felt were shortcomings of the F-15, they attempted to achieve their vision through another aircraft—this time, one they would design from the ground up.

Chapter 7 - The Lord's Work: Creating the F-16

By the start of 1969, the Air Force was generally excited to move forward with the F-15 program, confident that they were building one of the best fighter aircraft ever devised. Privately, Major John Boyd and Pierre Sprey seethed with anger. They felt that the F-15 was a missed opportunity at best, and that gold-plating and Air Force bureaucracy had destroyed their vision for a true fighter—a simple, lighter-weight plane that was designed solely for close quarters air-to-air combat in the vein of their idealized vision of noble, heroic World War I aces. The F-15 might turn out to be a good plane, but it lacked in its ability to perform the “white scarf stuff.”

Sprey thought that the F-15 was a lost cause. In his view, it was too expensive, relied on high-risk technology, was far too complex, and would not be able to achieve its performance goals. Sprey referred to the F-15 as “irrational” because it was ostensibly a fighter plane that, in his mind, was not optimized for air-to-air combat. As early as July 18, 1968, he proposed an alternative design to General James Ferguson, commander of Air Force Systems Command (AFSC). Ferguson took no action, but Sprey refused to give up. He recalled: “When it became very clear to me that General Ferguson either couldn’t or wouldn’t do anything about getting a more rational fighter, I decided at that point that I would carry this debate into public. That is, the classified public debate, not the newspaper debate.” He gave a series of briefings at NASA and “all over the Pentagon... on behalf of an airplane that I called the F-X2.”³⁹² This plane became more frequently referred to as the F-XX. However, Sprey was not the only advocate for such a fighter. In 1968, the Assistant Secretary of Defense for Systems Analysis, Alain Enthoven,

³⁹² Sprey OHI, 39; Neufeld, “The F-15 Eagle,” 64.

instructed General Dynamics and Northrop to study the potential for exactly this type of light weight fighter.³⁹³

Sprey's goal was to take Boyd's EMT approach and design a fighter that would excel according to those criteria—namely, maneuverability and air-to-air dogfighting situations at slower speeds (centering on Mach 1, in the range around subsonic to supersonic speeds). Sprey argued that his plane would be “smaller, much more austere, and vastly higher performance.” The weight would be significantly less than that of the F-15 at only 25,000 pounds. It was conceived as a single-seat, single-engine plane with a higher thrust-to-weight ratio, significantly lower wing-loading (60 pounds per square foot), with a light internal gun and two heat-seeking sidewinder missiles. His proposal did not allow for “complex” avionics systems, instead using a “simple visual radar.” This was in direct contrast to what Sprey felt had gone wrong with the F-15. Sprey also did not limit his proposals to the Air Force. He was willing to talk to anyone who would listen. He proposed his new lightweight fighter (LWF) concept to the Navy as well, as a replacement for their VFAX (F-14) program, which Sprey labeled the VFXX. As he recalled, his LWF proposal “would really answer the mission of a pure air-to-air fighter as opposed to the F-15 which by now is really a fighter-bomber in classical Air Force tradition.”³⁹⁴

Sprey's threat to “go public” was not limited to other government agencies like NASA and the Pentagon. In March of 1970, the American Institute for Aeronautics and Astronautics held a conference in St. Louis, the headquarters of the F-15's producer, McDonnell Douglas. The goal of the conference was to celebrate and showcase the new F-15 in front of the entire defense

³⁹³ Kenneth P. Werrell, *Chasing the Silver Bullet: U.S. Air Force Weapons Development from Vietnam To Desert Storm* (Washington, D.C.: Smithsonian Books, 2003), 81.

³⁹⁴ Sprey OHI, 39-40; Neufeld, “The F-15 Eagle,” 64.

and aerospace contractor community. Sprey was a keynote speaker. Historian Grant Hammond describes Sprey taking the stage “with malice aforethought and a hint of glee,” as he proceeded to openly criticize the F-15, demanding that the Air Force and the contractor community do better. He then laid out his vision for a lightweight fighter, calling for contractors to submit prototypes of his F-XX to compete in a flyoff.³⁹⁵

Historian Jacob Neufeld describes the response to Sprey’s ideas succinctly: “The Air Force and Navy were not impressed.” They argued that a LWF lacked the necessary range to operate over enemy territory, and that larger, more complicated avionics and radar packages were needed to deal with enemy air defenses and to allow for early detection of enemy aircraft. The Air Force pointed to the F-104 Starfighter and its ineffectiveness in escort missions in Vietnam as evidence that lightweight fighters were ineffective—hardly conclusive, since the F-104 was primarily a high-speed interceptor that was not at all optimized for air-to-air combat. Perhaps most importantly, both services argued that the kind of aircraft Sprey proposed lacked the speed and high-altitude performance necessary to deal with the new MiG-25, which ironically was also designed primarily as an interceptor and was not optimized for air-to-air combat. Neufeld notes the skepticism this attitude engendered from many other members of the fighter pilot community, saying: “Many veteran Air Force fighter pilots facetiously recommended that the best solution to the air superiority problem was to ‘buy MiG-21s.’”³⁹⁶

Yet the Air Force was confident that the F-15, even with its larger size, weight, and extra bells and whistles, was more than adequate to meet the threat of Soviet fighters. In particular, a NASA study called the “Driver Report” had indicated that the Navy’s F-14 might be superior to

³⁹⁵ Hammond, *The Mind of War*, 84-85.

³⁹⁶ Neufeld, “The F-15 Eagle,” 65.

the F-15 in air-to-air combat. To fight this argument, in 1968 and 1969, the Studies and Analysis Division in the Air Staff Headquarters was run by Lieutenant General Glenn A. Kent, who partnered with Colonel Larry Welch to create an extensive computer simulation of air-to-air combat, specifically for comparing the F-14 and F-15 against MiG-21s and potential future Soviet aircraft. This program, called “Tac Avenger,” showed that the F-15 was far superior to the F-14 in simulated air-to-air combat. Yet Kent also recalled: “Of course, the MiG-21 wasn’t a match for either one of them.” The simulations, however, had been programmed using Boyd’s EMT data as their basis. The program then ran simulated “duels” between two planes, rather than simulating engagements with many planes or with varied objectives. Boyd himself was present for some of the programming of the simulator.³⁹⁷ Small surprise then that the program confirmed Boyd’s own views, even if he was dissatisfied with how the F-15 ended up, feeling that the plane did not truly capture a sense of the pure aerial duel he was after.

For some, this disappointment was acute, and there was still a felt need among certain elements of the fighter community for a fighter more dedicated to air-to-air combat. For advocates of the “white scarf stuff,” the larger F-15 was a shameful embarrassment. Test pilot and “Fighter Mafia” member Chuck Myers recalled: “When I say, ‘We’re not happy with the F-15,’ I wouldn’t want people to think that I helped spawn that airplane, all I helped do was create the need for a new fighter airplane which we haven’t yet procured.”³⁹⁸ Sprey recalled his overall feelings on the F-15 and why it pushed Boyd and the other acolytes to pursue another option:

³⁹⁷ Kent OHI, 11-15, quote on 14.

³⁹⁸ Myers OHI 38.

“We had gotten disgusted with it [the F-15], because it had gotten too loaded up with junk. And so we went off and as kind of bureaucratic guerrillas, an underground started the F-16.”³⁹⁹

The Fighter Mafia

While nurturing a sense of anger and betrayal over the perceived corruption of the F-15 and the complete lack of interest in a lightweight fighter, Boyd found a receptive audience in former fighter pilot and test pilot Everest Riccioni. Boyd’s biographer Robert Coram described Riccioni as a “professional Italian” who “has an unending need for recognition,” similar to Boyd’s own need for constant validation.⁴⁰⁰ Riccioni had been flying fighters for quite some time, gaining experience in World War II in the cockpit of P-38s and P-51s. After the war he earned an undergraduate degree in aeronautical engineering and a Master’s in applied mathematics, then attended MIT where he completed the coursework for a PhD in aeronautical engineering but dropped out before completing his dissertation. While teaching at the Air Force Academy, Riccioni had written a book-length manuscript on air to air tactics called “Tigers Airborne,” in which he posited that current Air Force tactics were stupid and got pilots needlessly killed. Riccioni was forbidden from publishing the manuscript, although one of his superiors sent a copy to Boyd.⁴⁰¹

In April 1968, Riccioni had completed his thesis for the Air War College, entitled “The Air Superiority Fighter, A Modern Analysis.” He framed his discussion by rejecting the then-current war in Vietnam as a proper war from which to learn lessons about air superiority. As he stated, “Vietnam is not the source of an air superiority air-battle problem in 1968. Only the

³⁹⁹ "Extended Interview: Pierre Sprey," Sept 28, 2012, *The Fifth Estate* [<http://www.cbc.ca/fifth/blog/extended-interview-pierre-sprey>], accessed Dec 2, 2017.

⁴⁰⁰ Coram, Boyd, 237-238.

⁴⁰¹ Coram, Boyd, 238.

eventuality of war with an enemy possessing a powerful air force can create the requirement for an air superiority aircraft. Such a country is Russia, or a China of the future.” Instead he looked to the heroes of World War I for inspiration on developing fighter aircraft. He quoted an undated report by Billy Mitchell: “Control . . . is obtained by the air battles of pursuit aviation. It can be gained in no other way... [Pursuit] is the branch of aviation which assures victory in the air.”⁴⁰²

Riccioni argued that the Air Force began taking the wrong turn in the 1920s and 1930s when bombing advocates pushed their theory over the role of pursuit aviation, and he cited Claire Chennault (the ACTS instructor from the 1930s who had argued for an emphasis on fighters and was pushed out by Kuter and other bomber advocates) as a “visionary” and a sort of martyr to the cause. To Riccioni, the wedding of Air Force identity to bombing doctrine in the interwar period was “a nadir of insight into the fighter operation” from which “it has never recovered.”⁴⁰³ The paper then referred to Boyd as “a bright young luminary” whose EMT ideas could help solve the problem of a lack of air superiority fighters.⁴⁰⁴

Riccioni’s work emphasized the characteristics of the stereotypical knights of the air, both generally and in its advocacy for air-to-air combat with small, nimble fighters in close-turning gun-based dogfights as the ideal means for achieving air superiority. He also expressed the raw aggressiveness seen in many fighter pilots, and he urged that fighter designs needed to keep that sense of aggressiveness in mind. As he said: “One of the primary roles of the air superiority fighter is to seek battle, to engage in aerial battle, and to do everything to destroy the opponent. The nature of a fighter aircraft is offensive action; all else is pure nonsense. . . . The

⁴⁰² Everest E. Riccioni, FR 39919 “The Air Superiority Fighter, A Modern Analysis,” Research Report, Air War College, Air University, Maxwell AFB, Alabama, April 1968, 3, 13.

⁴⁰³ Riccioni, “The Air Superiority Fighter,” 19, 32, 34.

⁴⁰⁴ Riccioni, “The Air Superiority Fighter,” 34.

fighter aircraft is a fight looking for a time and place to occur.”⁴⁰⁵ He argued that maintaining this personal sense of aggressiveness for combat was an absolute necessity for success, and that youth and rank were key to maintaining it. Tying this into the orthodox lack of appreciation for high-ranking authority figures, especially those that do not actively prove themselves as tough fighter jocks, Riccioni argued that

Air combat maneuvering demands skills and an aggressive temperament that requires the experience of at least a senior first lieutenant for their achievement. It is the author’s observation that few pilots ever retain the necessary level of aggressiveness beyond the rank of junior major. For reasons that are explainable through analysis, the aggressive temperament is more a function of rank than of age. Thus, senior commanders who dominate the performance of squadrons and wings seldom appreciate this factor. They generally lose their lust for high G, high speed, close-pass maneuvering, and ‘through their maturity’ they decide it will no longer be done. To resist this result it is notable that General Mordecai Hod, commander of the Israeli Air Force, flies 30 hours per month in operational aircraft.⁴⁰⁶

He also emphasized maneuverability and agility as the key characteristics that an ideal fighter aircraft should possess. “Closely allied to the subject of performance is the requirement for a fighter to be highly maneuverable. This has been recorded since World War II. The United States pilot has been vehement in his demands for great maneuverability, especially since he has seldom had the maneuvering edge on the enemy.”⁴⁰⁷ Maneuverability was such a core component of his argument for a small, lightweight fighter aircraft that, while most fighter advocates who opposed the use of missiles did so by arguing that missiles did not track targets accurately, Riccioni instead argued that the reason missiles were ineffective was that they were not maneuverable enough. As he stated, missiles were “inherently unmaneuverable. . . . The

⁴⁰⁵ Riccioni, "The Air Superiority Fighter," 38-39.

⁴⁰⁶ Riccioni, "The Air Superiority Fighter," 63.

⁴⁰⁷ Riccioni, "The Air Superiority Fighter," 40.

missile cannot cope with a target maneuvering intelligently against either the delivery aircraft or the missile itself.”⁴⁰⁸

His report also used the specter of Russian air-to-air ability as a basis to argue that America would lose an air war of attrition. However his calculations reveal much about his thought process. Riccioni claimed that the Warsaw Pact forces held 9,000 “pure” air-to-air fighters, referring almost exclusively to MiG-15s, -17s, -19s, and -21s. By contrast, he argued (using emasculating gender-based language) that NATO aircraft were “impotent in competitive maneuvering battles” and that the F-4, F-102, F-106, and P-1 should not be counted as “pure” air-to-air fighters for the purpose of his comparison. He argued that only F-104s, F-100s, F-86s, F-84s should count as true air combat fighters, and by that measure, NATO forces had only 1,800 planes against the Soviets’ 9,000, adding the stinger that “the Russian aircraft can all outmaneuver the NATO aircraft.”⁴⁰⁹

Riccioni also rejected the idea of pilots relying on particular technologies, especially avionics computers and advanced radars. He argued that men were better than machines in terms of characteristics useful to fighter pilots. He stated: “No amount of electronic or optical equipment can substitute for a pilot’s ability to turn his head and see his antagonist.” Compared with missile-guidance computers, electronic aids were not worth the space they take up, because a human pilot was “the best, most reliable computer the world has yet seen.”⁴¹⁰

Riccioni did list the requirements that he thought should define the ideal, “pure” air-to-air fighter (which he referred as the MASA: Modern Air Superiority Aircraft). These desired

⁴⁰⁸ Riccioni, "The Air Superiority Fighter," 44.

⁴⁰⁹ Riccioni, "The Air Superiority Fighter," 53-56.

⁴¹⁰ Riccioni, "The Air Superiority Fighter," 43, 104.

specifications were purposefully in contrast with those of the high-altitude, high-speed interceptors of the TAC inventory in 1968. An air-to-air fighter had to be designed to make a close-turning dogfight the optimal conditions. Thus, he insisted on some electronics that aided those roles: an inertial navigation system, for example, and flight controls placed within the peripheral vision of the pilot so that the pilot could maintain visual with his own eyes and still see key instrumentation. However, he insisted that electronic equipment be easy to remove, in order to lighten the aircraft's weight on missions that would focus on dogfighting. He did not completely neglect missiles. Saying that an IFF system was key, Riccioni argued that missiles could serve as a "long arm" attack function, but he insisted that the main goal was to use the threat of missiles to force the enemy pilot into a close turning dogfight. As he explained, "an air battle aircraft is not required to be faster than its adversaries to bring adversaries into its web of influence; nor is the missile the solution to the problem, i.e., depended upon to destroy the adversary. The missile will indeed destroy the adversary unless he accepts the turning battle at which the MASA *must excel*."⁴¹¹

Riccioni emphasized that his ideal was that "[t]he aircraft is designed to win in a *turning* battle with its adversaries; it is not a high-speed thoroughbred." a lightweight air-to-air fighter should excel at "low and very low altitudes..." and low speeds, in order to increase maneuverability. Because he viewed the missile as primarily a threat to draw the enemy into a dogfight, "[t]he air superiority aircraft under analysis has an *absolute requirement* for cannon ordnance."⁴¹² He also emphasized visibility as key to winning dogfights. Thus he advocated bubble canopies, but he also insisted that a true air-to-air fighter was a single-pilot craft.

⁴¹¹ Riccioni "The Air Superiority Fighter," 124-125, emphasis in original

⁴¹² Riccioni, "The Air Superiority Fighter," 123, 126-127 emphasis in original

Although it could be argued that the individuality celebrated in fighter-pilot culture tends to bias pilots to favor single-seat aircraft, Riccioni argued that the presence of a back-seater would limit visibility and thus had to be eliminated. However, he did rely on celebration of the lone individual as well: “The other factor complementing the single pilot solution is the absolute demand for decisive action in maneuvering a fighter in combat. The indecision of two men, where the talents and insights and (at the absolute least) the opinions of two pilots will differ, can just barely be tolerated in the fastest, most dangerous, most fluid form of battle that man has created.”⁴¹³

Riccioni concluded that an air superiority aircraft “must be designed to be *immediately* and *eminently* prepared to win in maneuvering aerial battles. It is for aerial battle that it is *designed* to excel.”⁴¹⁴ Whether this paper had any larger or lasting impact is unclear. However, the aircraft he described served as a blueprint for what the fighter advocates sought to create, in form if not the totality of the reasoning behind it. It relied heavily on Boyd’s ideas and reflected the main thrust of Riccioni’s future advocacy.

Boyd and Riccioni did not interact much until May 1969, when Riccioni was assigned to the Tactical Fighter Requirements Division at the Pentagon, and then promoted to Chief of Development, Plans, and Analysis in January 1970, making him Boyd’s boss. Riccioni agreed with most of Boyd’s and Sprey’s arguments, especially the desire for a lightweight dedicated air-to-air fighter.⁴¹⁵ All three men were dissatisfied with the size and weight of the F-15 and wanted a smaller plane truer to their vision of knightly, agile air combat.

⁴¹³ Riccioni, “The Air Superiority Fighter,” 150, 153-154.

⁴¹⁴ Riccioni “The Air Superiority Fighter,” 154-155, emphasis in original.

⁴¹⁵ Hammond, *Mind of War*, 85.

Riccioni's advocacy was not much different from Boyd's in style, and it was found equally off-putting to those who were not predisposed to share their views. In 1969, Riccioni partnered with other sympathetic members of the Air Staff to produce a report to McConnell and his Vice Chief General John Meyer, that recommended the lightweight fighter as an alternative to the F-15. The head of the Systems Analysis Division in the Air Staff Headquarters, Lieutenant General Glenn A. Kent thought that this line of argument, especially if delivered through Riccioni's argumentative personality, might push away potential allies. He recalled that "while General Meyer might be in favor of the lightweight fighter, it was my belief that after hearing the briefing he probably would no longer be in favor of the lightweight fighter."⁴¹⁶

Kent thought that Riccioni could have made the convincing argument that because there had been many technological advances since the F-15 program had begun, it was now possible to achieve all the performance characteristics of that program in a much smaller, cheaper airplane. Kent recalled: "That would have been great... but Colonel Riccioni didn't look at the problem that way. . . . What did shine through in the briefing was that anybody who thought that the F-15 program was a good idea, didn't really understand. . . . You're almost making it a necessary condition that in order to go with a lightweight fighter that one must admit to a certain amount of poor judgment."⁴¹⁷ Riccioni, like Boyd, stuck with an accusatory, combative tone rooted in the fighter pilot's typical aggressiveness. Their insistence that F-15 advocates admit that they were "wrong" was possibly a result of their shared need for validation, and it also torpedoed their efforts. Kent described Riccioni's briefing as "a semi-disaster."⁴¹⁸

⁴¹⁶ Kent OHI, 16.

⁴¹⁷ Kent OHI, 16-17.

⁴¹⁸ Kent OHI, 17.

The Air Force was not about to admit that the F-15 might have been a mistake. After all the time and resources that had already been poured into it, as well as its status as a symbol against being forced to adopt Navy designs, the F-15 was a tent pole of Air Force technological development, and the Air Force was worried about any potential threats to the F-15 program. One potential threat that had plagued the planning process was still lingering: The Navy's F-14 program. Some members of the Air Staff were worried that, if the F-14 was successful, Congress might determine that the F-15 was unnecessary. Air Force leaders also resisted even considering a program for another new fighter, which could itself pose a threat to the F-15.

However, Boyd, Sprey, and Riccioni sought to use that rivalry with the Navy to their own advantage. Riccioni wrote a memo to one of the generals in charge of Research and Development, claiming that the Navy was developing a lightweight fighter of its own. He did not know this. The memorandum only cited "small incidental factors and rumors" as evidence, but he argued that the Navy might have a lightweight fighter design of their own that could pose a threat to the F-15. The memorandum concluded with a message of hope that "Lt. Col. John Boyd and I are quietly pushing an informational probe deeper to get more information and more substantial, precise information."⁴¹⁹ According to Coram, Boyd laughed as he told Riccioni, "We don't care what the Russians are doing. We only care about what the Navy is doing."⁴²⁰ Either Boyd's primary motivations did not lie in national security but in advancing his agenda, or else he had elevated the "white scarf stuff" so highly as to think of top capability in air-to-air combat and broader national security as the same thing.

⁴¹⁹ Quoted in Hammond, *Mind of War*, 88-89.

⁴²⁰ Coram, Boyd, 239.

Whether or not the Navy threat existed, Lieutenant General Otto Glasser had heard all he needed to hear, since he was already predisposed to want a lightweight fighter himself. Glasser was an electronics engineer who had worked on intercontinental ballistic missile programs and radar development, and in 1965 he had become Deputy Director of Operational Requirements and Development Plans for the Air Force Office of the Deputy Chief of Staff, Research and Development. He told Riccioni to continue his efforts: “Stay on this,” he said. “I’ve long urged an a/c [aircraft] of this type—We could have scooped all with it—Run with this.”⁴²¹ With that endorsement, the trio proposed a study into using EMT and Boyd’s trade-off studies as a methodology for fighter design. The project, given the purposefully obtuse title “Study to Validate the Integration of Advanced Energy-Maneuverability Theory with Trade-Off Analysis,” was merely a cover for the three men to gain funding to design their lightweight fighter. The Air Force complied, to the tune of \$149,000.⁴²² Historian Grant Hammond called the grant “a license to steal, a con man’s dream: permission to do what you wanted to do by the party you were conning.”⁴²³

At around this time, Boyd, Sprey and Riccioni thought of themselves as quite the team. They had essentially pressured the Air Force to fund a study to replace its preeminent project. Riccioni floated the idea of the trio calling themselves “The Fighter Mafia,” with himself as their “Godfather.” However, Boyd still considered himself the leader of the group. He saw his role as fostering “an underground guerrilla movement” against the Air Force, which, when finding out what the new “mafia” was up to, would consider them “an enemy of America.”⁴²⁴ Boyd and

⁴²¹ Quoted in Hammond, *Mind of War*, 89.

⁴²² Coram, *Boyd*, 239.

⁴²³ Hammond, *Mind of War*, 89.

⁴²⁴ Coram, *Boyd*, 240.

Riccioni had taken their stereotypical fighter-pilot individualism and maverick attitude to such extremes that they now saw themselves as enemies of the American military, waging a secret insurgency within the Pentagon. That attitude only grew over time. Around this time, Boyd began to speak of his “Grand Strategy,” his plan to work against the Air Force, secretly build a prototype of the F-XX, and then pressure USAF into buying it. The “Mafia” took pained efforts to hide their activities, refusing to speak of their work openly either over the phone or even in private conversations, fearing that they might be overheard. References to work on the F-XX were in coded terms that reflected the zealous fundamentalism of their goal—they would simply refer to work on the lightweight fighter as “the Lord’s work.”⁴²⁵

The Fighter Mafia’s advocacy had grown to such extremes that they had begun to cause rifts between themselves and other fighter advocates who had been allies. In a 1973 interview, Major General John J. Burns, a strong fighter advocate who just a few years previously had been one of the loudest voices in advocating that the F-15 be a dedicated air-to-air fighter, now found himself aligned against Boyd and his followers. Using their own religious terminology as a pejorative against them, Burns recalled:

Now, if we have any problems, it’s with the zealots who say you don’t need anything but performance and a gun. And now we’re trying to hold them back. The lightweight fighter advocates say all you need is very high maneuvering combat performance and a gun. . . . So it’s ironic that back in 1965, we would be castigated for talking about very high thrust ratios and very low wing loadings complementary to a modernized and a capable avionics suit, whereas today we’re being castigated because we want armament and avionic suits on our high performance airplanes.⁴²⁶

The study grant was split between two contractors. Northrop received \$100,000, and General Dynamics was given the other \$49,000. Northrop was to create a prototype code

⁴²⁵ Coram, *Boyd*, 244-5.

⁴²⁶ Burns OHI, 19.

numbered the YF-17 (“Y” designating experimental) and General Dynamics’ version was the YF-16. The fact that these awards were simply handed out by the Fighter Mafia and were not subject to the usual competition and participation process made it possibly illegal. RAND analyst G.K. Smith also indicated that, in Spring 1970, AFSC, through ASD, granted contracts of \$150,000 to General Dynamics and another \$100,000 to Northrop with a mission statement to study a lightweight fighter that “emphasized transonic and lower supersonic maneuvering.”⁴²⁷ It is unclear whether Smith was referring to Riccioni’s study with a simple disagreement on the amounts or if this was additional funding provided by ASD. In either case, the focus was on the type of dogfighting maneuverability that Boyd and his acolytes sought.

The extra-legal dealings did not stop with Riccioni’s study. Boyd took secret meetings with Harry Hillaker, the chief of General Dynamics’ preliminary design division in Fort Worth, Texas. Hillaker and Boyd had first met in 1964 at Eglin, and found they had similar interest in lightweight fighters. As Boyd grew increasingly frustrated with the F-15, his talks with Hillaker became more frequent. By 1970, Hillaker was flying from Dallas to Washington DC at his own expense almost every weekend, meeting with Boyd in hotels or his home (fear of being caught made the office off-limits). Then he flew back to Texas on the morning when he had to report for work again. This type of covert action, which Boyd and Hillaker only referred to as “the Lord’s work,” done between the Pentagon and a contractor, off the books, was certainly a violation of federal law. Hillaker recalled in 1987: “Nobody told me to work on it. I just did. Nobody was stopping me. Under today’s standards, I would probably be indicted.”⁴²⁸

⁴²⁷ G.K. Smith, et al., “The Use of Prototypes in Weapon Systems Development,” RAND Project Air Force Report, number R-2345-AF, March 1981, 85.

⁴²⁸ Coram, *Boyd*, 245, Quoted in Hammond, *Mind of War*, 87.

To attempt to gain support from others in the Pentagon, Hillaker gave a series of briefings on the virtues of the light weight fighter. The officers in the audience of these meetings had no idea that Hillaker and Boyd knew each other. In fact, the two had meticulously rehearsed these briefings. Boyd functioned as a “plant” in the audience, asking pre-planned questions of Hillaker. Boyd even gave other Air Force officers questions that they might ask Hillaker. All the answers had been practiced, and although Hillaker was expressing Boyd’s own views (as the two of them had all but scripted the performance), the impression was that Hillaker was shutting down Boyd’s “objections.” The show of the arrogant Boyd being put in his place by a civilian contractor impressed the other officers.⁴²⁹ In growing his support network, Boyd knew he was widely disliked and was able to use that to his advantage.

As his meetings with Hillaker ramped up, Boyd was transferred to Systems Command headquarters at Andrews Air Force Base, tasked with monitoring the F-15 program as it continued development at Wright Patterson. Viewing this as a “nonjob,” Boyd almost completely ignored the assignment. Andrews was also in Washington DC. He still spent much of his time at the Pentagon, working on the LWF and meeting with Hillaker on weekends and talking on the phone with him and others doing “the Lord’s work” throughout much of the night. Boyd frequently came to work late, missing half days several days a week, as he was up most of the night working on his LWF concept. In February 1970, Tom Christie, then working at Eglin, set up First Lieutenant Robert Drabant as a liaison to Boyd. Drabant’s entire job was to talk to Boyd on the phone for several hours a day and run data through the computer at Eglin, eventually generating over 1,500 EMT charts based on the Fighter Mafia’s designs for the LWF. To cover

⁴²⁹ Hammond, *Mind of War*, 88.

this obvious use of Air Force resources for a job the Air Force did not intend to do in the first place, Boyd named the project the “Expanded Energy-Maneuverability Concept.”⁴³⁰

Sprey described the fighter mafia and their tactics: “We were bureaucratic guerrilla warriors, fighting the system and deploying whatever underground means we could use. . . . We’re a network of subversives.”⁴³¹ This work went beyond the meetings of Boyd, Christie, Hillaker, Sprey, and Riccioni. The mafia reached out and tried to find allies throughout the Pentagon and the rest of the military. As fighter mafia advocate James Burton described, “Quietly, secretly, it [the fighter mafia] worked the hallways, back doors, and alleys of the Pentagon and the aircraft industry. Its members probed the establishment everywhere and looked for any signs of support for their theme of building a better fighter than the F-15 at half the cost. Slowly but surely, they established a network of sympathetic key officials within the Air Force and the Office of the Secretary of Defense, a network that would be instrumental when it came time to strike in the open.”⁴³²

Not all the mafia members were as secretive. The godfather himself, Riccioni, allowed his “fighter jock” aggressiveness to manifest in ways that proved harmful to his own cause. Referring to himself in the third person, he typically carried a hunting arrow with him as a pointer he could use in meetings. His explanation for carrying it typified the stereotype fighter pilot mentality. He carried it, he said, “because I am a warrior. It never lets me forget that I am a true warrior.”⁴³³ He brazenly warned generals that they should beware of the fighter mafia. He

⁴³⁰ Coram, *Boyd*, 244-247.

⁴³¹ Quoted in Kelley Beaucar Vlahos, “40 Years of the ‘Fighter Mafia’” *The American Conservative*, September 20, 2013, [<http://www.theamericanconservative.com/articles/40-years-of-the-fighter-mafia/>], accessed August 25, 2017.

⁴³² Burton, *The Pentagon Wars*, 17.

⁴³³ Quoted in Coram, *Boyd*, 249.

bragged about being its creator and sent insulting memoranda to high ranking officers extolling the virtues of the LWF concept. He included veiled references to the true purpose of the \$149,000 study grant, predicting that one day the LWF would embarrass the F-15 and the Air Force along with it. These comments became so conspicuous that Boyd himself, a man who insisted on getting credit for everything to the point that he was willing to physically assault people to gain praise, told Riccioni to tone it down. “If you insist on getting credit for the work you do,” he said, “you’ll never get far in life.” Strange words coming from Boyd.⁴³⁴

Riccioni’s attitude eventually resulted in his removal from the country. The F-15 was the Air Force’s key project, and to threaten it seemed to be an attack on the Air Force itself, since losing the F-15 would threaten the service’s budget and force structure. Fighter mafia advocate (and close friend to Boyd) James Fallows explained: “Within the Air Force, loyalty to the F-15 became what profession of faith in the Blessed Virgin is within the Church: a prerequisite act of belief for all who seek membership.”⁴³⁵ Riccioni, in doing “the Lord’s work,” was thus labeled a heretic. At a social function just before Christmas of 1970 Riccioni went on at length to General John Meyer, Vice Chief of Staff of the Air Force, about the virtues of his lightweight fighter concept. Meyer was so infuriated by this that the next workday Meyer called Riccioni’s boss, General Glasser and demanded he be removed from his position. Although it took almost ten months for that order to be carried out, by September 1971, Riccioni was ordered to Korea. Meanwhile, he remained at the Pentagon with Boyd, pushing their lightweight fighter idea.⁴³⁶ Although at least some of the reason for Riccioni’s removal was his abrasive personality and

⁴³⁴ Coram, *Boyd*, 249-250.

⁴³⁵ James Fallows, *National Defense* (New York: Vintage, 1984), 103.

⁴³⁶ Hammond, *Mind of War*, 88. Note that Hammond frequently misspells General Meyer’s name.

demeanor with his superior officers, he and the rest of the Fighter Mafia blamed it solely on his ideas. They all viewed Riccioni's reassignment as punishment for his views about the lightweight fighter, further cementing the idea that Boyd and his associates were enemies of the state because they had different ideas. In reality, this was likely only part of the reason. Others included their secret misuse of resources, their aggressiveness against their superiors, and the fact that they were threatening one of the most expensive development programs in the Air Force at the time.

Opening Doors

Support was building, however, for the lightweight fighter concept within the American government, particularly after the announcement of the Nixon Doctrine in Summer 1969. Surprising members of his staff, including his National Security Advisor, Henry Kissinger, President Nixon announced that, outside of nuclear conflict, US policy would allow Asian nations to handle their own military defense issues. He added: "We [the United States] will give assistance to those plans."⁴³⁷ For Secretary of Defense Melvin Laird, "assistance" meant providing hardware, especially military aircraft. To that end, Laird allocated \$58 million for the fiscal years 1970 and 1971 for the development of an inexpensive, austere fighter aircraft meant for the international market. Around the same time, in June 1970, John Foster, as head of DDR&E, promoted the idea of not only sharing responsibility for international defense with allies but also sharing in development costs and in the acquisition of technical knowledge as well as a way to further reduce costs.⁴³⁸ In May 1971, Congress issued a report criticizing both the F-

⁴³⁷ Foreign Relations of the United States, 1969–1976, Volume I, Foundations of Foreign Policy, 1969–1972 Document 29 [<https://history.state.gov/historicaldocuments/frus1969-76v01/d29>] accessed August 28, 2017.

⁴³⁸ Hammond, *Mind of War*, 90-91.

14 and F-15 programs, instead advocating that \$50 million be spent towards an alternative lightweight fighter. Boyd's biographer Robert Coram implies that this report might have been the work of the fighter mafia, since it contained information that the Air Force and Navy considered proprietary.⁴³⁹

At the time, the Air Force was working to revise its procurement process as part of an effort throughout the Department of Defense. Former Defense Secretary Robert McNamara's "Total Procurement Package" concept had eliminated the use of prototypes, instead emphasizing studies and analysis of potential designs without actually building them. Theoretically, this allowed for the study of a large number of potential designs before committing to one, thus lowering costs. In actuality, these paper studies often promised results that were not achieved in the actual product. This led to massive cost overruns as contractors attempted to fix their production models to match the performance specifications of their original studies. The F-111 and the C-5 had each gone billions of dollars over their original budgets, leading to severe criticism from Congress and the media, as well as to a 1970 Presidential Blue Ribbon panel that put pressure on the Pentagon to reform.⁴⁴⁰ It also contributed to the expectation—shared by the Fighter Mafia—that aircraft designs such as the F-15 would not be able to perform up to the level promised in their original design studies.

David Packard, electrical engineer and founder of Hewlett-Packard, became Deputy Secretary of Defense in January 1969. He worked to reject the policy of Total Package Procurement and return to the pre-McNamara system of prototyping as the basis for weapons acquisition. This policy became colloquially known as "fly before you buy." The growing idea of

⁴³⁹ Coram, *Boyd*, 251.

⁴⁴⁰ Hammond, *Mind of War*, 90-92.

the lightweight fighter seemed like a potential guinea pig for a return to this prototyping process. In February 1971, Laird agreed to a study of the lightweight fighter program as a potential tryout for Packard's new process. The review became known as the "Simon Study" after its leader, Allan Simon, who worked in research and development for the Department of Defense.⁴⁴¹ Interest among contractors was also generated when former MIT Professor of Aeronautical Engineering and NASA Deputy Directory Robert Seamans became Secretary of the Air Force in 1969. That October, he publicly expressed doubts about the feasibility of a force structure based on the F-15. In the industry journal *Armed Forces Management*, he stated: "There is every indication that this plane [the F-15] will be a substantial improvement over the F-4 and F-111. However, in view of mounting labor, management, and material costs, the question is, can we buy enough of them?"⁴⁴² The implication—that the F-15 was desirable but too expensive, and thus needed to be complemented with a cheaper plane with at least some similar capabilities—later became known as the "high-low mix" concept.

For contractors not involved in the large pet programs of the Navy's F-14 or the Air Force's F-15, the growing Air Force interest in a plane to augment the F-15, and the growing amount of money available specifically for a lightweight fighter, was a lifeline of funding and possible future contracts. Many of them jumped at the chance. Lockheed, Northrop, and Ling-Temco-Vought (LTV) all submitted unsolicited proposals for a lightweight fighter. Boyd and Riccioni personally visited Boeing to pressure them into a submitting a proposal as well.⁴⁴³ One of the proposals was from Lockheed's Advanced Development Projects Division, also known as

⁴⁴¹ Michel, "Revolt of the Majors," 133.

⁴⁴² Quoted in Smith, "The Use of Prototypes," 85.

⁴⁴³ Michel, "Revolt of the Majors," 133-34.

the “Skunk Works.” Clarence “Kelly” Johnson, as the head of that division, sent a four-page proposal to Seamans arguing that he could create two prototypes of a lightweight fighter for under \$36 million. This entry, the CL-1200 Lancer, was an evolution of his F-104 design. Another proposal submitted at this time was Northrop’s P-530 Cobra, which was derived from their F-5 fighter.⁴⁴⁴ The Cobra did go on to form the basis for the YF-17 that was eventually purchased by the Navy and became the F/A-18 Hornet.

Most of these early proposals were based on Riccioni’s desired specifications (mostly shared by Boyd and the rest of the Fighter Mafia), influenced by the F-86 Saber. The desired weight was 17,000 pounds but certainly no more than 20,000. The LWF would contain no radar whatsoever or any other systems that, as Riccioni put it, “were not essential for the mission,” which was defined as air combat with an emphasis on maneuverability. That maneuverability was to be based on dogfighting conditions, and thus Riccioni gave no requirements for maneuvering above Mach 1.6, with most maneuvering requirements based on a speed between Mach 0.8 and 1.2. Acceleration requirements did not go above Mach 1.5. The altitude specification for these agility requirements was 30,000 feet.⁴⁴⁵ Many of these requirements were similar if not identical to those that Riccioni had outlined in his 1968 thesis and that Boyd and Hillaker had been using for designs being done secretly. Thus, the fighter these advocates sought was a low-speed, low-altitude dogfighter with very little electronics interfering with the role of the pilot. Radar was unnecessary. Instead the pilot should rely on his own eyes. High altitude and high-speed performance, the previous hallmarks of Air Force requirements, were ignored in

⁴⁴⁴ Smith, “The Use of Prototypes,” 85.

⁴⁴⁵ Hammond, *Mind of War*, 91.

favor of agility in aerial dueling. The ideas of simplicity, man over machine, and the “white scarf stuff” took center stage.

In July 1971, after talking the issue through with Alan Simon, Packard announced a sum of \$200 million, available for any projects that might be good candidates for his prototyping procurement process. Certainly not all of that was meant for the lightweight fighter project; some was available to explore other ideas as well. A portion of this funding secretly went to the “Have Blue” project that resulted in the first stealth aircraft, the F-117. Out of a massive stack of 220 other proposals, two others (aside from the “Have Blue” stealth project) were chosen. In a memorandum about the decision in August 1971, DoD indicated approval for an advanced transport (a project which eventually resulted in the C-17 Globemaster III) and the lightweight fighter. That same month, the Air Force created a Prototype Program Office devoted to the lightweight fighter. In testimony to Congress that September, Packard requested an additional \$67.5 million for fiscal year 1972 to cover twelve new projects, one of which was the LWF. He spelled out the goals of the LWF program, saying it was “principally to demonstrate technology, high maneuverability, and good controllability throughout the performance range of the aircraft,” thus revealing that the project’s objectives were very much in line with the Fighter Mafia’s agenda.⁴⁴⁶

Statement of Work

In any case, by Fall 1971, the LWF was one of a few new Air Force projects to be developed under the prototype process. Due to the fighter mafia doing the “Lord’s work” in the years leading up to this point, the lightweight fighter development process was not starting from

⁴⁴⁶ Quoted in Smith, “The Use of Prototypes,” 85; See also Werrell, *Chasing the Silver Bullet*, 82-83.

scratch. The concept of the aircraft had been thoroughly studied by several contractors (along the lines that the fighter mafia had guided them), an extensive body of data was already available, and the project had backing from the fighter mafia's allies—key figures spread throughout the DoD and the defense industry.⁴⁴⁷ However, Packard's testimony also pointed to "technical risks." These included a number of potentially troublesome new technological innovations that had not been used in an aircraft before, such as high acceleration cockpits, fly-by-wire control systems (in which computers control the flight surfaces), and problems associated with thin wings at higher aspect ratios. The Air Force also thought that the lightweight fighter project might be a good opportunity to investigate other new problem areas, such as composite structures, direct lift controls (to manipulate the drag and lift by extending or lowering wing surfaces), side force, task-oriented control systems (automating certain tasks depending on a selected mode, thus reducing pilot workload), and integrated stores (electronic systems integrating the firing of various types of weapons).⁴⁴⁸

With the lightweight fighter project now officially in development, Boyd no longer had to hide the "Lord's work," but he did have a surge in meetings from contractors working on it. Boyd was committed to his fundamentalist belief in his pure air combat fighter and nurtured his need to be recognized as more capable than other engineers and contractors. Similar to the stereotypical fighter pilot's reluctance to respect leaders who did not have the personal experience of flying, Boyd also showed skepticism of small-scale testing procedures. In one incident, a large group of defense contractors presented Boyd with a potential wing design in which the engineers had made a mistake in the data of air flow at the wing tips. Instead of simply

⁴⁴⁷ Smith, "The Use of Prototypes," 85.

⁴⁴⁸ Smith, "The Use of Prototypes," 86.

pointing out the mistake, Boyd became irate and questioned the companies' entire process. He accused the contractors of "stroking the bishop" (his euphemism for masturbation) and said that their wind tunnel tests on the wings were useless. "Fuck a wind tunnel," Boyd allegedly yelled. "The biggest wind tunnel in the world is up there. It's called reality. This is not reality." Pointing to the door he then shouted: "You people are lying to me. Get the fuck out of my office."⁴⁴⁹

The Air Force released the official request for proposals (RFP) for a LWF in January 1972. The request itself expressed the idea of simplicity. To illustrate the radical departure the proposal process for the LWF was, it must be understood in the context of the previous standards. Before this point, proposal request documents were often in excess of 250 pages, many of which spelled out detailed performance requirements, all of which must be met within strict parameters. To handle the vast array of specific requirements, contractors were required to produce large amounts of documentation proving the ability of their proposal to meet all the specifications. In the McNamara years, Air Force officers related horror stories of proposal documents being delivered in several truckloads, all of which had to be evaluated by government evaluation boards.⁴⁵⁰

The RFP for the LWF took the completely opposite approach. Sources differ about its length, but it was somewhere between 21 and 50 pages long, with the technical details and specifications limited to only ten of those pages. The request also specified that even though the winner (or winners) of the contract would build prototype fighters, this did not imply that either fighter would be bought for a production run. Rather, the goal was to demonstrate the feasibility

⁴⁴⁹ Coram, *Boyd*, 254.

⁴⁵⁰ David C. Aronstein, and Albert C. Piccirillo, *The Lightweight Fighter Program: A Successful Approach to Fighter Technology Transition* (Reston: American Institute of Aeronautics and Astronautics, 1997), 7, 11.

of an LWF and examine the possible operational uses of such a plane. Furthermore, specific features or individual component technologies could be evaluated separately as parts of these prototypes and further developed on their own for future use. The request also specified that, if the Air Force did decide to procure a LWF, the final version was likely to incorporate elements of many design proposals. Also, instead of the typical method of providing lists of extensive performance requirements, the RFP set broader goals. Although the broad mission goals were clear and some characteristics were specified, the wording of the document encouraged contractors to take risks and make tradeoffs in meeting some goals at the cost of others if they thought doing so could improve overall performance. Contractors understood the type of plane the Air Force wanted—a dedicated air-to-air, lightweight, inexpensive fighter jet—but the details of how to accomplish that and with what subsystems were left up to the contractors themselves. In other words, the request was intended to give the Air Force a range of options across a spectrum of systems.⁴⁵¹

Some of the suggested goals included a weight under 20,000 pounds, “superior maneuvering” in the transonic and high-G area, lower speeds (Mach 1.2 at sea level, and 2.0 at altitude), limiting the avionics equipment to no more than what was absolutely “mission essential,” excellent pilot visibility, and an armament of both air-to-air missiles and a cannon. Against the wishes of some fighter advocates, the request did include a requirement for built-in hard points to carry bombs and thus to provide air-to-ground capability. The request also specified some larger performance areas as priorities. The highest priority indicated was “superior air-to-air performance,” measured in agility and maneuverability. To demonstrate this, the RFP suggested a plane be able to demonstrate sustained turns between 30,000 and 40,000

⁴⁵¹ Aronstein and Piccirillo, *The Lightweight Fighter Program*, 8, 11.

feet at a variety of speeds between Mach 0.8 and 1.6⁴⁵². These requirements reflected the thought of fighter advocates, especially Sprey and Boyd, who had previously argued that most dogfighting occurred in the transonic region slightly above and below the speed of sound and took place at those medium altitudes.

The RFP reflected Fighter Mafia thinking in other ways as well. Combat requirements were composed in a way that emphasized EMT, simplicity, and low costs. In the past, combat requirements were often formulated in simple ways such as an amount of time (typically three to five minutes) that an aircraft could operate at full afterburner. Because of this, planes with the higher thrust-to-weight ratios that the fighter mafia desired needed more fuel, and thus carried more weight. As analysts David Aronstein and Albert Picirillo noted, “this weight increase would cascade through the entire aircraft sizing process, affecting the airframe structural weight and the fuel weight for the other mission segments as well. The end result would be a prohibitively high takeoff weight for fighter designs having a high T/W [thrust-to-weight ratio].”⁴⁵³ The LWF RFP defined its terms differently, specifying specific air maneuvering tasks, rather than simply total time spent on afterburner. Thus, if a plane could complete a specific task faster (as planes with higher EMT performance could), then they were not required to carry enough fuel to keep the afterburner going for longer periods.⁴⁵⁴

The RFP also included criteria for technology selection, which attempted to eliminate the possibility of “gold-plating.” Contractors were asked to include only technologies that made a “direct contribution to performance,” provided a “moderate risk, but sufficiently advanced to

⁴⁵² Werrell, *Chasing the Silver Bullet*, 83; Aronstein and Picirillo, *The Lightweight Fighter Program*, 8-9.

⁴⁵³ Aronstein and Picirillo, *The Lightweight Fighter Program*, 9.

⁴⁵⁴ Aronstein and Picirillo, *The Lightweight Fighter Program*, 9.

require prototyping to reduce risk,” and could “meet cost, utility, and complexity restraints.”⁴⁵⁵ Thus, contractors must not include extraneous technologies for added features if they did not increase mission performance. The designs needed to be advanced, pushing the edge of what was state-of-the-art, but not so advanced that they ran the risk of causing cost overruns that might be needed to work out larger unexpected problems. The designs also had upper limits in matters of complexity and cost—with the overall unit cost of each fighter not to exceed \$3 million each (assuming a production run of 300 planes over three years).⁴⁵⁶ Again, the RFP demonstrated many of the core elements that the Fighter Mafia had been pushing for—an emphasis on air-to-air combat (as measured by maneuverability and EMT data) with “simplicity” as the main watchword.

The proposal process itself also broke from previous methods. In an attempt to create a less adversarial relationship with contractors, the Air Force cooperated closely with companies as they produced proposals. Just as the documentation was expected to be kept to a minimum, the Air Force LWF Prototype Program Office staff was kept as small as possible. However, the office received support as necessary from the AFSC Aeronautical Systems Division, USAF Labs, and NASA. The close cooperation between USAF and the contractors also allowed the government to maintain stronger oversight. The attempt to keep the amount of data (and thus documentation) to a minimum meant that contractors were expected to refrain (or at least decrease) from using viewgraph engineering (called “brochuremanship” at the time), which consisted of large amounts of attractive data that had to be sorted through. Instead, the Air Force demanded smaller amounts of raw, hard data. This included submitting wind tunnel raw testing

⁴⁵⁵ Aronstein and Picirillo, *The Lightweight Fighter Program*, 10.

⁴⁵⁶ Werrell, *Chasing the Silver Bullet*, 83.

information as well as actual wind tunnel models that the Air Force could use to verify a contractor's claims. In two cases, the Air Force could not reproduce contractors' claims in wind tunnel tests.⁴⁵⁷

The Air Force issued this RFP to nine companies, setting a due date for proposals at February 18, 1972. Keeping with the theme of simplicity, proposals could not be longer than 60 pages total, 50 for technical details, and ten for management details. Fairchild, Grumman, McDonnell-Douglas, and North American Rockwell did not respond. However, Boeing, General Dynamics, LTV, Lockheed, and Northrop each sent in a design proposal for an LWF—Northrop actually submitted two, one dual-engine design that they had been working on for some time, and another less developed single-engine proposal. The Air Force Source Selection Authority board, led by Lieutenant General James Stewart, Commander of Air Force Systems Command's Aeronautical Systems Division at Wright-Patterson AFB, Ohio, rejected Northrop's single-engine idea (called the P-610), the Lockheed proposal (the CL-1200 Lancer, which was essentially a modified F-104 Starfighter), and LTV's entry (the V-1100, which was simply a modified F-8 Crusader). The Air Force was looking for newer designs that were not simply updates of existing aircraft—moreover, Lockheed and LTV had submitted almost identical plans to the International Fighter Aircraft Competition in 1970, where they had lost to Northrop's F-5E. Boeing's entry, the model 908-909, was very similar to the General Dynamics model 401 proposal—in fact, at a glance, the two planes look very much alike. Wanting to use the process as a way to test several different technologies, the Air Force did not wish to select both the quite similar designs from General Dynamics and Boeing. The final decision was up to Air Force Secretary Robert Seamans, who picked the General Dynamics model 401 (soon to be labeled the

⁴⁵⁷ Aronstein and Picirillo, *The Lightweight Fighter Program*, 12.

YF-16), as well as Northrop's dual-engine P-600 (the YF-17), in large part because the two proposals were very different. The General Dynamics entry called for a single engine, a single tail fin, and a new "fly-by-wire" control system (to be explained further below). Northrop's entry had two engines, two tail fins, and traditional controls. Thus, by allowing both companies to produce prototypes, the Air Force could test a much wider range of potential options and subsystems.⁴⁵⁸ However, given the Fighter Mafia's stated preference for single-engine fighters, and the fact that Boyd had been secretly working with Hillaker, a General Dynamics engineer, it seems unlikely that the group would have supported Northrop's entry (or Boeing's)—especially given that Boyd had essentially co-designed the YF-16 along with Hillaker, and had been doing so for years. Given the fact that the two men had been working on this project long before the RFP was official, it is no wonder that General Dynamics had the edge and was selected over the similar Boeing proposal.⁴⁵⁹

Some sources have confused the RFP with the "Statement of Work" given once the official contract was awarded. That statement also held firm to idea of simplicity, to the point of consisting of only a few sentences. The Statement of Work given to General Dynamics simply states: "Design, develop and fabricate two prototype aircraft substantially in accordance with Contractor Technical, Management and Cost Proposal." Then it listed the document numbers of their proposal. Many sources have conflated this statement with the RFP itself, crediting Boyd and Sprey with writing the statement. However, these sources seem to indicate that Boyd and

⁴⁵⁸ Jay Miller, "F-16 Design Origins," *Code One Magazine*, February 4, 2014, [http://www.codeonemagazine.com/article.html?item_id=131], accessed September 16, 2017; Aronstein and Picirillo, *The Lightweight Fighter Program*, 11, 13-14.

⁴⁵⁹ Werrell, *Chasing the Silver Bullet*, 84-85.

Sprey also wrote the RFP themselves.⁴⁶⁰ This is highly likely given that its focus, for the most part, seems to be exactly in line with their thinking on what a LWF should be. If that is the case, Boyd had been secretly designing an aircraft with Hillaker on behalf of General Dynamics; and then Boyd himself wrote the proposal request for procuring a new prototype, which he tailored to describe the very same aircraft he had been secretly designing. Hillaker was correct when he later alleged that, if he and Boyd had been caught doing something similar even fifteen years later, they could have been brought up on charges.⁴⁶¹

Secretary of Defense Laird gave official approval for the building of the LWF prototypes on April 13, 1972. Just a few years earlier, the Air Force had been afraid, almost paranoid, that they would be forced (by Congress, presumably) to adopt Navy-designed aircraft because they had no superior options of their own. Yet with that order for the LWF, USAF now had three tactical aircraft of their own design in development at the same time: The A-10 Thunderbolt II, the F-15 Eagle, and now the LWF prototypes. All three of these had either been strongly influenced or originated by the Fighter Mafia: Sprey had been one of the primary voices in crafting the A-10, while he and Boyd had steered the course of the F-15 and had the leading voice in advocating for and designing the LWF program. Yet just as the LWF process was beginning to take (literal, physical) shape, Boyd was called away. He was reassigned to Nakom

⁴⁶⁰ Burton, *The Pentagon Wars*, 19 is the first example of this, based on an oral interview between Burton and Boyd. Burton claims to have kept a copy of the document in his briefcase at all times (for the purpose of silencing people who questioned his veracity). His description of the document sounds like a description of the RFP. The story is oft-repeated, sometimes sourcing Burton, and other times sourcing newer Boyd interviews. For example, see Hammond, *Mind of War*, 92; Werrell, *Chasing the Silver Bullet*, 83.

⁴⁶¹ From a 1987 interview, quoted in Hammond, *Mind of War*, 87.

Phanom Air Force Base for a top-secret intelligence gathering project. Boyd left in April 1972, just a matter of days after the LWF prototypes had been approved.⁴⁶²

Demonstrating New Technology

The precise origin of the aircraft that became the F-16 Fighting Falcon is difficult to date. Some sources trace its beginning to as early as 1964, when Hillaker and Boyd met and began discussing alternatives to the early F-X project along the lines of what eventually became their LWF concept. At this early stage, General Dynamics may have been looking ahead to how they would approach the F-X project, deciding to pursue two concepts, one more aligned with the specific requirements of the larger F-X and one more austere “gunfighter” craft. However, given the nascent state of the F-X project at the time, the design that became the YF-16 was probably not begun in earnest until 1968, when Assistant Secretary of Defense for Systems Analysis Alain Enthoven officially instructed both General Dynamics and Northrop to investigate the possibility of a LWF supplement to the F-15.⁴⁶³

That design, however, incorporated elements that General Dynamics had been working on for some time. The vast majority of technological decisions made when designing the YF-16 reflected the goals of the Fighter Mafia, possibly indicating Boyd’s influence. Determining exactly what decisions and developments should be credited to particular individuals is almost impossible. Not only was Boyd’s and Hillaker’s early work kept either unrecorded, secret, or often in coded language, but even the less guarded development at General Dynamics and their working relationship with the Air Force when designing the prototype often eschewed record-

⁴⁶² Coram, *Boyd*, 263-264; Hammond, *Mind of War*, 93.

⁴⁶³ Werrell, *Chasing the Silver Bullet*, 84-85 claims the project started in 1964, and Hammond, *Mind of War*, 87 implies the same. Aronstein and Picirillo, *The Lightweight Fighter Program*, 17 cites the later date as the official beginning.

keeping and documentation in favor of simplicity. Hillaker himself described the process at the General Dynamics offices and the USAF Prototype Program Office: “This management concept created an environment in which the contractor and the U.S. Air Force LWF program personnel maintained a common goal of identifying problems or concerns and finding quick and suitable solutions that were most often made verbally and on the spot.”⁴⁶⁴ Because design decisions were often made orally with a minimum of documentation (if any), tracing the precise evolution of the aircraft becomes problematic. Yet those decisions themselves indicate the degree to which the goals of the Fighter Mafia had influenced this process, regardless of their level of direct involvement.

One example is the use of forebody strakes—small protrusions along the body or in front of the wings of an aircraft. In their attempt to increase aircraft lift, General Dynamics had been exploring wider body shapes since 1966, yet these body shapes produced instability and separations of air flow at higher angles of attack. Being able to operate at high angles was important to dogfighting. NASA research indicated that, instead of avoiding these airflow interruptions, strakes could control the airflow by creating vortices over the wings. These vortices, properly directed, greatly increased lift—a property that became known as “controlled vortex lift”—and greatly increased an aircraft’s ability to operate at steeper angles of attack without stalling. Leading edge flaps decreased the drag and further improved performance at high angles.⁴⁶⁵ All of these features enhanced the maneuverability of the airplane.

Another key element of the Fighter Mafia’s LWF concept was reducing the weight as much as possible. Although some studies conducted around the time the LWF program began

⁴⁶⁴ Aronstein and Picirillo, *The Lightweight Fighter Program*, 12, 17. Quote on 12.

⁴⁶⁵ Aronstein and Picirillo, *The Lightweight Fighter Program*, 17.

indicated that switching primarily to composite materials was desirable rather than using conventional metal construction. However, General Dynamics used mostly conventional materials—the YF-16 was over 80% aluminum. Composite materials (graphite and epoxy-based) were used to reduce weight where possible, primarily in the tail. The blending of the body and wings that gave the YF-16 its distinct look was also an attempt to reduce weight while maintaining structural strength and to maximize fuel space without greatly increasing overall weight. The blended body also contributed to increased lift when in high angles of attack, increasing maneuverability.⁴⁶⁶

Among the largest concerns of the Fighter Mafia were the pilots themselves. Their insistence on prioritizing people over machines meant that pilots of LWF needed as much freedom and control over their aircraft as possible. Yet as fighters became more advanced and more maneuverable, the issue of human controls seemed to be reaching a limit. The generation of aircraft before the FX already presented difficulties for pilots in terms of the amount of work needed to control the aircraft. It was challenging to stay functional in turning dogfights where the body was put under stress and increased G-forces that could at times knock a pilot unconscious. If planes became even more maneuverable, as the Fighter Mafia and many engineers and industry experts wanted, how could pilots both stay in control of these increasingly complex aircraft and also have their bodies sustain the incredible physical forces assaulting them?⁴⁶⁷

To address the second problem, USAF had conducted centrifuge tests that determined reclining a pilot and raising their heels allowed them to sustain more Gs without losing consciousness. The YF-16 thus had a 30-degree reclined seat with heels elevated six inches.

⁴⁶⁶ Werrell, *Chasing the Silver Bullet*, 85; Aronstein and Picirillo, *The Lightweight Fighter Program*, 19, 3.

⁴⁶⁷ Aronstein and Picirillo, *The Lightweight Fighter Program*, 4.

Cockpit visibility was also a priority; thus a bubble canopy with only one structural frame behind the pilot allowed for a full 360-degree view at eye level, fifteen-degree downward visibility over the nose, and 40 degree downward to either side. The cockpit also included a heads-up-display and simplified instrumentation, allowing the pilot to focus on the combat situation, rely more on his own eyes and senses rather than instruments, and perform tasks using a minimum of physical motions.⁴⁶⁸

The YF-16 project became a testing ground for several new concepts that had been prominently discussed in aviation development and contractor circles, collectively referred to as “Control Configured Vehicle” technology (CCV). This approach consisted of three main concepts. First, “Relaxed Static Stability” called for placing an aircraft’s center of gravity farther to the rear, which, in addition to allowing weight reductions, could greatly increase maneuverability and make controls more responsive. However, having the center of gravity placed so far back renders the aircraft unstable along its pitch axis, requiring some sort of stability augmentation. Second, “Maneuver Load Control” allows a plane to be optimized for particular maneuvering conditions as opposed to being optimized for steady flight. Although this approach can be tailored for a variety of specific aircraft types and mission requirements, in the context of LWF fighter development, it was a way to design the aircraft to have the most maneuverability and responsiveness, even if that meant reducing the stability of steady flight. Third, “Novel Control Modes” referred to control surfaces that could apply direct force (either lift force or side-to-side force) allowing pilots to change an aircraft’s orientation without altering its flight path—essentially giving the pilot the ability to point the nose in various directions without changing his course. This could potentially give a pilot an edge in combat by increasing

⁴⁶⁸ Aronstein and Picirillo, *The Lightweight Fighter Program*, 20.

maneuverability, increasing the available options for weapons firing solutions, and making it more difficult for enemies to track the plane.⁴⁶⁹

Flying existing aircraft was already a complicated endeavor, and adding these CCV technologies could potentially increase the pilot workload beyond what was feasible. The solution that allowed these CCV concepts to be implemented and used effectively was a “fly-by-wire” system (although fly-by-wire was not itself a CCV component). To understand what fly-by-wire is, and why it is so often praised in the literature, some discussion of previous aircraft control systems is necessary. In the early decades of flight, aircraft used standard controls. A pilot held a stick, as well as kept his feet on pedals. These devices were connected via rods or cables to the actual control surfaces of the plane—such as ailerons or rudders. When aircraft grew heavier and faster, pilots did not have the physical strength to move these controls, and hydraulic assistance to amplify a pilot’s movement were common. Yet even with hydraulic assistance, the basic idea of a pilot’s motion moving a particular control surface remained intact. These hydraulic systems created their own problems, including risk of fire from flammable hydraulic fluid, and the vulnerability of planes from having their hydraulic lines damaged. Famously, during the Vietnam War, nearly 1,000 F-4 Phantoms were lost to ground fire, often from the damage done to their hydraulic lines.⁴⁷⁰

By contrast, a fly-by-wire system used electronic signals to cue motors that moved control surfaces, controlled by a computer system that made adjustments throughout flight and interpreted pilot commands. Thus, instead of a pilot’s movements directly correlating to particular control surfaces, a pilot’s commands were interpreted by a computer which determined

⁴⁶⁹ Aronstein and Picirillo, *The Lightweight Fighter Program*, 4.

⁴⁷⁰ Hannah, *Striving for Air Superiority*, 70-73; Werrell, *Chasing the Silver Bullet*, 87.

which control services needed to move (and how) in order to do what the pilot desired. This type of control system had been in development by the Air Force Flight Dynamics Laboratory as early as 1956, although the first use of such a system in flight traces back to World War 2. The Junkers aircraft company created the Mistel aircraft, which consisted of an unmanned Ju-88 bomber remotely controlled through electronic signals sent from mounting either an Me109 or Fw 190 fighter on top. All of the United States' manned spacecraft used exactly such a system, as did the V-2 rockets, and the Air Force conducted several tests of limited parts of these system on experimental planes. A full operation of a fly-by-wire system occurred in a 1967 test flight of a B-47 Stratojet. Aircraft losses in the Vietnam War spurred even further interest in development of fly-by-wire systems.⁴⁷¹

Not everyone was convinced that such a system was desirable. The research into fly-by-wire had some support from contractors such as Douglas and Sperry Flight Systems, as well as from Colonel Charles A. Scolatti, Chief of the Air Force Flight Control Division. To sell pilots—and more importantly, the Pentagon—on the idea of fly-by-wire, the Air Force Flight Dynamics Laboratory (FDL) held a conference on December 16-17, 1968 (the 65th anniversary of the Wright Brothers' famous flight) solely for the purpose of gaining support and funding for further research into fly-by-wire technology. One of the FDL engineers, Major J. P. Sutherland, appealed to the fondness for World War I air combat in his opening talk, showing a cartoon of beloved *Peanuts* mascot Snoopy as the “World War I Flying Ace” character, shooting at the Red

⁴⁷¹ James E. Tomayko, “Blind Faith: The United States Air Force and the Development of Fly-By-Wire Technology,” in Jacob Neufeld, George M. Watson, Jr., David Chenoweth, eds., *Technology and the Air Force: A Retrospective Assessment* (Washington D. C.: Air Force History and Museums Program, 1997), 167-177; Werrell, *Chasing the Silver Bullet*, 87-88; For a fuller explanation of fly-by-wire systems and the history of the concept, see William Elliot, “The Development of Fly-by-Wire Control,” AFMC Historical Study 7, December 1996.

Baron, with a thought bubble of what critics of fly-by-wire were likely thinking: “Security is a mechanical flight control system!” Sutherland’s talk emphasized the performance advantages of fly-by-wire controls, but focused mostly on the fact that they have built in redundancy and thus can sustain heavy damage without loss of control—unlike the vulnerable hydraulic standard controls that were costing so many planes and lives over the skies of Vietnam. He ended his talk with another cartoon of Snoopy the flying ace overlooking another *Peanuts* character, Linus, in the pilot seat, exclaiming: “Security is a fly-by-wire system!” FDL engineers often used another cartoon featuring Snoopy, having three of his four electrical cables shot off by the Red Baron, while shouting: “This fly-by-wire is great!” Sutherland further argued that fly-by-wire could not only make increasing performance requirements feasible, but it would even decrease weight, complexity, and cost.⁴⁷²

⁴⁷² J. P. Sutherland, “Fly-By-Wire Control Systems,” Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio, AD 679 158, September 3, 1968, 2, 35-36; Tomayko, “Blind Faith,” 173.

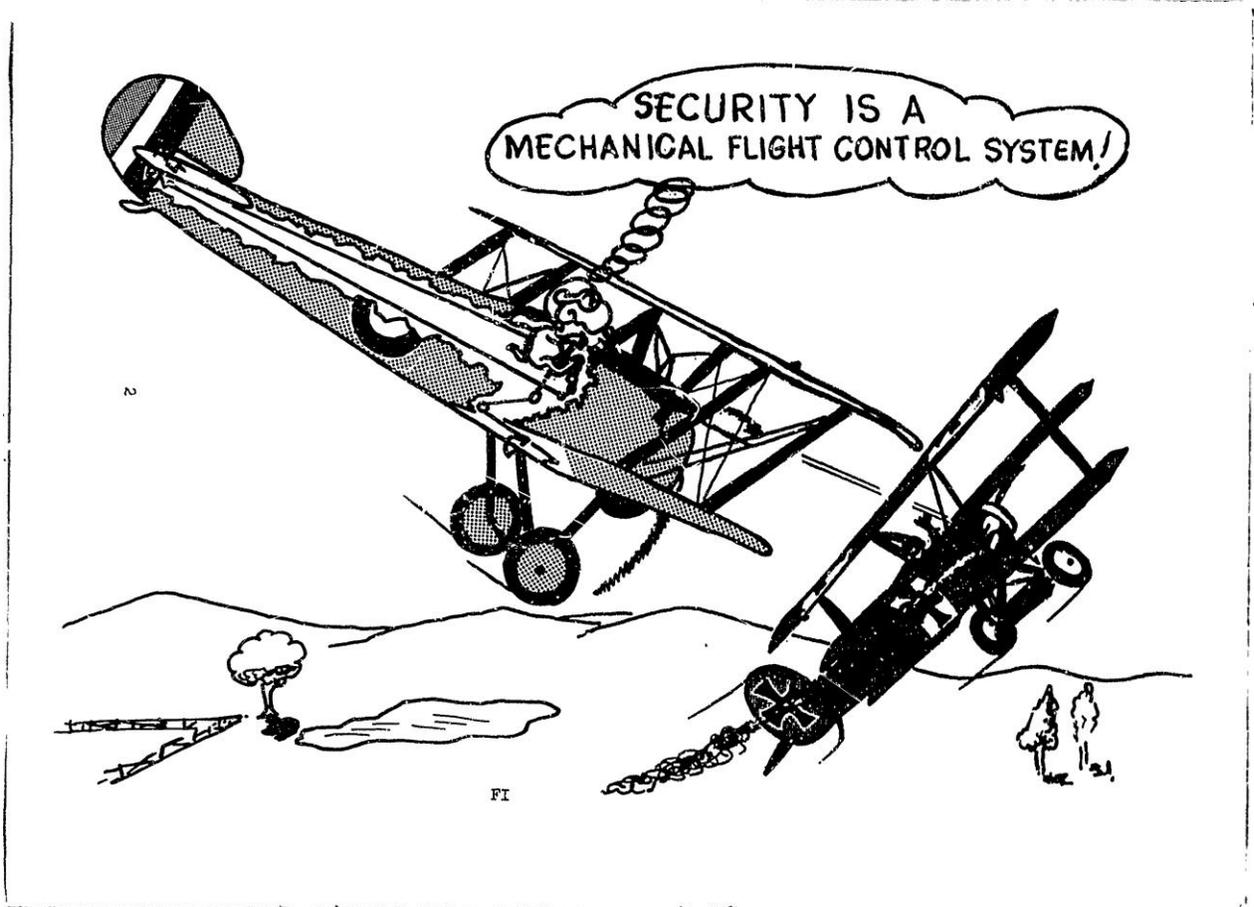


Figure 7-1 Using the imagery of dogfighting from the First World War, this cartoon expressed how many pilots felt skeptical about fly-by-wire systems disrupting the relationship between man and machine in the cockpit. From Sutherland, "Fly-By-Wire Control Systems," 2.



FIGURE 20

Figure 7-2 This cartoon demonstrates the idea that more advanced aircraft needed fly-by-wire controls, and that these were safer, simpler, and reliable due to redundancy systems. From Sutherland, “Fly-By-Wire Control Systems,” 36.

Experimentation with such systems continued. In 1969 and 1970, the Air Force partnered with McDonnell-Douglas to rig an F-4 Phantom with fly-by-wire controls that were so successful that F-4E models were retrofitted with a fly-by-wire controlling pitch only as a backup system. A Phantom with full fly-by-wire controls first flew in April 1972. NASA conducted a similar test with an F-8 Crusader modified for fly-by-wire controls. The Air Force modified their experimental F-4 even further to make it inherently unstable in subsonic flight (mostly by adding additional surfaces to add lift), in order to test the computer-controlled

system's ability to compensate. Not only did the computer-controlled system work, but these surface changes gave the F-4 gains in maneuverability beyond the production model F-4s. The aircraft was able to sustain maneuvering at 4-Gs up to 5,000 feet higher than before, and the aircraft could be flown at much higher angles of attack.⁴⁷³ The Fighter Mafia had been chasing exactly these performance parameters for their "pure" air-to-air fighter.

McDonnell's tests of their fly-by-wire YF-4E concluded that to truly take advantage of the possibilities of a CCV system, an aircraft needed to be designed with that in mind from the beginning, allowing it to have minimum size and weight while maximizing performance. McDonnell was not the only company that had been experimenting, however. General Dynamics had dabbled in fly-by-wire concepts when designing their B-58 hustler in 1957, and they used an electrical stabilization system in the F-111. James L. Dabold, an engineer for USAF ASD and an advocate of fly-by-wire, wanted to encourage the contractors involved in the LWF contract competition to use such a system. He made all of McDonnell's YF-4 data available to General Dynamics to further encourage them to use it.⁴⁷⁴

It must be emphasized that the design of the F-16 – especially the "relaxed static stability" of placing the center of gravity further toward the back as well as the body and wing shapes – rendered it unstable in normal conditions. Without the artificial stability controlled by the fly-by-wire system, the plane was not flyable; no human could successfully control the craft after an electrical failure. Use of a fail-safe system, in which a control surface is locked into a "safe" position in the event of an electrical failure was not possible, since the aircraft had no "safe" position. The inherent instability required that the FBW system continue to operate at all

⁴⁷³ Toymako, "Blind Faith," 176-78.

⁴⁷⁴ Toymako, "Blind Faith," 180.

times. To safeguard against a failure, the YF-16 used a quadruple sensor system—four independent electrical channels that provided triple redundancy. Even if the aircraft control system suffered two electrical failures, the FBW system could still operate the plane.⁴⁷⁵

Handing control of an aircraft over to a computer, it could be argued, was antithetical to the Fighter Mafia's core concepts of simplicity and of the value of man over machine. Yet viewed another way, fly-by-wire could be seen as fulfilling several core values of LWF advocates. In a sense, fly-by-wire reaffirmed the role of man as master of the machine. Although the pilot is unaware of the many adjustments to the flight surfaces being controlled by computer, the pilot also could give simple commands and more quickly translate his will into reality. Therefore, although a computer was making thousands of decisions, control, from the pilot's perspective, was a much simpler matter. Furthermore, fly-by-wire allowed for "relaxed static stability." The center of gravity of the airplane could be placed much further toward the aft, allowing for less drag, more lift, and tighter turns, as seen in the tests with the F-4, even though it had not been designed with this much maneuverability in mind. An aircraft designed to take advantage of that system, such as the YF-16, could become even more maneuverable—the trait most prized by the Fighter Mafia. The increased redundancy of the system also meant much greater survivability, rendering planes more durable in a dogfight.⁴⁷⁶ Thus, at a glance, fly-by-wire seems to contradict the goals of Boyd and his acolytes but actually is perhaps the ultimate fulfillment of them.

Not all of the components of the YF-16 were such fulfillments of Fighter Mafia ideals. The engine selection was especially debated. General Dynamics considered a twin-engine

⁴⁷⁵ Aronstein and Picirillo, *The Lightweight Fighter Program*, 21-22.

⁴⁷⁶ Tomayko, "Blind Faith," 164; Werrell, *Chasing the Silver Bullet*, 88.

design, using two General Electric YJ101 engines. Having two engines could produce more thrust, even with the increase in weight. Yet the company decided to incorporate the Pratt & Whitney F100 engine—the same as the one used in the F-15 Eagle. They cited that the F100 had lower fuel consumption and could produce more thrust in the supersonic realm. Although the Fighter Mafia favored simplicity, the F100 was anything but simple, especially when compared with the previous standard engine, General Electric's J79, which was the engine used in the F-4 Phantom. The new F-100 had 31,000 components, requiring 4.2 man-hours of maintenance per hour of flight. The earlier J79 was simpler, with only 22,000 components and 1.7 maintenance hours per flight hour. The complex F100 was also riddled with performance issues, suffering from frequent compressor stalls and higher than expected rates of fatigue.⁴⁷⁷

One other area that did emphasize the Fighter Mafia's penchant for simplicity and focus on air combat was the engine intake. Many fighter aircraft before this point, including the F-4 Phantom, used a variable inlet system, in which computers controlled the shape of the air intake depending on flight conditions such as speed and angle of attack, to maximize engine performance. This was especially useful at high speeds. Yet, because the focus of the plane was on air-to-air fighting, which designers argued happened at lower speeds, the YF-16 used a simpler system without a variable inlet.⁴⁷⁸

There Can Only Be One

To evaluate the two prototypes, the General Dynamics YF-16 and the Northrop YF-17, the Air Force planned for a series of flyoff competitions. The planes were not to be flown against each other, but tested independently against a number of criteria, most of which emphasized

⁴⁷⁷ Aronstein and Picirillo, *The Lightweight Fighter Program*, 23.

⁴⁷⁸ Aronstein and Picirillo, *The Lightweight Fighter Program*, 23.

Fighter Mafia ideals of focusing on maneuverability broadly and on air-to-air combat performance specifically. Some other aspects of the tests included logistical issues and general flight characteristics, but the process was also designed to be as flexible as possible. Contractors were encouraged to design their own tests, and the level of cooperation and the degree of direct interaction between the Air Force and the contractors were much higher and began much earlier in the process than had been true in previous aircraft procurements. Thus, flight test criteria emphasized that tests could be changed during testing on an ad hoc basis. One colonel involved in creating testing procedures commented: “We don’t want to bog down in minor details.”⁴⁷⁹

Speaking to the flexibility of performance parameters that had been established in the RFP, the testing process also emphasized that “[s]pecification-compliance type testing was not to be conducted.” Instead, testing revolved around seven criteria. First and foremost was “[p]erformance on the air superiority mission.” Also, “[a]ir combat maneuvering suitability was to receive special emphasis.” Beyond this, the aircraft were evaluated on flight envelope (gaining altitude and acceleration), notably within parameters thought important to air combat situations: 10,000 to 40,000 feet and Mach 0.6 to 1.6. Maneuverability was tested with sustained turns within altitudes and speeds corresponding to the common air combat ranges: 30,000 and 40,000 feet at speeds from Mach 0.8 to 1.6. Stability and engine performance were to be tested in high angles of attack. The plane’s ease of detection was also measured, and several weapons firings of both guns and the AIM-9E heat seeking Sidewinder missile would be conducted.⁴⁸⁰

The YF-16 prototype was completed in December 1973 and first flew on January 20, 1974 — accidentally. The flight control system was initially too sensitive, and during what was

⁴⁷⁹ Aronstein and Picirillo, *The Lightweight Fighter Program*, 15.

⁴⁸⁰ Aronstein and Picirillo, *The Lightweight Fighter Program*, 16.

intended to be a ground-only taxi test, the plane began an oscillating roll, causing the left wing and tail to slam into the ground. With the plane careening out of control and bouncing across the runway, the test pilot made the decision to actually take off, resulting in an unplanned six-minute first flight.⁴⁸¹

Early tests in 1974 revealed a number of small issues that were changed, usually to increase maneuverability or to increase the connection between man and machine. For example, the maximum roll rate was initially too low, decreasing maneuverability, so a higher rate gyro system was added to increase agility. Also, the fly-by-wire system presented challenges for pilots who were used to traditional controls. The YF-16's control stick was originally designed to remain still; it could not move. Instead, it responded to the pressure that pilots placed upon it. Pilots, accustomed to the tactile sense of moving the stick to move the plane, often exerted far too much force. To counter this and give the pilots a more natural, intuitive feeling, the control was redesigned to move, although that movement in no way affected the control surfaces. The stick still responded only to pressure, but the movement gave pilots tactile feedback.⁴⁸²

However, the key part of testing came in several simulated air-to-air combat exercises against other USAF and Soviet aircraft. The YF-16 flew against the F-106, the F-4E, and the other YF-16 prototype as well as against a captured MiG-17 and MiG-21. Each flight was flown until one plane arrived in a position that was likely to result in a probably "kill" using the gun. Not only did the YF-16 win against all of these opponents in direct match-ups, but its increased agility allowed it to win using far less fuel than the other planes. The most dramatic example

⁴⁸¹ Werrell, *Chasing the Silver Bullet*, 89. Footage of this accidental flight is readily available online: [<https://www.youtube.com/watch?v=UR-48Kri0Tw>], accessed September 23, 2017.

⁴⁸² Aronstein and Picirillo, *The Lightweight Fighter Program*, 28.

involved the F-4E. After the YF-16 won three consecutive rounds of simulated air combat, the Phantom ran out of fuel and was immediately replaced by a second F-4. Without refueling, the same YF-16 continued against the second Phantom, winning several more consecutive contests.⁴⁸³

The other plane competing with the YF-16 was Northrop's YF-17. Although Northrop used more lightweight composite materials in their design, it was in other respects a more conservative design, if only slightly so. The YF-17 was slightly heavier (by about 9 percent). The fact that it had two engines gave it nearly 25 percent more power than General Dynamics' design, and the twin tail fins rendered it controllable in high angles of attack. The cockpit of the YF-17 was reclined with elevated feet, although not to the extreme angles of the YF-16. The planes were similar in many areas, such as the fixed geometry inlet, the forebody strakes for creating vortex lift, and the heads-up-display in the cockpit. Perhaps the largest difference other than the engines was that the YF-17 used traditional control systems, as opposed to the fly-by-wire system of the YF-16.⁴⁸⁴

Two unexpected factors put a spotlight on the LWF competition, increasing both urgency and the international stakes. First was the 1973 Arab-Israeli War, known alternatively as the Yom Kippur War or the October War. The previous war in that area, the 1967 Six-Day War, had served as an inspirational example for fighter advocates, since the Israeli Air Force crippled the Egyptian Air Force in a matter of hours using mostly French Dassault Mirage III fighters. The IAF destroyed 380 enemy aircraft while losing only nineteen. Most of the Arab aircraft were

⁴⁸³ Aronstein and Picirillo, *The Lightweight Fighter Program*, 29.

⁴⁸⁴ Werrell, *Chasing the Silver Bullet*, 89.

destroyed on the ground, although the IAF also excelled in air-to-air engagements on that first day, shooting down twenty Egyptian planes while losing only two.⁴⁸⁵

However, six years later, the IAF did not experience the same level of success. A dense network of Egyptian SAM (Surface-to-Air Missile) launchers kept the IAF—then having added at least forty American F-4 Phantoms to their arsenal—from effectively conducting operations. The IAF was neutralized, not by enemy fighters, but by threats from the ground. Despite losing at least 87 planes to ground-based fire, the IAF still performed quite well in air-to-air combat. Exact numbers are difficult to ascertain, but Israeli sources claim that Israeli fighters (including the F-4s) shot down over 240 Arab aircraft. More than half of those kills were the result of air-to-air missiles. During these fights, the Israelis only lost sixteen planes to air combat, a 15:1 kill ratio. Even if these figures are exaggerated in favor of Israel, the success of the IAF in air-to-air fighting is impossible to deny. The reason for this disparity probably rests more on the fact that Arab forces had not updated their aircraft inventories, still relying on older MiG-17s and MiG-21s. In addition, their pilot training programs had not improved, nor did they emphasize air combat, nor tactics that made the best use of the MiG's advantages. The IAF, armed with newer French Mirages and American F-4 Phantoms, boasted a pilot force that had trained extensively for the air-to-air mission.⁴⁸⁶

Fighter advocates thus received more ammunition for their arguments in favor of air combat and the 'white scarf stuff' being necessary elements of, and even a basis for, military strategy. However, the U.S. Air Force interpreted the conflict as a warning that future wars might

⁴⁸⁵ Brereton Greenhous, "The Israeli Experience," in Benjamin Franklin Cooling, ed., *Case Studies in the Achievement of Air Superiority* (Washington D. C., Air Force History and Museums Program, 1994), 563-601.

⁴⁸⁶ Greenhous, "The Israeli Experience," 563-601.

involve high attrition rates of aircraft, at a time when the United States was shifting toward a model of fielding fewer higher-quality, expensive aircraft – namely the F-15 Eagle and the F-14 Tomcat. In March 1974, around the time the YF-16 was in the early phases of flight testing, General George Brown, Chief of Staff of the Air Force, commissioned the Air Force Tactical Fighter Modernization Group to find a replacement for the aging F-4 Phantom. The group concluded that any potential replacement must be cost-sensitive in the light of the potential for high rates of attrition in future conflicts. They proposed that the LWF should be procured, but that it should perform both air-to-air and air-to-ground roles.⁴⁸⁷

The second unexpected factor was that in May 1974, four NATO countries – Belgium, Holland, Denmark, and Norway – began looking to upgrade their aircraft inventories by replacing their F-104 Starfighters. Not only would a large international sale bring profits for the company behind whichever aircraft these nations picked, but a large purchase could also drive down unit costs and make the LWF even more affordable. If these four countries chose an American design, it could also serve as a step in the standardization of equipment across the various NATO countries.⁴⁸⁸

These factors pushed the timetable for testing the LWF earlier, and they also increased the stakes of the flyoff competition. However, throughout 1973 and into the time when the YF-16 began testing in Spring 1974, the Air Force was not necessarily planning to procure the LWF. The prototypes were a “technology demonstrator,” meant to show the possibilities of such a craft and to demonstrate and evaluate specific components, such as the FBW system. Members of the Fighter Mafia fought to change that.

⁴⁸⁷ Werrell, *Chasing the Silver Bullet*, 90.

⁴⁸⁸ Werrell, *Chasing the Silver Bullet*, 90.

Guerrilla Tactics

In April 1973, Boyd's assignment in Vietnam was over, and he returned to the Pentagon as the Director of the Office of Development Plans—a job that Boyd considered a “dumping ground,” a “dead-end street.” With his role on the Program Review Committee, Boyd could have had a voice in deciding what programs the Air Force would consider, adopt, and ultimately influence the overall direction of the service in terms of procurement. Yet Boyd considered the meetings “useless” and refused to attend, instead sending a secretary as a proxy. His first priority was to plug back into his network of Acolytes and work towards making sure the Air Force would in fact purchase the LWF and make it a cornerstone of the service's force structure. Boyd began calling his old contacts in various positions around the country, including Pierre Sprey. Boyd indicated that the fight against the Air Force itself was still a battle he intended to wage, saying, “The lightweight fighter is in trouble, Tiger. We're gonna have to go to the barricades.”⁴⁸⁹

In September 1973, other fighter advocates and members of Boyd's network were gaining key positions at the Pentagon. Thomas Christie was the new Director of the Tactical Air Division (Program Analysis and Evaluation) in the Office of the Assistant Secretary of Defense. One of his first priorities was finding a bar in which to have regular meetings with other members of the Fighter Mafia. Christie and Boyd, along with several members of each of their office staff, began meeting regularly on Wednesday nights at the Old Guard Room of Patton Hall in Fort Myer. These meetings were regular occurrences for over a decade.⁴⁹⁰ From here, the Fighter Mafia could plan their attacks against the Air Force in their effort to get the LWF

⁴⁸⁹ Coram, *Boyd*, 280-282, quote on 282.

⁴⁹⁰ Coram, *Boyd*, 290-291.

approved. In addition, also in 1973, Chuck Myers had become the Director of Air Warfare in the Office of the Secretary of Defense, a position which gave him oversight of research and development of any tactical aircraft the Air Force had in development. Thus, by the time the YF-16 was completed and the flight testing phase was about to begin, the Fighter Mafia's reach extended into the highest levels of the Pentagon. The year 1973 saw further turnover in key positions—in July of that year, economist and former CIA director James Schlesinger became the Secretary of Defense. Shortly after that, in August 1973, General George Brown, a former B-24 pilot and commander of the 7th Air Force in Vietnam (1968-1970) became the Chief of Staff of the Air Force. These figures were all connected through a member of Boyd's network, Colonel Richard Hallock. Hallock was a decorated paratrooper veteran of World War 2, who had served in a variety of roles in the Office of the Secretary of Defense throughout the early Cold War. After his retirement in 1967, Hallock worked as a defense consultant in several roles. By 1972, he had created Intrec, Incorporated—an umbrella company for management consultants and real estate investment corporations that served as consultants for defense contracts and procurement with Iran and other international U.S. allies.⁴⁹¹ Schlesinger was close with Hallock, and trusted his opinions. Hallock was also close to Sprey, having mentored him when Sprey first joined the Pentagon. When Schlesinger took the job, Hallock urged him to make Sprey's two pet projects—the LWF and the A-10—the basis of Schlesinger's efforts and the foundation of his legacy.⁴⁹²

⁴⁹¹ Col. Richard Hallock Papers Biographical Note, Columbia State University, [<https://archives.columbusstate.edu/findingaids/mc284.php>], accessed September 24, 2017.

⁴⁹² Coram, *Boyd*, 279.

The 1975 Air Force budget—under discussion in late 1973—did not include the LWF. Christie and Myers fought to change that, proposing \$30 million to push the LWF into full development. The Air Staff removed the amount from the budget, then Christie and Myers proposed revisions to add it back. Hallock was the link in the chain that brought these various figures together. Because of Hallock’s influence, Sprey was serving as a special advisor to Secretary Schlesinger. Hallock and Sprey then introduced Boyd to Schlesinger. Thus, throughout late 1973, the two lead members of the Fighter Mafia had regular private meetings with the Secretary of Defense. As he went about the process of helping design the flyoff process, making sure that his EMT data formed a key part of evaluation, Boyd hoped that a series of briefings at lower levels about the potential advantages of the LWF would increase support throughout the Air Force for placing the LWF in full production, and not just to see it as a “technology demonstrator.”⁴⁹³

At this point, according to Boyd acolyte James Burton, Boyd received a tip from an unnamed “mole in his [Boyd’s] network” that those on the Air Staff who opposed the LWF planned to give the appearance that the plane was being given fair consideration by allowing Boyd’s briefings to be approved up the ladder until they got to the Vice Chief of Staff and a board of three-star generals, who were then planning to disapprove of the program entirely.⁴⁹⁴ To counteract this, Christie met directly with Schlesinger and convinced him to approve a plan to increase USAF’s force structure from twenty-two to twenty-six wings by approving the lightweight fighter and the A-10 for production. Schlesinger not only agreed, but also—demonstrating the degree to which he agreed with the ideals of the Fighter Mafia—he stipulated

⁴⁹³ Coram, *Boyd*, 291-292, 294.

⁴⁹⁴ Burton, *Pentagon Wars*, 19.

that the LWF would be a dedicated air-to-air platform that was not wired for nuclear operations. Brown, who desired a larger Air Force, accepted the plan as well.⁴⁹⁵

Thus, Colonel Boyd began his briefing to members of the Air Staff and several Lieutenant General—men who allegedly had pre-planned to reject and cancel the LWF in that meeting—with a bold statement: “Gentlemen, I am authorized by the Secretary of Defense to inform you this is not a decision brief. This briefing is for information purposes only. The secretary and the chief of staff have decided to go into production with the lightweight fighter.”⁴⁹⁶

This story is somewhat confused in different sources, as Boyd himself told the story differently to different authors. In all versions of the story, Boyd claimed that senior leaders on the Air Staff saw his LWF idea as a threat to the F-15. In some versions, this alleged meeting occurred several years earlier, and involved getting the LWF approved as part of Packard’s prototype program; and in some versions, Boyd indicated that the briefing was specifically about the YF-16 and not the LWF concept generally—which is unlikely, since the YF-16 had not begun its testing phase or the flyoffs against the YF-17 by this point. The dialog also frequently differs depending on the source, as different members of the Fighter Mafia gave oral interviews and remembered the incident somewhat differently. In any case, the meeting was almost certainly part of gaining approval for production of whichever craft won the LWF flyoff competition, placing the meeting in late 1973 or early 1974.⁴⁹⁷

⁴⁹⁵ Coram, *Boyd*, 294-295.

⁴⁹⁶ Coram, *Boyd*, 295.

⁴⁹⁷ Most likely, the earliest publicly printed version of the story is from Bill Minutaglio, “Tales of the Fighter Mafia,” *Dallas Life Magazine*, May 3, 1987, 14. For other versions of the story based on oral history interview with various authors, see Burton, *Pentagon Wars*, 19; Hammond, *Mind of War*, 95-96

However, much as with Boyd's tale of chopping down an Air Force hangar to fuel fires for his men, the accuracy of the specific details of this story is less important than what it reveals about the attitudes and mindset of Boyd and the fighter mafia: That they saw themselves as an oppressed subgroup within the Air Force that was nonetheless "better" or more capable than its peers—and they felt solely responsible for pushing the LWF forward. Boyd was making seemingly paranoid claims about the Air Staff colluding against him, at the same time he was holding up his ability to outsmart them and taking most of the credit for what eventually became the F-16 Falcon. Although the fighter mafia clearly exerted a powerful influence over the LWF, there were also larger forces at work in Air Force reform, most importantly Packard's effort to end the Total Package Procurement policy with a prototype model that featured simplicity and flexibility as its main characteristics, as well as the desire for a designated air superiority fighter that had been building since before Boyd had arrived at the Pentagon.

There is one other important caveat to this story. According to Thomas Christie, it was not General Brown who approved of this agreement to enlarge USAF's force structure by procuring LWFs and A-10s. In a 1997 interview, Christie said that Schlesinger, an experienced economist, was convinced to adopt the LWF from a purely economic standpoint and had also worked to convince Brown to accept the aircraft. Brown allegedly refused. However, Brown was promoted to Chairman of the Joint Chiefs of Staff on July 1, 1974 and was replaced by General David C. Jones, a former bomber commander and aide to Curtis LeMay. Jones had then gone on to train in F-100s and F-4s before commanding the 33rd Tactical Fighter Wing at Eglin. Christie recalled that the deal to which Boyd referred had actually come in late 1974, when Schlesinger and Jones came to agreement: The force structure would increase from 22 to 26 tactical fighter wings, the Air Force would purchase both the F-15 and the LWF, and ten of those wings would

consist of lightweight fighters. However, Jones insisted that, as part of this agreement, USAF would be able to redesign the LWF to suit its needs.⁴⁹⁸

Schlesinger himself recalled this deal differently. In 1983, much closer to the actual events than when Christie tried to recall them, Schlesinger indicated that the deal between him and Jones was not simply about procuring the LWF. It also involved specifically choosing the F-16 over the competing YF-17. Schlesinger also said that the idea of expanding the force structure was Jones's. The rest of the details are similar. Schlesinger said that Jones "did some shrewd bargaining along the lines of the golden handshake. He said, in effect: "The price, sir, is four additional tactical air wings [each with 72 aircraft]."⁴⁹⁹

The choice between the YF-17 and the YF-16 was fraught with international significance, and at the end of 1974, when tests were wrapping up, other nations seemed to be pushing the YF-17. The *New York Times* noted in December that most western European air force officers favored the YF-17.⁵⁰⁰ The White House also favored it, emphasizing the international significance of the decision as well as the beneficial economic fallout from job creation. Texas Congressmen were placing considerable pressure on the Air Force and the White House to choose the YF-16, because doing so would grant massive production contracts to the General Dynamics plant in Fort Worth. Yet the Executive Branch noted that Texas was in a much less precarious economic situation at the time, which meant that granting those jobs to California sites by choosing the YF-17 might be more beneficial. The White House favored the YF-17 for a host of other reasons: "Both aircraft have met flight test standards. The F-17 is technologically

⁴⁹⁸ Werrell, *Chasing the Silver Bullet*, 91.

⁴⁹⁹ Hammond, *Mind of War*, 96.

⁵⁰⁰ "U.S. Decision in 'Fighter-Plane Sweepstakes' Is Due Jan. 15," *New York Times*, December 26, 1974.

newer and considered to offer greater mission capabilities and production potential against future requirements. Initial cost is the same but two engines offer greater life cycle economics.”⁵⁰¹

The final decision was announced on January 13, 1974. In a press briefing announcing that the YF-16 had won the competition, Secretary of the Air Force John McLucas insisted that other nations had influenced the decision. Ultimately, though, they did not have a vote. So the key factor deciding in favor of the YF-16 was performance—specifically, performance characteristics that reflected the fighter mafia’s values. McLucas argued that the YF-16 “had advantages in agility, in acceleration, in turn rate and endurance over the YF-17. . . . better tolerance of high G because of the tilt back seat, better visibility and better deceleration. . . . The YF-16 had lower drag and was a cleaner design.”⁵⁰² Although McLucas noted that most of these advantages applied only in supersonic speed ranges, they do suggest that the performance characteristics that the fighter mafia valued, especially maneuverability, were the deciding factors in the decision.

Many Pounds for Air-To-Ground

The F-16 Falcon was in most respects the physical manifestation of the Fighter Mafia’s ideal. It was lightweight and agile, and it emphasized the role of the pilot to such a degree that it lacked electronics packages and radar. However, after winning the competition in January 1975,

⁵⁰¹ “AIR COMBAT FIGHTER DESIGN DECISION STATUS AND SITUATION,” December 30, 1974, Box 1, folder “ND 1 Aircraft 3/1/75-6/30/75” of the White House Central Files Subject Files (Ford Administration), 8/9/1974-1/20/1977, at the Gerald R. Ford Presidential Library.

⁵⁰² News Briefing by Secretary of the Air Force, John L. McLucas At the Pentagon,” Jan 13, 1975, Box 21, folder “Lightweight Fighters (Navy & Air Force), 1974-75 (4)” of the Martin R. Hoffmann Papers at the Gerald R. Ford Presidential Library.

the F-16 design went to Air Force Configuration Control Committee, headed by General Alton Slay, a former fighter pilot himself. The Fighter Mafia was wary of the Configuration Control Committee, referring to it as the “Add-On Committee.” In the minds of Boyd and his acolytes, Slay’s role was to exact the Air Force’s revenge by making sure the F-16 did not threaten the F-15 in any way. That meant turning the Falcon into a multi-role craft emphasizing ground attack and nuclear delivery.⁵⁰³

The “full scale engineering development” process made significant modifications to the F-16. The size of the engineering team itself offended the sensibility of the fighter mafia—instead of the 25 managers who had overseen the original designs, the new management team was nearly 200 people. The number of engineers working on the project grew from about 150 to about ten times that at 1,500. Nine extra hard points and pylons were added to wings, enabling the F-16 to carry bombs. The landing gear became stronger. To accommodate the increased drag from these additions, the engineering team added about 400 pounds of fuel. That decision, in addition to a desire to have the twin-seat trainer version of the craft use the same airframe as the single-seat version, forced the team to enlarge the fuselage by about a foot. The team added a tailhook—an item that had been a particular sticking point for the Fighter Mafia in years past. The tail fin area was increased from 42 to 49 square feet, and the wings grew as well, from 280 to 300 square feet.⁵⁰⁴

Perhaps the largest change was the inclusion of a more complicated radar that could distinguish low-flying aircraft from ground clutter. The new electronics plus the external additions added over 2,000 pounds to the lightweight fighter. Sources including fighter mafia

⁵⁰³ Fallows, *National Defense*, 105; Hammond, *Mind of War*, 97.

⁵⁰⁴ Coram, *Boyd*, 307, Werrell, *Chasing the Silver Bullet*, 94, Fallows, *National Defense*, 105.

members and their allies or else based on Boyd's oral histories claim this number was between 3,000 and 4,000 pounds, although the final version of the F-16's weight was about 2,000 pounds more than the original YF model. This radar was about 30 percent the size of the F-15's radar, and was meant to have less overall capability. However, a problematic design process made the radar even less capable than the Air Force intended. Westinghouse won the contract to design the F-16's radar, and the system they delivered in June 1977 had only half the range the Air Force had specified. Its ground mapping was undecipherable, and the system had problems tracking targets while the plane performed maneuvers. Some of the units Westinghouse delivered were completely inoperative from the outset. The Air Force continued refining and testing the models, working with Westinghouse. By October 1979, USAF rated the radar as "marginally satisfactory" and accepted the system.⁵⁰⁵

Although the radar had been a point that Boyd and Sprey had found especially objectionable in earlier fighter designs, the bigger sticking point now for Boyd was the wing area. The added weight would require increasing the F-16's wing area in order to allow it to keep its agility, and the engineering team had increased the wing size from 280 to 300 square feet. Boyd insisted this was not enough and demanded 320 to 325 square feet. Boyd tried to use his network of allies, this time reaching out to an unnamed officer working in the F-16 development office. Boyd pressured the man to use his authority to push for a wing size of 320 to 325 square feet. After daily phone conversations for two straight weeks, the officer refused to budge, and the wing size stayed at 300 square feet. Boyd went to Spinney and said of the young officer, "He failed roll call." Allegedly, several years later, that same officer was promoted to general, and he

⁵⁰⁵ Werrell, *Chasing the Silver Bullet*, 93. For other sources of weight, see Fallows, *National Defense*, 105, Coram, *Boyd*, 309.

called Boyd to apologize, saying he had been wrong about the wing and regretted his decision. Boyd, ever the stubborn, aggressive, individualist fighter pilot, hung up on him.⁵⁰⁶

The move from a dedicated air superiority fighter to a multi-role aircraft played out in the press coverage of the aircraft as well. In the weeks after the F-16 was selected in January 1975, many reporters, officials, politicians, and test evaluators emphasized that the Falcon was supposed to be a dedicated air combat fighter, and they discussed its merits along those terms. McLucas even echoed some of the Fighter Mafia's main arguments when he described the F-16 to the press: "The Pentagon has said the lightweight fighter concept was pushed 'to reverse the ... trend toward more sophisticated and thus costlier air superiority fighters."⁵⁰⁷ One reporter covering the announcement emphasized that "[t]he stress in design of the lightweight fighter has been for maximum maneuverability and handling in aerial dogfights."⁵⁰⁸ Seven months later, this line began to shift subtly. David Lewis, the chairman and CEO of General Dynamics, still emphasized the dogfighting aspect of the F-16, arguing that it "can outfight any known competitor." Yet Lewis immediately followed up that assertion with the argument that the F-16 was "versatile" and has "an exceptional air-to-ground capability with weapons delivery ranges far better than current operational aircraft."⁵⁰⁹

By the Fall 1978, the story had shifted still further, to the point of insisting that the F-16 had been designed with ground attack in mind—a proposition which was almost the opposite of

⁵⁰⁶ Coram, *Boyd*, 308

⁵⁰⁷ "General Dynamics' F-16 Selected as Air Force's New Jet Fighter," *St. Louis Post-Dispatch* (St. Louis, Missouri), January 14, 1975.

⁵⁰⁸ "General Dynamics' F-16."

⁵⁰⁹ Clyde H. Farnsworth, "Gen. Dynamics' 'Contract of the Century,'" insert, "David S. Lewis Comments on Winning F-16 Contract," *St. Louis Post-Dispatch* (St. Louis, Missouri), July 29, 1975.

the Fighter Mafia's intentions. Reporters at that time claimed that although the plane emphasized air-to-air combat, the F-16 had actually been "designed as a 'multi-role fighter.'" H.F. Rogers, the Vice President of General Dynamics and Director of the F-16 program, did accurately state that the F-16 was intended as an air-to-air fighter, but not solely as that. He claimed that with the F-16 "the Air Force was looking for a new jet capable of both air-to-air and air-to-ground combat."⁵¹⁰ This shift in tone could represent honest confusion as the development process began to emphasize multi-role capability, and it does not necessarily indicate a purposeful attempt to manipulate the press and the public.

The fighter mafia, though, thought these choices to change the design and emphasize ground attack were deliberate retaliation, and many lightweight fighter advocates maintained that the changes made to the F-16 were an attempt to make sure the plane did not threaten the F-15 or its intended role. Reading the minds and intentions of the nearly 1,700 officers, managers and engineers who implemented those changes is hardly possible. Yet there is little direct evidence that these decisions were beyond what was usual for the time in USAF or in the corporations that served it. The service had long favored multi-role craft, such as the F-4 Phantom and the F-111. The F-15 itself had not been immune to changes that made it a multi-role airplane. Some of these changes originated from study groups within the service, especially the Air Force Tactical Fighter Modernization Group. This group, chartered by General George Brown when he served as Air Force Chief of Staff, was led by Major General Richard Cross, a former P-51 fighter pilot and tactical fighter wing commander. This group pushed for the F-16 to be capable of various

⁵¹⁰ Stephen Good, "F-16 fighters beginning to roll off production line," *The Morning News - Sunday News Journal* (Wilmington, Delaware), Originally for the *Dallas Times Herald*, October 15, 1978.

mission roles, as did NATO allies, especially the four countries who had agreed to buy the aircraft: Belgium, Holland, Denmark, and Norway.⁵¹¹

As early as February 4, 1975, fighter advocates attempted to limit the growth of mission requirements and especially to remove any air-to-ground components and prevent the addition of larger avionics and radar equipment into the F-16. On that date, Robert J. Croteau, from OSD Program Analysis and Evaluation, sent a message through Christie to an L. Sullivan (also of PA&E), regarding their stances on the issue. Croteau and Christie argued that the changes made to the F-16 were “unacceptable.” They believed that the aircraft should have “a minimum of sophistication,” that the additional avionics and radar capabilities were too complex and expensive, and that the added weight was reducing performance. Specifically, they charged that the changes interfered with air combat: “Extensive air-to-ground capability of [the] proposed configuration compromises air-to-air capability.”⁵¹²

The memorandum does attempt some compromise. The original “A” model of the F-16 was depicted as the one truest to the original concept of a “white scarf” air-combat lightweight fighter. The “B” model included the changes of which the Fighter Mafia disapproved—yet this memo proposed a “C” model that was a compromise between the two, allowing for some additional avionics and radar and a limited ground-attack capability.⁵¹³ This C model was never adopted.

⁵¹¹ Werrell, *Chasing the Silver Bullet*, 94; for the details of the Tactical Fighter Modernization Group, see Gaillard R. Peck, Jr., *America’s Secret MiG Squadron: The Red Eagles of Project Constant Peg* (Long Island City: Osprey Publishing, 2012), 61-62.

⁵¹² Memo, Robert J. Croteau, to Mr. Sullivan, through Mr. Christie, February 4, 1975, Box 21, folder “Lightweight Fighters (Navy & Air Force), 1974-75 (5)” of the Martin R. Hoffmann Papers at the Gerald R. Ford Presidential Library, 1.

⁵¹³ Croteau memo, 3.

By February 21, 1975, Chuck Myers was already infuriated with the direction the development of the F-16 was taking. Myers sent a memo to Schlesinger's special assistant, Martin Hoffman, arguing that the changes made to the plane made it "a far cry from the austere FIGHTER" that it had been intended to be. Myers insisted that "management" needed to place strong limits on the amount of avionics equipment the plane should carry in order to "restore" the plane.⁵¹⁴

The use of the word "restoration" is revealing. Fighter advocates – especially Myers, who had worked for so long to attempt to redefine the word "fighter" to mean optimization of the air-to-air combat role – thought that the changes made to the F-16 had corrupted it and that the plane needed to be restored. In his February memorandum, Myers included a long paper (presumably written by himself), explaining the way in which addition of the air-to-ground component was destroying the aircraft. He also gave instructions for how this restoration could occur, titled "F-16 (LWF/ACF) PROGRAM RESTORATION." The document reveals exactly how the Fighter Mafia viewed the changes. The paper states: "The F-16 has become a multi-purpose tactical aircraft with emphasis on accomplishing all manner of air-to-ground missions including low-visibility attack. It also incorporates the electronics which serve as a basis for inclusion of the all-weather intercept mission. The expansion of mission spectrum is accomplished with associated increases in weight, complexity, support burden and a loss of air combat maneuvering capability, the one mission for which the original design had been optimized."⁵¹⁵ Their displeasure and intention to combat the process were made explicit, as the paper continued: "This *mutilation of*

⁵¹⁴ Chuck Myers, Memo to Hoffman, 21 February 1975, Box 21, folder "Lightweight Fighters (Navy & Air Force), 1974-75 (4)" of the Martin R. Hoffmann Papers at the Gerald R. Ford Presidential Library.

⁵¹⁵ "F-16 (LWF/ACF) PROGRAM RESTORATION." In Myers memo to Hoffman, 21 February 1975, Hoffman Papers, 2-3.

the character of the LWF through the ACF missionization process is a management travesty which cannot go unchallenged.”⁵¹⁶

Members of the Fighter Mafia tended to assume that the changes made to the F-16 were the result of deliberate attacks on them, a sort of revenge for their “maverick” challenges to the Air Staff. However, the Air Force had understandable reasons for adding additional capabilities to the F-16 that had little, if anything, to do with plotting revenge. The Air Staff argued that if the F-16 were dedicated only for the air-to-air role and had no ground attack capability, then the F-16 could not truly replace the F-4 Phantom. The point of having a high-low mix of F-15s and F-16s was to be able to phase out older aircraft such as the F-4 while maintaining and enhancing the same capabilities. But if the F-16 had no ground attack, then only 70 percent of the Air Force inventory would be capable of attacking ground targets, an amount that the Air Staff found unacceptable. Even though the F-16 could achieve air superiority, the aircraft would be useless once that superiority had been achieved in a conflict. By adding ground-attack functions, the Air Staff argued, the F-16 could gain air superiority and then be used in a “swing role” to attack ground targets after that superiority had been won.⁵¹⁷

Although the Air Staff did argue that the primary purpose of the airplane was dogfighting, they were particularly concerned about nuclear delivery. Although the Fighter Mafia considered nuclear bombing to be an irrelevant and unnecessary mission, the Air Force worried that, if the F-16 replaced older aircraft as planned, then by the early 1980s, only one-third of the Air Force inventory would be capable of delivering nuclear weapons, a proposition

⁵¹⁶ “F-16 (LWF/ACF) PROGRAM RESTORATION,” Myers Memo, 3, emphasis in original.

⁵¹⁷ “Air Combat Fighter DSARC-II, General Counsel,” 11 March 1975, “Air Force Response to the OSD List of Questions on ACF (F-16),” Box 21, folder “Lightweight Fighters (Navy & Air Force), 1974-75 (5)” of the Martin R. Hoffmann Papers at the Gerald R. Ford Presidential Library.

that the Air Staff found troubling. In general, even beyond the issues of ground attack and nuclear delivery, the Air Force was legitimately worried that having an F-16 that was so specialized that it could only perform one specific role would render the Air Force incapable of adequately performing other missions. Thus, making the F-16 more versatile was considered a positive goal.⁵¹⁸

Although it seems plausible that some Air Force officials could have sought some sort of retaliation against the Fighter Mafia's pet project, possibly using the argument in favor of versatility as a cover, the push for multi-role requirements had logical arguments behind it and came from a wide group. The idea that the F-16 was being purposefully ruined by officials bitter against the fighter mafia seems simplistic at best, although this attitude does reflect the view the fighter advocates had of themselves – as an oppressed minority within the Air Force that was so trodden on that the government, the military itself, and USAF viewed them as enemies. This perception grew over time and eventually turned to paranoia – if that state had not arrived already by the late 1970s.

Certainly these additions were a breaking point for Boyd, especially the wing area question. During the late 1970s, when these changes were being implemented, Boyd frequently gathered with his acolytes Christie, Sprey, Spinney, Burton, and Boyd's assistant, Raymond Leopold, and ranted that the Air Force's "goldplating" was destroying the "pure" fighter he had designed. Coram's biography of Boyd notes that Boyd's anger about the modifications to the F-16 burned within him for the rest of his life, and they are what finally pushed Boyd to give up his

⁵¹⁸ "Air Combat Fighter," 7 March 1975, Box 21, folder "Lightweight Fighters (Navy & Air Force), 1974-75 (5)" of the Martin R. Hoffmann Papers at the Gerald R. Ford Presidential Library. Nuclear capability discussion on 14, the entire document explores the other issues of mission capability at length.

involvement with hardware design for good. After this point, Boyd focused entirely on his intellectual activities.⁵¹⁹ These efforts expanded his movement. The Fighter Mafia was about to go public.

Conclusion

By the early 1970s, the fighter mafia occupied some senior leadership positions within the United States Air Force and had significant leverage with others. Although not without limitations, they were able to exert their will over technological development of new aircraft hardware. Their will was based on the qualities associated with the “knights of the air” myth, and the stereotypes of fighter pilot values. Not only did most of the members of the fighter mafia exemplify qualities such as aggressiveness, independence, resistance to authority, celebration of heroic imagery, and protectiveness for their community in their personal lives, but their approach to technology was similarly infused with those concepts. They wanted an aircraft that exemplified those values, emphasizing the role of the individual man over the machine and excelling in aggressive and agile maneuvering battles in one-on-one air combat duels—they wanted airplanes that could do the “white scarf stuff.”

After the F-15 failed to live up to that vision, they rejected it, viewing it as a symbol of everything they thought was wrong with the Air Force. They then immediately turned to an attempt to create a new fighter plane that would live up to their vision. This time, instead of modifying existing designs, the fighter mafia (specifically Boyd and Hillaker, influenced by Sprey, Riccioni, Myers, and Christie) designed it from scratch. The result was the YF-16, which rose through the ranks of approval largely due to the underground efforts of the group that

⁵¹⁹ Coram, *Boyd*, 308.

skirted the edge of ethics and legality. The cultish and almost paranoid nature of the fighter mafia took to an extreme the mutually protective impulses among the earliest fighter pilots. This sense of mutual protection, combined with the resistance to authority characteristic of the mythic fighter pilot, expanded to an extreme degree, until the Fighter Mafia viewed themselves as more than just an oppressed minority in the Air Force – though they certainly were a minority. The core group of the Fighter Mafia was under a dozen, and although constructing an exact list of all of their supporters is impossible, they could not have numbered more than a few dozen. Despite their small numbers their influence grew, partially because of their prolific output of briefings and studies combined with the confrontational personalities that kept their ideas in the spotlight. In any case, the fighter mafia began to see themselves as enemies and guerrilla warriors fighting a righteous cause against a corrupted enemy regime. That attitude continued to grow, even after the F-16 won approval.

Yet the F-16 met the same fate as the F-15. Once it was out of the hands of the fighter mafia, the Air Force made modifications to it that took it away from their original ideal, making a more versatile plane, albeit one less specialized for the air-to-air role. This caused a deep-seated anger among many of the Mafia members, especially Boyd. After this, they took the ideals of their movement before a broader public, igniting a firestorm of controversy both within the corridors of the Pentagon, and among segments of the American public.

Chapter 8 - Drafting Scripture: The Canon of the Reformers

By 1975, when the F-16 was undergoing the modification process (or “goldplating,” as the fighter advocates saw it), Boyd and his core group of fighter mafia acolytes included Sprey, Riccioni, Christie, Spinney, Burton, and Boyd’s assistant, Raymond Leopold. None of these men held especially high rank, Boyd being the highest at Colonel. Yet the group prided themselves on their ability to effect large-scale change and influence those above them, such as three-star generals. Certainly the fighter mafia had achieved some successes—including their leading role in designing the F-15 as an air-to-air fighter and being the driving force behind the F-16 Falcon. However, in the end, they considered both of these projects to be extreme disappointments. Their “pure” vision for a modern aircraft that could replicate the “white scarf stuff” of their memory of air-to-air combat had been – in their minds – ruined by the Air Force establishment.

The Fighter Mafia certainly considered themselves to be a counter-culture within USAF that was actively oppressed by the mainstream establishment. The allegory that they saw as most fitting—and that they actively cultivated—was that of competing religious orders. They referred to their efforts as “the Lord’s work,” and took on the role of increasingly extreme religious zealots, fighting against what they saw as a corrupt orthodoxy. Historian Grant Hammond summarized their view: “In labeling it thus [as religious allegory], they [the Fighter Mafia] presumed the inherent righteousness of their cause, recognized that there would be martyrs to it (like Riccioni), and that they would be persecuted, right or not, by the powers that be. Their faith in their crusade would be sorely tested. Ultimately, the heresy that they represented to the

orthodoxy of the military services and the defense establishment was something that could not, and would not, last.”⁵²⁰

This view dovetailed neatly with the attitude and characteristics of the stereotypical fighter pilot. Boyd and his followers were the rugged individualists, who were not afraid to question authority; and to pursue their righteous cause, they needed to remain aggressive. However, up until the mid-1970s, the bulk of these attitudes had been focused on hardware directly related to their identity as fighter pilots – on making aircraft that fit solely that role, first the FX, then the LWF. When frustration with the latter drove Boyd away from this focus on fighter aircraft, his view enlarged to include the military as a whole. His movement grew with it, both in size and scope.

By the end of the next decade, the Fighter Mafia had grown and metamorphosed into a larger group: The Military Reform Movement. The movement was very public—its members became involved with journalists and published extensively through conference papers, briefings, articles in professional and popular magazines, and books. They became directly involved with members of Congress, who formed the Military Reform Caucus to represent the movement on Capitol Hill. The Reform Movement’s concerns were not solely with fighter aircraft (although this remained a main focus for them) but with the military as a whole, encompassing budgets, the technology development process, and overall doctrine. As this movement grew it became increasingly influential, yet increasingly radicalized, and many of its tenets remained a part of the discourse on politics and defense issues decades later. The Reform movement is perhaps best understood as an extension of the Fighter Mafia and thus as a translation of those original fighter pilot stereotypes—including strong individualism, distrust of

⁵²⁰ Hammond, *Mind of War*, 104.

and even resistance to authority, a strong or even single-minded focus on certain military concepts and roles, a connection to technologies that address only those roles, the need to protect their own community, the imagining of themselves as brave heroes, and above all, aggressiveness—dating back nearly a century.

The Gospel of Boyd

The origins of this movement were not so grandiose. In the midst of the testing and modification process for the F-16 fighter that they found so disappointing, Boyd and his original Fighter Mafia allies turned their sights to what they deemed as larger problems within the military as a whole, although they attempted to keep this effort internal to the Air Force. In 1974, Boyd worked extensively with his assistant, Raymond Leopold, who provided research assistance. With additional help from Spinney, the three of them produced a document critical of the Air Force's process of peacetime planning, but that could also point to what Boyd felt were better options. Finished on August 9, 1974, "Development Planning Interim Report" was only eight pages long. Along with this brief statement, however, came 140 pages of appendices with background and research material to back up the arguments made in the report. Key was the claim that the planning process then current within the Air Force was not pragmatic either in terms of combat capability or budget. The paper argued that the then-typical approach for the Air Force was to focus on "wish lists" that would consume the budgets of 1979 through 1983, reducing research and development in those years to almost nothing. Instead, Boyd argued for a

focus on mission-area analysis—linking projects to specific mission roles (such as air combat, ground attack, or others) instead of broad sets of capabilities.⁵²¹

Hammond, something of an apologist for Boyd, claimed: “In the maw of the system, [this paper] disappeared.”⁵²² Yet that was not entirely true. Although the paper itself had little direct impact, it did initiate an appraisal of the development process. It was the basis for a January 1976 proposal by the Air Staff’s Systems and Resources Management Action Group for a mission-area analysis concept to guide decision makers. That proposal was the catalyst for a process within Air Force Research and Development. By Summer 1976, the Air Force implemented many of Boyd’s, Leopold’s, and Spinney’s suggestions about focusing funding on specific mission roles.⁵²³ However, Boyd and his acolytes were either unaware of these changes, or were so convinced that they were being persecuted that they did not recognize the influence they actually had. Either way, the assumption among the fighter mafia was that this paper had gone unheeded.

This paper was not Boyd’s primary work, however. For the past four years, Boyd had spent some of his free time attempting to outline what he called his “learning theory.” By 1974 he had completed early versions of this project, which eventually coalesced into a short paper called “Destruction and Creation.” This was an attempt to outline his own thought process and to explain how systems and societies change through a cyclical process of destruction and creation. This was not unlike Thomas Kuhn’s concept of paradigms developed in his work *The Structure*

⁵²¹ Colonel Thomas C. Brandt, Lt. Colonel Howard E. Bethel, Captain Wallace B. Frank, Jr., “Mission-Area Resource Allocation for Air Force R&D,” *Defense Systems Management Review* 2 (Spring 1979, issue 2), 80; Hammond, *Mind of War*, 104.

⁵²² Hammond, *Mind of War*, 104.

⁵²³ Brandt, Bethel, and Frank, “Resource Allocation,” 80.

of *Scientific Revolutions*, which Boyd cited. Although it was not directly related to the reform movement, or even just to the military, the paper reveals much about Boyd's thought process. He placed the role of the individual above all else, arguing that the human instinct for survival itself is based on the drive to maintain individual independence of action. Any degree of cooperation with others occurs only if it can further the independence of the individual. Boyd, true to his beliefs in common with the stereotypical fighter pilot, assumed that individuality and individual action were the primary drivers of human existence. Although many non-fighter pilots might agree with this sentiment, later research into evolutionary history has challenged this assertion.⁵²⁴

Boyd went on to argue that systems and organizations that are too inwardly focused inherently lead to incorrect assumptions about the world and thus to incorrect decision-making. To remedy this, Boyd argued, it is necessary for someone to lead a process of destruction and creation—going outside the existing system, questioning its tenets and creating a new system. This process, he explains, will then continue to occur in a cyclical way, with old systems being continually destroyed and new ones created, all resulting in the improvement of humanity's capacity for independent action of individuals.⁵²⁵

⁵²⁴ For some examples of other models of human behavior that explain some evolutionary basis for cooperation, altruism, and group identity over individual independence, some useful starting places include Martin A. Nowak, "Five rules for the evolution of cooperation." *Science* 314, no. 5805 (2006): 1560-1563; Herbert Gintis, Samuel Bowles, Robert Boyd, and Ernst Fehr. "Explaining altruistic behavior in humans." *Evolution and Human Behavior* 24, no. 3 (2003): 153-172; and Ernst Fehr, and Urs Fischbacher. "The Nature of Human Altruism." *Nature* 425, no. 6960 (2003): 785.

⁵²⁵ John Boyd, "Destruction and Creation," September 3, 1976. The work was published by the US Army Command and General Staff College in 1987, but has been reproduced in many sources, and is available online:

[http://www.goalsys.com/books/documents/DESTRUCTION_AND_CREATION.pdf] or

[http://pogoarchives.org/m/dni/john_boyd_compendium/destruction_and_creation.pdf] or

[<http://globalguerrillas.typepad.com/JohnBoyd/Destruction%20and%20Creation.pdf>], accessed October 7, 2017.

Some analysts have found that “Destruction and Creation” may have merit on its own terms.⁵²⁶ But it is more obviously a product of Boyd’s own history and evidence of his frame of mind; and it can be seen as a self-defense of a stereotypical fighter pilot’s mentality. Extreme individualism and the impulse to question authority to the point of destroying systems and recreating new ones that suit oneself are all held as not only the highest good but as necessary for the continued survival of the species. Early fighter pilots often expressed similar trends as early as World War I, viewing previous modes of thinking about military power as inadequate, instead challenging authority to place a higher importance on air-to-air combat as key to victory.

Boyd had spent most of his career doing the same. He had continually accused the Air Force of being too inwardly focused – on its bureaucracy and on chasing technology as an end unto itself without focusing on achieving missions. He thought that the Air Force was stuck in a loop of its own internal inertia and had lost the ability to see the larger picture of winning large-scale wars. He saw himself as a person who could challenge that authority, destroy old systems, and build new ones in its place that emphasized what he thought was important. Specifically, that meant a focus on air-to-air combat. Yet in the mid-1970s, Boyd’s thinking drifted to areas outside of just the Air Force. Although he had little regard for USAF as a system, he began to apply his criticisms of the Air Force to the military as a whole, viewing the entire US military establishment as an “inwardly focused” system that needed to be re-created.

⁵²⁶ The most in-depth look at Boyd’s intellectual output is Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (London: Routledge, 2007). For a briefer examination of Boyd’s “OODA Loop” concept, see Frans P. B. Osinga, “The Enemy as a Complex Adaptive System: John Boyd and Airpower in the Postmodern Era,” in John Andreas Olsen, ed., *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd* (Annapolis: Naval Institute Press, 2015).

During the process of composing and refining “Destruction and Creation,” Boyd was inching closer to resigning his military career. Spinney had done exactly that, resigning from the Pentagon in June 1975, allegedly because—according to Boyd’s biographer Robert Coram—an unnamed major general had ordered Spinney to falsify budget information on the B-1 bomber. That same month, the Air Force had given Boyd the Harold Brown Award, the highest recognition of service to scientific contributions to USAF. The award recognized the use of EMT theory as the basis for the F-15 and F-16 as well as Boyd’s role in the service’s efforts to—as the award citation read—“forge a superior fighter force.”⁵²⁷ Still, this recognition did not assuage the sense of antagonism and persecution that Boyd perceived from the Air Force.

The event that pushed Boyd over the edge into retirement also came in mid-1975, when he was asked to participate in a top-secret study of the Soviet Tu-22M “Backfire” bomber—a long-range, supersonic strategic bomber with a swing-wing design that analysts feared was similar to the United States’s own B-1 bomber. Boyd argued that the CIA, the Defense Intelligence Agency, the Air Force, and especially the Navy were overstating the threat this bomber posed. Perhaps indicative of the importance he placed on maneuverability according to his EMT analysis, Boyd concluded: “The Backfire is a piece of shit, a glorified F-111.”⁵²⁸ After the study was completed, Boyd retired, effective August 31, 1975. It was from outside his military position, during his retirement years, that he did his most forceful work aimed at destroying existing systems within the military and attempt to create new ones.

Boyd spent the fall of 1975 in relative seclusion, reading, researching, and spending copious amounts of time on the phone discussing his ideas with his acolytes. This was so much

⁵²⁷ Coram, *Boyd*, 310.

⁵²⁸ Coram, *Boyd*, 311.

so that one of them, James Burton, competed with his teenage daughter for phone time to the point that Burton installed a second phone line, which he called the “Boyd line,” just to handle Boyd’s calls. However, by mid-1976, Boyd was back in the Pentagon. Tom Christie, one of the Fighter Mafia, was at a high position in the Office of the Assistant Secretary of Defense (Program Analysis and Evaluation), and he offered Boyd a job as a consultant. According to Coram, Christie’s intent was less to use Boyd as an actual consultant on any particular project but rather both to offer him financial assistance and to give him a “base of operations” with access to an office and official resources—for his part, Boyd insisted that he be given the smallest salary possible, which was one day of work for each two-week pay period.⁵²⁹ In any case, this meant Boyd was back, free in the halls of the Pentagon; and in his role as a consultant, he was able to offer briefings to a variety of military and government officials and contractors. From this position, he focused on refining his writings, much of which laid the foundation for what became the Reform movement.

The first year of Boyd’s career after his retirement from military service was spent bringing “Destruction and Creation” to its final draft, which he completed by September 1976. One month later, he gave a briefing that applied some of the concepts of that paper to a specific issue—one of his personal favorites—namely, fighter aircraft maneuverability. Around the same time Sprey began work on a briefing entitled “A New Conception of Air-to-Air Combat,” which picked up earlier threads of research with which he had dabbled in 1975. This research was fueled further when NASA awarded Boyd a small grant to study why pilots flew flight simulators differently than they did actual aircraft. This briefing was finished by August 4, 1976, also known as the “Fast Transients Brief.” It centered around three historical examples: The

⁵²⁹ Burton, *Pentagon Wars*, 43-44; Coram, *Boyd*, 340-341.

German invasion of France in 1940, air combat between the MiG-15 and the F-86 Sabre during the Korean War (with which Boyd himself had personal experience), and the then-current 1976 Israeli raid on Entebbe airport to rescue hostages in Uganda. The key point of these examples, Boyd argued, was speed. In these cases, the victor was the side that operated so quickly that the enemy was so disoriented as to perceive ambiguity, disorder, confusion, and chaos. The final slide of the presentation made Boyd's overall point simple and clear: "He who can handle the quickest rate of change survives."⁵³⁰

This idea formed the core component of Boyd's thinking and intellectual activities for most of the remainder of his life, and it quickly expanded. The next month, the briefing had become the first draft of "Patterns of Conflict," which is perhaps Boyd's best-known work outside of EMT. Boyd rewrote, edited, and refined this presentation continually. Each new version was designated by a "warp" number—the first draft was Warp I, then reworked into Warp II, and so on. This was a reference to his children's favorite television show, *Star Trek*. By October 1977, Warp XII was complete. Versions after this one dropped the warp designation. With each version, the briefing grew longer. The original form lasted between 60 and 90 minutes. By the mid-to-late-1980s, "Patterns of Conflict" had grown to its final form, then titled "A Discourse on Winning and Losing," which was a fourteen-hour briefing (split into two days). Boyd always insisted that his briefs could not be shortened, condensed, or summarized. Either he was booked for the entirety of the briefing, or he refused to present—no matter who asked. Allegedly, according to Sprey, Boyd once hung up on the executive officer for the Chief of Naval Operations when they refused to allow him six full hours for a briefing. He did not permit

⁵³⁰ For background on the presentation, see Coram, *Boyd*, 322, 327-328; the presentation itself is available online: [http://www.ausairpower.net/JRB/fast_transients.pdf], accessed October 7, 2017.

anyone to look at his slides or the executive summary until after hearing the full brief. Those slides also became increasingly erratic. Despite Boyd's earlier reputation for concise, clear presentation skills, as the "Patterns of Conflict" briefing increased in length, the presentation's slides became dense, filled with full paragraphs and a jumble of bullet points.⁵³¹

In terms of content, the "Patterns of Conflict" briefing argued that the American strategic approach to war needed to be completely rewritten. To demonstrate the new approach that Boyd wanted to create, the presentation consisted of a survey of military history reaching back to ancient Mesopotamia. Each of his examples argued that the most successful strategy was built on purposefully obscuring one's intent by making quick movements that appeared nonsensical but were designed to draw an enemy out. As he stated, conflicts were won by those who are "more subtle, more indistinct, more irregular, and quicker—yet appear to be otherwise."⁵³² Building from his previous works, "Destruction and Creation" and the "Fast Transient Brief," he argued that speed and the ability to disorient an opponent were the two keys to victory.

Although this analysis was derived from examples he picked from the breadth of military history, Boyd was especially fascinated by the approach of Germany during World War II, especially the invasion of France in 1940, which, in Boyd's analysis, was perhaps the prime example of his approach. According to Hammond, at least part of this fascination with the Nazi

⁵³¹ Coram, *Boyd*, 328-329. Several versions of both "Patterns of Conflict" and "A Discourse on Winning and Losing" are available online: [<http://www.ausairpower.net/APA-Boyd-Papers.html>]

A nearly seven-hours long recording of the "Patterns of Conflict" briefing, made to congressional staffers at House Representative Jim Lightfoot's (R-IA) office in the mid-to-late-1980s is available on YouTube in multiple places: [https://www.youtube.com/playlist?list=PL4pmLxkc7CTcukIIPD0UThT7Y_K09oxXe] contains a full playlist of the entire briefing, also: [<https://www.youtube.com/watch?v=lzRqZnPVeJI&t=131s>] contains the first part of a series with links to the remainder. The user who uploaded the videos wrote a brief article about that project for Medium: [<https://medium.com/@jasonmbro/uploading-john-boyd-4264b82d73ed>], all sites accessed October 7, 2017.

⁵³² Boyd, "Patterns of Conflict," [<http://www.ausairpower.net/JRB/poc.pdf>], accessed Oct 7, 2017.

war machine, as well as Boyd's interpretation of it, came from Boyd's and Sprey's actual interviews with former Nazi officers. Allegedly, while working on the design of the A-10 Thunderbolt in the early 1970s, the CIA secretly extracted several former Nazi officers from Germany, including former tank commanders and Stuka dive bomber pilots to safe houses in Maryland. Boyd and Sprey were among those who gained access to these individuals, and they interviewed the Germans about their views on the role and vulnerability of armor to air power, as well as for tactical details of their close air support operations. These insights contributed to the design of the A-10, but they also helped Boyd toward the thinking that prevailed in "Patterns of Conflict."⁵³³

"Patterns of Conflict" also contained another idea that was central to the Fighter Mafia and became the core of the Reform Movement: Simplicity. The briefing argued that complexity (either technical, organizational, or operational) was harmful to successful operations because it reduced speed. Complex systems could cause personnel to "be captured by their own internal dynamics," and they would be unable to adapt and act quickly.⁵³⁴ These concepts became the cornerstones of what became the Reform Movement: The idea that simpler weapons were more effective because they allowed the user to be faster and thus keep an opponent in a state of confusion and disorder.

These ideas were not really completely new. They bore a striking resemblance to Basil Liddell Hart's idea of "The Indirect Approach," first outlined in his 1929 work, *The Decisive Wars of History*. This was later refined and expanded as *The Strategy of Indirect Approach* in

⁵³³ Hammond, *Mind of War*, 121. The details of this incident are somewhat mysterious. Hammond does not provide further clarification, nor does he cite a source for this story.

⁵³⁴ Boyd, "Patterns of Conflict."

1941 before being republished in 1942 as *The Way to Win Wars*. Even the title bears similarity to Boyd's later title for his briefing: "A Discourse on Winning and Losing." Liddell Hart claimed that wars were always won by the side that achieves surprise by taking "the indirect approach." In Liddell Hart's own analysis, there are even cases in which a "direct" approach is so unexpected that it works like an "indirect" one by causing so much confusion and disorder—an assessment with which Boyd would likely have agreed. Boyd did cite several of Liddell Hart's works in his briefing, although the extent to which he relied on them is uncertain. In any case, although they used different terminology, the ideas they described were quite similar.

Boyd spend the remainder of the 1970s giving his briefing to whoever would agree to sit through its entire length. This included military officers from various services from captains to generals, congressional aides, members of Congress, and the majority of the Pentagon press corps. Richard "Dick" Cheney, then the Congressman for Wyoming, not only heard Boyd's briefing but began having regular private meetings with Boyd. The philosophy of the Fighter Mafia became a cornerstone of Cheney's thinking about defense issues. Three successive Marine Corps Commandants – General Robert H. Barrow, General Paul X. Kelley, and General Alfred Gray – each heard Boyd's briefing and had regular private sessions with Boyd. This influenced efforts to shift the Marine Corps' doctrine to maneuver warfare throughout the 1980s in what is sometimes referred to as "the second enlightenment of the Marine Corps." Gray later brought Boyd to the Marine Corps Infantry School as a guest lecturer. Freeman Dyson, a renowned physicist at the Institute for Advanced Study at Princeton who was known for his work on quantum electrodynamics, also attended the "Patterns of Conflict" briefing many times.⁵³⁵ William Lind, then a staffer for Democratic Senator from Colorado Gary Hart, was also in the

⁵³⁵ Burton, *Pentagon Wars*, 47-49.

audience for Boyd's briefing in this period. Lind drew a connection between Boyd's group and the Prussian military reformers of the early nineteenth century, and he first began referring to Boyd and his acolytes as "The Reformers" in the late 1970s.⁵³⁶

Many listeners were open to Boyd's ideas, and some were not. For example, Dr. John J. Martin, Assistant Secretary of the Air Force for Acquisition, worked with a group of nuclear physicists that advised on national defense issues—most of whom were quite critical of "Patterns of Conflict." Many high ranking Air Force personnel also found the ideas distasteful. Some, such as General John C. Toomay, Deputy Chief of Staff for Development Plans at Air Force Systems Command, admired Boyd's work but was unable to translate the broad ideas of the briefing into specific tasks.⁵³⁷

Boyd's acolytes and followers, however, needed to balance their image of Boyd as the preeminent sage with the fact that he received much criticism and even resistance from some of his audience. On the one hand, Boyd's followers described him as the smartest person in almost any room, a man whose intellectual prowess was capable of reducing his listeners to—as James Burton described—"quivering masses of jelly." Burton and Sprey told a story that an unnamed "famous Air Force officer" who later became chief of staff of the Air Force was so shocked by Boyd's intellect that he had a nervous breakdown while on the phone and was literally rendered unconscious. To explain how a person could possibly reject such intellectual authority, Boyd's followers explained those not swayed by his presentations as rejecting his ideas because they were too old, too entrenched, or even brainwashed, by the establishment in which they had spent long careers. As Burton describes, these older, usually higher-ranking officers, were "rigid and

⁵³⁶ Coram, *Boyd*, 330-331.

⁵³⁷ Burton, *Pentagon Wars*, 45-47.

unimaginative. . . . The younger officers, the ones not yet totally programmed by the system, were more able to grasp Boyd's ideas."⁵³⁸ This was perhaps a simplistic interpretation, and it was certainly not universal. Some older officers accepted the ideas, and not all younger ones accepted them. Yet his followers believed that Boyd was an intellectual superhuman whose mental faculties were so impressive they could cause mental trauma in others. They believed that anyone who would reject such a powerful mind must either be mentally inferior ("rigid and unimaginative") or be agents of the establishment—adherents of the system Boyd sought to destroy and replace. This was an exaggeration at best, but it was a necessary view to both preserve and promulgate the image of Boyd as a messiah figure for the emerging Reform Movement.

Giants vs. Midgets

While Boyd was pursuing the grand-scale sweep of military history from 5000 BCE to the then-present, focused on philosophy and overall strategy, others within the Air Force turned their eyes to the more specific issue of air-to-air fighter combat. The Vietnam War had been a traumatic event for the nation and, more specifically, for the Air Force as an institution on a number of levels. After the end of U.S. participation in combat in 1973, and then in the wake of the fall of Saigon in 1975, the U.S. military saw a need for reform—although there was much disagreement about how to do so. For the Air Force, air-to-air combat in Vietnam had been an area of disappointment, to say the least—American fighters did not perform nearly as well as they had in previous wars. This was for a multitude of reasons, but one of the larger reasons was technological: The performance of missiles. A series of tests was run in 1976-1977—known as

⁵³⁸ Burton, *Pentagon Wars*, 47-48.

the AIMVAL/ACEVAL tests. They were originally intended to solve issues with missile technology, but they were seized upon by the Fighter Mafia and its growing network of supporters as the movement morphed into the Reformers, who used the tests to bolster their arguments in favor of a dedicated lightweight fighter and against hardware that they deemed too “complex.” These tests became a sort of rallying cry for the Reform Movement throughout the 1980s, and they require some scrutiny.

In the last years of the Vietnam War, both the US Navy and the US Air Force addressed many of the perceived shortcomings of that conflict. Perhaps the best known was the attempt to update training systems. During the war, the Navy created the Fighter Weapons School, colloquially known as “Top Gun,” and its graduates achieved success in the dogfights of 1972. The first American Ace of the war was Lieutenant Randy “Duke” Cunningham, who, while not a graduate of the program, had trained with Top Gun instructors. The Air Force did not make drastic changes in its training procedure until after the war, when it instituted the Red Flag exercises and the Aggressor Squadron to simulate combat against Soviet aircraft.⁵³⁹ Both services also made efforts to upgrade their technology in response to the problems of Vietnam, including making changes to their aircraft. The Air Force consolidated their early warning radar system into a more unified, integrated air defense network called Project Teaball. This project

⁵³⁹ The literature on these changes is large. The best starting place for the Air Force side is Brian Laslie, *The Air Force Way of War: U.S. Tactics and Training After Vietnam* (Lexington: University of Kentucky Press, 2016); and Marshall Michel, “The Revolt of the Majors: How the Air Force Changed After Vietnam,” (PhD Diss., Auburn University, 2006). See also, Donald J. Mrozek, *The US Air Force After Vietnam: Postwar Challenges and Potential for Responses* (Maxwell Air Force Base: Air University Press, 1988); and C. R. Anderegg, *Sierra Hotel: Flying Air Force Fighters in the Decade After Vietnam* (Washington, D.C.: Air Force History and Museums Program, United States Air Force, 2001). Although a definitive scholarly monograph regarding Top Gun does not yet exist, a useful collection of mostly oral histories is Robert K. Wilcox, *Scream of Eagles: The Creation of Top Gun and the U.S. Air Victory in Vietnam* (New York: J. Wiley, 1990).

was only active for just about three months in the latter part of 1972, but, when the system was active, American pilots experienced much greater success in air combat.⁵⁴⁰ Both services also addressed the air-to-air combat issues through changes to their aircraft hardware. The Navy began pursuing the VFAX, eventually resulting in the F-14 Tomcat, designed to be more effective in the air combat role. Although the origins of the Air Force's F-X program can be traced to before the Vietnam War itself, the perceived problems with air combat in Vietnam spurred that program forward and influenced the decisions that resulted in the F-15 and F-16 fighters.

These changes occurred in almost every aspect of the main services—including doctrine, training, and technology. However, the services focused especially on air-to-air missiles. The performance of the missiles in Vietnam had been far below what had been projected. During Operation Rolling Thunder, the US relied on two principal missiles – the AIM-7 Sparrow and the AIM-9 Sidewinder. The Sparrow was a radar-based missile, designed to lock onto a target with radar from a long distance. It was notoriously unreliable, however, with fewer than one in ten firings producing a hit. Of the Sparrows fired in this period, 29 percent missed their target while an alarming 63 percent failed to launch correctly. After August 1967, the missile's failure rate grew to 80 percent. As historian Marshall Michel has noted, the missile “proved to be a complete failure.⁵³⁷” Even if the Sparrow had performed at its best, it was simply not an effective system for close range turning engagements where split-second timing could mean the difference

⁵⁴⁰ Michael Hankins, “The Teaball Solution: The Evolution of Air Combat Technology in Vietnam, 1968-1972,” *Air Power History* 63 (Fall 2016). For more on technological changes more generally throughout the Vietnam War, see Steven Fino, “Breaking the Trance: The Perils of Technological Exuberance in the U.S. Air Force Entering Vietnam,” *Journal of Military History* 77 (Spring 2013); and Michel, Marshall L. *Clashes: Air Combat Over North Vietnam, 1965-1972* (Annapolis: Naval Institute Press, 2007).

between victory or defeat. Using a complicated set of switches and requiring back-and-forth communication between the pilot and the WSO, the missile took 5.2 seconds to complete its launch sequence, including a 1.4 second trigger-squeeze. Yet the average time a pilot had to fire during a dogfight was 2.2 seconds. Most dogfights simply did not allow enough time for the missile to be used as designed. Nor could the missile's narrow radar beam hold a lock against a maneuvering target such as a fast-turning MiG fighter. These weapons systems suffered from the same design assumptions that plagued the F-4 Phantom itself – that dogfighting was irrelevant, and interception was key. As Navy pilot Frank Ault recalled, “It was a damn good system. . . the best of its time – but it had been designed for fighting relatively non-maneuvering bombers.”⁵⁴¹

The heat-seeking AIM-9 Sidewinder, while generally more reliable than the Sparrow, also had problems. It could be fired quickly, in less than one second, and it was designed for closer ranges. However, the Sidewinder was unable to match the turning radius of most enemy planes, and it was often simple to defeat with a hard turn. The missile's guidance system also habitually locked on to other heat signatures such as those found in clouds, the sun, or the ground, instead of the intended target of the enemy engine. The homing system also confused many of the under-trained US pilots. When the missile sensed a heat source, it produced a growling sound in the pilot's headset. This did not indicate a solid lock on a target, as many pilots assumed, but merely meant that the missile sensed some kind of heat source somewhere. This led to many firings outside of the missile's intended parameters, where it had no chance of homing in on an enemy plane. This type of mistaken launch occurred on 28 percent of all

⁵⁴¹ Wilcox, *Scream of Eagles*, 106.

Sidewinder firings. Overall, the missile's performance was slightly better than the Sparrow, with a 15 percent hit rate, yet 56 percent of the missiles experienced technical failure.⁵⁴²

During Rolling Thunder, USAF attempted to address part of this problem by developing a new dogfighting missile – the AIM-4D Falcon, also a heat-seeker. However, the missile was plagued with flaws. As Robin Olds observed:

Whoever thought up that gadget didn't know a damned thing about air-to-air fighting, and didn't ask anyone who ever had. The Falcon required a complex set of steps to cool the seeker before the missile could be fired, sometimes taking up to a minute. Once cooled it was good for a limited period of time and couldn't be cooled again. This was intolerable in dogfights. Who in hell thought we had the luxury of checking our watches? . . . Assuming it locked on, launched, and guided, it had to hit the target with its little 3-pound warhead in order to do its job. What a classic fuck-up.⁵⁴³

Introduced late in the campaign, only 54 Falcons were fired during Rolling Thunder, producing only five hits. Like the Sidewinder, many of these firings were done outside the missile's proper envelope.

Both the Navy and the Air Force sought to remedy all these issues by updating their missiles. The services jointly developed a new version of the medium-range, radar guided Sparrow, the AIM-7F, with solid state electronics. The Navy worked on a long-range radar guided air-to-air missile, the AIM-54 Phoenix. Of most interest for air combat pilots was the short-range, heat seeking Sidewinder. Both services started developing replacements for these, the Air Force worked on the CLAW missile, intended as a “low cost, light weight, simple and effective” replacement for the Sidewinder, while the Navy developed the AIM-95 Agile missile.

⁵⁴² Michel, *Clashes*, 153-5.

⁵⁴³ Olds, *Fighter Pilot*, 304-6.

Until these could be designed and tested, both services sought an upgrade to the existing Sidewinder, the AIM-9L.⁵⁴⁴

The multitude of similar missile options coming from both services was frustrating for the US Congress, who sought to reduce defense costs. The 1975 Congress, through the Director of Defense Research and Engineering (DDR&E), pressured the services to agree to a short-range air-to-air missile. This directive also asked the services to study the effect of aircraft numbers on air-to-air combat, as a guide in planning a future force structure. This second part of the directive asked a complicated question. Most voices within the services agreed that the new F-15s, F-14s and F-16s were more capable fighters than older aircraft, and EMT served as a useful way to measure and visualize that superiority when comparing planes one-on-one. But the effect of numbers had not yet been fully addressed. What congress was essentially asking was, how many of the older type of fighter planes (such as the F-5, for example), would it take to defeat an F-15? The result was a series of joint tests with the Air Force and Navy conducted at Nellis Air Force Base in 1976 and 1977. The first part of the test—the Air-Intercept Missile evaluation (AIMVAL)—was the evaluation of air-intercept-missiles (potential Sidewinder replacements), and the second part was the Air Combat Evaluation (ACEVAL)—testing the latest generation of aircraft against higher numbers of older planes.⁵⁴⁵

The stakes of these tests were high, since they would likely determine or at least strongly influence decisions on budgets, force structure, and procurement into the 1990s. Foreign sales of fighters, especially of the F-15, also hung in the balance. To ensure the objectivity of the tests,

⁵⁴⁴ Steven Fino, “Doubling Down: AIMVAL-ACEVAL and US Air Force Investment in TacAir post-Vietnam,” *Vulcan 2* (2014), 129-130.

⁵⁴⁵ Fino, “Doubling Down,” 131-132; Anderegg, *Sierra Hotel*, 158-159.

each aircraft was equipped with an Air Combat Maneuvering Instrumentation pod (ACMI) that could track and record the position and attitude of up to eight aircraft at a time and relay that information to ground stations. This allowed analysis of the tests to be based more on hard data rather than solely on the potentially mistaken recollections of individual pilots after the fact. However, the ACMI system included one very serious drawback. To collect the data, the pods had to be flown over a range with regularly spaced ground receivers. Only one such range existed at the time, near Nellis, but the range was small by air-engagement standards. To use this range, the tests had to be conducted in a cylinder thirty miles in diameter and at an altitude no higher than 3,000 feet. Although these limitations were not likely to hamper the missile portion of the evaluation, the ACEVAL section would face serious limitations. Pilots in simulated combat were limited to maneuvering in this 30-mile diameter. To enforce this, the test designers established a rule that pilots could not attack at beyond visual range. They would have to see the enemy with their own eyes before opening simulated fire on them. Although this limitation had been present during the Vietnam War and could thus be defended as true to life at least in some circumstances, the rule eliminated the largest advantage of both the F-15 and F-14 – their advanced radars.⁵⁴⁶

The F-15's radar was designed to detect enemy aircraft at long range, up to 100 miles, and the its inclusion had been a contentious point for the Fighter Mafia and lightweight fighter advocates, yet keeping the large, heavy radar had been—for some—the *raison d'être* behind the overall design philosophy of the Eagle. The visual identification rule eliminated the F-15's chief advantage. To attempt to make up for this loss in detection range, the Air Force purchased six-power commercial-grade rifle-scopes and mounted them to the side of the aircraft's head's-up

⁵⁴⁶ Fino, "Doubling Down," 132-135.

displays, nicknaming them “Eagle Eye.”⁵⁴⁷ However, off-the-shelf hunting equipment did not come close to making up for state-of-the art long-range radar.

Other limitations included a minimum altitude. Although the 3,000 foot ceiling on the ACMI range already forced the aircraft into generally low altitudes, pilots could not operate close to the ground for safety reasons. Test planes also did not fly with their standard combat configuration, were armed with their maximum missile load (which did not simulate some of the missile shortage issues seen in Vietnam), and, because this was a simulation, actual missiles were not fired. This caused many pilots to complain that the lack of a visible missile and its smoke trail limited their ability to take evasive actions. Some pilots also complained about the statistical limitations or how success would be measured. Arguments took place about whether the test rewarded survival and encouraged pilots to flee rather than encourage aggressiveness. Similarly, pilots were unsure if they should maximize the probability of a single kill by firing as much as they could as quickly as possible, or if they should attempt to conserve their ammo and emphasize precision in order to potentially achieve a higher hit percentage.⁵⁴⁸

The AIMVAL portion of the tests began on January 3, 1977. Against the “Blue Air” team of Air Force F-15 Eagles and the Navy’s F-14 Tomcats, a group of “Aggressor” pilots flew as the “Red Air” team, using F-5s. Various missile designs were tested in a variety of scenarios, but the most successful by far was the Sidewinder AIM-9L, nicknamed “Lima.” Its chief advantage was that its more sensitive heat-seeking device allowed it to be fired from any angle, and it could even calculate how to lead a target on its own. Previous versions of the AIM-9 had required a pilot to maneuver directly behind an enemy, but the Lima could be fired from any position,

⁵⁴⁷ Fino, “Doubling Down,” 135.

⁵⁴⁸ Fino, “Doubling Down,” 136-137.

meaning that difficult maneuvering and the tight turns of dogfights were not necessarily required. Noting that the Lima could be fired when approaching an enemy straight on, head-to-head, many pilots likened it to shooting an enemy in the “mouth” and began referring to the weapon as the “Lip-Winder.”⁵⁴⁹

The previous generation of missiles had not lived up to their promise. Although many engineers, planners, and some pilots had predicted as early as the 1950s that the age of gunslinging dogfights was over now that the world had entered the missile age, the Vietnam War proved otherwise. Members of the Fighter Mafia had emphasized that guns, not missiles, should be the fighter pilot’s weapon of choice, as it had been in the days of the “white scarf stuff” in the First World War. However, in light of the new AIM-9L, predictions about the end of dogfighting returned, seemingly with more weight. This was not necessarily the case, although the nature of these fights did change. Dogfighting still occurred, but at much greater ranges than before. F-15 pilot C. R. Anderegg recalled, when the “Lima” entered service: “Some proclaimed that the days of basic fighter maneuvers were over. There was no reason to do quarter-planes, high and low yoyos, and barrel rolls to the other guy’s six o’ clock, they said. All one had to do was point and shoot. What they discovered was that BFM [Basic Fighter Maneuvering] was not dead; the maneuvers just got bigger and started further away.”⁵⁵⁰

The AIMVAL portion of the test might have challenged some of the Fighter Mafia’s stances on maneuvering and the use of guns, but it also seemed to reinforce one of their core beliefs – namely, that a relatively simple aircraft (the F-5) using a relatively simple weapon (the AIM-9L) posed a lethal threat to the more advanced, complex, and expensive aircraft like the F-

⁵⁴⁹ Anderegg, *Sierra Hotel*, 158-159.

⁵⁵⁰ Anderegg, *Sierra Hotel*, 159.

15. Perhaps the most dramatic example of this was a test scenario that earned the nickname “The Towering Inferno” (after the 1974 film of the same name). In that engagement, four F-15s using AIM-7 Sparrows flew against four F-5s using the AIM-9L “Lima.” By the end of the encounter, six of the aircraft were downed, leaving one F-15 Eagle closing in from behind the last remaining F-5. The Eagle launched its Sparrow missile just as the last F-5 turned around and fired its Lima Sidewinder. The computer tracked the F-5 as “killed” by the Sparrow, but the Lima was already launched, and the final F-15 was killed by a shot from beyond the simulated grave.⁵⁵¹

If that incident gave ammunition to the Fighter Mafia’s argument that smaller, “simpler” fighters could represent a lethal threat to the more advanced F-15s, then the ACEVAL tests seemed to do the same to a much larger degree. These combat simulations, which ran from June 2 to November 10, 1977, consisted of 720 individual encounters of varying sizes, from one-on-one matchups to four-on-four, as well as mismatched combinations, although in none of the tests did the “blue” team of F-15s or F-14s have numerical superiority against the “red” F-5s. In total, the test involved 3,222 sorties. A variety of other options were tested as well, including letting either side or both sides have access to ground-controlled radar to give early warning of opponents’ movement, and starting positions varied across 27 options. However, all the conditions were within the thirty-mile size limitation of the test range. The end result of all the tests was surprising. In smaller scale engagements, involving one or two planes on each side, the advanced F-15s and F-14s dominated the older F-5s. In larger scale battles, the F-15s and -14s endured a much higher loss rate. One of the data analysts during the test, Stephen Dvorchak,

⁵⁵¹ Anderegg, *Sierra Hotel*, 159; Fino, “Doubling Down,” 139.

summarized the findings: “As the number of fighters in an engagement increases, the exchange ratio trends toward One.”⁵⁵²

These findings seemed to contradict the expectation that the more advanced fighters would dominate the “simpler” and allegedly less-capable competition. These results have been interpreted and explained in a number of ways. For example, historian and former fighter pilot Steven Fino has argued that, when the total number of aircraft is lower, advanced technology does translate into increased situational awareness. But a high number of planes in the sky becomes too much for any one pilot to keep in a coherent “mental picture,” so the technological advantage is canceled out.⁵⁵³ Another former fighter-pilot-turned-historian, C. R. Anderegg argues that the win-loss ratio depends much more on the conditions of each specific scenario. Access to ground radar and radar warning equipment could often be the determinant of loss or victory. Sometimes this gear was part of the test. At other times, F-5 pilots bought commercial grade radar detectors meant for cars and used them in their cockpits to learn when F-15 radars were locked on them. But Anderegg also insisted that for the F-15 pilots discipline was the key. If the Eagles maintained strict discipline in sorting and claiming targets and in maintaining unique radar locks, they could achieve victory reliably.⁵⁵⁴

Others, including some of the pilots, rejected the tests completely as unrealistic, arguing that the parameters of the tests and, even more, the intense sense of competition and the complicated “cat and mouse” tactics engendered between the aggressive fighter pilots during the test, led to data that were not representative of actual warfare conditions. One anonymous pilot

⁵⁵² Quoted in Fino, “Doubling Down,” 140.

⁵⁵³ Fino, “Doubling Down,” 140-141.

⁵⁵⁴ Anderegg, *Sierra Hotel*, 160-161.

went so far as to make a satirical presentation-slide mocking the tests and then slipped it onto the desk of General Robert Dixon, commander of TAC. The slide read:

ACEVAL-AIMVAL

A shootout in an isolated tennis court between giants armed with rifles, pistols, and knives and midgets armed with only pistols and knives.

Chief rule: Have to identify color of eyes before shooting.

(The midget and his pistol represent a future threat)

ACEVAL

A test to see how the outcome is affected by the number of giants and midgets in the tennis court.

Number of players: one to four, but never outnumbered more than two to one.

AIMVAL

A test to see which pistol is best for the giants

Types of pistols: Austere little, little, medium, big, elaborate big.

(Midgets are never outnumbered, giants outnumbered two to one in 50% of trials)

Shootout Results

More or less as expected; Mutually devastating.⁵⁵⁵

Many parties involved criticized the design of the test, doubting that it could produce any useful results. Some Senate staffers rejected the tests as unhelpful due to the unique, unrealistic conditions, while the Air Force Studies and Analysis branch issued a statement urged that the results of the test not be taken too strictly to argue for any particular points. The test's director, Naval aviator Rear Admiral Ernest Tissot, warned that the tests "should not be treated in terms of specific system absolutes." The Air Force's Deputy Chief of Staff for Research and Development provided possibly the most useful and accurate summation of the tests, reporting to Congress that having "theoretically taken a big skyhook and dropped these airplanes into a 30-mile arena," the tests had been "a canned situation."⁵⁵⁶

Anderegg offered one other potential explanation of the surprising performance of the AIMVAL-ACEVAL tests—fighter pilot culture. He noted that up, until this point, dogfighting

⁵⁵⁵ Quoted in Fino, "Doubling Down," 141-142.

⁵⁵⁶ Fino, "Doubling Down," 136-137.

had been all about maneuvering to get behind one's opponent after "the merge" – the point at which two fighters approaching head-to-head pass each other. The result was a close-in fight that required high maneuverability above all other factors—the "white scarf stuff" was still valuable. But the advent of the next generation of missiles in the mid-1970s, especially the AIM-9L, allowed pilots to fire from anywhere, even before the merge. Pilots took some time to adjust to the idea of long range attacks with missiles to achieve a kill before close-range maneuvering commenced. Anderegg recalled:

In the early 70s, if an F-4 pilot briefed his adversary that a Sparrow shot from ten miles would be counted as a kill, he would be laughed out of the briefing room with hoots of "Get a grip," or "You need a tally on reality." . . . As the reliability of the missiles improved, the culture of long-range missiles slowly spread throughout the fighter force. . . [After AIMVAL-ACEVAL] the fight did not start at 1,000 feet range as in the days of "40-second Boyd." The struggle was starting while the adversaries were thirty miles apart, and the F-15 pilots were seriously intent on killing every adversary pre-merge.⁵⁵⁷

Implied here was the idea that at the time of the ACEVAL tests, F-15 pilots had not yet developed the tactics that took advantage of their hardware and made them more devastating to the more austere planes they flew against.

In any case, although both the Air Force and Navy learned much from the AIMVAL-ACEVAL tests, the insistence on visual identification and the limitation to under 30 miles robbed the F-15 of its chief advantage. This limited how applicable those tests would have been to an actual war environment. Some could argue that future conflicts might be similar to Vietnam in the need for visual identification before attacking, while a case could equally be made that such limitations would not exist in a hypothetical "next war," making the F-15 worth the investment. These issues were not put to the test of live combat until 1991, but throughout the 1980s, the emerging Reform Movement ignored the warnings of the test officials that the results

⁵⁵⁷ Anderegg, *Sierra Hotel*, 163.

should not be interpreted too strictly or used as ammunition for arguments. Instead the Reformers seized on the AIMVAL-ACEVAL tests as “proof” for their position that small, cheap, “simple,” lightweight fighters (and simple, cheap technology in general) was superior to more advanced, high-technology options when higher numbers were involved.

As the tests were not conducted in public and the official report of the tests was kept classified, it took some years before this argument became one of the official talking points of the movement. In the remaining years of the 1970s, however, other former members of the Fighter Mafia began to take the nascent movement public.

Mutually Exclusive

Boyd’s brief “Patterns of Conflict” was heard widely throughout the Pentagon and elsewhere in the late 1970s, but that work was somewhat esoteric compared with the work of other Fighter Mafia members and allies who sought to get more specific with their goals. Outside of Boyd’s own work, one of the earliest influential papers to push the still nascent reform agenda came from Franklin Spinney in 1978, a briefing entitled “Defense Facts of Life.” Allegedly, this briefing was drafted at the behest of Tom Christie, who asked Spinney to look into perceived problems in retention of personnel and in readiness for future combat. Coram alleges that large numbers of people were leaving the military because they were disgusted by careerism and a general sense of a lack of integrity in leadership.⁵⁵⁸ Spinney did address this by running a survey demonstrating that most pilots in the 1970s that left the service did so because of a perceived lack of “professionalism,” which Spinney admits is a vague term. However the other common issue causing low pilot retention was that most pilots did not think that they were allowed to fly

⁵⁵⁸ Coram, *Boyd*, 345.

enough, and they simply wanted to be flying more often. In any case, Spinney's paper seems much more focused on issues of readiness and planning than on personnel problems.

Spinney first began giving the "Defense Facts of Life" talk in 1978, and he collaborated with Boyd and Sprey before finalizing its arguments, evidence, and language. His overall point was that "technically complex" weapons systems, specifically tactical aircraft, were eating far too many budget dollars and not delivering actual combat readiness. Spinney outlined the Reformers' belief that the United States was in crisis. As he stated in his introduction, "our nation faces a long-term defense problem of fundamental importance." The problem, according to Spinney, was "the tendency for high investment weapons systems to take an unacceptable toll on the state of readiness." Spinney pointed to "complexity" as the root cause of almost all the military's problems.

Complexity was not only the main issue of the briefing; it became the key word for the entire Reform movement. So Spinney took some care in defining the term. "Complexity," he said, "is a quality of the whole that relates the number, arrangement, and coordination of the parts to one's ability to comprehend the whole." Put another way, "increasing complexity runs up the number, increases the variety of arrangements, and complicates the coordination of the parts—and, thereby, decreases one's ability to comprehend the whole." Spinney argued that complexity directly caused rigidity, and he saw the two as nearly synonymous. Thus his entire analysis rested on the concept of a spectrum with "complexity" at one end and "flexibility" on the other. As he saw it, "increasing complexity increases our rigidity in a game where survival of the fittest makes flexibility a paramount virtue."⁵⁵⁹

⁵⁵⁹ Franklin Spinney, "Defense Facts of Life," December 5, 1980, Office of Secretary of Defense, 8. Available online: [<http://pogoarchives.org/labyrinth/defense-facts-of-life-1980.pdf>], accessed 27 November 2016.

This point is key to understanding the entire Reform Movement agenda, as they assumed complexity was the opposite of flexibility. This however, is not necessarily the case. As they argued, for example, the F-15's long-range radar was suitably complex, yet when used as intended, it greatly increased the flexibility available to the pilot, allowing him to know enemy locations early, and take action before enemies could do the same, and thus have initiative on the battlefield, allowing pilots to engage in the time and place of their choosing. The "complex" AIM-9L also increased flexibility, allowing pilots to fire the missile from any direction without having to first pass the merge and then maneuver behind an enemy aircraft. Words like "complexity" and "flexibility" are broad terms that can be interpreted in a number of ways. Spinney's definitions in "Defense Facts of Life" were the expression of Fighter Mafia ideals, and that definition also set the agenda for the future of reform movement, and how they would see complexity.

A large part of his argument against complex weapons as he defined them focused on their tendency to increase costs. He argued that although complex weapons cost more in the procurement stage, they also have a cascading effect, causing increased costs for operation, support, and maintenance. He also argued that because complex weapons take much longer to develop, not only are the development costs higher, but the development timeline is stretched. For Spinney, this was problematic because with more complex weapons, the impact of financial and technological decisions was not felt for many years, which not only decreases the predictability of future capabilities but also requires the military to maintain certain spending patterns, even if future economic conditions change. What this all meant, in Spinney's analysis, was again a massive decrease in flexibility. If the military was locked into having to pay certain costs for many years due to the decision to develop a certain highly complex weapon, the

military was thus less flexible. He emphasized in his presentation: “Increasing complexity magnified the *real cost* of adapting to unanticipated changes in income.”⁵⁶⁰

Just as Spinney conceived of a spectrum in which complexity and flexibility were opposites, he also seems to have conceived of a similar spectrum involving people and technology. In one sense, he did argue that men and machines must work together harmoniously to be effective in combat, arguing that “a superior military force is a synthesis of man and machines.” He said: “We want to develop and field technology that blends harmoniously with the patterns of human behavior under conditions of war.”⁵⁶¹ Yet Spinney also painted a picture in which complexity in technology was directly opposed to a human’s ability to use that technology effectively. He argued that, as weapons became more complex, they diminished the human contribution that he thought was key to combat effectiveness. When ranking the elements that he thought made a “superior military force,” Spinney ranked people as the most important factor, followed by ideas, motivation and psychology, and skills. Machines were placed last on the list, with a presentation slide declaring in bold text: “Machines don’t fight wars—people do!”⁵⁶² Although he argued for a synthesis of men and machines, clearly Spinney’s conception included two spectra—complexity was opposed to flexibility just as technological complexity was also opposed to people themselves.

These ideas need not necessarily be opposed. One area that “Defense Facts of Life” seems to avoid is the way in which technology can be both complex in its design and simple in terms of user experience. Fly-by-wire technology is perhaps the best example. From a design

⁵⁶⁰ Spinney, “Defense Facts of Life,” 14. Emphasis in original.

⁵⁶¹ Spinney, “Defense Facts of Life,” 6.

⁵⁶² Spinney, “Defense Facts of Life,” 6.

standpoint, according to Spinney's definition, fly-by-wire systems are very complex. Many inputs from several sensors are processed by computer and translated into a combination of outputs for flight control surfaces. Designing such systems requires an interdisciplinary approach. Yet from the user perspective, the operation is quite simple: Moving the control stick moves the plane where the pilot desires. Of course, the Fighter Mafia were not opposed to fly-by-wire technology, since it enhanced their overall goals of increasing an aircraft's maneuverability. Yet this example demonstrates that Spinney's interpretation of what constitutes "complexity" was at least debatable. His views did not necessarily show the only approach to issues of military hardware but simply one of them—one that some of his audience shared and others did not.

However, Spinney worked to defend himself against the common criticisms lodged against his presentation. He was adamant that his stance on complexity did not make him anti-technology or even against large military budgets. He supported the use of technology when it supported or enhanced his own goals. Again, fly-by-wire technology, for example, could meet this criterion, although he does not mention it specifically. The issue was not whether to use high technology but how to keep that technology "simple" according to his definition. As he stated, he was concerned with "*how we should use our superior technology. Advanced technology and high complexity are not synonymous.*"⁵⁶³

Regarding budgetary issues, he defended himself by insisting that he was not against large budgets. Rather, he said, the problems of the Department of Defense overall were so ingrained that the process for determining how money was spent was eroding combat capability. Just as he was not against technology itself but only against how it was then being used, he was

⁵⁶³ Spinney, "Defense Facts of Life," 3. Emphasis in original.

not against a large military budget but only against how money was then being spent. He said: “We need more money to strengthen our military; however, we believe that unless we change the way we do business, more money could actually make our problems worse.”⁵⁶⁴ This pointed to the way the Fighter Mafia, which had now evolved to the larger group of the Reformers, saw themselves as a small, rebellious faction within a large, corrupt system. Spinney’s apologetics reveal that the root problem, as they perceived it, was the system itself—from Congress to the entire Defense Department to the individual services—the mode of thinking and operating throughout the entire establishment was flawed. As Boyd might have seen it, the established system needed to be destroyed and recreated.

In the opening of his briefing, Spinney had attempted to hedge his arguments. But by the end, he had pushed his ideas to extremes, and made statements that some likely considered inflammatory at best. Spinney compared the United States military establishment with the French military in 1940, and he likened the U.S. military’s approach to warfighting to that of Adolf Hitler himself. Spinney argued that the US held to a Maginot Line mentality similar to the French on the eve of defeat. Although the French had high-technology solutions in armor and aircraft, their doctrine and force structure were inappropriate for the type of warfare the Nazis waged against them in May 1940. Spinney warned that the United States was in exactly the same position of relying too much on technology without an appropriate doctrine. Later he argued that a large factor in the eventual Nazi defeat in that war was Hitler’s misplaced faith in technological solutions. Spinney argued that the United States was committing the same mistake as Hitler, warning that “we have evolved a self-reinforcing... faith in the military usefulness of ever

⁵⁶⁴ Spinney, “Defense Facts of Life,” 3.

increasing technological complexity.”⁵⁶⁵ Spinney even referred to this approach as the “New Religion” within the United States military, furthering the image the Reformers had of themselves as an oppressed minority who held to the truth within a larger, corrupt religious order. Coram indicates that Spinney certainly saw his role in apocalyptic terms, noting that “[f]or him [Spinney], this was an Armageddon-like conflict in which the forces of good stood against the forces of evil.”⁵⁶⁶

Although Spinney attempted to provide disclaimers for his work early in the briefing, the ultimate conclusion was in no way restrained. The last words of his presentation were: “Our strategy of pursuing ever increasing technical complexity and sophistication has made high technology solutions and combat readiness *mutually exclusive*.”⁵⁶⁷ His conception of a spectrum with complex technology at one end and battlefield effectiveness on the other end was clear—these were, in his mind, competing ideas that were opposites of each other.

“Defense Facts of Life” is important primarily because it set the agenda for the Reform Movement. Although Boyd was seen as the leader, inspiration, and central figure, his own major work, “Patterns of Conflict,” was more general and more philosophical. It provided the underlying outlook and many key beliefs of the Reform Movement, but Spinney gave it specificity. Spinney defined the terms for arguments that lasted for the next decade, outlining exactly what “simple” and “complex” meant to the Reformers. He also outlined the apologetics they would use—being able to claim that they valued men over machines, yet that they were not opposed to technology but only to how some technologies were being used. To extend their own

⁵⁶⁵ Spinney, “Defense Facts of Life,” 128. For his comments comparing the US to the French, see 3, 117.

⁵⁶⁶ Coram, *Boyd*, 348.

⁵⁶⁷ Spinney, “Defense Facts of Life,” 133.

religious analogy, in which the US government and military establishment was an old, corrupt religious order, if Boyd was the Jesus of the cult of the Reformers, Spinney was its Paul.

Buzzwords

These two briefings formed the core documents of the Reformers' agenda, although others began adding more. Pierre Sprey made his own entry into the Reformers' growing canon in 1979 with his briefing "The Case for More Effective, Less Expensive Weapons Systems." Like the other briefings, this one was continually updated and refined over the course of several years.⁵⁶⁸ Sprey's main goal in his paper was to argue against what he presented as the typical view that "quality" weapons were inherently more expensive and that cheaper alternatives were ineffective. Sprey thought that the conventional wisdom of the common phrase "you get what you pay for" was wrong. To that end, Sprey conducted a brief historical analysis matching up a variety of weapons systems, dividing them into "Cheap Winners" and "Expensive Losers." For example, he compared the Armalite AR-15 rifle against the more expensive counterpart it replaced in the Vietnam War, the M-14 rifle, arguing that the AR-15, at approximately one-fourth the cost, was more effective in Vietnam.⁵⁶⁹

He made similar comparisons with ten other combat systems, chosen somewhat arbitrarily. This included comparing the AIM-9D Sidewinder with the AIM-7 Sparrow, arguing that the Sparrow had only one-third the hit rate of the Sidewinder in Vietnam. He also compared the P-51 Mustang to the P-38 Lightning, both World War II-era fighters, arguing that the P-51

⁵⁶⁸ John T. Correll, "The Reformers," *Air Force Magazine* (Feb. 2008), 40-44.

⁵⁶⁹ Pierre Sprey, "The Case for More Effective, Less Expensive Weapons Systems," a June 1982 version of this talk was given at United States Military Academy Senior Conference XX: "The Military Reform Debate: Directions for the Defense Establishment for the Remainder of the Century, available online: [<http://pogoarchives.org/labyrinth/11/12.pdf>], accessed 27 November 2016, 184-185.

was cheaper and more effective. In emphasizing the Reformers' view that men are more important than machines, Sprey argued that air-defense guns using radar-assisted targeting would be inherently ineffective against maneuvering aircraft. He argued that "well-trained or experienced gunners" using only their eyes through optical sights could outperform the radar-assisted systems.⁵⁷⁰ This insistence that an individual's eyesight can be more reliable than technologically assisted targeting systems speaks to the values of the Fighter Mafia—that individual people are key. This emphasis on eyesight had been a key factor in designing the F-16 cockpit.

These examples have some merit, but they can be misleading, since Sprey's analysis discounts much of the context. For example, the AIM-7 Sparrow was designed as a long-range radar-guided missile, yet the rules of engagement over Vietnam required visual identification of all enemy aircraft before firing—thus, the Sparrow was rarely, if ever, fired in the conditions for which it was designed. It can be argued that this does not make the weapon ineffective, but merely shows it to be specialized for a particular purpose. Similar arguments can be made about the contexts conditioning his other examples.

In addition, Sprey's analysis reveals the extent of his dualistic thinking. He presents each of these technologies as either/or propositions in a zero-sum game. In reality, decision-makers are often presented with far more than two specific choices on issues, and often they need not make choices in such absolute terms. P-38s and P-51s can both exist and perform well in different roles and tasks. Sidewinders and Sparrows can be specialized for different circumstances, designed to excel in specialized roles, and both be a part of a larger combination of weapons systems available to pilots. Yet Sprey reduced his argument to absolute choices

⁵⁷⁰ Sprey, "More Effective," 185-189.

between only two alternatives. In each example, he argued that one choice was effective and the other ineffective. One was simple, the other complex. One was cheap, one was expensive. One was right, at least according to Sprey, and one was wrong. As he put it: One was a winner, and one was a loser.

This winner/loser dynamic offered in “The Case for More Effective, Less Expensive Weapons Systems” is important not only because it pushed the Reform movement from somewhat more nuanced arguments into more simplistic, dualistic thinking. It also created a set of buzzwords that could be easily repeated and understood in public venues. After this point, those terms began appearing with increasing frequency in interviews and publications of the Reform Movement.

Sprey also created a list of specific hardware programs on which he thought the Reformers should focus. Sprey identified eleven categories of military capabilities, and for each one, he offered a choice between two options – one was a “cheap,” “simple” option that he considered the “winner,” and the other was a “complex,” “expensive,” “loser” option favored by the military establishment. He did not explain each choice in detail, focusing most of his analysis on two categories: For armor, Sprey found the M60A1 “Patton” superior to the newer, expensive M-1 Abrams battle tank, primarily because the older tank had more “mobility” in terms of a longer range (despite the M-1s increased speed due to its more powerful engine). In terms of offensive power, Sprey focused on rate of fire, rather than other factors, and dismissed the superior Chobham armor of the M-1, arguing that since the armor was not present on the rear of the M-1, it was just as vulnerable to the M60A1.⁵⁷¹

⁵⁷¹ Sprey, “More Effective,” 192-200.

Most of his analysis centered on the subject that spawned the movement to begin with: air-to-air combat. Unsurprisingly, Sprey argued that the F-16 was superior to the F-15 Eagle. He evaluated each according to what he considered “the four principal effectiveness characteristics that contribute to victory in air-to-air combat.” These included surprise, outnumbering the enemy, agility and maneuverability, and lethality of weapons. The criteria themselves point to the values of the Fighter Mafia and their particular interpretation of what air-to-air fighter combat should look like – namely, the “white scarf stuff” of close-maneuvering dogfights. Sprey argued that the F-16 could achieve surprise simply because it was smaller. Because the F-16 was cheaper, more of them could be produced to outnumber opponents (although this assumes that opponents did not also mass produce lightweight fighters). Sprey argued that the F-16 was more maneuverable and agile than the F-15; and, as to lethality, since the aircraft had virtually the same armament, the more agile F-16 was superior.⁵⁷²

These criteria ignore other potential factors, such as ground radar, air defense networks, and long-range weapons. Like the AIMVAL-ACEVAL tests, they ignore the capabilities of the F-15s long-range built-in radar and the ideal firing envelope of long-range, radar-guided missiles. Sprey assumed that, in an air-to-air fight, all parties will shut their radars off to avoid detection, and he also assumes that missiles will perform exactly as they did under the limitations of the rules of engagement in the Vietnam War, from which he obtained his data. If air-to-air combat conformed to the Fighter Mafia’s vision of close-range gentlemanly duels in the sky with clear weather conditions, then his analysis would likely be correct.

These objections do not completely dismiss Sprey. Certainly within particular parameters, in many specific scenarios, the F-16 is a very effective aircraft—perhaps more

⁵⁷² Sprey, “More Effective,” 188-192.

effective than the F-15 under certain conditions. Rather, Sprey's argument emphasized the ways in which the Fighter Mafia and the emerging Reform Movement interpreted military engagements and military history to conform to their preexisting views. They valued men over machines, saw technological complexity as a threat, and were legitimately worried about spiraling budgets. They valued speed and maneuverability above almost all other concerns, and they were convinced that greater numbers could overcome greater quality—although Sprey argued that there was no difference between “quantity” and “quality” and that his cheaper, simpler options were thus both quantitatively and qualitatively superior. Most importantly, Sprey's briefing conveys the idea that every choice is between two discrete options, and that one of those options is a “winner,” the other a “loser.” One is right, one is wrong. And to Sprey, the “complex” option is the wrong option. As he summarized his report, “[w]eapons that were remarkably effective in their day have almost always been relatively simple.”⁵⁷³

This paper also helped define the agenda for the Reform Movement, mostly by defining specific programs that mafia members should oppose and push to eliminate. The F-15 and the M-1 Abrams Battle Tank were the most often referenced examples of “complex” weapons that were ineffective. The growing Reform Movement presented these programs as symbols of everything they thought was wrong with the procurement process in the DoD, and they argued for the cancellation of those programs. Some other examples that became prominent later in the movement's efforts, such as the Bradley Fighting Vehicle and the AH-64 Apache Helicopter, were not yet mentioned. Although many Fighter Mafia members had input into Boyd's “Patterns of Conflict” briefing and although Boyd and Sprey had both helped Spinney to refine “Defense Facts of Life,” there is little indication, if any, that anyone but Sprey contributed to “The Case

⁵⁷³ Sprey, “More Effective,” 203.

for More Effective, Less Expensive Weapons.” Like the other documents, Sprey’s briefing was shared throughout the Pentagon. The nascent Reform Movement was growing but was still internal to the military.

Conclusion

After the F-16 deviated from Boyd’s and Hillaker’s original design, the Fighter Mafia changed. Their ideas moved in a much broader direction, both in audience and subject matter. The texts produced by Boyd, Spinney, and Sprey became the canonized scripture of their movement, and formed the basis for all the writing and advocacy that came afterward. Still, their ideas were motivated by the elements of the “knights of the air” myth. In their attitudes and personal approaches as well as in the changes they advocated, the main elements of the fighter pilot stereotype were present: Aggressiveness, resistance to authority, individualism, valuing man over machine, protection of their own community, and a penchant for heroic imagery.

Now their advocacy was no longer limited to fighter aircraft; the ideas behind what they thought made effective fighters were applied to other technologies. In the late 1970s and the 1980s, they began talking about the technology of tanks, artillery, personnel carriers, and other weapons, but they still emphasized the same elements that they had emphasized when talking of fighter planes: agility, maneuverability, the ability to surprise, the idea that men were more important than machines, and the conviction that that all machines needed to be “simple.”

The larger shift, then, was not in subject matter, but in scope. Not only did they start discussing different types of weapons in the same terms as they had previously discussed fighter aircraft; they also expanded their audience to include politicians and the general public. Aided by journalists and members of Congress, Boyd and many members of the Fighter Mafia created the “Reform Movement.” This movement argued for cheaper, simpler weapons drawn largely from

elements of the myth of the “knights of the air.” The movement loomed large throughout the 1980s in the public press, popular literature, and on Capitol Hill – this last through the formation of a Congressional caucus dedicated to pushing the ideals born among the Fighter Mafia.

In the late 1970s, the movement was mostly internal to the military, discussed in the halls of the Pentagon and in the chambers of particular members of Congress. Largely due to the intervention of William Lind, the Mafia was about to go public and launch a much broader movement.

Chapter 9 - Going Public: The Life and Times of the Reform

Movement

A number of events occurred in late 1979 to take the Reform Movement from the halls of the Pentagon and into the public arena. To that end, Thomas Christie attempted to leak a copy of Charles Spinney's briefing to Congress around this time, although the degree to which it was read is unclear.⁵⁷⁴ The larger impetus came from William Lind, the staffer from the office of Colorado Senator Gary Hart. Lind was familiar with Boyd's "Patterns of Conflict" briefing; he had been among the many who heard the briefing throughout the late 1970s. James Fallows had contacted Lind in 1979 for a story he was pursuing about military procurement. Fallows was not just any random reporter. At the time, he was the Washington editor for *The Atlantic*, and in 1977-1978 he had been the head speech writer for the Jimmy Carter administration. He was also a Rhodes scholar who had studied economics at Oxford University. For Fallows to focus on the economics of weapons procurement was fitting not only because of the Reformers' emphasis on cost but also because of the intense political debates of the day. President Carter was in a public duel with his eventual Republican challenger, Ronald Reagan, regarding defense spending, the latter arguing for radical increases in the defense budget.⁵⁷⁵

While talking to Fallows, Lind indicated that the man with whom Fallows should really talk was John Boyd, whom Fallows called immediately for an interview. Boyd was not impressed, dismissing Fallows as a "goddamn preppy." According to Robert Coram, Boyd attempted to intimidate Fallows by getting uncomfortably close to Fallows' face and jabbing him

⁵⁷⁴ John T. Correll, "The Reformers," *Air Force Magazine* (Feb. 2008), 40-44.

⁵⁷⁵ Coram, *Boyd*, 350-351.

in the chest while shouting at him. Despite this, Fallows put in the time to hear the “Patterns of Conflict” briefing and Spinney’s “Defense Facts of Life,” and he spent much time talking with Pierre Sprey. The end result of what became months of interviews was “The Muscle-Bound Superpower,” published on October 2, 1979 in *The Atlantic*.⁵⁷⁶

This article was the first full presentation of the Reformers’ views given in public. Fallows began the piece by arguing that the state of American defense was in full crisis, arguing that “that nation’s military security is inadequate, and some experts fear that the United States has become shackled to high technology that may fail when put to the ultimate test.”⁵⁷⁷ Boyd was mentioned throughout the article. His quotations were sometimes followed by comments from “his associate[s],” a veiled reference most likely to either Spinney, Sprey, or both. The piece reinforced the belief that Boyd and his group were the voice of reason within the Pentagon and that they were an oppressed minority, preaching their message of reform to those who had not ears to listen. Boyd was quoted as explaining this, saying of himself and the Reformers: “The Aerospace industry is out of control. But I will tell you this: There is no smaller lobby in this nation than the lobby for real defense.” Boyd also explained what he meant by “real defense,” which became the major catch phrase of the article. He said: “I’ve been talking about war, waging it, and winning it. People don’t discuss that subject very often in this building.” An unnamed “associate” chimed in: “It’s really the Department of Technology, not the Department of Defense.”⁵⁷⁸

⁵⁷⁶ Coram, Boyd, 351; James Fallows, “Muscle-Bound Superpower: The State of America's Defense,” *The Atlantic Monthly*, October 1979, 59-78.

⁵⁷⁷ Fallows, “Muscle-Bound,” 59.

⁵⁷⁸ Fallows, “Muscle-Bound,” 59.

In the article, Fallows framed the issue of reform in a slightly different way than what the Reformers had taken up to that point. Fallows focused on three individuals as key in eroding the effectiveness of the military. The first was former Secretary of Defense Robert McNamara. Fallows argued that McNamara's emphasis on management techniques as guiding principles was the opposite of "real defense" as defined by the Reformers. This criticism related to the fighter pilot's ideal that leaders can be respected only if they perform certain acts—in the case of many pilots of the early twentieth century, they were reluctant to show respect for authority figures who did not have extensive experience as fighter pilots themselves. With Fallows' and the Reformers' critique against managers, academics, technocrats, and the bureaucracy itself, this element of the stereotypical fighter pilot mindset was turned against the defense industry at large. To hammer this point, Fallows quoted Elmo Zumwalt, former Chief of Naval Operations and who had worked in the offices of the Secretary of Defense and Secretary of the Navy. Zumwalt said: "They've [defense analysts] never been there. They've never stared the Russians in the eye. They live in their academic environment and assume that everyone thinks the way they do. When you've been through a nuclear confrontation, as I have several times, you're different."⁵⁷⁹ Sprey argued the same more succinctly: "Almost nobody is trained for combat anymore. They're businessmen. Until we change that, nothing else will count."⁵⁸⁰

To the Reformers, only personal experience in combat could make someone a wise decision-maker, because it altered one's temperament, and individual attitudes mattered more than data and statistics. Effectiveness in war was not something that could be studied or understood through research – only by the personal experience of men in combat. As Fallows

⁵⁷⁹ Quoted in Fallows, "Muscle-Bound," 61.

⁵⁸⁰ Quoted in Fallows, "Muscle-Bound," 63.

summarized: “Management 'rationality,' so noble in intention and benign in apparent effect, is... the greatest enemy of real defense. What we need... is a different calculus, based not on computer printouts but on the realities of the battlefield. . . . Its premium must be placed on flexibility in equipment, people, and ideas.”⁵⁸¹

After blaming McNamara for beginning the path of destruction for the American armed forces, Fallows then targeted Hyman Rickover, the Navy admiral who had directed the development of nuclear-powered vessels. Fallows described Rickover’s legacy as “technology run wild.” Fallows and the Reformers conceived of technology as having almost agency unto itself, seemingly with a mind of its own. They criticized the Pentagon for pursuing technology for its own sake, without regard to cost or capability, and they blamed Rickover for bringing that mindset to the military. While criticizing the expensive yet capable nuclear submarines and carriers, Fallows argued: “These are Rickover's creations, but more fundamentally they are technology's; what can be built, will be built, even at the cost of bad military sense.”⁵⁸²

To make this point, Fallows referred to the AIMVAL-ACEVAL tests, although he did not mention specific aircraft by name. To keep the Reformers buzzwords about complexity and affordability fresh in the minds of readers, he stated: “The Air Force matched a relatively cheap and simple plane against a fancier and more complex model which costs about five times as much.” Fallows noted that in the one-on-one matchups, the expensive plane (the F-15) did perform better. In larger engagements, however, the exchange rate was closer to equal. Without attribution, evidence, or citation, Fallows argued that “nearly everyone says” that a potential future war would feature these types of larger engagements. He also failed to mention the

⁵⁸¹ Fallows, “Muscle-Bound,” 62.

⁵⁸² Fallows, “Muscle-Bound,” 64.

constricted conditions of the tests, which barred the use of the F-15's chief advantage (and the main source of its price tag), the long-range radar. In addition to bashing the "complex" new aircraft, Fallows also borrowed Sprey's other main example, the M-1 Abrams tank, to show high technology run amok.⁵⁸³

The picture Fallows painted was that high technology solutions are inherently too "complex" because they have too many potential points of failure. The article depicted a Defense Department that procured complexity for its own sake. He noted: "Another disadvantage of the modern, high-technology military is its resemblance to a Rube Goldberg illustration; things will be fine as long as every single part of the system works exactly right every time."⁵⁸⁴ Although there is some truth to this, as suggested in some failures of the Pratt & Whitney F100 engine in both the F-15 and F-16, Fallows slid into hyperbole. Many high-technology systems, for example, the F-16's fly-by-wire system, were built with several points of redundancy, specifically to prevent a systems failure if one individual component fails.

Another point that Fallows hit hard, which also became a calling card of the Reform Movement later on, was that the defense industry was dishonest and outright corrupt. In evidence of this, he pointed to the testing process for many weapons, again with attacks at what he perceived as an overreliance on management and bureaucracy. He asserted that many weapons systems experience problems because of "self-contained bureaucracies whose tests were not subject to outside scrutiny." His prime example was the Falcon missile. In the testing environment, he said, it had achieved a very high kill probability; yet in the Vietnam War, its

⁵⁸³ Fallows, "Muscle-Bound," 65.

⁵⁸⁴ Fallows, "Muscle-Bound," 65.

performance was dismal.⁵⁸⁵ Although there is some truth in the idea that weapons tests might not be appropriate, Fallows ignored the chief reason for the Falcon missile's poor performance in Vietnam – it was rarely, if ever, fired under the conditions for which it was designed. The Falcon was intended as a long-range missile that could hit at beyond visual range—but the rules of engagement in Vietnam strictly forbade firing on targets without first obtaining visual confirmation. The testing environment of the Falcon extended across its intended range of capability. The problem with the missile was less with the weapon itself; it was more that the missile was not used for what it was designed to do.

The third figure Fallows and the Reformers blamed for eroding “real defense” was Paul Nitze, famous for his role as director of the Strategic Bombing Survey immediately after World War II. He was especially relevant to the Reformers due to his role in shaping theories regarding potential nuclear war. Fallows referred to the role of deterrence theory in shaping defense strategy as “an obsession, a disease. . . . [Theory about nuclear war] is the modern equivalent of medieval theology.”⁵⁸⁶ With this and other references, Fallows also continued the metaphor of the Reformers as a type of reformation within a misguided religious order, referring to technology as “the grail” that the military pursued.⁵⁸⁷ Continuing the metaphor, Fallows viewed the faith that men like Nitze placed in the value of nuclear capability as baseless, a drain on budget dollars that were needed elsewhere. He asserted: “The fantasy of Minuteman vulnerability, the scare talk of Paul Nitze and his acolytes, and the naked blackmail that men such as [Georgia Senator Sam] Nunn and [Washington Senator] Henry Jackson are demanding

⁵⁸⁵ Fallows, “Muscle-Bound,” 66.

⁵⁸⁶ Fallows, “Muscle-Bound,” 66-67.

⁵⁸⁷ Fallows, “Muscle-Bound,” 66.

for their votes could do more harm to ‘real defense’ than any weapon our enemies know how to produce.”⁵⁸⁸

Fallows concluded with six concrete steps he argued should be taken to restore “real defense.” Some of them reveal connections to the ideals of the Fighter Mafia. First, Fallows advocated abandoning the ICBM leg of the nuclear triad completely, because keeping them as an integral part of defense was too complicated and expensive. Secondly, he argued that having large nuclear submarines with many warheads on board was ineffective. Echoing similar arguments as those used against the F-15, he argued against the Trident submarine, saying that one large, expensive, complex submarine was both vulnerable and too expensive. It would be better, he thought, to split nuclear warheads up among as many as twelve smaller, cheaper, simpler submarines. Third, Fallows asserted that NATO allies were not contributing enough money to defense costs; and so, to save the US some money, allies should increase their defense spending. Lind especially influenced this point. Fourth, Fallows argued that the types of problems faced by major powers in the latter part of the 20th century were not the types of problems that large militaries can solve. So he admonished that the US should settle on a cheap, “modest policing force Serving a very short-term, limited policing and peacekeeping function.” Demonstrating the influence of the Fighter Mafia, and of Boyd’s work especially, Fallows emphasized: “Forces designed for this role should have quickness and adaptability as their cardinal virtues: get in, act calm, get out.”⁵⁸⁹

The last two points in “Muscle-Bound Superpower” show the most evidence of influence from Boyd and his acolytes (of whom Fallows was certainly a member by this point). He said

⁵⁸⁸ Fallows, “Muscle-Bound,” 72.

⁵⁸⁹ Fallows, “Muscle-Bound,” 72-76, quotes on 76.

that the military should use the “triage system” to ignore or eliminate weapons that are too “high-cost, high-technology, [and] high-vulnerability.” The fact that Fallows assumed expensive and technologically advanced systems were inherently “vulnerable” is telling. In making this point, Fallows listed several doctrines and specific weapons systems that should be, in his view, eliminated because they did not “make a fundamental difference” to defense. In this list he included aircraft carriers and Navy aircraft (generally speaking), the Pershing II tactical nuclear missile, and the AEGIS missile defense system, all of which he argued could be replaced by a large fleet of small, inexpensive diesel submarines. He argued that the Soviet military threat could be contained cheaply, for example, by placing mines along the gap between the Soviet Union and Greenland, Iceland, and the United Kingdom, thus bottling up the Soviet fleet. Repeating an argument of Lind’s, Fallows argued that a fleet of relatively inexpensive, simple blimps could counter the Russian submarine threat, citing evidence from World War II that no convoy with a blimp escort was lost to submarines. Openly demonstrating influence from the Fighter Mafia, Fallows argued that the very doctrine of using air power for deep interdiction bombing and strategic bombing was flawed and should be abandoned. He argued that chasing after technologies to enhance bombing capability led to “expensive” aircraft “with exotic engines, radar, and wings.” These planes did not “make a difference,” he said. “What does make a difference is numbers of planes.”⁵⁹⁰ Blatantly on this point, Fallows was influenced by the goals of the Fighter Mafia, who valued small, simple, inexpensive aircraft procured in large numbers as key to defense, Air combat was their most important function, and bombing did not make a difference.

⁵⁹⁰ Fallows, “Muscle-Bound,” 77-78

His final point was that the military was no longer training people for combat but for management. This practice needed to cease. The complaint was not limited to the enlisted men and lower ranks but included the upper levels of leadership. Fallows claimed, “the Army is no longer made up of, or led by, men who can fight.” Asserting that the majority of military members were careerists and bureaucrats who cared about themselves, about promotion, and about organizational charts rather than combat, he claimed that the military had lost its spirit. Once again, the fledgling Reform Movement looked to Adolf Hitler’s Wehrmacht for positive examples of military organization. Fallows argued that approximately one-third of the 650 German general officers in World War 2 were killed in action and that this was indicative of aggressiveness of officers that correctly led from the front. Comparatively, they complained that in Vietnam, only three American general officers were killed, and two of them died in non-combat related accidents.⁵⁹¹ This measurement of success is curious at best, because few analysts would regard the death of large numbers of general officers as a sign of victory—yet in the minds of the Fighter Mafia and later the Reformers, who were influenced by the idea of aggressiveness originating in the “knights of the air” myth, the claim that leaders dying in combat was a measure of success made sense.

Boyd’s “Patterns of Conflict,” Spinney’s “Defense Facts of Life,” and Sprey’s “The Case for More Effective, Less Expensive Weapons Systems” all formed the Reformers’ agenda, both in terms of overall backing philosophy and specific points, and those briefings were heard widely throughout the Pentagon and by members of Congress and their staff. However, Fallows’ “Muscle-Bound Superpower” took the movement public in 1979, and the Reformers’ agenda

⁵⁹¹ Fallows, “Muscle-Bound,” 78.

became a hot topic within the defense community and expanded to Washington, the public press, multitudes of articles, and best-selling books throughout the majority of the 1980s.

The original goals of the Fighter Mafia had been fairly specific—to recreate the “white scarf stuff” based on the constructed memory of World War I air-to-air combat by procuring small, inexpensive, “simple” dedicated fighter aircraft. The goals and methodology of the Fighter Mafia had been rooted in fighter pilot culture and the stereotype of the “knights of the air” extending back to the First World War. All five major characteristics of that culture were still present in the Fighter Mafia movement—and although the Reform Movement was broader in terms of its goals, membership, and methods, it was still based in the five major characteristics of fighter pilot culture, if sometimes less directly.

Aggressiveness was still the dominant factor. It showed itself in how members of the movement interacted with others by aggressively attacking previous doctrines. It also showed in the charge that the military was not focused enough on combat. In the end, the Reform Movement aimed to produce a military that acted with more aggressiveness. Their sense of independence and their desire to be perceived as free and unconventional played a role both in shaping their emphasis on man over machine and their insistence that authority figures were incompetent at best or even corrupt. These concepts overlapped with the third characteristic: Maintaining heroic imagery regarding themselves. The Reform Movement had a tendency to view themselves as voices in the wilderness who had come to save the broken defense industry, and the religious imagery they relied on reinforced this conception of themselves, especially Boyd, as messianic. Because they viewed their growing but still relatively small community in these terms, they grew increasingly afraid, and in some cases even paranoid, that the Pentagon or the US government was in fact their enemy. This helped to shape the fifth characteristic:

Protection of their community from the perceived threat of outsiders. Many of their arguments focused on the fourth characteristic – technology – but only the kind of technology that furthered their goals. As many members of the Reform Movement often reiterated, they were not against technology. They were against technology they deemed to be too “complex,” for example, according to Spinney’s definition. Any technology that furthered their goals of cheap, simple weapons was positive – a good example was fly-by-wire technology -- much as fighter pilots of the First World War had been closely linked to, and protective of, technology that furthered their goals in air combat. Although the Fighter Mafia and the Reform Movement were in many ways separate entities, the latter can be considered an outgrowth, or perhaps a mutation, of the former.

Vietnam Syndrome and the Hollow Force

Fallows’ article was not the only event to push the Reformers’ agenda into the public spotlight. Other events around the same time contributed to a general sense that the American military was in a state of crisis; and the sense of crisis was so pervasive that it was given a name: Vietnam Syndrome. Although not all of these events pointed toward the Reformers specifically, the increasing perception among the general public that the military was in need of major change gave the Reformers a foothold to grow support for their recommendations.

In the years after the fall of Saigon in 1975, the American people generally had come to question the ability of the American military to solve problems. Historian Patrick Hagopian saw this as American “leaders’ hesitancy in the use of force, and the mutual mistrust of the nation’s leaders and citizenry in the event of an armed conflict.”⁵⁹² Leslie Gelb, a former government official, used the term “Vietnam Syndrome” as a critique when defining it in a *New York Times*

⁵⁹² Patrick Hagopian, *The Vietnam War in American Memory Veterans, Memorials, and the Politics of Healing* (Amherst: University of Massachusetts Press, 2012), 408.

article as “a reluctance to flex American military muscles.”⁵⁹³ In the late 1970s and beyond, references to the failure of Vietnam and the American reluctance to repeat that mistake were frequent refrains in the press and in Congress. In November 1978, *U.S. News and World Report* questioned America’s military ability in their piece, “America – Declining Power?” *Business Week* was even more scathing in their special issue released in March 1979 which featured the headline: “The Decline of U.S. Power.” Inside the cover, which depicted a weeping Statue of Liberty, the lead article claimed that the “shattering experience of Vietnam” had put the US in “decay” and that “there are signs of U.S. weakness everywhere.” The Vietnam experience was “threatening the way of life built since World War II,” and that the entire economic system of the world was “now in crisis.”⁵⁹⁴

Not only were civilians and politicians affected, but military leaders too succumbed to the Vietnam Syndrome. For the military, however, it was often accompanied by a deep and growing mistrust of civilian leaders and the civilian population. Some developed the idea that military means had limits in solving certain types of conflicts, and they expressed a refusal to be sent into conflicts without very clear, obtainable objectives.⁵⁹⁵ They also knew that the American public was deeply skeptical about getting involved in another war. Although some were against any war and some only wanted to make sure that future wars were of a certain kind, the worry that

⁵⁹³ From November 7, 1983, quoted in Mrozek, *The US Air Force After Vietnam*, 59.

⁵⁹⁴ Quoted in Christian G. Appy, *American Reckoning: The Vietnam War and Our National Identity* (New York: Viking Press, 2015), 284-285.

⁵⁹⁵ George Herring, “Preparing Not to Refight the Last War: The Impact of the Vietnam War on the U.S. Military,” in Charles E. Neu, ed., *After Vietnam: Legacies of a Lost War* (Baltimore: Johns Hopkins University Press, 2000), 73-74.

America might find itself in “another Vietnam” dominated almost any discussion of foreign policy in the late 1970s and 1980s.⁵⁹⁶

The concept of Vietnam Syndrome was most often invoked as a pejorative by conservatives and nationalists to attack those who questioned America’s military might. A special target of attack was the Weinberger Doctrine. After the Beirut bombing of a US Marine Corps barracks in 1983, Secretary of Defense Caspar Weinberger said that military force should be used only as a last resort and only when vital US interests were at stake and, even then, only with the full support of Congress and the American people. This doctrine was attacked by conservatives. As Secretary of State George Shultz quipped, this was the “Vietnam Syndrome in spades.”⁵⁹⁷ In a sense that judgement was correct—the reluctance to use military intervention was in fact a direct expression of Vietnam Syndrome.

In this way, the memory of the Vietnam War became politically weaponized. This was especially true of the idea that the American people – more specifically the anti-war movement and mainstream media outlets – had betrayed the troops and caused the failure of Vietnam. In almost exactly the same way that the post-World War I “stab in the back” myth had taken root in Germany and allowed for the mobilization of right-wing movements, Vietnam generated its own “stab in the back” myth that enabled conservative hawks to build a stronger political base.⁵⁹⁸ But

⁵⁹⁶ For explanation on Vietnam Syndrome, see Appy, *American Reckoning*, particularly chapter 10, “No More Vietnams.”

⁵⁹⁷ Quoted in Hagopian, *The Vietnam War in American Memory*, 184. See also, Herring, “Preparing,” 74-75.

⁵⁹⁸ For a more detailed exploration of the memory of Vietnam as a “stab in the back” myth and its political and societal implications, see Hagopian, *The Vietnam War in American Memory*. For more on how the memory of Vietnam became a search for blame, see Gregory Daddis, “The Importance of the Vietnam War’s Tet Offensive,” *War on the Rocks*, January 29, 2018 [<https://warontherocks.com/2018/01/importance-vietnam-wars-tet-offensive/>], accessed February 11, 2018.

they had an uphill battle in trying to convince the American people to support larger defense budgets and further applications of US military power. Much of the public was still skeptical about the ability of the military to accomplish its goals and reluctant to spend American lives in conflicts around the globe. Even as late as December 1990, *Newsweek* discussed the build up towards the Gulf War by noting, “Vietnam hangs in the collective subconscious like a bad dream, a psychic wound that leaves the patient forever neurotic.”⁵⁹⁹

In these churning waters, the Reform Movement could occupy a unique place: They were definitely hawks, but they could appeal to those who were skeptical about the American military. Essentially, they could argue that, yes, the military was in a crisis and was even incapable of victory—but not because America was weak or needed to avoid global conflict. To the contrary, the Reformers provided a way of identifying the problem of the military as an internal one—their technology was bad, too expensive and too complex—but with the right weapons (cheaper, simpler ones), America could and, by implication, *should* be an active military force around the world. Those who were opposed to large defense spending might also be attracted to the Reformers’ message because it also advocated generally lower budget allocations for the military. This message had enormous appeal both to conservative hawks and to those on various places on the political spectrum.

Arguments stemming from the Reformers' ideas made their way to the floors of Congress. On May 29, 1980, the Chairman of the House Armed Services Committee's Investigations Subcommittee, New York Democrat Samuel Stratton, opened a subcommittee meeting with the assertion that President Carter and Secretary of Defense Harold Brown were

⁵⁹⁹ Evan Thomas, John Barry, Amm McDaniel, and Douglas Waller, “No Vietnam,” *Newsweek*, December 10, 1990, 24.

not properly listening to the advice of military personnel. This was in response to a letter from Carter and Brown, directly to the chairman of the Senate Armed Services Committee, asking them to make large cuts to the defense budget for 1981. Those in Congress who favored drastic increases in the defense budget were insulted by the letter. For example, Republican Representative Robin Beard, from Tennessee, claimed the letters from Carter and Brown “read like third-grade readers. It's an insult. . . . These letters are absolutely, totally insane.”⁶⁰⁰

Army Chief of Staff General Edward C. Meyer testified during the meeting, arguing that tactical forces were far below necessary strength levels. “Right now, as I have said before, we have a hollow army.”⁶⁰¹ The next day, *The Washington Post* ran a story about the meeting written by reporter George Wilson, who misused some of Meyer’s assertions about defense requirements and desired budget levels. The story gave the impression that the US military was completely inadequate to counter the Soviet threat, that it was too small, and that it lacked high-quality, modern weaponry. This is not exactly what Meyer said. A close reading of his testimony reveals, for example, that enlistment numbers were actually higher than in previous years and infantry requirements had been met. Meyer’s comment about a “hollow army” came specifically in answer to a direct question about the number of tanks in a particular armored division at Fort Hood, Texas.⁶⁰²

The Carter administration has often been criticized for decreasing defense budgets. Yet the truth about defense policy in those years is complex—Carter sought to increase the force structure of the military, if not its funding, and largely followed defense policies much like those

⁶⁰⁰ Quoted in Frank L. Jones, "A 'Hollow Army' Reappraised: President Carter, Defense Budgets, and the Politics of Military Readiness," (Carlisle: Strategic Studies Institute, U.S. Army War College, 2012), 7.

⁶⁰¹ Quoted in Jones, “A ‘Hollow Army,’” 7.

⁶⁰² Jones, “A ‘Hollow Army,’” 7-11.

of his predecessors, Richard Nixon and Gerald Ford. Finding it difficult to raise defense budgets in a struggling economy, seeing decreases in enlistment in an all-volunteer force after the end of the draft, as well as canceling the B-1 bomber in favor of other projects that were then still classified, the public image of Carter was that he was not serious about defense and certainly not as serious as some hawks wanted. This at least partially mistaken impression was mixed together with the nebulous sense of failure, sometimes bordering on dread, that was Vietnam Syndrome. Into that swirling mixture came Meyer's comment about a "hollow army," which, despite being misleading at best and blatantly false at worst, was taken out of context and sensationalized by some press outlets. The term "hollow army" or "hollow force" became a catchphrase in the early 1980s to describe a general state of ill-preparedness within the entire US military, as well as a way to attack the Carter administration as being soft on defense.⁶⁰³

For Americans who followed news about defense issues, media reports discussing logistics and readiness problems continued to erode the public trust in the ability of the US military to perform adequately. On the same day as the above hearing, on May 29, 1980, during a session of the House of Representatives, California Democratic Representative Victor Fazio was especially concerned, and he repeated many issues raised by the Fighter Mafia. The aircraft in the current inventory, he said, were not up to the task of a potential conflict, largely due to maintenance problems as a result of weapons becoming too "sophisticated." He then inserted an entire article from the *Chicago Sun-Times* into the *Congressional Record*, which he referred to as "chilling." The article "U.S. Warplanes—A Giant Fleet of Lemons," by Patrick Oster, criticized the F-14, F-15, and F-111 as being too complex and not being mission-ready most of the time. One of the largest issues was a shortage of spare parts for all of those planes. The article asserted

⁶⁰³ Jones, "A 'Hollow Army,'" vii-ix.

that in the past year, the Navy had to cannibalize parts from some F-14s to repair other F-14s due to a lack of spare parts. Oster painted the Air Force in an even bleaker light, quoting Alabama Republican Representative Jack Edwards, who claimed that “at some fighter bases, maintenance personnel have actually used their own money to purchase parts at local electronic supply outlets such as Radio Shack.”⁶⁰⁴ Edwards cited no specific sources nor gave specific examples for this claim. There may be some truth to the story, although the type of consumer-grade electronics available at a public store such as Radio Shack was unlikely to fulfill the high-performance needs of fighter aircraft such as the F-111 and F-15. Nevertheless, the story became a talking point, and it received news coverage and contributed to the increasing public perception of the “hollow force” that was losing effectiveness at least in part due to over-complexity.⁶⁰⁵

The public’s sense of frustration with the American military was at its height at this time. Only a matter of weeks before Fazio and Edwards expressed their concerns in Congress, Operation Eagle Claw had experienced a disastrous failure. On April 24, 1980, in an attempt to end the Iranian Hostage Crisis, eight RH-53D Sea Stallion helicopters flew to a staging base from which they were to launch a raid on Tehran to rescue trapped Americans. The mission experienced a perfect storm of problems (figuratively and literally) that resulted in tragedy. Problems began in the planning stage, when planners chose to use helicopters whose operational capability did not line up with the needs of the mission. Weather information was classified and thus not delivered to pilots, who were not only unaware of the possibility of dust storms but were not trained to handle them. One helicopter experienced mechanical problems and abandoned the

⁶⁰⁴ Congressional Record, Extensions of Remarks, “Complex Technology Causing Military Readiness Problems,” House of Representatives, May 29, 1980, 12752.

⁶⁰⁵ Coram, *Boyd*, 358-359.

mission early. A second was damaged by a dust storm and forced to land. A third then experienced mechanical failures. The commanders of the force decided to abort the mission, a decision that President Carter confirmed within twenty minutes of the decision on the ground. When the US forces began their return journey from the staging base, one of the helicopters crashed into a transport plane. In the crash and subsequent fire, eight Americans were killed. As if that were not enough, some of the helicopters were not cleansed of sensitive information, and the Iranian revolutionary government captured classified intelligence material, including the names of several Iranian agents working for the US government.⁶⁰⁶

This event caused a serious lack of faith in the Carter administration and in the military broadly, and it seemed to confirm the worst fears that were spawned by the Vietnam Syndrome. The event served as a catalyst for changes to many aspects of the military, and some of the Reformers – notably, Spinney – were intent on using the tragedy as a springboard to further their agenda. As news of the operation broke on television, Spinney’s wife happened to go into labor with their child. Allegedly, as she shouted at Spinney to take her to the hospital, he instead opted to sit by the news reports with a calculator, reviewing data from helicopter reliability studies. He calculated that the military should have sent fourteen helicopters instead of eight—an assessment with which some analysts agreed after the fact.⁶⁰⁷ However, the number of craft used was not the only problem nor the only limiting factor in the operation. Regardless, Carter displayed integrity

⁶⁰⁶ Charles Tustin Kamps, "Operation Eagle Claw: The Iran Hostage Rescue Mission," *Air & Space Power Journal International Edition - Spanish*, 18 (Third Quarter, 2006), available online: [<http://www.airpower.maxwell.af.mil/apjinternational/apj-s/2006/3tri06/kampseng.html>], accessed October 14, 2017. See also, Charles Cogan, "Desert One and Its Disorders," *The Journal of Military History* 67 (January 2003), 201-216.

⁶⁰⁷ Coram, *Boyd*, 353. Cogan argues in "Desert One and Its Disorders" that ten or twelve helicopters would have been sufficient.

by accepting full responsibility for the failure, an event which was one of the strongest contributing factors in his inability to win reelection.

For many observers, analysts, and much of the public, it seemed that the US military was in need of reform and the Reformers sought to define the form the changes would take. Their efforts were bolstered by the support of their allies within the military as well as many members of Congress. Fallows' original publication, "Muscle-Bound Superpower" in October 1979 had named many of these allies, such as Democratic Georgia Senator Sam Nunn and Democratic Colorado Senator Gary Hart. Lind, still a staffer for Hart at the time, was featured prominently in the article as one of the Reformer's chief advocates—who had first coined the term "The Reformers." Fallows went out of his way to describe the Reformers as "zany" with a pinch of "kookiness," pointing out Boyd's austere spending habits and emphasizing Lind's confrontational attitude as well as the fact that his office contained a portrait of fascist dictator Benito Mussolini. Years later, Lind proclaimed himself a monarchist. Despite this, Fallows became a convert to the Reformers' new gospel, and he admitted that he had "[come] to respect and value them more than anyone else I met."⁶⁰⁸ These men formed the core of a group that began to grow quickly.

National Defense and Its Critics

Early in 1981, other press outlets besides *The Atlantic* began to champion the Reformers' views, led by the *Washington Post*. Reporter Michael Getler summarized Boyd's "Patterns of Conflict" briefing, noting how much of an influence it already had in the Pentagon. Major General Jack N. Merritt from the Army War College was a strong supporter of Boyd. "He really

⁶⁰⁸ Fallows, "Muscle-Bound," 62.

is one of the most innovative and original guys I've ever had anything to do with," Merritt said, "and he created a lot of excitement up here among strategists and historians." Marine Commandant Robert H. Barrow and Marine Lieutenant General P.X. Kelley, then in the process of creating the U.S. Rapid Development Force, were also Boyd's acolytes by this point. Senator Gary Hart was mentioned as using Boyd's ideas as a standard against which to measure other proposed defense initiatives, and the Navy was so taken with Boyd's concepts that the *Proceedings of the U.S. Naval Institute* published studies applying Boyd's concepts to naval warfare. Making the connection to the first generation of fighter pilots even more explicit, Getler cited Sprey as saying that Boyd's work was "the best work of its kind since that done by Germany's famous 'Red Baron' of World War I, Manfred von Richtofen."⁶⁰⁹

Also in March 1981, although Lind had already labeled Boyd and his followers the "Reformers," the press began officially referring to "The Reform Movement," crediting Gary Hart with coining the phrase. Hart repeated many of the same main points from earlier briefings and articles, such as the comparison with the French of the interwar period and the identification of the *Wehrmacht* as the ideal model to follow. By this point, Newt Gingrich, then a Republican Congressman from Georgia, had become an active member of the movement, as was Arnold Punaro, a staffer for Senator Sam Nunn. Most of the group pushed back against incoming President Ronald Reagan's efforts to drastically increase funding for the military, mostly because they disagreed with the specific programs to which money would go—the expensive, complex systems, especially Reagan's proposal to build more nuclear-powered aircraft carriers. Instead, the Reform Movement emphasized cheaper, simpler carriers and submarines, whose smaller size

⁶⁰⁹ Michael Getler, "Air Conflicts Used as Strategic Pattern," for the *Washington Post*, reproduced in *Hartford Courant* (Hartford, Connecticut), March 13, 1981.

could render them more maneuverable.⁶¹⁰ For the Reformers, agility was one of the chief measures of success, as it had been for the Fighter Mafia and the original “knights of the air.”

Some of the articles covering the emerging movement added to Boyd’s status as a messiah by exaggerating his past or even fabricating stories. For example, in a piece for the *Atlanta Constitution* by Henry Eason that was reproduced in several newspapers across the country, Boyd was referred to as an “ace” fighter pilot.⁶¹¹ In reality, not only was Boyd not an ace; he had never even fired his guns in a real combat situation. The article quoted Hart, Gingrich, and Boyd at length, repeating many of the main points made in previous briefings and articles—that analysts and bureaucrats had taken control of the military and that their ossified, parochial vision had destroyed the military’s combat capability. In addition to repeating other main arguments, this piece emphasized movement and agility as key determiners of success. Boyd was quoted as arguing that performing “super-fast maneuvers and feints” would “dissolve [an] adversary's moral fiber, disorient his mental images, disrupt his operations, overload his system in order to generate confusion, disorder, panic, chaos.” Boyd stated that the then-current American military was not capable of performing such skilled maneuvers.⁶¹²

In May 1981, Fallows followed up with two publications that expanded the footprint of the Reform Movement significantly. The first was another article for *The Atlantic*, “America’s

⁶¹⁰ “Tactician urges U.S. to adopt blitz warfare,” *Arizona Republic* (Phoenix, Arizona), March 23, 1981.

⁶¹¹ Henry Eason, “Mobility, maneuver concept tossed at traditional Pentagon thinking,” for the *Atlanta Constitution*, reproduced in *Stevens Point Journal* (Stevens Point, Wisconsin), March 24, 1981. Also reproduced as “New warfare theory attracts attention,” in *Great Falls Tribune* (Great Falls, Montana), March 23, 1981, and as “A new way of thinking about land warfare” in *The Greenwood Commonwealth* (Greenwood, Mississippi), March 25, 1981. The article was reproduced for *The Washington Post*, although the claim to ace status was dropped, replaced with referring to Boyd simply as a “top-notch fighter pilot.” See “Veteran fighter pilot does a solo for the military,” for *The Washington Post*, reproduced in *Asbury Park Press* (Asbury Park, New Jersey), May 3, 1981.

⁶¹² Eason, “New warfare theory attracts attention.”

High-Tech Weaponry.”⁶¹³ The second was much more important—the publication of his first book, *National Defense*. The work was essentially an elaboration of the points he argued in “Muscle-Bound Superpower,” using a similar structure and, in some cases, reproducing sections of the article nearly word for word. Fallows said the book had three major themes he wished to emphasize. He described them: “The first and most important is that our national defense is in constant danger of being so borne away by theory that it loses touch with fact, historical experience, and simple common sense.” To illustrate the point, Fallows compared the American military establishment to the fictional Laputans of *Gulliver’s Travels*, so enamored with theory that the material needs of their society suffered. Second, Fallows asserted that warfare is a unique enterprise and should be studied on its own terms, outside the normal boundaries of labor or production economics. He summarized: “Solutions that make sense in other walks of life may lead to disaster when applied wholesale to defense.” His third theme was that “the truly urgent military questions have little to do with how much money we spend. Indeed, more money for defense, without a change in the underlying patterns of spending, will not make us more secure, and may even leave the United States in a more vulnerable position than before.”⁶¹⁴ This point was nearly a quotation from Spinney’s “Defense Facts of Life.”

National Defense also repeated and expanded on Sprey’s briefing, especially on the sections in which Sprey had compared certain arbitrarily paired weapons systems. Fallows focused on the two largest of Sprey’s examples – the M-16 rifle and the F-16 Falcon. Fallows argued that both of these weapons had been “perverted by bureaucratic pressures.”⁶¹⁵ In his

⁶¹³ Fallows, “America’s High-Tech Weaponry,” *The Atlantic* 247 (Issue 5, May 1981), 21.

⁶¹⁴ Fallows, *National Defense*, (New York: Random House, 1981), xiii-xv.

⁶¹⁵ Fallows, *National Defense*, 76.

biography of Boyd, Coram referred to this chapter as “one of the strongest sections of the book,” even though it repeated most of the same points from Sprey’s briefing. However, it did present Boyd as a near-messianic figure whose original vision for the F-16 was the solution to many problems in the Air Force—until the Air Force ruined it. As Coram summarized, Fallows lamented “what it [the F-16] had become in the hands of the Air Force—how ‘enhancements’ had converted the once-nimble fighter into an all-weather bomber. The buttonhook turn was something of the distant past.”⁶¹⁶

A full examination of the book is not necessary, as many of the points in it have been explained above—yet Fallows’ views on fighter aircraft procurement bear some scrutiny. Fallows noted that John McGrath, the public relations director for McDonnell Douglas, had sent a letter of complaint to *Newsweek* after it published an article criticizing the combat effectiveness of the F-15 Eagle. McGrath argued that, when flown in combat exercises against enemy aircraft thought to have capability greater than or equal to the F-5, the F-15 won those conflicts at a kill ratio of 88:1. Countering this, Fallows again pointed to the AIMVAL/ACEVAL tests as evidence that the expensive radar avionics equipment that drove up both the cost and physical size of the F-15 was useless in combat because of two assumptions. First was that visual identification of enemy aircraft would always be a requirement. Second was the assumption that the enemy would prove able to detect radar signals pointed at it, which would give away the F-15’s position and thus cause it to lose the element of surprise.⁶¹⁷ However, these were only assumptions, and although they bore some truth during the Vietnam War, they would not necessarily hold true in future conflicts.

⁶¹⁶ Coram, *Boyd*, 358.

⁶¹⁷ Fallows, *National Defense*, 44-46.

Within those limits, Fallows argued that the ACEVAL tests proved that the F-15s were not so much better than F-5s to justify their cost. Fallows also relied extensively on data provided by Riccioni to compare the F-15, the F-4, and the F-5, examining the number of planes that could be built for the same cost, as well as the total number of sorties that could be run per day. By showing that the cost of 250 F-15s was equal to the cost of 1,000 F-5s, he projected that in the same amount of time that 250 F-15s could be flown, the F-5s could run 2,500 sorties. After dissecting fighter aircraft procurement in this way, he ultimately reiterated Spinney's main argument; Fallows asserted that complexity in and of itself is a "form of organizational cancer."⁶¹⁸

To fix the defense crisis that faced the nation, *National Defense* concluded with four recommendations that were more directly in line with the Fighter Mafia ideals than "Muscle Bound Superpower" had been. First, he argued, the most important task was to "restore the military spirit" of the armed forces. This meant building "bonds of trust, sacrifice, and respect" among the ranks, echoing the Fighter Mafia's emphasis on aggressiveness and combat spirit. He also shared their frustration with leadership, especially leaders who, they thought, had not earned their place through combat. Fallows pointed again to the German General Staff of World War II, arguing that officers must all first serve as enlisted men before rising through the ranks. This was meant to "avoid the worst warping effects of the academies," for which the Fighter Mafia had often expressed open contempt.⁶¹⁹

Second, Fallows repeated the mantra of "stop[ping] the progression toward ever more costly and complex weapons," again calling for independent testing and criticizing specific

⁶¹⁸ Fallows, *National Defense*, 42-44, 47.

⁶¹⁹ Fallows, *National Defense*, 171-173.

weapons platforms, arguing that they should be replaced with their cheaper counterparts, such as the diesel submarine and the F-16 Falcon. Nodding toward the fighter pilot concept of competitiveness often expressed through athletics, Fallows used a sports analogy, arguing that, just as competitiveness was a core component of success in the National Football League, so more competition in the defense industry could produce better weapons for less money. Third, Fallows repeated his call to abandon the “theology of nuclear weapons.”⁶²⁰

His final point was a call for “coherence” in defense policy. Fallows meant that debate about defense questions tended to lack nuance and become disconnected from factual data, instead devolving into simplistic debates over either more or less funding. Fallows encouraged deeper discussion, going beyond the number of dollars spent on defense, and instead looking at how those dollars were spent.⁶²¹ There is some merit in this argument, although Fallows seemed to be simplifying the issues surrounding defense procurement to the purely economic realm. Conveniently, Fallows hoped that such a focus would favor the Reformers’ positions.

Fallows earned wide acclaim and circulation for his book, which won an American Book Award in 1983 and was a runner up for nonfiction in the National Book Critics Circle.⁶²² Not only did it seem to provide more credibility for the Reform Movement, but it widened the scope of their audience far beyond the Pentagon and government circles within which they had operated until then. The public awareness of their movement grew significantly and quickly. The goals of the movement were not hidden, either. Lieutenant Colonel Walter Kross, a senior fellow

⁶²⁰ Fallows, *National Defense*, 171-177.

⁶²¹ Fallows, *National Defense*, 176-184.

⁶²² Coram, *Boyd*, 358. The “American Book Award” which Fallows received was granted by the National Book Foundation. The awards reverted to their previous name, the “National Book Awards,” in 1987 to avoid confusion with the American Book Awards granted by the Before Columbus Foundation, which began in 1980.

at the National Defense University in Washington, put it clearly in assessing the book for *Air University Review*: “This book is not just another one of many on defense. James Fallows’s *National Defense* is part of a plan to reorder the U.S. military fundamentally. By necessity, therefore, Fallows’s work must be reviewed in a broader context: as part of the efforts of a small group of well-placed civilian analysts who want to recast the United States military in their preferred mold.”⁶²³

Kross’s review provides a useful look not only at the movement itself but also at how its critics perceived it. Kross was quick to mention that the Reformers might seem loud, credible, and overpowering to the point of bossiness, but that they were actually a very small group with little experience among them. He noted: “Their combat experience is virtually nil, even including combat training experience. The Reformers mostly quote and footnote themselves, the same one dozen experts.”⁶²⁴ He summarized their main points, which stemmed from the original stereotypical ideals attributed to fighter pilots — that complex, expensive weapons degraded combat capability, that attrition warfare was the wrong approach, and that maneuver and surprise should be the hallmarks of military doctrine. Ultimately, as Kross summarized, “the Reformers hold out the promise of more capability for less cost. There it is—more or less—a fiscal aphrodisiac guaranteed to gain widespread support, both inside government and with the public.”⁶²⁵

Kross was skeptical of the relationship between Fallows and Boyd’s other acolytes, even asserting that the two might be using each other for their own ends. He asserted: “The

⁶²³ Walter Kross, “Military Reform: Past and Present,” *Air University Review* 32, no. 5, (July-August 1981), 101.

⁶²⁴ Kross, “Military Reform,” 102.

⁶²⁵ Kross, “Military Reform,” 103.

relationship between Fallows and the Reformers is truly Faustian. He portrays them in a favorable light and carries their case to the public as only a gifted writer can. In return, they provide the seemingly compelling logic and stark examples Fallows needs to vault himself to the apex of defense journalism.”⁶²⁶ Notably, Kross also identified four key figures at the core of the entire movement. Boyd was “the messiah” figure of the group, Spinney the “prime disciple,” and Sprey the bureaucrat who could open doors to power. These three were also in the core element of the original Fighter Mafia. In addition, however, Kross noted that the fourth key member of the Reformers was the relative newcomer William Lind, whom Kross presented as the one who “facilitates the movement on Capitol Hill.”⁶²⁷

Kross identified nine specific points upon which the Reformer’s arguments hinged, and he argued that they were in fact “myths” that could be disproven or countered. A few of them bear some brief exploration. First, one of the chief characteristics of stereotypically independent fighter pilots was the lack of respect for leaders who had not proven themselves in ways the pilots deemed most relevant. Kross called out the Reformers for this attitude, noting: “Fallows and the Reformers display a contempt for military leaders rarely expressed so openly by those largely serving in government.” He then proceeded to explain why the then-current crop of general officers deserved credit: They were more diverse, better educated, more experienced, and had more responsibility than their predecessors. Attacking the Reformers’ argument that the US was too inflexible in its reliance on attrition, Kross asserted that maneuver was indeed core to US doctrine at the time. He noted:

The Reformers’ distrust of technology clouds their vision. They cannot see the major contribution today’s weapons make to maneuver strategy and tactics. Theater level flank

⁶²⁶ Kross, “Military Reform,” 103.

⁶²⁷ Kross, “Military Reform,” 103.

operations are commonplace. Air power itself is the essence of maneuver in theater-wide operations. Airlift can be a decisive maneuver factor through rapid movement of a small potent force. On the battlefield, covering and trapping operations are a way of life. Air Force close air support is a powerful maneuver element, moving among important battles as needed. Attack helicopters make land armor look static by comparison. Battlefield interdiction operations are designed to disrupt the enemy's building forces, thus weakening, delaying, and even deterring an armored thrust. Recognizing that we cannot match the Soviets weapon for weapon, our forces place high priority on exploiting enemy weakness. We plan to attack the enemy's central nervous system through counter-C3, defense suppression, and special operations. The Reformers oppose many service programs that support modern military maneuver.⁶²⁸

Kross pointed out one of the central weaknesses of the Reformers' argument: They misapplied historical examples to the point of bordering on self-contradiction. He stated:

The Reformers see what they want to see in history. They ignore historical lessons of weather, sound offensive counterair and electronic warfare operations, and a balanced quality/quantity force structure. . . . The Reformers venerate General Heinz Guderian because he put a radio and a radio operator in each German tank in 1940. Yet they oppose modern equivalents of this important action. Had they been on the German General Staff in 1935, they might have accused Guderian of being fixated on overcentralization and high technology.⁶²⁹

Kross, noticed that the AIMVAL/ACEVAL tests were central to the Reformer's claims, and so he took special aim at their interpretation of them, criticizing it for being too limited. Kross argued that those tests began the development of newer long-range weapons (such as the AMRAAM missile) that played to the advantages of the F-14's and F-15's long-range capabilities. The tests also revealed the importance of defeating enemy ground radar, and they pushed pilots to develop new tactics. Kross also noted the conditions of the test were ideal for the F-5s but that they did not allow the "complex" F-15s to use their advantages. Historian John Correll summarized that same criticism: "The Reform vision was perfectly suited to an

⁶²⁸ Kross, "Military Reform," 105.

⁶²⁹ Kross, "Military Reform," 106.

imaginary war in which aerobatic fighters dueled in clear skies on sunny days. That war would never exist.”⁶³⁰ Kross also went to a favorite example of many fighter pilots: Israel. He argued that the Israeli combat experience proved that numbers are not the key determinant of battle. “The Israelis have defeated numerically superior enemies,” he said, “whipping them with U.S. aircraft and missiles that the Reformers oppose. And, at this writing, the F-15 is still undefeated in air combat. In fact, the Israelis have repeatedly beaten air forces which were heavily equipped with the MiG-21, an aircraft almost identical to the Reformers’ favorite, the F-5.”⁶³¹

Finally, Kross pointed out that the Reformers seemed to have tunnel vision, assuming that their preferred mission (namely, air-to-air combat under ideal conditions) was the most important mission in a future war and that most, if not all, of the military’s resources should go to that mission. Kross instead reminded readers that the military must fulfill a variety of missions:

They [The Reformers] would have the public believe that the visual air battle is the decisive activity. It is crucial, but so are other missions. Historically, 90 percent of all aircraft are lost to ground fire. We must prepare well for many missions under many conditions. . . . We pursue sophistication when needed for the mission. Our all-weather air-to-air fighter (the F-15) and our all-weather attack aircraft (the F-111) constitute only 19 percent of our fighter force. From 1975 to 1986, we will modernize our force with F-15s, F-16s, and A-10s: about 3000 aircraft. Only about 800 will be F-15s, the rest are simple, basic day-visual fighters. We will selectively modify some of the F-16s and A-10s with extra capability, but only as needed.⁶³²

Kross did agree with Reformers in some areas, mainly in the charge that, due to increased bureaucracy in the military, the officer corps suffered from deep apathy. This apathy was, according to Kross, the only reason why the reformers had been able to amass as large a

⁶³⁰ Correll, “The Reformers,” 43.

⁶³¹ Kross, “Military Reform,” 107.

⁶³² Kross, “Military Reform,” 107.

following as they did. He also agreed that some changes were needed in the military, but he qualified his position by saying that change needed to be evolutionary and balanced – not a revolution in an all-or-nothing game that the Reformers seemed to advocate. Ultimately, Kross viewed the Reform Movement as a threat that the military “must deal with.” He wanted the military to think carefully about the Reformers’ critiques and make some of the changes they proposed. He also argued that it was important for the military to clearly articulate why they rejected many of the Reformers’ proposals. He concluded: “The U.S. defense establishment always needs reform—but in moderation. The fear of many professionals is that these particular Reformers have gone beyond the bounds of moderation in both method and objective. The Reformers might better be called the ‘Replacers,’ because they would have the military trade one set of problems for another. In doing so, they pose a serious threat to us all.”⁶³³

In his review of *National Defense* in one of the most prominent service journals of the Air Force, Kross barely mentioned the book itself, instead turning it into a review of the entire Reform Movement. In doing so, he clearly articulated the opposition’s main arguments and outlined their plan of action. Although the Reformers viewed themselves as a persecuted minority of voices in the desert, Kross showed that, in reality, many who spoke against the Reformers were open to some of their ideas, but simply advocated for a more balanced approach.

Kross also emphasized just how powerful even this small group was in terms of influence, noting:

Good connections both inside and outside of government enable the Reformers to market their views through their Washington network to decision-makers and the public. The Reformers apply to bureaucratic war the very principles they seek to infuse into the military. This daily struggle is fought on the Reformers’ own terms. Their tactics are well timed, designed to keep the services off-balance. Meanwhile, they outmaneuver the services to undermine hard-won programs, usually in a forum where the services have

⁶³³ Kross, “Military Reform,” 108.

little influence. As a result, a handful of critics is close to precipitating a fundamental change in U.S. military strategy and forces—not because they are necessarily right but because they make their case more persuasively in Congress and in the media than do the military services.⁶³⁴

Caucus

As the movement grew, more members of Congress became convinced by the Reformers' arguments, and they were not content to stay on the sidelines and merely advocate positions without taking action. They decided to get organized. In Summer 1981, several members of Congress, led by Republican Representative William Whitehurst of Virginia and Democratic Senator Gary Hart of Colorado, formed a group to advocate for the Reformers' ideas in Congress. They called themselves the Military Reform Caucus (MRC) with Whitehurst as chairman. There is little documentary record of their earliest meetings, but they first made national news in August 1981. At that point, the MRC consisted of sixteen members from both the House and Senate. They were a bipartisan group of liberals and conservatives, and the majority of them were members of the armed services committees of their respective chambers.⁶³⁵

The MRC's first public action was to present a series of demands to the newly incoming Secretary of Defense, Caspar Weinberger. Claiming that costs were too high for what Whitehurst referred to as "space-age contraptions," the caucus presented the Secretary with a laundry list of changes that the Reformers had long advocated. These included the cancellation of nuclear

⁶³⁴ Kross, "Military Reform," 102.

⁶³⁵ "Whitehurst Seeks Less Costly Weapons," *Daily Press* (Newport News, Virginia), August 12, 1981. Michael McManus, "Support growing for better defense spending," *Democrat and Chronicle* (Rochester, New York), January 21, 1982 confirms Whitehurst was the chairman.

submarines in favor of smaller diesel ones, the development of another smaller and cheaper fighter aircraft, as well as “to develop less costly weapons, devise new military tactics and create a modern-day think tank to study strategy [and] to set up a team of specialists to take a new look at how the Pentagon plans to spend the \$1.5 trillion President Reagan has earmarked for defense for the next five years.” Whitehurst also echoed the Reformers’ main idea: Complex weapons reduced the nation’s combat readiness, and thus the nation needed to revert to simpler weapons.⁶³⁶

The MRC’s statement of purpose borrowed heavily from Boyd and the other Fighter Mafia members’ writings. It said: “Historically, the most important factor in winning wars is people. Strategy and tactics come second, and equipment is third. . . . [Weapons that are] too expensive to be afforded in the numbers we need or too complex to be maintained and operated on a battlefield won’t help us deter war, or win if we fail to deter.” Some reporters and analysts looked to the Reformers as providing a way for incoming President Ronald Reagan to increase defense quality while still saving money.⁶³⁷ The idea that the administration could get better weapons for less money was certainly alluring, and some reporters and analysts openly called for the adoption of the Reformers’ ideas. For example, conservative syndicated columnist Michael McManus became enamored of the movement. “Many more senators and congressmen should

⁶³⁶ “Whitehurst Seeks,” *Daily Press*.

⁶³⁷ The quote and this argument were from Jack Garamond and Jules Whitcover, “Butter and Guns Dilemma,” a syndicated column from the *Chicago Sun-Times*, August 19, 1981; reproduced in several papers, such as *Honolulu Star-Bulletin* (Honolulu, Hawaii), August 19, 1981; *Argus Leader* (Sioux Falls, South Dakota), August 20, 1981; *Pensacola News Journal* (Pensacola, Florida), August 20, 1981; *Press and Sun Bulletin* (Binghamton, New York), August 20, 1981; *Star Gazette* (Elmira, New York), August 20, 1981; and *The Jackson Sun* (Jackson, Tennessee), August 20, 1981.

join the Military Reform Caucus,” he said. “And it should hire a full-time staff to fight the good fight!”⁶³⁸

Predictions at the time indicated that the defense budget was set to increase from \$157 billion in 1981, to \$220 billion by 1983. Analysts skeptical of this drastic increase in spending at a time when the economy was struggling referred to the Reformers as “voices in the wilderness.”⁶³⁹ By the end of January 1982, the MRC had not yet taken official, firm positions on specific issues, but they had released a briefing in December 1981, clearly stating that the US military faced both an internal and external crisis. The briefing claimed: “We are worried that our military can no longer win. Second, we have doubts as to whether the American people will continue to support high and increasing budgets for a non-winning military.”⁶⁴⁰

In addition to the familiar calls for a more numerous fleet of smaller, diesel powered submarines instead of large nuclear ones, the caucus also introduced a new set of programs they wished to cancel. The MRC had become openly critical of the Navy’s F-18 fighter plane — the same plane that began life as the YF-17 and had competed against Boyd’s pet project, the YF-16. The F-18, much like the F-16, had gone through development that added weight and extra capabilities. The MRC argued that the F-18’s costs had risen too far, and that the aircraft should be canceled—the money instead should be used to purchase a larger number of older A-7 Corsair IIs. In January 1982 the MRC also started criticizing the Bradley Infantry Fighting Vehicle as too

⁶³⁸ McManus, “Support,” this was a syndicated column reproduced in many cities, including The Morning Call (Allentown, Pennsylvania), January 21, 1982; The News Journal (Wilmington, Delaware), January 21, 1982; and Asbury Park Press (Asbury Park, New Jersey), January 23, 1982.

⁶³⁹ McManus, “Support.”

⁶⁴⁰ McManus, “Support.”

expensive and complex. Instead, they thought, the Army should continue to rely on the main armored personnel carrier used during the Vietnam War, the M113.⁶⁴¹

Partly due to the increase in positive press coverage, as well as because of evangelism by its members, the MRC grew at a rapid rate. In August 1981 the group was sixteen members, yet, by the beginning of May 1982, it had grown to fifty-five – a bipartisan group of thirteen Senators and 42 Representatives. The group also grew bolder in its actions, demanding an audit of the service academies and war colleges of all the armed services to determine “the extent to which, if at all, military history is taught.” Specifically, they pushed for the adoption of Boyd’s particular interpretation of history, and the MRC also gave the civilian leaders the deadline of January 1, 1983 by which to rewrite their field manuals and training programs to incorporate Boyd’s particular brand of maneuver warfare.⁶⁴² The degree to which these Senators and Members of Congress criticized the history instruction in professional military education was questionable. Much of what they seemed to believe about the past was wrong. Not only did they refer to Boyd as an “ace,” which was blatantly false, but they argued that more time should have been spent studying Heinz Guderian as the “mastermind of Blitzkrieg,” as Boyd presented him. Yet none of those making these assessments pointed out that not only did the Nazi military not use the term *Blitzkrieg* until after the Battle of France, but Guderian was not at all the driving force behind the creation of that doctrine; he was but one of many members of the German General Staff.⁶⁴³

⁶⁴¹ McManus, “Support.”

⁶⁴² Bruce Ingersoll, “Ace of the fighter pilots has a new theory of war,” syndicated from the *Chicago Sun-Times*, reproduced in *Detroit Free Press* (Detroit, Michigan), May 5, 1982.

⁶⁴³ For a fuller exploration of Nazi Germany’s maneuver warfare doctrine, often mistakenly referred to as *Blitzkrieg* (which should more properly be identified as *Bewegungskrieg*), and its development in the interwar period, see Robert Citino, *The German Way of War: From the Thirty Years' War to the Third Reich* (Lawrence: University

Policy-makers within the military did begin moving toward adopting some of the Reformers' ideas. In the Fall 1981, Brigadier General Donald Morelli of the Army Training and Command told reporters that Army doctrine was shifting towards Boyd's ideas "of lightly armored, highly agile units capable of pursuing the tactics of speed and deception." In April 1982, Boyd's plans received additional official endorsement, when "a task force of Army and Air National Guard officers... released their 'Vista 1999' plan for the future. Many of their recommendations are resounding echoes of Boyd."⁶⁴⁴

The Vista 1999 study by the Air National Guard did in fact repeat most of the main points made by Boyd and the rest of the Reformers, arguing for simple, austere weapons bought in large numbers. Led by Major General Francis R. Gerard, the study called for "a small, simple, lethal fighter for \$3 million a plane."⁶⁴⁵ Such standards would have eliminated the F-16 Falcon itself, which, by that point, cost around \$13 million each. Indeed, the Reformers – particularly Boyd, Sprey, and Spinney – made it clear to journalists that although they liked elements of the F-16, they insisted "that even cheaper, more austere planes should be built."⁶⁴⁶

Growing the Movement

Other writers, both in and out of the military, wrote more works that contributed to the output of the Reform Movement, giving them a larger public blueprint and a public image of increased validity. For example, Thomas E. Etzold, a Professor of Strategy at the Naval War College, wrote a book entitled *Defense or Delusion?* (1982), in which he argued that "American

Press of Kansas, 2005); and Karl-Heinz Frieser, *The Blitzkrieg Legend: The 1940 Campaign in the West* (Annapolis, Naval Institute Press, 2013).

⁶⁴⁴ Ingersoll, "Ace"

⁶⁴⁵ "Weapons," *St. Louis Post-Dispatch* (St. Louis, Missouri), Jun 10, 1982.

⁶⁴⁶ "Weapons," *St. Louis Post-Dispatch*.

military equipment is, simply, too sophisticated for its own good.”⁶⁴⁷ Sam Nunn, one of the founding members of the MRC, asserted: “What we’re going through is a slow, unintentional, unilateral disarmament by cost overrun. And what it means is that we haven’t learned how to manage technology properly.” Sprey took that same line of thinking even further: “A true pacifist would probably applaud adding \$100 billion to the defense budget. Eventually you’ll get to a defense that will hardly hurt a flea.”⁶⁴⁸ By Summer 1982, the Reformers had settled on six major weapons systems as targets, fighting for their cancellation. These included: The Trident Nuclear Submarine, Nimitz Class Carriers, the F-18 Hornet, the Apache Attack Helicopter, the M-1 Abrams Battle Tank, the Bradley Infantry Fighting Vehicle, and the F-15 Eagle, the aircraft that arguably started the movement. Their arguments against all of these systems amounted to the idea that complexity made them inherently unreliable.⁶⁴⁹ However, complex systems are not inherently unreliable; sometimes redundancy systems that increase complexity can be considered to simultaneously increase reliability. The two are not mutually exclusive concepts.

Some Reformers, including Boyd, argued that the pursuit of technology for its own sake was part of American culture and heritage, and thus resisting it took active effort. Reporter Bob Adams, summarizing Boyd’s arguments, described “the general American fascination with technology. This is a nation of tinkerers. Can any nation that invented everything from the electric lightbulb to the airplane, and put a man on the moon, be incapable of inventing a tank that will outdrive, outshoot, and outfight any other?”⁶⁵⁰ The Reformers alleged that few decision

⁶⁴⁷ Bob Adams, “Fight Brewing Over Complex, ‘Goldplated’ Arms,” *St. Louis Post-Dispatch* (St. Louis, Missouri), June 6, 1982.

⁶⁴⁸ Adams, “Fight Brewing.”

⁶⁴⁹ Adams, “Fight Brewing.”

⁶⁵⁰ Adams, “Fight Brewing.”

makers within the government or military leadership were willing or able to stop these trends, due to an epidemic of careerism. Their views stemmed from fighter pilot's traditional distrust of leadership figures who had not proven themselves in air combat. Some of the Fighter Mafia, and later the Reformers, were suspicious of military leaders who had not proved their valor in combat—hence the accusations of rampant careerism during peacetime. One reformer, Democratic Senator Thomas F. Eagleton of Missouri asserted that this careerism and the chasing of technology for its own ends was an epidemic. He stated: “There's just a mindset at the Pentagon. They can't stop themselves. It's almost indigenous to the process that you don't buy something that's functional and simple. It has to be supersophisticated—almost ahead of the state of the art.”⁶⁵¹

Speaking to the endemic nature of the bureaucratic impulse they criticized, the Reformers also criticized the close connection between government and industry, arguing that military personnel often advocated programs because they had strong ties to contracting companies and were often hired by those companies. The Reformers referred to this as a “revolving door” between the military and its contractors, and the inherent corruption of that system destroyed potentially cost-saving competition and options in terms of weapons capabilities. On that point, the Reformers had some support from across the ideological aisle. The moderately liberal-leaning organization the Council on Economic Priorities reported that between 1971 and 1979 over 2,000 individuals had used that “revolving door” to move from government positions to defense contractor positions or vice-versa.⁶⁵²

⁶⁵¹ Adams, “Fight Brewing.”

⁶⁵² Bob Adams, “‘Cheap Hawks’ preach reform,” *St. Louis Post-Dispatch* (St. Louis, Missouri), June 11, 1982.

Although the Reformers sought broad systemic changes, they continued to focus on specific hardware, especially aircraft. In early 1981, Nunn pressured sources at the Pentagon to release a fifty-six-page assessment of the F-15 Eagle written by Spinney. The report focused on the increased cost of the plane, mostly due to adding the “complex radar and missile-launching systems.” The criticism may have reflected the fighter pilot’s ideal of using one’s own eyes in air-to-air combat and using guns for kills, rather than missiles. Spinney also repeated the Reformers’ interpretation of the ACEVAL test, allegedly proving that F-15s were not superior to F-5s. He also repeated arguments about readiness, saying that the complexity of the technology made maintenance more difficult and that the F-15 was thus not mission-ready more than 44 percent of the time. He also pointed to the higher cost of training pilots, noting that one hour of training cost \$2,686 on the F-16, but \$4,600 on the F-15.⁶⁵³ Sprey was at his most extreme when discussing his vision for a lightweight fighter aircraft. By 1982, he was arguing that the austere F-16 fighter was too bloated and that what the Air Force really needed, if it was to succeed at air-to-air combat, was a plane one-third the size – “7,000 pounds or less wrapped around a 30 millimeter cannon,” and costing no more than \$3 million each.⁶⁵⁴

The Reform movement was bi-partisan, and included liberal-leaning members, but was generally ideologically conservative. To distinguish the Reformers from those conservatives who disagreed with them, but still wanted increased defense budgets and favored the advanced military hardware that the Reformers criticized, journalists began referring to the Reformers as “cheap hawks.” The group did not agree on all issues, however. Some Reformers constructed “hit lists” of programs they wanted to cancel. In addition to those previously listed, the Cheap

⁶⁵³ “Weapons,” *St. Louis Post-Dispatch*.

⁶⁵⁴ Adams, “Cheap Hawks.”

Hawks targeted the B-1 bomber and C-5 Galaxy, arguing that cutting those programs would save almost \$200 billion over five years. Other reformers thought that killing individual programs was not enough, but that systemic issues required a revolution. This group argued that canceling individual programs was just a way to “shoot the cripples,” when a better solution would be to change procurement policy from the ground up.⁶⁵⁵

Newt Gingrich became a particularly avid spokesman for the Reform Movement. He was the keynote speaker at a West Point conference in June 1982, the audience of which included Army Chief of Staff General Edward Meyer. Gingrich toured military bases and lectured soldiers on the tenets of the movement and continually expressed his opinion (and that of the Reformers) that the American military was in the midst of its largest crisis. He stated: “I am absolutely convinced that we would lose a war on the Eurasian mainland to the Russians either today or under any plans I have seen so far in this administration. [...] We have a fundamental crisis in grand strategy which, candidly, the Reagan administration has been simply sidestepping.”⁶⁵⁶

In addition to attracting members of both major political parties, the Reform Movement was not limited to politicians but included some Pentagon defense analysts, academics, and civilian specialists. Some of these had formed advocacy groups to push a Reform agenda, or something similar to it. For example, Dina Rasor, just 26 years old, became an active voice as the director of the Project on Military Procurement—a group based in Washington D.C. and funded by the National Taxpayers Legal Fund that sought to reduce wasteful military spending and was thus aligned with the Reformers. In addition to arguing for independent agencies outside

⁶⁵⁵ Adams, “Cheap Hawks.”

⁶⁵⁶ Henry Eason, “‘Small Voice’ Lobbies for Aggressive Defense,” Cox News Service, *The Palm Beach Post* (West Palm Beach, Florida), July 11, 1982.

the government that could test new weapons systems before they were purchased, Rasor and the PMP also accused the Army of blatant corruption, alleging that they falsified testing data on the M-1 Abrams battle tank.⁶⁵⁷

Partly for being a major source for journalists covering the Reform Movement, Rasor was hailed as a “leading critic of the Pentagon and acclaimed Wonder-woman of the Whistleblowers.” However, her ties to the Reform Movement became too strong in the minds of her funding sources. The head of the National Taxpayers Legal Fund fired Rasor in March 1982 because she focused so much on the Reformers and the programs they sought to eliminate – like the M-1 Abrams – and so little on the broader range of issues intended by the PMP.⁶⁵⁸

Blood for Money

For some, then, close association with the Reformers could be a liability. Certainly, many policymakers found the Reformers’ ideas less than ideal, even dangerous. Kross’s critiques sought a balance, although he was particularly biting at times. For example, Kross admitted the appeal of the Reformer’s ideas, but he ridiculed them at the same time. “They’re smart,” he said, “and their ideas are eminently appealing. You can easily wish yourself into believing you can get ‘more’ for ‘less’ – particularly if you don’t have an understanding of modern tactical war.”⁶⁵⁹

Some critics of the movement went further. Secretary of Defense Weinberger argued that complexity was desirable to deal effectively with Soviet weapons. He claimed: “The Soviets have very large numbers of very complex, very sophisticated, very survivable weapons. And we have to equip our people so that they can compete on equal terms. What we feel we need is not

⁶⁵⁷ Adams, “Cheap Hawks”

⁶⁵⁸ “Military reformer fired from project,” originally for the *Chicago Sun-Times*, reproduced in *The Odessa American* (Odessa, Texas), March 27, 1982.

⁶⁵⁹ Adams, “Cheap Hawks”

gadgetry, or complexity, or technology, for its own sake. It's simply to keep our weapons at least equal to, the Soviets' weapons. We don't think we ought to send our troops up in weapons we know are inferior.” Republican Senator John G. Tower of Texas went even further, castigating the Reformers. “Are you going to trade blood for money,” he asked, “and put your guys in an M-60 tank that won't stay on the battlefield with a Russian T-72 or T-80? The Russians have 50,000 tanks. What are you going to do—buy 100,000 (cheaper) tanks and put them out there knowing that only some will survive?”⁶⁶⁰

The F-15 remained one of the more contentious points, as opposing it was close to the heart of the original Reformers themselves. Yet it had become a symbolic rallying point for the Air Force establishment, who sought to protect it, and these defenders had solid points to make as well. In response to the charge that the F-15 was too complex, Major General Albert G. Rogers, the Deputy Chief of Staff for Logistics at TAC, argued: “Imagine the logistical problems when the longbow replaced the spear. What happened when the bow got wet? Or when it dried out again? And you lost your arrows a lot? And you had little guys who couldn't pull the bow? But the longbow played hell with the spear-throwers. It killed them before they got close enough to throw their spears.”⁶⁶¹ This quotation characterizes what those who opposed the Reformers thought: That the MRC's arguments were so extreme that they had become absurd caricatures of themselves. Some critics simply argued that members of the MRC were not knowledgeable about military issues and should be ignored. Richard DeLauer, Undersecretary of Defense for Research and Engineering, cited as the “Pentagon's top procurement official,” claimed: “A lot of them [the MRC members] don't know what they're talking about. I can't talk to Nancy

⁶⁶⁰ Bob Adams, “Fight Brewing.”

⁶⁶¹ Adams, “Fight Brewing.”

Kassebaum, I talk right by her. Her eyes glass over when I talk about trade-offs between survivability and capability and sophistication.”⁶⁶²

Donald Malvern, the President of the F-15’s manufacturer, McDonnell-Douglas, defended the aircraft against charges of gold-plating. He argued that reducing the terms of the debate to “simple” versus “complex” was simplistic, ignoring the realities of designing weapons systems. He claimed: “Anybody who talks glibly about ‘goldplating’ doesn’t know what he’s talking about. We’re not in favor of goldplating. We’re not in favor of complexity. The simplest adequate solution is usually the best. But it’s a complicated problem to determine what that simplest adequate solution is.”⁶⁶³

Other Air Force leaders rejected the Reformers’ claims on other grounds. They noted that Soviet aircraft made use of many of the technological advantages that the Reformers argued against, especially long-range radar and all-weather capability, similar to that of the F-15. General Rogers of TAC insisted: “We’re not in a numbers game.” Qualitative superiority was more important numerical superiority. Kross also went to the press to contextualize Spinney’s arguments about readiness, saying that the Reformers were cherry-picking their data and that the decision to buy fewer spare parts was a deliberate decision – not a result of bad bureaucracy. He clarified: “We were forced to ask which would be better by 1984: combat-ready wings of F-4s or a new generation of fighters like the F-15. We decided to go for the planes first and the spare parts later. Spinney measured readiness at its nadir.”⁶⁶⁴ Lieutenant General John T Chain Jr., USAF Deputy Chief of Staff for Plans and Operations, openly ridiculed the Reformers,

⁶⁶² “Pentagon worried by Military Reform Caucus,” *The Des Moines Register* (Des Moines, Iowa), December 28, 1983.

⁶⁶³ “Weapons,” *St. Louis Post-Dispatch*.

⁶⁶⁴ “Weapons,” *St. Louis Post-Dispatch*.

nicknaming them “fuzzy heads,” and he claimed that they were “doing a disservice to the country” by pushing for “plain vanilla airplanes.”⁶⁶⁵

Countering the Reformers’ insistence that the ACEVAL tests proved the impotence of the F-15, the Air Force’s head spokesman for the F-15 program, Lieutenant Colonel Robert Nicholson, emphasized that the design of the tests eliminated all of the advantages of the F-15, so that it was not a fair trial of the plane’s combat capability. He specifically spoke against the very model of the World War I “knights of the air,” engaged in a style of combat that had become a thing of the past that the F-15 could avoid. He explained that the F-15’s superiority did diminish in a dogfight, but that Eagle pilots are trained to avoid that situation entirely. “The F-15 has the ability to fly out of a dogfight,” he said. “You want to avoid a dogfight in the World War I sense, where planes are thick as flies. We train our people to shoot down the enemy before they even know we’re around.”⁶⁶⁶ Admitting that missiles were not yet the perfect solution, Air Force planners pointed to the then-under-developed AMRAAM (Advanced Medium Range Air-to-Air Missile) as the solution to missile problems.

The Assistant Secretary of the Air Force for Manpower, Reserve Affairs, and Installations, Tidal W. McCoy, disagreed with the Reformers but sought a middle ground. Although he still argued that complex weapons had capabilities that could make them inherently superior to the simple weapons Reformers wanted, he also argued that high-tech weapons could—by nature of their advanced technology—become cheaper and actually easier to maintain. In this way, technological advancement could solve the cost problem. For him, simple

⁶⁶⁵ Charles Mohr, “Arms Numbers Decline as Costs Climb.” *Daily Press* (Newport News, Virginia), October 24, 1982.

⁶⁶⁶ “Weapons,” *St. Louis Post-Dispatch*.

and cheap were not automatically linked. He used Boyd's pet project—the F-16, and specifically its ground-attack capability, the element of the F-16 that Boyd objected to the most—to make his case. By comparing the bomb load of the Falcon to that of the B-17, McCoy argued that the damage done in the Schweinfurt raids of World War II—which required 291 aircraft and 2,910 crew members—could be done with only six F-16s. Yet the F-16 only cost 1.6 times the cost of a B-17. McCoy summarized: “If an opponent has a technologically superior weapon in sufficient quantity to inflict credible damage on another's forces, he will win the conflict. There really are absolutes in national defense. We are discussing the difference between deterring or winning a war and losing it, not the difference between driving a Chevrolet and a Rolls-Royce.” He then turned the Reformers' often-used analogy of France in 1940 against them, arguing that their insistence on simple, cheap weapons was the true “Maginot Line mentality.” He said: “The defense of this nation cannot rest of yesterday's fortifications. We cannot fall behind a 'Maginot Line' of less sophisticated equipment and expect to win a conflict that is both technologically and numerically superior. The national defense effort must continue to be based on sophisticated technological advantages that make our weapons highly capable—and simpler to operate and maintain.”⁶⁶⁷

Fierce Beliefs

The Reformers countered these critiques by clarifying their views. For example, Nunn was careful to guard against the claims that the Reformers were inherently opposed to technology. He clarified: “People say, ‘That crazy bunch—they want to use Piper Cubs instead of F-15s.’ That's a strawman argument. We need high technology. But we don't need to put every

⁶⁶⁷ Tidal W. McCoy, “Arms quality is vital priority,” *Chicago Tribune* (Chicago, Illinois), June 28, 1983.

new gadget on every new weapon system.”⁶⁶⁸ Countering the idea that the Soviet threat had a qualitative advantage from complex technology, the Reformers accused the Pentagon of inflating the Soviet threat. According to one reporter who spoke to many MRC members, “They [the Reformers] see the Pentagon using a puffed-up version of the Soviet threat to justify the bells and whistles it wants to add to American weapons.” Democratic Representative from Wisconsin Les Aspin, a former Pentagon employee and later Secretary of Defense, alleged that estimates of Soviet military spending did not show their actual spending; they gave the amount that the US would have to spend to match. Thus, for example, inflation in the United States could make it seem that the Soviets had increased spending, when, in actuality, they had not.⁶⁶⁹

Some voices in the Air Force thought that it was unsafe to speak openly to the press if they agreed with the Reformers. Noting that they were “sympathetic” to the Eagle overall, some anonymous sources approached the *St. Louis Post-Dispatch* to say: “The people planning our force structure are already going around the Air Force saying: ‘We’ve got to get off this [F-15] horse. It’s too expensive.’ I can see the handwriting on the wall.”⁶⁷⁰ This might lend some credence to the Reformers’ paranoia that the Air Force was actively seeking to silence their movement, or it may have been an example of how Reformers cultivated that paranoia to garner support for their cause.

Senator Thomas Eagleton (D-MO), one of the Reformers, revealed the degree to which “complexity” and “expensive” were relative constructions, by holding up the F-4 Phantom as a model of a simple, easy-to-operate, easy-to-maintain aircraft that was reasonable in cost.⁶⁷¹ The

⁶⁶⁸ Adams, “Fight Brewing.”

⁶⁶⁹ Adams, “Fight Brewing.”

⁶⁷⁰ “Weapons,” *St. Louis Post-Dispatch*.

⁶⁷¹ “Weapons,” *St. Louis Post-Dispatch*.

irony in that stance was that, at the time of the F-4's design, it was considered in much the same terms as the F-15 Eagle was at the time of its design—it was considered complex, expensive, too advanced for its own good.⁶⁷² Yet by the early 1980s, although the Phantom was approaching obsolescence, it appeared relatively stable, simple, and affordable by comparison. Although Eagleton likely did not mean to do so, he made it clear that most of the Reformers' main arguments were relative to their own moment in time. Most new weapons platforms, just like most new technologies in other contexts, can seem complex and expensive at the moment of their creation; yet over time, advancement continues rapidly, making the once complex and expensive seem simple and cheap by comparison.

Despite criticism from some corners, the Reformers, for the most part, had the media on their side. Many reporters may have been attracted to the movement because of the “David vs. Goliath” story it seemed to embody, in which the Reformers seemed to be brave underdogs or outsiders fighting against a monolithic machine. On a surface level, their arguments seemed to have weight. Certainly, many reporters struggled to understand the debate over quality versus quantity. They pointed out repeatedly that defense spending was increasing rapidly, but the Air Force inventory had fewer planes than before. They also argued that buying newer weapons meant those weapons had not been tested in combat.⁶⁷³ Yet mere numbers of aircraft are not a solid measure of effectiveness, especially if the capabilities of those planes are not fully assessed. Obviously new technologies had not been tested in combat—since the United States had not fought in a major conventional conflict since 1973, none of the weapons developed since then

⁶⁷² For more on the Phantom's design process see Bugos, *Designing the F-4*; and Hankins, “The Phantom Menace.”

⁶⁷³ An effective summary of these points can be found in Mohr, “Arms Numbers.”

had been used in real combat situations. But this did not mean that the United States should restrict itself to equipment used in previous wars. In fact, this was logically impossible to do.

The Reformers actively sought press coverage as much as they could. They kept lists of journalists who reported on military matters and who regularly produced opinion pieces. Representative Jim Courter (R-NJ), who co-chaired the MRC in 1984, wrote several pieces advocating the reform movement in major media outlets such as the *Wall Street Journal*, *New York Times*, and *Christian Science Monitor* in addition to making regular television appearances on programs such as the *Today Show* and the *McNeil-Lehrer News Hour*. In addition, certain members of the caucus often pressed for the release of documents proving their case. They could thus portray themselves as forcing the Pentagon to release documents that proved the Reformers right—however in most cases these documents were written by other Reformers who had worked within the Defense Department. For example, Nunn pressed for the release of Spinney’s briefing in 1983, and then, the next year, Courter pressed for the release of a report about mistakes made in the Grenada invasion that proved the reformers’ views correct—that document happened to have been written by William Lind.⁶⁷⁴

The Reformers’ appeal was at least in part based on their ability to portray themselves as an oppressed minority that the mainstream bureaucracy was attempting to suppress—much as fighter pilots in the era of strategic bombing had seen themselves as an oppressed minority within the Air Force. There may have been some truth to the charge of suppression, although obtaining non-biased sources is nearly impossible. One potential example came in January 1983,

⁶⁷⁴ Robin Goldstein, “Courter: watchdog of the military,” *Asbury Park Press* (Asbury Park, New Jersey), June 8, 1984; Lance Gay, “General blames rules for loss of several copters in Grenada,” *The Pittsburgh Press* (Pittsburgh, Pennsylvania), June 23, 1984.

when a study that Spinney had produced internally within the Pentagon was made public. It called for sweeping reforms and argued that increasing military spending would not solve any of the problems with American defense. According to the *New York Times*, the Spinney report had been repeatedly suppressed by Pentagon officials, and Spinney had been ordered to cease giving briefings to any other Pentagon employees.⁶⁷⁵ Two months after the article in the *New York Times*, Spinney was featured in the cover story of *Time* Magazine. The story cast Spinney as a “mystery man and maverick” and Boyd as “clear thinking,” a “rebel,” someone “fierce in his beliefs.” The story credited Nunn with forcing the “Defense Facts of Life” briefing to be declassified, despite objections by superiors at the Pentagon. The story also claimed that leaders in both the Air Force and the Department of Defense routinely ordered Spinney to lie and to falsify his data and that they had threatened to fire him many times.⁶⁷⁶

Fitzgerald, the whistleblower who had released documents showing cost overruns on the Minuteman missile and C-5 aircraft programs, also told similar stories. He asserted that in the Pentagon “lying was a way of life” and that corruption was so rampant that government agencies were frequently “offering private contractors blank checks to build weapons.” He claimed that, after going public in the late 1960s, he was mildly threatened; then, instead of being fired outright, departmental restructuring eliminated his position. He also claimed the Pentagon falsified his personnel records to say that he was a frequent marijuana user, a womanizer, and a closet homosexual. How both of the latter two contradicting assertions could be convincingly true was not addressed. In any case, Fitzgerald’s arguments about waste predated the Reform

⁶⁷⁵ Charles Mohr, “Pentagon Budget Planning Criticized by 2 Studies,” *New York Times*, January 12, 1983, [<http://www.nytimes.com/1983/01/12/us/pentagon-budget-planning-criticized-by-2-studies.html>] accessed Nov 19, 2017.

⁶⁷⁶ George Church and Christopher Redman, “Pariah at the Pentagon,” *Time* 121 (Issue 10, March 7, 1983), 38-39.

movement itself, although his arguments, as well as his religious allegories, were often used by the Reformers. Fitzgerald's 1972 book *The High Priests of Waste*, referring to the Pentagon establishment, was accompanied by nationwide promotional tours.⁶⁷⁷

The Department of Defense denied these allegations. Verifying whether these incidents happened is not possible beyond the inherently biased oral histories. In any case, this depiction of the Reformers as underdog outsiders attacking a corrupt system, or as faithful believers holding true to a cause they thought was just, drew on the image of the "knights of the air" that had motivated the movement to begin with, while making the movement more sympathetic to the press and the public.

Support for the movement grew to include non-government organizations and think tanks. The strongly conservative Heritage Foundation became closely aligned with the Reform Movement. In 1981, the foundation released a book called *Reforming the Military*, edited by Jeffrey Barlow, which featured a collection of essays arguing for the Reformers' agenda written by Reformers. The collection included an article on the Marines by William Lind, and one on tactical air power by Pierre Sprey. In 1983, the foundation released a study by George W.S. Kuhn that echoed the reform agenda. Kuhn's work was featured in another Heritage Foundation publication, *Agenda '83*. The organization did attempt to have some balance, such as a discussion of how complex weapons can be effective and affordable, in an essay by McCoy and

⁶⁷⁷ William McGowan, "Cost analyst blew whistle on Air Force," *Pensacola News Journal* (Pensacola, Florida), November 5, 1984; A. Ernest Fitzgerald, *The High Priests of Waste* (New York: Norton, 1972).

American Foreign Policy Council Fellow Sven Kraemer in the first volume of the series *Mandate for Leadership: Policy Management in a Conservative Administration*.⁶⁷⁸

Other supporters sought a middle ground as well. Some analysts agreed that American defense was in a state of crisis, although they might disagree with the Reformers as to what the solutions were. For example, Jeffrey Record, a professor at the Air War College, agreed that American defense had been undermined by an over-reliance on technology. Calling back to a constructed memory of earlier combat—just as the image of the “knights of the air” had done—he took the Reformers’ mantra of men being more important than machines to a further extreme, arguing that technocratic values had replaced the “traditional warrior values” of the military. Record implied that the management and technocratic impulses he criticized were so harmful that they were actually treasonous and deserving of court-martial. However, he did also balance this by saying that “some of [the Reformers] proposed reforms would probably create more problems than they solve” and not everything they argued for should be followed. However, he concluded: “If the reformers do not have invariably correct answers, they are nonetheless asking the right questions. And the military-reform movement is not responsible for the past 35 years of military malpractice.”⁶⁷⁹

Like many of the Reformers, Record saw the problem with American defense as specifically a cultural issue. He, like other Reformers, argued that American culture was too focused on technology for its own sake, while dismissing the human element. He claimed that

⁶⁷⁸ Jeffrey G. Barlow, ed., *Reforming the Military* (Washington, D.C.: The Heritage Foundation, 1981); Richard N. Holwill, *Agenda '83* (Washington, D.C.: Heritage Foundation, 1983); Charles L. Heatherly, *Mandate for Leadership: Policy Management in a Conservative Administration* (Washington, D.C.: Heritage Foundation, 1981).

⁶⁷⁹ Jeffrey Record, “Unprepared: Can U.S. make war even if it wants to?” *The Montgomery Advertiser* (Montgomery, Alabama), February 2, 1984.

the US military had an “unbridled [...and] unwarranted—faith in technology” and that “[t]he American military is culturally, as well as by professional training and education, prone to disregard the fact that war remains first and foremost a human encounter.”⁶⁸⁰

Rise and Fall

The Reform Movement and the MRC were deliberately bi-partisan and appealed to certain individuals on both sides of the ideological aisle. However, the movement did lean conservative, and it became more so over time. This divide in political ideology appeared as early as 1982, when A. Ernest Fitzgerald, the whistleblower who called out escalating costs on the Minuteman III missile and C-5 aircraft programs, argued: “Some liberals will say: ‘I don't want a more efficient military force.’ The cheap hawks say: ‘Yes, I do—but one we can afford, and one that really works.’”⁶⁸¹

By Summer 1983, as conservative politicians and organizations such as the Heritage Foundation began to have a stronger voice in the Reform Movement, they began to reject some of the liberal members as not being true believers in the cause. Religious imagery continued to be used as members of the Reform Movement fought about the true tenets of their faith. In July 1983, Edwin Feulner, the first President of the Heritage Foundation, attacked liberals in the group for jumping on the bandwagon of the Reformers, just so they could make cuts in defense spending. He claimed: “What started as an in-earnest effort to strengthen U.S. defenses—get ‘more bang for the buck’—is being used by congressional disarmers to indiscriminately chop into the defense budget.” He particularly targeted Hart, the Colorado Democrat, whom Feulner

⁶⁸⁰ Jeffrey Record, “Has America’s military lost its fighting effectiveness?” originally for *The Washington Post*, reproduced in *The Age* (Melbourne, Victoria, Australia), June 4, 1984.

⁶⁸¹ Bob Adams, “Cheap Hawks.”

dismissed as “one of those who continues to parade around in the dress blues of military reform, as if wearing some holy man's garb.”⁶⁸²

By December 1983, the MRC had 70 members, and reporters noted: “The caucus has taken on a more conservative look lately.” Representative Jim Courtier (R-NJ) took on a leadership role, and more conservatives such as Senators Charles Grassley (R-IA), Jeremiah Denton (R-AL), William Roth (R-DE), and Nancy Kassebaum (R-KS) joined the movement. The MRC had no official office space and no staff. All that was required of members was regular attendance at an occasional Thursday morning breakfast.⁶⁸³

One area in which the Pentagon establishment and the Reformers agreed was in the area of maintenance and readiness. Congressman Whitehurst and Secretary Weinberger clarified that when previous sessions of Congress decreased the military budget, large cuts were made to maintenance, producing a backlog of requests. Kross estimated that from 1976 to 1980, \$5 million had been removed from maintenance spending. Although he was a fierce critic of the Reformers, he also admitted: “If the reformers hadn't yelled about readiness, we'd have had a national scandal.”⁶⁸⁴

The Reformers did have some concrete successes. In May 1981, Congress passed the Nunn-McCurdy Act, which set certain budget thresholds for weapons procurement. The Department of Defense was required to report to Congress if a program's costs increased by

⁶⁸² Edwin Feulner, “Military reform important, but not Hart's plan,” *The Daily Reporter* (Greenfield, Indiana), July 6, 1983.

⁶⁸³ “Pentagon worried,” *The Des Moines Register*.

⁶⁸⁴ Adams, “Cheap Hawks.”

more than 15 percent of its present estimate, or more than 25 percent of its original estimate.⁶⁸⁵ Throughout the early 1980s, the Reformers succeeded in inserting a number of amendments to various defense authorization bills. These usually amounted to statements that Pentagon officials must be more careful in their consideration of procurement decisions.⁶⁸⁶ These amendments were modest in scope and lacked the sweeping change the reformers wanted, but they were successful at least in moving the needle and in growing support for their cause.

On August 6, 1982, the MRC became a bit more aggressive. In response to Reagan's comments that he intended to increase military spending beyond the amounts agreed to by Congress, 23 House Republicans, prompted by Reformers Gingrich and Whitehurst, issued a letter to the President threatening to purposefully block his legislation agenda. The letter stated, "We have worked together successfully to pass our national agenda, but this pattern could be destroyed if your comments on defense spending are put into action."⁶⁸⁷

The Reform Movement reached its greatest height around 1985. Riding their small successes, by May of that year, the MRC had risen to 106 members—26 Senators and 80 Representatives, co-chaired by Representative Dennis Smith (R-OR), Senator David H. Pryor (D-AR), and Representative Mel Levine (D-CA). Senator Barry Goldwater was also identified by some press outlets as a "spearhead" of the movement. One of the movement's larger successes came in 1983, when they won passage of an amendment creating an office for

⁶⁸⁵ Moshe Schwartz, "The Nunn-McCurdy Act: Background, Analysis, and Issues for Congress," Congressional Research Service, 7-5700, R41293, available online [<https://fas.org/sgp/crs/misc/R41293.pdf>], accessed October 27, 2017.

⁶⁸⁶ Eason, "Small Voice."

⁶⁸⁷ "Warning to Reagan," *Longview News-Journal* (Longview, Texas), August 23, 1982.

weapons testing independent of the Pentagon.⁶⁸⁸ After this, the MRC pushed for a large number of even more controversial reforms. Attacking the flawed F-16, the caucus (at Courtier's insistence) demanded a flyoff competition between the F-16 and the F-20 Tigershark, arguing that the simpler, cheaper F-20 could be a potential replacement, especially for National Guard units. Goldwater pressed for a massive restructuring of the entire military leadership. Many of these changes were implemented as the 1986 Goldwater-Nichols Act. Although this type of structural reform to reduce inter-service rivalry and simplify chain-of-command issues was not necessarily a key tenet of the Reformers, they nonetheless had a least some hand in producing it.⁶⁸⁹

Although Gary Hart had been, to some extent, rejected by the more conservative faction of the movement, he still made the Reform cause part of his bid to obtain a presidential nomination in the primary election process in 1988. Regardless of his status within that community, he published a book that did promote generally the same causes and arguments of the movement. Released in 1986, *America Can Win: The Case for Military Reform* was co-written with William Lind. The book not only spread the reform gospel further, it also painted a vivid picture of the way in which many Reformers saw themselves. Hart described them (and thus himself), as "a loose band of intellectual and political guerrilla fighters... ambushing the

⁶⁸⁸ "Pentagon worried," *The Des Moines Register*.

⁶⁸⁹ William Ringle, "Caucus wants answers on defense windfall," *Pensacola News Journal* (Pensacola, Florida), May 24, 1985; "Military Reform Caucus criticizes inflation figures," *Statesman Journal* (Salem, Oregon), May 24, 1985; Wayne Biddle, "Northrop F-20 gets a fighting chance," *The San Bernardino County Sun* (San Bernardino, California), June 8, 1985; Jim Stewart, "Report: Disband Joint Chiefs," *The Palm Beach Post* (West Palm Beach, Florida), October 17, 1985; Gary Hart, and William S. Lind. *America Can Win: The Case for Military Reform* (Bethesda: Adler & Adler, 1986).

defense establishment with unexpected questions, unwelcome facts and innovative alternatives.”⁶⁹⁰

Despite Hart’s efforts, the movement continued to swing in a more conservative direction. In 1986, two who had been in the MRC – Senator Charles Grassley (R-IA) and Congressman Dennis Smith (R-OR), who was also a former Air Force fighter pilot who flew F-4s in the Vietnam War – became the co-chairs of a group simply called “The Foundation,” whose mission was to provide increased oversight of military procurement. The Foundation immediately hired Paul Hoven and Joseph Burniece, two whistleblowers nicknamed “The Pentagon Moles,” who had previously worked to publicize cost overruns in the Pentagon. The formation of The Foundation was a calculated move to place oversight in a more strictly conservative light. Dina Rasor, former head of the PMP and author of the 1985 book *The Pentagon Underground*, which promoted the Reformers’ ideas, had attempted to keep the PMP from becoming ideologically aligned in any one direction. Grassley and Smith’s new organization was specifically designed to pull more conservatives into defense debates.⁶⁹¹

The MRC continued going strong for a number of years, but by 1987 the movement had already begun to lose most of its steam. Boyd and Sprey slowly lost their access to key policymakers and they were no longer sought-after around Washington D.C. Sprey became so frustrated that he quit his position as a consultant at the Pentagon to open up a music recording studio. As members of the media and popular press became less interested in him, Boyd tried to focus on making new briefings that rehashed his philosophical ideas from *Destruction and*

⁶⁹⁰ Richard Halloran, “Hart military book has ‘88 in mind,” *Detroit Free Press* (Detroit, Michigan), May 2, 1986.

⁶⁹¹ William Ringle, “Conservative GOP’ers lead team that stamps out government abuse,” *Florida Today* (Cocoa, Florida), June 3, 1986; Dina Rasor, *The Pentagon Underground* (New York: Times books, 1985).

Creation, but he became increasingly withdrawn and spoke of longing for assisted suicide. After suffering some health problems, deep depression, and a series of incidents in which he committed gross violations of the policies at his apartment complex, Boyd moved to Florida, where he settled into a routine of listening to television news and shouting death threats at the screen whenever a Pentagon official or General appeared.⁶⁹²

Burton also pronounced the death of the Reform Movement around 1987, arguing that it had begun to die as soon as it shifted its focus to Washington D.C. He charged that the members of the MRC had “abandoned their troops under fire,” the troops in this case being Reformers like Sprey, Razor, and Lind, while the enemy doing the “firing” was the US government and the media. By 1987, the “spark and fire” of the movement had apparently died.⁶⁹³

This was an exaggeration, as the media was continuing to discuss the issues, and the MRC still functioned. However, certainly by 1989, the pace of deterioration increased. The caucus membership was slowly beginning to decline. In that year, it boasted 91 members. Despite taking a hard lean towards conservatism, some liberals were still active in the group, including Representative Barbara Boxer, a liberal California Democrat who, in 1989, co-chaired the caucus with conservative Delaware Republican William Roth. Other ideologically opposed members included Representative Joseph P. Kennedy II, a liberal Massachusetts Democrat, liberal Senator Alan Cranston, a Democrat from California, Texas Senator Lloyd Bentsen, a conservative Democrat, as well as conservative Wyoming Republican Congressman Dick

⁶⁹² Coram, *Boyd*, 415-420.

⁶⁹³ Burton, *Pentagon Wars*, 237.

Cheney, who was a member of the caucus until he was tapped to be Secretary of Defense in March of that year.⁶⁹⁴

What kept this diverse group together, in addition to the goals of the reform movement itself, was a sentiment of resistance to established authority. One analyst from the Government Accounting Office noted: “It's [the MRC] made up of the people who are not in the establishment, in the sense of who is in the managing hierarchy. It's not a powerful position to be in, but it's truthful and it's honest.” The anti-establishment mindset, the sense of being an outsider David fighting against a corrupt Goliath was a powerful motivating force, and it explains much of the group’s appeal. However, their own successes worked against them. To remain in the spotlight, an anti-authority cause needs continued anger and resistance. As the Reform Movement began to have some success, the sense of crisis seemed to wither away, and the energy motivating the group began to slowly dissipate. As one reporter argued, “the urgency for the caucus has declined in recent years, as the House and Senate Armed Services Committees have become more receptive to reform issues.”⁶⁹⁵

Conclusion

Although the Reform Movement was much broader than the Fighter Mafia, it was motivated by similar concerns and a similar culture. The Fighter Mafia had taken the characteristics of the “knights of the air” mythology – aggressiveness, competitiveness, individualism, resistance to authority, heroic imagery, protectiveness toward their own community, and adherence to their own favored technologies – to an extreme. The Reform

⁶⁹⁴ Celia Cohen, “An unlikely team: Bill Roth and Barbara Boxer: Delawarean, Californian unite to fight Defense waste,” *The News Journal* (Wilmington, Delaware), May 14, 1989.

⁶⁹⁵ Cohen, “An unlikely team.”

Movement had taken these ideas and applied them to the military as a whole, arguing that only their small community fought for truth and justice against a corrupt bureaucracy, that undue complexity was destroying American defense, and that the country needed to return to simpler weapons. The very idea of “simplicity,” however, was not only completely relative to specific periods, since older weapons that seemed complex at the time of their creation always seemed simple later on, but it spoke to a constructed, imagined past where older forms of fighting were superior and more desirable than newer, seemingly “complex” ones. Their idea that more effective defense equipment could be procured for less money was attractive to many on both sides of the political aisle, and thus a strong amount of support grew quickly.

If one of the Reformers’ chief complaints was that these new complex, expensive weapons had not been fully tested in the crucible of live combat—that was about to change. On August 2, 1990, the Iraq Army, under the leadership of Saddam Hussein, invaded the neighboring country of Kuwait. After a decade of harsh debate and internal reappraisal, the United States was about to find itself in a large scale conventional war against a major military power for the first time since the Vietnam War. Within a matter of days, some observers, including an anonymous Congressional analyst, hailed the Iraqi crisis as “a test case” for procurement policy and the contrasting ideas of the mainstream defense community and the Reformers. The latter began preaching that the end was near—that America was about to realize that they should have listened to the Reformers all along. Gary Hart, parroting the words of James Fallows from ten years earlier, wrote an article for the *New York Times*, arguing that the United States was “virtually muscle-bound in dealing with regional conflict” and that “[t]he

vaunted military buildup of the 1980s fails us. We are prepared for a nuclear war with a disintegrating Soviet Union and unprepared for military action in Kuwait.”⁶⁹⁶

The Reformers were right that Iraq would indeed serve as a test case for the issues that had been debated for the previous ten years. But it would not prove to be the vindication they so desperately sought.

⁶⁹⁶ Robert Becker, “Post-Cold War crisis challenges defense budget,” *Daily Press* (Newport News, Virginia), August 9, 1990.

Chapter 10 - Desert Storm: Reform or Revolution?

In the aftermath of the Vietnam War, all of the US military services experienced some form of identity crisis, questioned their past assumptions, and initiated some sort of reforms.⁶⁹⁷ Just as the 1920s and 1930s had become a period of massive doctrinal and technological change, for the United States, the 1970s and 1980s can be considered a second interwar period – between the large wars of Vietnam and Iraq.⁶⁹⁸ Like the period between the world wars, this second interwar period saw a massive amount of doctrinal and technological change. Boyd and the Reformers attempted to guide these changes, first in the Air Force and eventually across all four services. They never seemed happy with the results, yet they did have some success in contributing to these efforts and sometimes even governing them.

The changes were put to the test in the Gulf War. For some observers, the Reformers were proved wrong in the war against Iraq in 1991. The Reformers themselves, however, interpreted the conflict as vindication—Boyd himself even claimed personal credit for the American victory. There are kernels of truth to be found in both positions, but the most useful way of evaluating the Reformers in light of the Gulf War is to say that it was not at all like the future war they predicted. In that sense, the Reformers truly failed. The measures that they advocated were intended to be used in a certain kind of war—one that never actually happened. In that sense, their ideas were never truly tested, but what did happen made clear that the Reformers' ideas did not have universal application. If the Reformers were right, they were right in a hypothetical scenario that never occurred.

⁶⁹⁷ A useful overview of reforms in all the services can be found in Herring, “Preparing.”

⁶⁹⁸ Of course, there were many smaller military conflicts during this period, but none took on anywhere near the size in terms of blood and treasure as the larger wars around it.

Be All You Can Be

The Army initiated widespread doctrinal change in 1973, reforming their entire approach to war fighting. That process began when General William E. DePuy became the first head of the Army Training and Doctrine Command (TRADOC). Heavily influenced by the recent Arab-Israeli Wars, DePuy released a heavily revised Army Field Manual 100-5, *Operations*, in July 1976. The manual assumed that the tempo of future wars would be far faster than anything previously experienced, and thus the US Army needed to emphasize training, suppression, use of their terrain, and the use of combined arms to increase lethality.⁶⁹⁹

Boyd and the Reformers were not impressed with these attempts at change, arguing that they merely restated earlier doctrines based on firepower and frontal assaults. They also seemed too focused on defense, rather than embracing Boyd's ideas of agility, speed, and movement. William Lind, when lecturing at institutions in all four services including the Army, referred to the new Army doctrine as a "piece of garbage." Boyd himself ridiculed the Army for spending months to come up with a new doctrine that he considered essentially the same as their old one. Allegedly, in the late 1970s, whenever Boyd gave a briefing and noticed Army generals in his audience, he would hold a copy of the 1976 manual over his head and proclaim, "It's a piece of shit."⁷⁰⁰

Once again, the Reformers' ideas were influenced by their constructed institutional memory of "knights of the air." In his critique of the 1976 manual, Burton noted "the 1976 Army doctrine advocated maneuver of our friendly forces in order to get in front of the enemy to slug it out—maneuver in order to shoot at the enemy. Boyd preached the opposite—shoot in order to

⁶⁹⁹ John L. Romjue, "The Evolution of the Airland Battle Concept," *Air University Review*, May-June 1984.

⁷⁰⁰ Burton, *Pentagon Wars*, 53; Coram, *Boyd*, 370.

create opportunities to maneuver—and maneuver in order to create chaos, panic, and collapse and get behind the enemy to capture its forces. ‘Fighter pilots always come in the back door, not the front,’ he stated over and over.”⁷⁰¹ The concepts that Boyd and the Reformers attempted to press not only on the Army but on the entire United States military were deeply rooted in Boyd’s conception of the true fighter pilot, linked to his understanding of the “knights of the air” mythology.

In 1977, DePuy was replaced as head of TRADOC by General Donn A. Starry, who had previously had a hand in writing a revised version of the 1976 Manual 100-5. In 1978 and 1979, Starry, partnering with Army Chief of Staff General Edward C. Meyer, sought to improve the Army’s doctrine further, questioning the defensive posture embedded in their previous manuals. Through a series of wide ranging studies in those years, Starry and Meyer began to develop the idea of the “extended battlefield.” Under this concept, commanders at various levels needed to see further into enemy rear areas, and think in terms of time frames. In other words, the battlefield became multidimensional, incorporating a time dimension, a much deeper space dimension, and air and land dimensions, as well as potential chemical or nuclear dimensions. All of these had to be juggled in different ways by various levels of command. Time was the crucial factor, as each commander had to plan and think in terms of what state the hypothetical battle would be in in either twelve, 24, or 72 hours from any given point. It also called for US forces to be far more aggressive. This was not just an “active defense” – it focused more on the offensive, seeking to predict and prevent Soviet rear-echelon forces from being active in the front line. This

⁷⁰¹ Burton, *Pentagon Wars*, 54.

kind of planning called for careful coordination with ground and air assets, which is why the doctrine earned the name “AirLand Battle.”⁷⁰²

The new doctrine was officially published in a new Field Manual 100-5 and made public in March of 1981, during the time when the Reform Movement was becoming increasingly active. A thorough analysis of the details of AirLand Battle is not necessary here, although it should be clear from this brief sketch that it bears some similarities with Boyd’s ideas from *Patterns of Conflict*. They shared insistence on movement, aggressiveness, agility, increased tempo, and the comparison to doctrine in the German *Wehrmacht* during the Nazi regime. One of the main originators of the new doctrine was the Deputy Chief of Staff at TRADOC, Major General Donald Morelli. He described AirLand Battle in many of the same terms that Boyd himself used, saying that the new battle concept would “stress the use of lightly armored, highly agile units capable of pursuing the tactics of speed and deception.” The press tended to discuss this concept in the context of the reform movement, so clearly the connection between Boyd’s and the other Reformers’ work was linked openly with the development of AirLand Battle.⁷⁰³ The *New York Times* also described the new doctrine using almost the exact same language that Boyd had used: “The new doctrine, which has been described as the most fundamental change in strategy since the Civil War, departs from the traditional emphasis on a war of attrition with massed firepower on a well-defined front. AirLand Battle, as described in the new Army field

⁷⁰² Romjue, “The Evolution.”

⁷⁰³ Bruce Ingersoll, “Ace of the fighter pilots has a new theory of war,” originally for the *Chicago Sun-Times*, reproduced in *Detroit Free Press* (Detroit, Michigan), May 5, 1982

manual, calls for deep counterattacks behind enemy lines coupled with a tactical use of agility, deception and surprise.”⁷⁰⁴

Whether or not Boyd and the Reformers had any direct influence on DePuy, Starry, or Morelli is unclear, although the press certainly tended to conflate the two groups because of the similarities in their basic ideas. It could be a case of coincidental parallel thought at a time when all services were attempting to move away from the models of warfighting used in Vietnam. However, the Reformers noted the similarities in language. And they were not happy.

One of Boyd’s closest friends and a fellow Reformer, Air Force Colonel James Burton accused the Army of plagiarizing Boyd’s work. Burton noted that in Fall 1981 Morelli began a series of briefings within government and military circles to explain AirLand Battle. Burton claimed that, during one of these briefing sessions at the Pentagon, he commented that Morelli’s presentation was very similar to Boyd’s. This suggestion, Burton said, caused Morelli to “explode into a tirade. . . . His reaction was so emotional and defensive that I [Burton] presumed he had run into this same criticism before.”⁷⁰⁵ Burton insisted that “there can be no question” that the Army’s ideas were directly influenced, if not copied wholesale, from Boyd’s ideas. According to him, Boyd had met with DePuy and briefed him on his ideas, and Burton asserted that TRADOC had kept copies of Boyd’s briefings on hand throughout the 1970s.⁷⁰⁶

If Morelli denied Boyd’s influence on the Army’s doctrinal changes, other Army institutions openly welcomed Boyd and his ideas. As noted in the previous chapter, the

⁷⁰⁴ James Brooke, “MAJ. GEN DONALD MORELLI, 51; HELPED DESIGN STRATEGIC PLAN,” *New York Times*, July 4, 1984, [<http://www.nytimes.com/1984/07/04/obituaries/maj-gen-donald-morelli-51-helped-design-strategic-plan.html>], accessed Nov 6, 2017.

⁷⁰⁵ Burton, *Pentagon Wars*, 52.

⁷⁰⁶ Burton, *Pentagon Wars*, 52.

commandant of the Army War College, General Jack N. Merritt, sought to incorporate Boyd's ideas into the school's curriculum.⁷⁰⁷ Another contributor to the composition of AirLand Battle doctrine was an instructor at the Army Command and General Staff College at Fort Leavenworth, Kansas. Lieutenant Colonel Huba Wass de Czege frequently invited Boyd and William Lind to give guest lectures to both students and faculty there. In 1982, West Point held a symposium on the Military Reform Movement, further demonstrating the Army's embrace of (or at least openness to) Boyd's ideas. Wass de Czege later founded and was the first Director of a center for Army Professional Military Education, the School of Advanced Military Studies (SAMS). The students at SAMS, seeing themselves as an elite due to their extra year of study, began to refer to themselves as "Jedi knights," a moniker that bears indirect relation to the "knights of the air" mythology, as the Jedi of the *Star Wars* films were often portrayed as excellent fighter pilots, embodying many of the ideals of individualism that the "knights of the air" myth celebrated. Boyd's "Patterns of Conflict" briefing was an official part of the SAMS curriculum throughout the mid-1980s.⁷⁰⁸

Boyd and the rest of the Reformers were more accepting of these later changes in Army doctrine, yet still criticized them. The fact that the Army was adopting some of the Reformers' ideas but not all of them was still a sticking point. Specifically, AirLand Battle called for forces to be "synchronized," while Boyd favored groups acting independently, arguing that this would increase the enemy's confusion. His often-repeated mantra was "You synchronize watches, not people." Although this was only one small element of a much larger shift in doctrine that did

⁷⁰⁷ Michael Getler, "Air Conflicts Used as Strategic Pattern," originally for *The Washington Post*, reproduced in *Hartford Courant* (Hartford, Connecticut), March 13, 1981

⁷⁰⁸ Coram, *Boyd*, 370-371; Burton, *Pentagon Wars*, 53.

incorporate his ideas, Boyd remained highly critical of the Army and did not realize the degree to which they had reformed. As he told Wass de Czege during a discussion about Army strategy, “They still believe in high diddle diddle, straight up the middle,” and he insisted that the new doctrine was a “piece of shit.”⁷⁰⁹ This was a vast oversimplification of the Army’s actual new approach.

Reforming the Marines

The Reformers clearly had a large influence on the changes in Army doctrine, whether or not they were credited. But they had greater success with the Marine Corps. In the late 1970s, Lt. Col. Michael Wyly was an instructor at the Marine Corps Infantry School at Quantico, Virginia. He was attempting to update the curriculum of the school with new strategic concepts, especially in the wake of the problems of Vietnam. Once again, William Lind was the connection who allowed the Reform Movement to expand its reach into more institutions. Wyly asked Lind to recommend someone who could help him theorize new strategic approaches, and Lind immediately gave him Boyd’s name. There were some tough negotiations regarding the time frame of a guest lecture in his classes – class periods at Quantico were scheduled for two hours, and Boyd insisted on having a unbroken five hours for the briefing, to which Wyly eventually agreed. Wyly brought Boyd to the Infantry School in January 1980. Allegedly students stayed after the end of the *Patterns* briefing, stretching the session well past eight hours.⁷¹⁰

Wyly became a full-fledged member of the Reform Movement and a devoted acolyte of Boyd. Boyd became an instructor at the Marines Corps Infantry School, and written copies of all of Boyd’s briefings were bound into a large volume bound in a green cover. Wyly assembled the

⁷⁰⁹ Coram, *Boyd*, 371, Burton, *Pentagon Wars*, 243.

⁷¹⁰ Coram, *Boyd*, 376-379, Burton, *Pentagon Wars*, 54.

volume, which became colloquially known as “the Green Book” and was required reading for Marine Corps officers at Quantico. The two of them began assigning their classes to read works written by former Nazi officers, emphasizing maneuver warfare tactics. In another example of the ways in which the Reformers embodied the old fighter pilot value of protecting their own community, Boyd rewarded his acolyte by using his “underground network” to get Wyly transferred away from Quantico and into a job at the Pentagon, where he worked in the office of the Deputy Secretary of Defense, Frank Carlucci.⁷¹¹

Robert Coram, in his biography of Boyd, insists, as did many of the Reformers, that despite the growth of the Reformers’ ideas within the Marines, the upper leaders refused to support their proposed reforms. According to Coram, Marine Corps Commandant General P. X. Kelley, in 1983, openly ridiculed the Reformers and Lind specifically, marginalizing them as “people who meet in basements.”⁷¹² The Reformers’ perception of being persecuted is, in this case, simply not true—Kelley, and others, were actually quite supportive of Boyd and the Reformers. As early as Spring 1981, some important leaders in the Marine Corps were active members of the Reform Movement, including then-Marine Commandant General Robert H. Barrow. Kelley himself was called “a Boyd listener and supporter” by the *Washington Post*. Kelley told reporters: “An hour spent with John [Boyd] is of inestimable value. He has become extremely well accepted by field grade officers in the military. We need officers who think war and how to defeat the enemy.”⁷¹³ Such ringing endorsement is a far cry from what the Reformers and Coram describe as persecution.

⁷¹¹ Coram, *Boyd*, 380-381, 387-388.

⁷¹² Coram, *Boyd*, 388.

⁷¹³ Getler, “Air Conflicts.”

Wyly continued publishing the ideas of the Reformers in the Marine Corps *Gazette*, the service's journal, edited by Colonel John Greenwood, a retired Marine officer who also supported the Reformers' ideas. Another strong supporter of the Reformers was General Alfred Gray, who, in the early 1980s, designed Marine training exercises at Camp Lejeune based on Boyd's concepts of maneuver warfare. By 1987, Gray had become commandant of the Marines Corps. In his new capacity, he asked Wyly to write a campaign plan and a five-year outline for reforming the Marine Corps. Wyly and Boyd cooperated on the project, which, in 1989, resulted in a new doctrinal manual for the service, which Gray designated as "FMFM-1 Warfighting" and proclaimed the new official Marine Corps doctrine in. Although Boyd and Wyly had written the book themselves, they immediately lobbied Gray to make large changes to the manual.⁷¹⁴

Much like the F-15, the F-16, the Army's doctrinal shifts, and now the Marine Corps' doctrine manual, even when Boyd had a direct hand in developing a product, he could not remain happy with it. He insisted that other people—especially the "establishment" in various institutions—had corrupted his ideas. If Boyd could not have total control over every aspect of a project, he became frustrated and claimed that the project was not being kept true to his vision and he rejected it. However, the Marines Corps accepted his ideas to a larger degree than the other services did. This may be why Boyd later refused to bequeath his personal papers to the Air Force, the service by which he felt most maligned, and instead left them to the Marine Corps Archives at Quantico.

⁷¹⁴ Coram, *Boyd*, 386-391.

The Navy and USAF

Boyd and the Reformers were nominally satisfied with the Marines' reforms and somewhat critical that the Army adopted some but not all of Boyd's concepts, but they reserved a special anger for the U.S. Navy and the Air Force. Burton and other reformers claimed that the Navy had made no changes to its doctrine whatsoever and that it still adhered to old, out-of-date ideas. Similarly, they charged that the Air Force had refused to change in the post-Vietnam years. Charging that Boyd had no effect whatsoever on the Navy, Coram also claimed that, in response to Boyd's ideas, "[t]he Air Force did not change at all. Even today, retired senior generals take pride in the fact that Boyd's ideas had no influence whatsoever on the Air Force."⁷¹⁵ Burton went further, pointing out that Air Force Chief of Staff General Lew Allen did initiate "Project Warrior" in 1982, a program attempting to increase Air Force officers' familiarity with strategy and with warfighting theory. Burton claimed that, although the project published and circulated reading lists of books that Boyd had personally recommended and rewarded officers who studied them, this was only a token effort. He insisted: "The Air Force did the least to change its thinking."⁷¹⁶

There is one problem with this view: It is patently false. Both services made large changes in their doctrine, and they incorporated many of Boyd's ideas as well as some concepts from the Reform Movement more broadly. Yet, because Boyd's ideas were only partially rather than completely adopted, Boyd and his followers became frustrated and outright hostile. In a sense, this can be seen as an extension, or extremist version of the element of the original fighter pilot myth that emphasized protection of the fighter community. By the 1980s, this trait had

⁷¹⁵ Coram, *Boyd*, 370.

⁷¹⁶ Burton, *Pentagon Wars*, 51.

expanded to include not only other fighter pilots but the Reform Movement broadly. The community had grown so self-protective, inward-looking, and paranoid of potential threats to their movement that instead of seeing the Air Force as an ally that adopted some of their ideas, they viewed outsiders as enemies conspiring to take them down.

The Navy went through many changes during this period. They were the first to recognize the major problems with missile accuracy in the Vietnam War, and, after a thorough review resulting in the “Ault Report,” the Navy changed its maintenance and transportation procedures to improve handling of the sensitive warheads. The Navy also realized that the training of fighter pilots, especially in the realm of air-to-air combat training, was shockingly deficient, and they had taken steps during the Vietnam War to change that, such as creating the Navy Fighter Weapons School, known colloquially as “Top Gun.” After the Vietnam War was over, the Navy made extensive use of Boyd’s Energy Maneuverability Theory to design their F-14 Tomcat. The Navy also decided to procure the lightweight fighter that had competed against the YF-16 that Boyd had co-designed—and thus the YF-17 became the F-18 Hornet. In December 1980, the U.S. Naval Institute *Proceedings* published a study of how to apply Boyd’s strategic theories of maneuver warfare to naval doctrine.⁷¹⁷ The Navy did not completely overhaul its doctrine from the ground up to be in line with the Fighter Mafia’s ideas about maneuver warfare and its focus on small lightweight fighters. Still, they did incorporate parts of these ideas into their reform efforts in the 1970s and 1980s.

The Air Force also instituted many changes in these years, although their changes were less sweeping than those instituted by the other services. George Herring has argued that in the post-Vietnam years, “[t]he Air Force was not inclined toward self-criticism or disposed to look

⁷¹⁷ Michael Getler, “Air Conflicts.”

searchingly at the Vietnam experience.”⁷¹⁸ There is some truth to this, as discussion of the war and its possible lessons were not discussed in Air Force service journals to a large degree. Yet to characterize USAF as unchanging is misleading.

The Air Force actually went through a myriad of changes in this period, not only in the procurement of technology but in their entire approach to warfighting. The Air Force exchanged much of its inventory in the 1970s and 1980s, replacing older planes with new fleets of aircraft that Boyd had a hand in developing, such as the F-15 and F-16. They also included guns on their aircraft, developed new air-to-air missiles, and, much like the Navy, created entirely new training systems that emphasized air-to-air combat and maneuverability. The result came in the Red Flag exercises, which were accurately described as a revolution in training procedures.⁷¹⁹ Once again, Boyd, the Fighter Mafia, and the Reformers might have been upset that the institution did not follow every single one of their recommendations to the letter, but many of their ideas did influence the post-Vietnam Air Force.

A New Old Theory: John Warden

The Air Force changed in one other major way – not because of Colonel John Boyd but because of Colonel John Warden—another former fighter pilot who turned into a firebrand strategic thinker who enjoyed pushing against authority. A graduate of the Air Force Academy in 1965, Warden was a former fighter pilot with a significant amount of time in both seats of the F-4 Phantom. However, he did not fly in air-to-air combat. His time in Vietnam was spent mostly as a Forward Air Controller in an OV-10 Bronco. Later, Warden transitioned to flying F-15 Eagles.

⁷¹⁸ Herring, “Preparing,” 69.

⁷¹⁹ Brian Laslie, *The Air Force War of War*; See also, Marshall L. Michel III, “The Revolt of the Majors.”

Despite the large amount of time he spent in fighter planes, Warden was not the “typical” fighter pilot. He showed some of the traits typical of the “knights of the air” myth, and he rejected others. Certainly, Warden was very much an individual and an independent thinker. He was mainly a theorist whose ideas pushed against the established doctrine of his day. In that sense, he was similar to Boyd. Both men also tended to alienate many of those around them, although Boyd did that through his bombastic, aggressive, and offensive personality, whereas Warden was simply withdrawn and overly formal, especially compared to the stereotype of the fighter pilot. As Major (and later four-star General) Gregory S. Martin observed: “Warden was not your typical sloppy pilot type who would hang around in the bar and talk about air maneuvers.”⁷²⁰

Despite this, Warden did emphasize the role of air-to-air combat. While serving as an F-4 pilot near Madrid in a squadron that focused on delivery of nuclear weapons in Europe, Warden wrote an essay and submitted it to his superiors as a memorandum. Entitled “Employment of Tactical Air in Europe,” this paper argued that gaining air superiority should be the primary mission of the Air Force, since other missions could not perform freely without it.⁷²¹ Also, like Boyd, Warden loathed the idea of a direct confrontation with the enemy’s main forces. Instead, influenced heavily by Basil Liddell-Hart and J.F.C. Fuller (especially Fuller’s analysis of the campaigns of Alexander the Great), Warden argued for an “indirect approach” (to borrow Liddell-Hart’s term) in which the main enemy forces could be avoided completely. Warden thought modern air power could perform these actions but only if it had total freedom of action.

⁷²⁰ Quoted in John Andreas Olsen, *John Warden and the Renaissance of American Air Power* (Dulles: Potomac Books, 2011), 4, 42.

⁷²¹ Olsen, *Renaissance*, 23-24.

Warden did not believe in limited war at all; he insisted that any of the failings of air power in Vietnam were a result of limitations being placed on it rather than any inherent limitations of air power itself.⁷²²

Warden was, as historian John Olsen called him, “a quintessential air power advocate.”⁷²³ Warden differed from Boyd and many of the other Reformers in his personality and in some of his ideas, although certain concepts did overlap between the two. Both favored avoiding large set piece battles in favor of an “indirect approach.” Both emphasized the role of air-to-air combat as a way to gain air superiority. However, Boyd and his acolytes, especially those in the Fighter Mafia, seemed to pursue air combat as an end unto itself. Warden was more concerned to use air power in an operational way to affect the battlefield. Gaining air superiority through dogfighting was certainly a part of that, but Warden’s ultimate end was to use air power operationally in such a way that it changed the nature of war itself, making ground armies minor elements in war, if not obsolete.

In 1985, Warden was offered a job at the prestigious National War College and began writing a manuscript that outlined his ideas. The result was *The Air Campaign*. The book argued, as he had earlier, that air superiority is the first priority of air power, followed by interdiction, then close air support (which Warden regarded as “highly overrated”). Regarding the achievement and maintenance of air superiority, Warden argued that “skilled personnel,”

⁷²² Olsen, *Renaissance*, 27, 30-1, 37. Although the nature of the problem with air power in Vietnam continues to be debated among scholars and planners, most historians have rejected this view and instead argue that air power had inherent limitations that rendered it ineffective in the Vietnam War. The best summation of this view can be found in Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: The Free Press, 1989).

⁷²³ Olsen, *Renaissance*, 37.

“materiel,” (including aircraft technology but also support equipment, air defense, and production facilities), and “position” were the key aspects. This can be interpreted to have much in common with the Reformers’ ideas about men first, then machines being the key components of success. Warden also emphasized concentration of force and a fierce, aggressive offensive attack against the enemy. Key to his entire vision was the selection of targets for interdiction bombing. Warden referred to “centers of gravity” that needed to be destroyed. These included typical interdiction targets such as transportation and supply routes and nodes, but Warden emphasized that the most important “center of gravity” was the enemy’s command and control. He believed that wars were waged less by a nation-state’s people and more by the leaders who made the decisions. Thus, by eliminating or isolating leaders, wars could be won without having to directly engage an enemy’s fielded forces. He observed: “Without command, a military organization is nothing but a rabble, a chicken with its head cut off. . . . As the death of the king of the field of battle meant defeat for his forces, so the effective isolation of the command structure in modern war has led to the rapid defeat of dependent forces.”⁷²⁴

Warden’s work was controversial, and it received much criticism to be sure. However, it also received heavy endorsement from key leaders. The commandant of the National War College, Major General Perry M. Smith, noted, “this is the most important book on air power written in the past decade. Must reading for everyone interested in future combat. This is the book I wish I had written.” Smith distributed the book to several Air Force generals, including General Charles L. Donnelly, the commander of USAFE. Donnelly later wrote the introduction

⁷²⁴ John A. Warden, *The Air Campaign: Planning for Combat* (San Jose: ToExcel, 1998), 44; Olsen, *Renaissance*, 65-72.

for the published version of *The Air Campaign*, noting: “This book is the start of something very important. . . . A book of this type has been needed for a long time.”⁷²⁵

The book was not officially published until 1988, but in the interim, between its writing and its dissemination, Warden was assigned to the 36th Tactical Fighter Wing in Bitburg, Germany, first as Vice Commander in 1986, then as full commander in 1987. The wing bore special significance for a fighter pilot, since the 36th TFW was “the premier F-15 wing in the heartland of Europe.”⁷²⁶

Warden used the assignment as an opportunity to experiment with some of his theories. In some ways he recognized the presence of the “knights of the air” mentality even among the latest crop of F-15 pilots, and he emphasized the important aspects of support necessary for fighter pilots to be able to operate. As Warden himself noted: “The guys flying the F-15s are like the knights on the horse, but somebody first has to put the horseshoes on the horse.”⁷²⁷

In an astounding coincidence, members of the wing gave Warden the call sign “Genghis,” just as years earlier, Boyd had earned the unofficial nickname “Genghis John.” Yet that is where the similarities between the two ended, at least regarding Warden’s actions as wing commander. He took a number of steps that worked against the stereotype of the fighter pilot’s values, especially extreme individualism. These included smaller, symbolic matters such as insisting on proper dress code in the officer’s club (coat and tie after 4pm), following full formal ceremonies for promotions of officers even at lower level positions down to flight commander,

⁷²⁵ All quotes in Olsen, *Renaissance*, 81.

⁷²⁶ Olsen, *Renaissance*, 83.

⁷²⁷ Quoted in Olsen, *Renaissance*, 83.

and – the decision that generated the most enmity among his subordinates – the elimination of reserved parking spaces.⁷²⁸

But the more far-reaching decisions had to do with Warden’s experiments in operational matters, particularly his insistence on using “big wing” formations. Holding to the old values of the knights of the air, most fighter pilots held to their sense of individuality—that dogfighting was in essence, a contest between individuals—a gentleman’s duel. Warden disagreed, believing that, as in any other form of combat, numerical advantage was key to victory. He put it clearly in *The Air Campaign*: “The larger the force gets, the fewer losses it suffers, and the greater losses it imposes on its opponent.”⁷²⁹ He applied these ideas directly to the training exercises of the 36th TFW, designing air-to-air combat simulations based on large formations of fighters, over the strong and repeated opposition from other pilots and commanders in the wing.⁷³⁰ However, once his concept was put to the test in a large air-to-air exercise at Incirlik, Turkey, participants changed their tune. Using large formations of 24 F-15s in simulated combat against Aggressor forces simulating Soviet capability, Warden’s concept proved successful. Most of those who originally protested the idea came out of the exercise arguing that the Air Force should have adopted these tactics years ago. Other commanders considered the approach “ground breaking,” and the “big wing” concept went on to form the foundation of the fighter tactics that were implemented in the Gulf War in 1991.⁷³¹

Despite this, General William Kirk, who was nearing the end of his career and did not wish to “rock the boat” extensively, thought Warden’s greatest strengths were not as a wing

⁷²⁸ Olsen, *Renaissance*, 90-91.

⁷²⁹ Warden, *The Air Campaign*, 61.

⁷³⁰ Olsen, *Renaissance*, 88-89.

⁷³¹ Olsen, *Renaissance*, 95-96.

commander, but as a strategic planner. To that end, in 1987, Kirk assigned Warden to a job on the Air Staff at the Pentagon. At first, Warden was charged with planning a specific exercise to simulate a hypothetical Soviet attack on Bitburg. His efforts went largely unnoticed until Lieutenant General Michael J. Dugan became the deputy chief of staff for Plans and Operations on March 1, 1988. Dugan was drawn to Warden's work and saw it as a way to solve the seemingly growing problem of a loss of Air Force identity. In the face of limited wars and insurgencies such as Vietnam, SAC—which had been the *raison d'être* of the Air Force since even before it formally existed, had become increasingly irrelevant over the years. Although TAC had increased in prominence, the perception of most Air Force leaders was that TAC was tied to—and even subordinate to—the Army. This was especially true once AirLand Battle doctrine took hold. The doctrine placed Air Force at the whims of Army commanders, who decided when and where to apply tactical air power. Some Air Force leaders, such as TAC commander General Wilbur Creech, praised the arrangement under AirLand Battle as the proper and most effective use of air power. He had encouraged this cooperation with the army as a way to increase the importance of TAC relative to other Air Force commands. Other Air Force leaders, such as Dugan, thought that air power should instead be separate and was a war-winning tool in and of itself. Dugan thought not only that was this operationally unsound but that the very idea of the Air Force as an independent force had been badly eroded.⁷³²

After reviewing Warden's work, Dugan saw him as the man who could restore a sense of Air Force identity and make clear its operational relevance as an independent force. Dugan first made Warden his personal assistant, and directed Warden to compose a position paper presenting his ideas. The result was a one page memo entitled "Project Air Power," advising that a new

⁷³² Olsen, *Renaissance*, 101-104.

directorate be created to develop plans for the Air Force. The director of plans, Major General Charles G. Boyd (no relation to John Boyd), was impressed, and, in July 1988, General Boyd assigned Warden to serve as director of the new Deputy Directorate for Warfighting Concepts. It was in this role that Warden began refining his ideas. He began thinking not simply in terms of what targets to destroy and then measuring the level of destruction but, even more, in terms of what larger effects attacks could produce in the enemy—a concept later conceptualized as “effects-based operations.” Warden refined his concept of “centers of gravity” into his “Five Rings Model,” arguing that attacking different target sets can enable different effects. Warden arranged these target sets in levels of importance. The outer ring, and the least important, was made up of the fielded military forces, followed by population and agriculture, then infrastructure and industry, then war industry and key production centers, and, finally, the bullseye in the center was command and control. Warden argued that war planners should attempt to attack in the innermost rings first, to cripple an enemy. Taking out enemy leaders could potentially end a conflict without having to address any of the outer rings, or so Warden claimed. Although attacking innermost rings had proven difficult in previous wars, Warden and others believed that new technologies, especially precision weapons and stealth, would allow the inner rings to be destroyed quickly.⁷³³ It should be emphasized, however, that despite Warden’s prolific output, his directorate and his allies represented only a small part of the Air Force. Many respected his ideas, but his strategic vision was not implemented as official doctrine in any sense.

Warden produced far more content and generated more ideas than are discussed in this brief sketch, but a detailed analysis of Warden’s theories is not necessary for the discussion at hand. Important to note is that Warden was certainly not a member of the Reformers nor was he

⁷³³ Olsen, *Renaissance*, 101-116.

a follower of Boyd. Warden's ideas were not directly influenced by Boyd's work, although they were working from similar sources (especially Liddell-Hart and Fuller). The two differed on many key concepts—Boyd would likely have bristled at the idea of concentration and at the type of “big wing” formations of up to 24 fighter aircraft that Warden advocated. The focus of each thinker was also different—Boyd and the Reformers were more concerned with technology, training, bureaucracy, and, above all else, the procurement process, whereas Warden was not concerned with those issues, focusing instead on how to use air power at the operational and strategic levels in a way that fundamentally changed the nature of warfare. If Boyd called back to the romanticized ideal of ace fighter pilots and knights of the air from the First World War, Warden had more in common with the air power prophets and theorists of the 1920s and 1930s, such as Douhet and Mitchell. However, there are many similarities in Boyd's and Warden's work as well: The emphasis on air-to-air combat and air superiority, the focus on an indirect approach that disrupts and disorients the enemy, and the emphasis on movement to strike key places to render an enemy off-balance and incapable of making or carrying out command functions.

In any case, Warden's ideas received a wide readership in the Air Force in the late 1980s, at a time when the Reform Movement had already spent many years introducing and attempting to popularize their concepts of maneuver war.⁷³⁴ Warden may not have been a part of that movement or even shared any of its goals, but he did benefit from some amount of groundwork having been done. The upcoming Gulf War, then, became a test of the ideas of both thinkers, with different results.

⁷³⁴ Olsen, *Renaissance*, 65.

Trading Machines for Lives

On August 2, 1990, Saddam Hussein invaded Kuwait, prompting a quick response from Western planners. General Norman Schwarzkopf was then the commander of US Central Command (CENTCOM, responsible for security issues in the Middle East, Egypt, and parts of central and south Asia). In the early stages of planning a response to Hussein's invasion, he sought an option for a large-scale air attack that could be effective in the region before large ground troops could arrive. Schwarzkopf had little faith that the Joint Staff, accustomed to planning small-scale retaliation strikes, could handle planning an offensive of the size he envisioned. So he asked, instead, for the Air Staff to get involved. On August 8, Schwarzkopf called the Chief of Staff of the Air Force, Michael Dugan, who was out of the office at the time, so the call fell to the Vice Chief General John Loh. Loh passed Schwarzkopf's request to the Deputy Chief of Staff, Plans and Operations, Lt. General Jimmie Adams, who was on temporary duty. This meant that the request went to the Director of Plans, Major General R. Minter Alexander. Alexander immediately called Warden to fulfill CENTCOM's need for a plan.⁷³⁵

Warden was prepared to respond quickly. Prior to this, not only had he designed and executed exercises for large scale air offensives against hypothetical Soviet enemies (a series of plans known as "Checkmate"), but he had already been planning for an air attack plan in the theater, unofficially and informally. After receiving the request from Schwarzkopf, Warden worked with the other members of his directorate to formulate a more concrete plan which he named "Instant Thunder," in contrast to the gradual bombing campaigns of "Rolling Thunder" during the Vietnam War. The plan had five main goals: "Isolate Saddam (target Saddam's

⁷³⁵ Richard G. Davis, *On Target: Organizing and Executing the Strategic Air Campaign Against Iraq* (Washington D.C.: Air Force History and Museums Program, 2002), 58-59.

regime, not the Iraqi people), Eliminate Iraq's offensive capability, Incapacitate Iraq's national leadership, Reduce the threat to friendly nations, and Minimize damage to enhance rebuilding (minimize civilian casualties and collateral damage)."⁷³⁶ To that end, the six-day plan called for 163 sorties on the first night to attack air defense systems, chemical weapons, the Presidential Palace, electric grids, and telecommunications.⁷³⁷

The original plan as presented was controversial. Lieutenant General Charles Horner, commander of Ninth Air Force and Commander of Central Command Air Forces (COMCENTAF) regarded the plan as too "embryonic" and not fully planned at the operational and tactical levels. Warden was, for all intents and purposes, removed from the project, as other elements of his team, led by former F-15 pilot Colonel David Deptula, remained to turn the basic concept of Instant Thunder into a workable, executable plan. Deptula kept the conceptual orientation of the plan the same, but, in designing specific strikes, he emphasized the role of stealth technology and the idea of "simultaneity" – hitting related targets in close succession and thus increasing the level of shock and disruption of the enemy.⁷³⁸

The entire plan of Instant Thunder, and Desert Storm as a whole, was thus based on making extensive use of the very technologies that the Fighter Mafia and the Reformers had rallied against. The Reformers had been advocating replacing a few dozen F-15s with a few thousand F-5s, presumably willing to accept significantly higher attrition rates of pilots. Historically, this approach of gaining victory through sheer mass amount of manpower, using

⁷³⁶ Davis, *On Target*, 66-67, quote on 75.

⁷³⁷ Davis, *On Target*, 77.

⁷³⁸ Davis, *On Target*, 82-83, 87-88, 90-91. For additional details of the planning of the campaign, see also, Diane T. Putney, *Airpower Advantage: Planning the Gulf War Air Campaign, 1989-1991* (Washington D.C.: Air Force History and Museums Program, 2004).

outdated or even obsolete technology had more in common with Soviet stereotypes than the typical American approach. Joint Chiefs Chairman General Colin Powell said as much when approving the plans for the air campaign in Iraq. “Our nation has pursued for decades the policy that has substituted machines and technology for human lives,” he said. “I think especially in this environment we will continue that policy.”⁷³⁹ The Reformers sought to put man over machine to an extreme degree, but in planning for war in 1990, American leaders instead sought to use technology as a substitute for manpower—still man over machine, but in a way that protected men’s lives by having machines take on more of the burden.

The Box Score

Boyd, the Fighter Mafia, and the Reformers had predicted a future war in which large fleets of aircraft battled for air superiority in ferocious dogfights. That hypothetical scenario demanded, they argued, smaller aircraft with less technological complexity, instead relying on the flying skill of the individual pilot. Planes like the F-16 would be far more useful than the large and, as they saw it, cumbersome F-15 Eagle. Even the Falcon was perhaps too large and unwieldy according to some of their assessments. They assumed that the large all-weather radar of the F-15 was unnecessary and made the Eagle vulnerable. They also assumed that because enemies could detect when a pilot locked onto them, missiles would be useless. The ranges would be too small and the planes too agile, and achieving a lock would also give away an attacking pilot’s position. Instead, the pilots would become knights of the air, using agile planes to their fullest advantage due to highly trained skills to out-maneuver enemies before blasting them out of the sky with bursts of their guns at close range. Perhaps more than any other

⁷³⁹ Quoted in Davis, *On Target*, 100.

assumption, the Reformers' conception here assumed that an enemy air force would be highly trained and disciplined, would operate in large numbers, and would have a deep familiarity with their systems.

In the skies above Iraq in 1991, almost none of these assumptions were true.

First, radar played a key role in gaining and maintaining air superiority. E-3 and RC-135 aircraft flew airborne warning and control missions, able to alert coalition pilots to approaching enemies and give them situational awareness long before battles began. EF-111 and EA-6s aided this effort through electronic jamming of enemy communications. The coalition flew decoy drones both to distract enemy radar away from strike aircraft and to keep enemy radar sources active so they could be targeted. Those Iraqi radar sources were then consistently pounded with high-speed anti-radiation missiles (HARMs, most often fired from F-4Gs, although other aircraft carried them as well) that denied Iraqi forces the advantages of radar.⁷⁴⁰ All of these efforts supported the air-to-air mission to give coalition pilots an advantage, and it must be emphasized that the performance of coalition pilots in Desert Storm owes much to these support efforts.

Second, the disposition of coalition aircraft reveals the disconnection between what the Reformers wanted and how the Air Force actually deployed its assets. For example, air-to-air sorties were flown almost exclusively by F-15Cs (for the Air Force, while the Navy primarily flew their F-14 Tomcats in the air combat role). The F-16, which Boyd had wanted to be the embodiment of the platonic ideal of an air-to-air combat fighter, was not used in air-to-air combat in Iraq at all. The F-16 was used as a fighter bomber, almost exclusively to attack ground targets. The Fighting Falcon achieved zero air-to-air kills in the Gulf War. In fact, the only time

⁷⁴⁰ Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report*, Washington D. C., 1993, 12-13, hereafter cited as GWAPS Summary Report.

that F-16s flew in an air combat capacity (in a CAP—combat air patrol—sortie) was the day before Operation Desert Storm launched, specifically to deceive or confuse Iraqi ground controllers, as they expected to see F-15s in that role.⁷⁴¹

Examining air-to-air combat statistics, the conflict seems one-sided to say the least. From January 17 to March 22, 1991, coalition pilots shot down forty-one Iraqi aircraft. Although Iraqi ground defenses did successfully shoot down many coalition planes, only one was lost to air-to-air combat: An F/A-18 Hornet piloted by Navy Lieutenant Commander Michael Scott Speicher was shot down by an air-to-air missile.⁷⁴² Of the 41 kills, 36 of them (88 percent) were accomplished by an Air Force F-15 Eagle. The Navy claimed three kills, one from an F-14 and two from the F-16's old competitor, the F/A-18 Hornet. The remaining two kills were from A-10 Thunderbolts destroying helicopters.⁷⁴³

The assumption that proved the most out of place was that enemy air forces would be highly trained and capable pilots. This could hardly have been further from the truth. Many of the coalition pilots had participated in extensive training in air-to-air combat against a variety of

⁷⁴¹ Williamson Murray, and Wayne W. Thompson, *Air War in the Persian Gulf* (Baltimore: Nautical & Aviation Publ. Co. of America, 1997), 105.

⁷⁴² Gulf War Air Power Survey: Volume V: A Statistical Compendium and Chronology, Washington D.C., 1993, 637, hereafter cited as GWAPS v5. For information about Speicher, see "Intelligence Community Assessment of the Lieutenant Commander Speicher Case". 27 March 2001. FOIA Electronic Reading Room. CIA. 10 September 2006. Available online:

[https://web.archive.org/web/20041017122850/http://www.foia.cia.gov/docs/DOC_0000588922/0000588922_0001.gif],

[https://web.archive.org/web/20110721234933/http://www.foia.cia.gov/docs/DOC_0000588922/0000588922_0002.gif],

[https://web.archive.org/web/20110721234943/http://www.foia.cia.gov/docs/DOC_0000588922/0000588922_0003.gif], Accessed November 11, 2017.

⁷⁴³ GWAPS v5, 653-654.

simulated threat types and force structures, either through the Air Force's Red Flag exercises or the Navy's Top Gun program.⁷⁴⁴ Their training appeared all the more impressive compared to the Iraqi Air Force's apparent lack of the same. Western intelligence sources noted that Iraqi fighter pilots were poorly trained and inexperienced. The years spent flying in the Iran-Iraq war had not presented a significant challenge or risk to pilots. Success in the air in that war had not required a high level of competency, especially in the air-to-air realm. Pilots were trained on a rigid, almost rote pattern, taught to execute specific maneuvers based almost entirely on instruments, rarely, if ever, looking outside the cockpit. Some effort was made to upgrade pilot training, although Iraq's financial problems hampered this effort, and the program was not near the standards of western air training systems. One US Navy Intelligence report stated: "Intercept tactics and training [were] still predominantly conservative, elementary, and generally not up to western standards."⁷⁴⁵ In addition, the culture of the Iraqi Air Force favored ground attack as the more desirable role. The most skilled pilots thus gravitated to CAS assignments, leaving the air-to-air role to the least competent and least trained pilots. Although the Iraqi Air Force consisted of state-of-the-art Soviet aircraft, the Iraqi pilots, as historian Williamson Murray put it, "did not possess the basic flying skills to exploit fully the capabilities of their aircraft."⁷⁴⁶

Part of this was a doctrinal issue. Adhering to the Soviet doctrinal model, Iraqi pilots were directed and instructed by ground controllers using radar to watch events unfold and constantly communicating with pilots. This system had been used to great effect by the North Vietnamese Air Force during the Vietnam War. F-4 pilot Captain Steve Ritchie gave the best

⁷⁴⁴ Murray, *Air War*, 92.

⁷⁴⁵ SPEAR, "Iraqi Threat to U.S. Forces," quoted in Murray, *Air War*, 67.

⁷⁴⁶ Murray, *Air War*, 67.

description of how the system worked: “The average North Vietnamese fighter pilot is strictly tied to the ground radar control officer, who is a pilot, and he follows the instructions from the ground implicitly. They tell him when to go burner, when to arm his missiles, when he's clear to fire, when to jettison his tanks, when to break off, where to land, and what heading to turn to; everything is controlled from the ground.”⁷⁴⁷

Using this ground-control doctrine, the NVAF had inflicted heavy losses against American fighters, and the Iraqi Air Force seemed poised to do the same. However, the Iraqi system seems to have been less tightly controlled in terms of air-to-air encounters than the North Vietnamese had been. Although ground radars were intended to provide targeting information and flight vectors to Iraqi pilots, most of the target information was meant to aid SAM missile launch sites and AAA gunners. The Iraqi Air Defense system was tightly organized. Each of four sectors possessed operations centers to gather radar and visual tracking information. In Baghdad, the Air Defense Operations Centers coordinated the entire effort, relying on the French-built computer system called KARI (this was not an acronym, it was merely the French spelling for “Iraq” written backwards). This system had several redundancies and forms of communication with key nodes in hardened shelters to ensure that the system remained operational during an attack.⁷⁴⁸ Regardless of the level to which Iraqi fighters intended to rely on ground controllers, the American military had undergone significant changes in overall quality of training, equipment, and doctrine, much of it specifically geared to combat the Soviet ground-control

⁷⁴⁷ Captain Richard S. Ritchie, United States Air Force Oral History Program, Interview #K239.0512-630, 11 Oct 72 and 30 Oct 72, 74-75.

⁷⁴⁸ Carlo Kopp, “Operation Desert Storm The Electronic Battle Parts 1 - 3,” Air Power Australia, 1993, available online [<http://www.ausairpower.net/Analysis-ODS-EW.html>] accessed Nov 11, 2017; see also, Murray, *Air War*, 67-69.

model. Furthermore, the plan of attack was intended to remove ground-control capability through Warden's concept of parallel warfare.

Coalition aircraft conducted near-simultaneous attacks against headquarters in Baghdad as well as the operations centers in various sectors. Although KARI was still partially functional, the Iraqi Integrated Air Defense System was no longer integrated. Radars and SAM sites had trouble communicating, and many were completely non-functional. One large testament to the success of these effects-based operations was the fact that coalition planners expected to lose between 20 and 25 aircraft to enemy fire on the first night of the war. In fact, they only lost one—Speicher's F/A-18.⁷⁴⁹

The Iraqi Air Force likely had significant problems operating, given the damage done to their communication and interception operations centers. However, even before the effects of the bombing attacks had set in, the Iraqi pilots performed poorly. The qualitative differences between coalition and Iraqi fighter pilots were shocking, to say the least. As F-15s flew CAP missions during the opening strikes, searching for possible MiG threats, infrared cameras revealed one MiG-29 crashing into the ground, while another MiG-29 launched a missile that destroyed a friendly MiG-23 that happened to be crossing ahead of it. By the third day, the few air-to-air encounters of the war tended to fall into a recognizable pattern. As Murray described it, "Iraqi pilots generally failed to respond to radar lock-ons and displayed almost no capacity or willingness to maneuver between the time that Coalition aircraft locked on to them and the time that a missile impacted. In two cases they ran into the ground before the missile hit, hardly suggestive of combat effectiveness or good training."⁷⁵⁰

⁷⁴⁹ Murray, *Air War*, 122-123.

⁷⁵⁰ Murray, *Air War*, 110-111, quote on 162.

After the third day of the war, air-to-air encounters dropped off significantly. The Iraqi pilots avoided engaging Coalition aircraft in battle, yet much of their force remained intact. When the Coalition planners began targeting the hardened shelters in which the Iraqi aircraft were kept, many Iraqi pilots attempted to flee to Iran. This again demonstrated the level of incompetence in the Iraqi fighter pilot force, as many of them did not have enough fuel for the journey and crashed their aircraft into the ground. Coalition pilots saw the opportunity to destroy the enemy in the air as they fled. Murray's account does not even refer to these shoot-downs as proper engagements. It simply calls them "opportunities to add to the box score."⁷⁵¹

Also contrary to the arguments of the Reformers were the weapons used to achieve the air-to-air victories. The Reformers' assumption that missiles would be useless, especially long-range radar-homing missiles, was proven completely false. Of the 41 official kills, three were due to ground impact, and the two credited to A-10s had used the Thunderbolt's infamous GAU-8 cannon. Every other kill—the remaining 36—was the result of a missile hit. The heat-seeking AIM-9M (an upgraded version of the "Lima," or "L" model) accounted for twelve—exactly one third—of the kills. Fully two-thirds of them were due to the AIM-7M Sparrow—an upgraded model of the radar-guided missile against which the Fighter Mafia had argued so vehemently. Their assumption had been that the rules of engagement present in Vietnam, which prohibited missile firings from beyond visual range, would be present in any future war such as this one. However, the increased performance and integration of early warning and control (AWACS) aircraft allowed pilots to shoot from beyond visual range often. In fact, sixteen of the air-to-air

⁷⁵¹ Murray, *Air War*, 180.

kills (exactly two-thirds of those achieved by the AIM-7, and 44 percent of the total number of missile kills) were attacks from beyond visual range⁷⁵².

One of the most surprising encounters of the war took place during the first night of the strike, January 17, in which a completely unarmed EF-111 was credited with an unofficial air-to-air kill against an Iraqi Mirage F1. The EF-111 was a heavily modified version of the aircraft most hated by Boyd and the Fighter Mafia. Equipped for electronic warfare (radar tracking and jamming), the plane had no weapons, yet it found itself in the sights of an Iraqi fighter pilot, who launched two heat-seeking R.550 “Magic” air-to-air missiles. After a combination of gut-wrenching evasive maneuvers and flares, the EF-111 managed to dodge the missiles, although the Iraqi pilot closed in for a gun kill. The EF-111 pilots, Captains James Denton and Brent “Brandini” Brandon, decided to use their aircraft’s advantages. In the dark desert night, they got as low to the ground as possible and relied on their complex, expensive, ground-looking radar to map the terrain as they flew. The Mirage followed them. After making sure the Iraqi pilot was committed, Denton pulled up hard. The Iraqi pilot, unable to see into the darkness, crashed in a giant fireball almost immediately as the EF-111 escaped. Both Denton and Brandon were later rewarded with the Distinguished Service Cross.⁷⁵³ The Fighter Mafia and the Reformers had argued vehemently against the F-111 itself, against the concept of having a two-pilot aircraft, and

⁷⁵² GWAPS Summary Report, 60; GWAPS v5, 653-654.

⁷⁵³ Ian D’Costa, “The EF-111 Raven Managed to Take Down an Iraqi Mirage... Without Ever Firing a Shot,” Tactical Air Network, [<https://tacairnet.com/2013/09/10/unarmed-kill/>], accessed November 11, 2017; See Also, “EF-111A RAVEN,” Cactus Air Force Wings and Wheels Museum, [http://www.cactusairforce.com/inventory_item/ef-111a/], accessed November 11, 2017. This story is attested in most US sources, but Tom Cooper, who claims to have examined Iraqi sources (yet does not cite specific documents), has disputed the facts of this kill, arguing that the Iraqi pilot escaped and later claimed the EF-111 as a kill of his own. See Tom Cooper, “In January 1991, Both Iraq and America Claimed Fictional Air-to-Air Victories,” *War is Boring*, September 28, 2017 [<http://warisboring.com/45910-2/>], accessed February 26, 2018.

against the type of complex radar it carried. Yet not only did all those components make a substantial contribution to the overall effort in the Gulf; those exact components also proved able to score air-to-air victories, even without the use of offensive weapons.

This is not to imply that these systems were perfect. Problems did still exist. In an encounter on February 6, for example, two Coalition F-15s were chasing two MiG-21s and two SU-25s that were attempting to flee to Iran. In this case, identifying the targets and gaining clearance to shoot proved difficult. Two F-15 pilots fired a total of three AIM-7s, two missed, the other fell due to a failed motor. Both F-15 pilots were able to close in and destroy all four targets with heat-seeking AIM-9s. However, the encounter only reinforced how poorly trained the Iraqi pilots were. As Murray described the encounter, “At no time in the engagement did the Iraqis take evasive action, and they appeared oblivious to missile attacks or the approach of F-15s to the rear of their aircraft.”⁷⁵⁴

You Say You Want a Revolution?

For many observers, the Gulf War proved the Reformers wrong. Air power historian John Correll noted: “What really took the ginger out of the Reform movement was the Gulf War. In that war, high technology undeniably worked. Its star performers included the much-maligned F-15 and all of the other systems that had been attacked by the Reformers.”⁷⁵⁵ Furthermore, the performance of such “complex,” advanced weaponry was at such a high level that many participants and observers argued that not only were the Reformers wrong, but that the Gulf War signified a “Revolution in Military Affairs” (RMA). This was a claim that the new technologies seen in the war, particularly stealth, precision weapons, and information systems, fundamentally

⁷⁵⁴ Murray, *Air War*, 192.

⁷⁵⁵ Correll, “The Reformers,” 44.

altered the nature of warfare, and it meant that those who did not possess those capabilities would be the quick losers in any future war.⁷⁵⁶

Some analysts took this idea even further, arguing that the Gulf War proved that air power could win wars on its own and that air power as an instrument of war had finally realized the promises made by its prophets such as Douhet and Mitchell. Historian Richard Hallion was one of the most vocal supporters of this concept. His book *Storm Over Iraq*, released just one year after the conflict, stated these ideas in bold, unambiguous terms. He argued that, “air attack rendered all categories of armored fighting vehicles superfluous—they were no protection to their occupants whatsoever, no matter how thick their armor.” He went on to imply that forces outside of air power are essentially useless, since the Gulf War “has revolutionized war,” ushering in a new era of warfare based on air power. “In the air power era, neither armies nor navies can be considered the *primary* instrument of securing victory in war.”⁷⁵⁷

Hallion took these arguments even further: “Today, air power is the dominant form of military power. . . . Air power has clearly proven its ability not merely to be *decisive* in war... but to be the *determinant of victory* in war.” Hallion extended his claims into the political sphere, claiming that air power was now the mark of a new American Empire. He made this clear in a prophetic passage whose implications some readers could find troubling despite his reassertions:

As dominant land power characterized a *Pax Romana*, and a dominant sea power a *Pax Britannica*, dominant air power is the characteristic of modern America. This does not imply, as some would fear, a mindless policy of global interventionism, nor does it imply

⁷⁵⁶ The literature on RMA is extensive, and many air power historians address it in some form. Two useful overviews and critiques of the concept include Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton: Princeton University Press, 2006); and Thomas G. Mahnken, *Technology and the American Way of War Since 1945* (New York: Columbia University Press, 2008).

⁷⁵⁷ Richard Hallion, *Storm Over Iraq: Air Power and the Gulf War* (Washington: Smithsonian Institution Press, 2002), 253-254, emphasis in original.

a millennium of untroubled peace. But it does imply that, for the future, conflicts around the world will be small ones, and aggressors who dare to threaten the vital interests of the United States and its friends will risk their own destruction amid a hurricane of air attack.⁷⁵⁸

These claims have something in common with Warden's ideas, but they are a far cry from the vision of the Reformers. If the concept of RMA was correct, then the days of dogfighting "knights of the air" were truly over. Instead, complex, expensive weaponry rendered previous forms of warfare obsolete, and Boyd's concept of maneuver warfare was unnecessary and outdated. It should be emphasized, however, that although the idea of RMA captured the imagination of many analysts at the time, the events of 9/11 and the subsequent wars in Afghanistan and Iraq in the 21st century have revealed that just as the Reformers based their arguments on sweeping assumptions, RMA advocates did also.

Nevertheless, the argument that the conduct of the Gulf War proved the Reformers wrong is somewhat overstated and borders on simplistic. Clearly, the complex, expensive weapons that the Reformers argued against did prove themselves quite effective in 1991. However, the war itself was not of the type that the Reformers predicted. The Reformers had been worried about a large-scale conventional conflict, most likely against the Soviet Union, in which large numbers of units of high quality, well-trained military units of all types engaged each other in large-scale battles of maneuver, including massive dogfights with trained fighter pilots dueling in clear skies. This was not the case in the Gulf. Weather conditions, including heavy fog, low clouds, and frequent rain, made absolutely necessary and effective the very all-weather capabilities of coalition aircraft that the Reformers had decried. And the Iraqi military was not the high-quality opponent that the Reformers envisioned fighting, even though, even before the war began, it

⁷⁵⁸ Hallion, *Storm Over Iraq*, 264, 267, emphasis in original.

appeared that they might be. On paper, Iraq had the world's fourth largest army and its sixth largest air force. Certainly, Iraq in 1990 did not seem like a paper tiger.⁷⁵⁹ Once the war began, however, the bulk of the Iraqi military, and especially the Air Force, proved to be of such a low quality that most of the Reformers' ideas went untested. This is not to minimize the fact that fierce fighting did occur in some places among highly trained Iraqi troops, especially Republican Guard units.

Overall, the combination of terrain, environment, composition of the enemy, and the quality of opposing forces rendered Iraqi forces vulnerable to just the type of attack that Warden had envisioned. This was not the type of war that The Reformers were worried about. The type of warfare they did predict never occurred, and thus their ideas, in that sense, have never been fully tested. What can be said for certain is that the Reformers' vision was not well suited to all kinds of war. If they were right, they were only right about particular scenarios that have, as yet, not been seen.

Taking Credit

However, in a stunning example of all parties seeing what they wanted to see, just as RMA advocates saw the Gulf war as a refutation of the Reform Movement, the Reformers themselves interpreted it as a validation of their ideas. The Reformers rejected the concept of RMA out of hand. Spinney argued that: "At the core of the RMA is a radical hypothesis that would cause Sun Tzu, Clausewitz, and George Patton to roll over in their graves."⁷⁶⁰ Burton's work avoided the entire issue of air combat, pointing instead to the A-10 Thunderbolt, whose design was heavily influenced by Pierre Sprey. This was, Burton said, the "inexpensive, simple,

⁷⁵⁹ Hallion, *Storm Over Iraq*, 128, 146.

⁷⁶⁰ Quoted in Correll, "The Reformers," 44.

slow-flying, ugly but lethal symbol of the Reform Movement.” Since the A-10 was successful in its anti-tank campaign, and responsible for about half of the bomb damage in the war, Burton deemed it a validation of the Reformer’s vision.⁷⁶¹ Of course, this ignored the fact that the more prominent symbols of the Reform Movement, especially the F-16 and the role of air-to-air combat itself (in addition to ground weapons they disparaged, like the M-1 Abrams tank), did not play out in any way near the Reformers’ predictions.

If the air war did not reflect the Reformers’ vision, they still claimed credit for the success of the ground attacks. In Boyd’s biography, based mostly on oral histories with the members and associates of the Reform Movement, Coram notes that “Boyd played a crucial role in the top-secret planning of what would become America’s strategy for prosecuting the Gulf War.”⁷⁶² Secretary of Defense Dick Cheney, a longtime associate of Boyd’s and a member of the Reform Movement, began calling Boyd to the Pentagon immediately after the invasion of Kuwait, for a series of private meetings. According to Coram (and his sources, most of whom were members of the movement), the main plan of attack used by ground troops—having the Marines use a small amphibious assault as a feint, while the Army made a large “left hook” with the goal of enveloping the enemy—was completely Boyd’s idea, which Boyd then gave to Cheney. Schwarzkopf’s original plan had been a direct assault against the Iraqi main force. Cheney rejected this plan in a rare example of Washington interfering with the operational and tactical plans of the on-scene commander—exactly the type of action for which the Johnson Administration was so heavily criticized during the Vietnam War. Coram dismissed Schwarzkopf as merely a “head-strong” general who knew far less than Cheney about

⁷⁶¹ Burton, *Pentagon Wars*, 241, 242.

⁷⁶² Coram, *Boyd*, 422.

operational warfare. Merely having conversations with Boyd apparently meant that “Cheney knew more about strategy than did his generals.” In his rejection of the plan, Cheney even quoted Boyd directly, saying: “I can’t let Norm do this high diddle up the middle plan.”⁷⁶³

Coram argues that the Marines’ amphibious assault was the textbook example of Boyd’s ideas about maneuver warfare, since they were able to penetrate behind enemy lines and cause confusion. As many as fifteen divisions of Iraqi troops eventually surrendered to two divisions of Marines. Brigadier General Richard Neal seemed to confirm Boyd’s at least partial influence on these attacks when speaking to the press about the reason for the successful attacks. He observed: “We kind of got inside his [the Iraqi troops’] decision cycle.” Spinney recognized this as an element of Boyd’s thinking and told him: “John, they’re using your words to describe how we won the war. Everything about the war was yours. It’s all right out of ‘Patterns.’” Coram added: “Everything successful about the Gulf War is a direct reflection of Boyd’s ‘Patterns of Conflict.’”⁷⁶⁴ The only way this statement could be even partially accurate is if the entirety of the air war is ignored.

Any problems in the plan, including the fact that the Republican Guard was able to escape to Iraq, the Reformers blamed on Army commanders for not following Boyd’s vision. Both Coram and Burton blamed the commanders of the two US Army Corps in charge of chasing the Republican Guard – Lieutenant Generals Gary Luck and Frederick Franks. Franks in particular was singled out for insisting on having his forces move in mass, rather than splitting up and allowing some elements to get far ahead of the others. Claiming that this was a validation of Boyd’s critique of the Army’s concept of “synchronization,” he claimed that Franks had “a

⁷⁶³ Coram, *Boyd*, 423-424

⁷⁶⁴ Coram, *Boyd*, 424-425.

large dose of dinosaur blood flowing in [his] veins.”⁷⁶⁵ Burton also blamed the M-1 Abrams as supposedly slowing down the chasing force due to its high fuel requirements and due to the need to replace the engines’ air filters due to the sandy environment. He claimed that the M-1’s complexity made it a liability, and he said that this was why the Republican Guard got away. In turn, this allowed Saddam Hussein to stay in power. So Burton was implying that the troubles in Iraq after the war might have been avoided if only the Army had chosen a less complex engine for the M-1.⁷⁶⁶ Burton also asserted that the Reformers – including him in particular – were responsible for making changes to the Bradley Fighting Vehicle’s armor that saved many lives and that, if only more of his changes had been implemented, even more lives could have been saved.⁷⁶⁷

That is the Reformers’ interpretation of what happened, but looking at sources outside of their circles gives quite a different picture. The claim that Schwarzkopf originally planned to run straight into enemy main force units but that Boyd came up with a counter plan that saved the war is patently false. From the very beginning of the planning process, the basic conception of the ground operation was to use a deception attack in the east while main forces conducted a sweeping envelopment from the west. This could not be considered “up the middle” by any stretch of the imagination. The early versions of the envelopment plan had been drawn up by four of the “Jedi Knights” of SAMS at Ft. Leavenworth—the very students who had been exposed to Boyd’s ideas and incorporated many of his concepts into their thinking. In fact, they used similar historical references as Boyd, particularly allusions to the German *Bewegungskrieg*,

⁷⁶⁵ Burton, *Pentagon Wars*, 244.

⁷⁶⁶ Burton, *Pentagon Wars*, 245-246.

⁷⁶⁷ Burton, *Pentagon Wars*, 255-256.

as they imaged in the “left hook” into Iraq as a plan similar to the German attack through the Ardennes Forest in 1940.⁷⁶⁸

Also, Franks had a hand in planning the operation itself, especially given that his VII Corps would be the main force of the envelopment’s sledgehammer. The characterization of Franks as feeble, slow, and unappreciative of the power of movement is simply false. One of the principles of war, since the days of Clausewitz, is mass—and that is exactly what Franks intended to use. He did not want to split up VII Corps, which would severely hamper its effectiveness. Instead, he emphasized: “I’m not going to attack with five fingers. I’m going to attack with a fist. We will not hit the enemy piecemeal. We’ll hit him with mass.” He was also strongly opposed to slowing down or stopping for any reason. In fact, when one of Franks’ operations officers suggest a brief pause before attacking the Republican Guard, Franks rejected the idea out of hand. His operational plan emphasized “no pauses,” a point that he hammered so heavily with his subordinates that the word “pause” was not uttered aloud again until Franks himself decided to use it. Officers only said “The P-word.”⁷⁶⁹

According to historian Rick Atkinson, Franks’ decision to pause before attacking the Republican Guard was not because his tanks were too “complex;” it was due to a number of factors, including the fact that his soldiers lacked thermal sights and thus could not operate effectively at night without risking mass casualties when breaching enemy positions.

Furthermore, the idea of attacking without mass, as the Reformers’ suggested, would not likely have led to victory. Franks and his commanders had every reason to believe that it would make

⁷⁶⁸ Rick Atkinson, *Crusade: The Untold Story of the Persian Gulf War* (New York: Houghton Mifflin, 1993), 108-109.

⁷⁶⁹ Atkinson, *Crusade*, 258-259.

them vulnerable to becoming—as Franks’ operations officer put it—“a latter-day Pickett’s charge” that would “send fratricide off the charts.” VII Corps, as well as British forces in the area, would be vulnerable to a potentially devastating counterattack. One of his commanders had advised: “If we continue to move, you’re going to have me in the Republican Guard tomorrow and nobody behind me to mass against them.” Apart from these various reasons, however, Atkinson does acknowledge that refueling was part of the reason given for Franks’ decision to pause.⁷⁷⁰

Atkinson goes as far as to argue that the ultimate reason for the failure to capture the Republican Guard rests with Schwarzkopf himself. His decision to accelerate the battle plan by fifteen hours meant that VII Corps had to deploy before it was ready. This acceleration also did not factor in the difficulty and time needed in breaching enemy positions at night. Some officers believed that Schwarzkopf’s anger at Franks—which continues to influence the historiography on this controversial issue—was not genuine, but a show meant to push other army elements into moving faster. Furthermore, arguing that Franks and VII Corps were too slow is misleading—they were only “late” because Schwarzkopf moved the timetable fifteen hours ahead at almost the last minute. But despite the brief pause, Franks’ VII Corps had still arrived at its intended position—in place to destroy the Republican Guard—well ahead of their original schedule.⁷⁷¹

Historian Robert Citino tells a slightly different version of events, in which refueling concerns of the M-1s played no role. Instead, he argues, the main reason for the pause was in the extensive network of minefields that blocked part of the path – a barrier that was far more dense and treacherous than expected. Citino emphasizes that, even though there was a short delay, VII

⁷⁷⁰ Atkinson, *Crusade*, 400-403.

⁷⁷¹ Atkinson, *Crusade*, 406-407.

Corps was very successful in subsequent attacks, tearing through Iraqi armored units in the hard-fought but ultimately quite one-sided Battle of 73 Easting, and successfully engaged Republican Guard units, utterly destroying the groups it encountered. He dismisses the idea that the escape of the Republican Guard was the result of the operational pause. The M-1 also proved its worth; its depleted-uranium shells often blew straight through an entire Iraqi tank, maintaining enough velocity to demolish a second tank behind the first.⁷⁷² Thus, notwithstanding debates about the M-1 engine, most of the success of armor in the Gulf War was the result of “complex” advanced technology. The infrared sights allowed tank gunners to target Iraqi tanks at night or in sandstorm conditions, and their upgraded cannons possessed a greater range than Iraqi tanks, meaning Americans could often fire without fear of being fired upon. The upgraded ceramic armor held—even direct hits from the Republican Guard T-72s caused only minor damage. Not one single M-1 was destroyed or had its armor penetrated during the entire war.⁷⁷³

The escape of the Republican Guard is one of the most controversial and debated aspects of the Gulf War—possibly because it is one of the very few moments of coalition forces failing to achieve a major objective, and thus it is often the target of analysis. What is clear in any case, is that there are many sides to that story, and many ways to interpret what happened. Boyd, Spinney, Burton, and their allies had some truth behind their arguments. However, the Reformers’ insistence that the failure to destroy the Republican Guard was because planners had not listened to them and adopted all of their ideas over the past decade is at best simplistic.

⁷⁷² Robert Citino, *Blitzkrieg to Desert Storm: The Evolution of Operational Warfare* (Lawrence, University of Kansas Press, 2004), 285-287.

⁷⁷³ Thomas G. Mahnken, *Technology and the American Way of War Since 1945* (New York: Columbia University Press, 2008), 132-133.

As the saying goes, victory has a thousand fathers, but defeat is an orphan. As was the case in many other aspects of their movement, the Reformers took this idea to an extreme, claiming credit for all the successful aspects of the Gulf War and arguing that any shortcomings were the result of people not listening to them. There is some truth to some of these arguments, although they ignore much of the air dimension. Perhaps a better way of understanding the Gulf War is to acknowledge the way in which a somewhat balanced approach, using a mix of various specialized aircraft types allowed air power to achieve specific objectives that aided efforts on the ground, where a similarly balanced and varied approach was effective as well. Although Franks' insistence on synchronizing his forces may have been a mistake, if the Air Force had followed all of the Reformers' ideas and had canceled the F-15 and F-16, choosing to fly only F-5 fighters instead, the results of the Gulf War would likely have been quite different.

The Gulf War, which became colloquially known as the "100-hour war," brought a wave of triumphalism and a resurgence of confidence and pride in the American military that had not been present since before 1964. As President George Bush proclaimed on March 1, 1991, "by God, we've kicked the Vietnam syndrome once and for all."⁷⁷⁴ This triumphalism seemed to push the Reformers out of the spotlight completely, as observers praised the role "complex" technologies, especially aircraft such as the F-15 Eagle that the Reformers had resented. However, Boyd, Spinney, Burton, and their allies insisted that the war had proved them correct. Some agreed. Boyd's acolytes took to the press when they could to continue to argue the cause. For example, business writer Tom Peters, who had worked in the Pentagon and in the Nixon

⁷⁷⁴ George Bush: "Remarks to the American Legislative Exchange Council," March 1, 1991, Online by Gerhard Peters and John T. Woolley, The American Presidency Project [<http://www.presidency.ucsb.edu/ws/?pid=19351>], Accessed November 14, 2017.

administration and was a Boyd devotee, argued that the Gulf War was not actually a fair test of the Reformers' ideas. He insisted that the enemy faced in Iraq was incompetent and ill-equipped. In a contest against the Soviets, he said, American "high-tech" weapons would not be as effective. As he surmised, the only thing the Gulf War proved was this: "That heavyweight boxing champ Evander Holyfield could beat the tar out of me—and it wouldn't take him 100 hours."⁷⁷⁵

Conclusion

If the Gulf War killed the Reform Movement, it was at least in part because the movement had been on its last legs for some time. It had been in decline for at least three years leading up to the war, with less and less media coverage and a shrinking caucus membership. However, the war did serve as a powerful piece of evidence that the technology the Reformers had tried to kill was in fact very effective, at least in this particular instance. If the Reformers were right, they were only so in certain, particular cases that have not yet been seen.

However the Gulf War went further than illustrating the fallacies of the Reform movement. It seemed to indicate that the entire fighter pilot mythos might be somewhat outdated—at least in the form that the Reformers and the Fighter Mafia had assumed it would retain. Air-to-air combat was a very small part of the Gulf War. Air superiority had been achieved not with close-turning gun battles with fantasized scarves waving in the breeze but mostly with the large, heavy F-15, using a complex radar, sorting targets, and firing missiles from longer ranges, ending the fights long before they could become gentlemanly duels. This did not mean that fighter-pilot culture or the "knights of the air" mythology had died—as Steven

⁷⁷⁵ Tom Peters, "Don't leap to hasty conclusions in the wake of war," *Chicago Tribune* (Chicago, Illinois), March 25, 1991.

Fino has argued, this culture merely translated itself to a different tactical and technological environment.⁷⁷⁶ However, those who had claimed in the 1950s that the era of dogfighting was a relic of the past had not been wrong; they had spoken prematurely. The vision that the Fighter Mafia had championed of acrobatic gun duels in the sky was only barely relevant by 1991. Although pilots did still prudently train for the possibility of dogfighting, it was not the cornerstone of air power strategy that the Fighter Mafia had envisioned—nor had it ever been.

⁷⁷⁶ Fino, Tiger Check.

Chapter 11 - Conclusion

After 1991, the Reform debate was confined to ever smaller sectors, and the Reform movement declined sharply after the Gulf War. The flurry of newspaper coverage of the movement virtually ceased, and key members of the movement either abandoned the cause or, in some cases, changed their minds. For example, one of the louder voices in the original Reform Caucus, Senator Sam Nunn seemed to reverse his position on the Reform Movement's core belief that superior numbers of simpler weapons would be effective. Just a matter of months after the war, Nunn argued for deleting budget allocations for purchasing F-16s. Although the Fighting Falcon had played a key role in the war, Nunn recognized: "We used 250 [in Gulf War operations]. We have a total of 1,600. How many more do we need?" Dick Cheney, also a member of the Reform Movement and a close associate of Boyd, argued for canceling the F-16 program after 1993. Hillaker himself, who had co-designed the Falcon with Boyd, acquiesced: "At some point, you've got to recognize that you've got to shoot the horse.... It's time to get on with things."⁷⁷⁷ As if to signify the death of the lightweight fighter program, a matter of months after the Gulf War ended, the original prototype of the F-16 was mounted in Memorial Park at Langley Air Force Base.⁷⁷⁸

By the mid-1990s, the Military Reform Caucus had disbanded.⁷⁷⁹ Some members of the movement tried to keep it going, especially Chuck Spinney. Still working in the Pentagon, he saw himself in a one-man war to eliminate high spending on defense technology. As late as

⁷⁷⁷ Ron Hutchinson, "F-16 Falcon Fights for Life," originally for the *Ft. Worth Star Telegram*, reproduced in *The Montgomery Advertiser* (Montgomery, Alabama), October 23, 1991.

⁷⁷⁸ Charles H. Bogino, "F-16 gains higher stature at Langley, Monument honors role in Gulf War," *Daily Press* (Newport News, Virginia), October 25, 1991.

⁷⁷⁹ "Problem areas are the same," *The Palm Beach Post* (West Palm Beach, Florida), March 9, 1998.

1998, Spinney was furiously and publicly criticizing the Navy's F/A-18 program, arguing that the technology was flawed, that the wings were designed incorrectly, and that \$47 billion was being knowingly wasted. Spinney's complaints were lined with superlatives, arguing that Pentagon procurement policy in the late 1990s "insults the American taxpayer [and] undermines our form of government." Even his ally and former boss Tom Christie thought such statements were counterproductive. However strong his rhetoric, by this point, the press found it easy to marginalize him as "a solitary voice at the bottom of a well."⁷⁸⁰

Pierre Sprey, too, moved on. As early as 1986, his frustrations with the Pentagon had grown too much to bear and he resigned, stating that "it would be impossible to build another honest aircraft." Instead, he became a recording engineer and music producer with his own music label. Some of his work was sampled for Kanye West's hit "Jesus Walks." Sprey also insisted that the Reformers' ideology of simplicity – that "less is more" – informed how he recorded and arranged music.⁷⁸¹

Dina Rasor continued her work, founding the Project On Government Oversight (POGO) in 1981—a nonprofit, nonpartisan organization that continued the work of the Reformers by attempting to find instances of excessive government spending, particularly in the defense department.⁷⁸² POGO continued as a small but active voice in Washington D.C.

⁷⁸⁰ Greg Schneider, "Leading an assault on the Pentagon," *The Baltimore Sun* (Baltimore, Maryland), March 8, 1998.

⁷⁸¹ Thomas Ricks, "Whatever Happened To ... Pierre Sprey?" *The Washington Post*, May 16, 2006, [<http://www.washingtonpost.com/wp-dyn/content/article/2006/05/15/AR2006051501518.html>], accessed Nov 27, 2017. For information on Sprey's recording, see his website:

[<http://www.mapleshaderecords.com/main/audiophile.php>], accessed November 27, 2017.

⁷⁸² See [www.pogo.org], accessed Nov 27, 2017.

Literature produced by people associated with the movement continued to see release. For example, Winslow Wheeler, a former National Security Advisor to several senators, including MRC member Nancy Kassebaum (R-KS), released his book, *The Wastrels of Defense: How Congress Sabotages U.S. Security* in 2004. He made many of the same arguments that Reformers made. Key was that too much federal defense money went to frivolous or even fraudulent expenditures that endanger the nation. Promotional material for the book was written by Reform supporters such as Jeffrey Record and James Fallows.⁷⁸³ In 2011, Wheeler collaborated with Pierre Sprey, Chuck Spinney, Thomas Christie, and other Reformers for a book titled *The Pentagon Labyrinth*, which argued many of the same issues that the Reformers had been championing for years regarding problems with technology acquisition in the Department of Defense.⁷⁸⁴ The book was dedicated to John Boyd.

The technology associated with the Fighter Mafia went into decline as well. As all the US military services continued to chase expensive, technologically advanced aircraft such as the F-22 Raptor and the F-35 Lightning, older planes – notably including the Fighter Mafia’s pet project, the F-16 – have receded. In 2017, General Dynamics, whose military aviation division was purchased by Lockheed in 1992, shut down production of F-16 fighters at its main Fort Worth, Texas plant, ending forty years of continuous production. Although some F-16s will continue to be built in other locations, the cessation of production in Fort Worth marks a significant downturn in the aircraft’s history. The legacy of the Fighter Mafia still ran strong in

⁷⁸³ Winslow T. Wheeler, *The Wastrels of Defense: How Congress Sabotages U.S. Security* (New York: Naval Institute Press, 2013).

⁷⁸⁴ Winslow T. Wheeler, *The Pentagon Labyrinth: 10 Short Essays to Help You Through It: from 10 Pentagon Insiders, Retired Military Officers and Specialists with Over 400 Years of Defense Experience* (Washington, D.C.: Center for Defense Information, 2011).

General Dynamics' corporate culture, even among workers on the production line, who still praised Boyd and the Fighter Mafia as righteous rebels whose simpler approach was a corrective to the "complicated and expensive" aircraft of the period.⁷⁸⁵

Although many Reformers moved on, some remained active, expanding into other areas and forming a vocal part of an emerging extreme conservative wing of American politics. Among some of them, many of the themes that appeared during the Reform Movement have grown more radical as some of these activists applied those themes to broader subjects. The habit of seeing the US government as an enemy that must be defeated has remained strong within this branch, as has the villainization of the media. The Reformers had emphasized that technological complexity was dangerous, and that idea seems to have expanded to a distrust of anything "complex," including regulatory policies and tax codes.

Newt Gingrich, a staunch Reformer advocate, remained an example of this, having been a key force in shaping the evolution of American conservatism. His arguments for "simple" policies, as well as his distrust of the government (regardless of which party is in control) and his attacks on the press, were all traits in common with the Reform movement. It would be an overstatement to say that the Reformers caused the stances, yet they undoubtedly contributed to them. Gingrich remained active both as a member of Congress and, later, as a strong advocate for President Donald Trump and his administration. In his later years, Gingrich was not especially active in the promotion of the Reformers' ideas, although he did actively make known

⁷⁸⁵ Max B. Baker, "How the F-16 fighter jet put Fort Worth on the aerospace map," *Fort Worth Star-Telegram*, November 24, 2017 [<http://www.star-telegram.com/news/business/aviation/article186288298.html>], accessed Nov 27, 2017.

his involvement with the movement, claiming that his associations with Boyd and others rendered him a “military expert” as late as 2006.⁷⁸⁶

William Lind is an example of the largest degree of radicalization extending from the Reform Movement. He argued for the Reformers’ points for some time, but he became more invested in his paleoconservatism. Although even in the 1970s he kept a portrait of fascist dictator Benito Mussolini on his office wall, he became more and more open about his association with authoritarianism and right-wing extremism. This was evident in Lind’s voluminous writing as the former Director of the Center for Cultural Conservatism and in his many columns on sites such as TraditionalRight.com, LewRockwell.com, and American Conservative Magazine, among others. He has promoted the “cultural Marxist” conspiracy theory that claims a secret liberal cabal is plotting to overthrow Western society. His 2014 novel *Victoria* not only celebrates a violent militia movement overthrowing the American government, but glorifies deportations and executions (including burning people alive and using tactical nuclear weapons against African-American communities) of those who practice what he denigrates as political correctness or of cultural undesirables, who, for Lind, include any who are not white, straight, male, conservative, and “Christian” (in a superficial, cultural sense). His views on warfare evolved from a focus on maneuver warfare, as he advocated with Boyd, to arguing, instead, that the largest threat facing the state is “Fourth Generation Warfare,” in which decentralized, non-state actors attack a state not only in a military sense but also in a cultural and

⁷⁸⁶ Rick Tyler, Gingrich Communications director, “Newt Gingrich is a Military Expert,” *Chicago Tribune* (Chicago, Illinois), March 6, 2006.

ideological sense. Lind at least met with President Trump, but the level of his influence on the administration was unclear.⁷⁸⁷

At least in part because of the continued activity of some members, the Reform Movement and the Fighter Mafia still played a part in framing the debate on defense technology, even forty years after the height of their influence. Trump showed a proclivity for these arguments, and, early in his presidency, he seemed to be pushing for similar policies. For example, Trump loudly criticized the Fifth-Generation F-35 fighter, instead preferring the 40 percent cheaper, and much technologically simpler F/A-18 Hornet—which itself was a product of the lightweight fighter flyoff competition that produced the F-16. Trump’s earliest budget plan called for the purchase of 80 Hornets.⁷⁸⁸ Trump supported changing the move to using magnetic catapults on Navy aircraft carriers as well, due to his perception of them being overly complex and expensive. He explained his reaction to the electro-magnetic catapults: “It sounded bad to me. Digital. They have digital. What is digital? And it’s very complicated, you have to be Albert Einstein to figure it out. And I said—and now they want to buy more aircraft carriers. I said, ‘What system are you going to be—’ ‘Sir, we’re staying with digital.’ I said, ‘No you’re not. You going to goddamned steam, the digital costs hundreds of millions of dollars more money and it’s no good.’”⁷⁸⁹

⁷⁸⁷ William Lind, “The Next Conservatism,” *Traditional Right* [<https://www.traditionalright.com/the-next-conservatism/>], accessed December 22, 2017.

⁷⁸⁸ Richard Aboulafia, “Trump’s Strange Fixation with the Super Hornet: Sorting The Fake From The Real,” *Forbes*, September 11, 2017, [<https://www.forbes.com/sites/richardaboulafia/2017/09/11/trumps-super-hornet-assertions-sorting-fake-from-real/#5e79e6643254>], accessed November 27, 2017.

⁷⁸⁹ Ellen Mitchell, “Trump wants ‘goddamned steam’ catapults on new aircraft carriers,” *The Hill*, May 11, 2017 [<http://thehill.com/policy/defense/333040-trump-wants-goddamned-steam-catapults-on-new-aircraft-carriers>], accessed Nov 27, 2017.

These attitudes reflect the same goals as the Reform Movement—a shift to technology that seems simpler and is less expensive. Yet not all principals are so quick to accept their ideas. Former Air Force Chief of Staff General Merrill McPeak, in an interview in 2017, summed up the main charges against the Reformers. He lambasted the influence of the Fighter Mafia, spoke of how complexity was a relative concept, and emphasized that overspecialization in any one area—which is what the Fighter Mafia pursued—is not always helpful. Ironically, perhaps, McPeak indicated that the Reform Movement (which emphasized man over machine) was itself much too focused on machines and did not take men as seriously as they should. As he explained,

Boyd is highly overrated. . . . Look, the whole defense reform movement, there are a lot of good guys in there — (Tom) Christie, my friend the writer for *The Atlantic*, James Fallows. He’s a good writer and he was part of the defense reform movement. But they were focused on the wrong thing. They were focused on equipment. They thought the A-10 was the greatest thing since canned tuna fish. . . . I don’t think even they were dumb enough to think it was a great airplane. It was an example of somebody listening to them. So they were flattered by it. But their real paradigm was the F-86. And the F-16. The minute that the Air Force got its hands on it, they wrecked the F-16, according to these guys, by making it a jack of all trades. When I was commanding in the Pacific, we had an F-16 wing at Kunsan. The 8th (Fighter) Wing. And they did everything. There wasn’t anything the F-16 couldn’t do. And the defense reform movement would’ve said, “You bastardized it. You should’ve kept it as a light fighter forever, as a gun fighter. Don’t ruin it by putting some of the missiles on it.” But they forget that the F-86 was the most complicated aircraft in the Korean War. If you want a simple aircraft you should’ve looked at the MiG-15, right? So they got the argument a little bit wrong. But then along comes Boyd... and people said, “Wow, a fighter pilot with a brain!” They tended to listen to him when in many respects he was a failed officer and even a failed human being in some ways. . . . They were right about some stuff and they were wrong about some stuff but the real payoff is when you’ve got a warrior spirit and your guys just won’t quit. They’ll fight for you. That they never stumbled onto – the human being element is what we need to reform.⁷⁹⁰

⁷⁹⁰ Carl Prine, “Q & A with Merrill ‘Tony’ McPeak,” *San Diego Union Tribune*, November 23, 2017 [<http://www.sandiegouniontribune.com/military/sd-me-mcpeak-speaks-20171113-story.html>], accessed December 22, 2017.

McPeak, even in criticizing Boyd, still held up the key tenets of the “knights of the air” myth when he referred to “warrior spirit.” He certainly took a strong stance, as most people did, either for or against Boyd and the Fighter Mafia. The group continued to be polarizing. Within the defense community, most people who knew anything about Boyd and his followers tended to have strong opinions one way or the other—either Boyd was a messianic hero, or he was overrated, wrong, and even a terrible human being. In fact, people rarely fit so neatly into such a black or white mold. Boyd and the others associated with the Fighter Mafia and the Reform Movement are best seen as complex and nuanced. Certainly they were not the heroic messiahs that much of the literature presents them as, but neither were they stupid. Energy Maneuverability Theory was a powerful and useful tool that continued to serve as one of the main methods of evaluating aircraft. Boyd’s “Fast Transients Brief,” which focused on methods for fighter pilots to constantly maneuver in ways that created problems for their opponents, continued to be an influential tool for the training of fighter pilots for many decades. Some of Boyd’s other writings, such as “A Discourse on Winning and Losing,” probably received too much praise. Certainly too little attention has been paid to Boyd’s personality flaws and failure of leadership. The “fighter jock” traits that he took to such an extreme alienated the very people he was trying to reach. These traits were far too often celebrated. Boyd’s life demonstrates that radical hypermasculinity is not a substitute for leadership; it is a self-destructive, toxic force that undermines one’s goals.

Myths and Legacies

The attitudes and arguments of the reform movement were not new. Thomas Jefferson himself embraced a similar approach when he argued for replacing the bulk of the US Navy with

small, cheap, simple gunboats instead of large, expensive, complex ships of the line.⁷⁹¹ Yet the Reformers' ideas were not rooted in the Barbary Wars; they were an outgrowth of the fighter pilot culture that first came into existence during the First World War. War had always been a brutal affair, but the veneer of Victorian Era values in the nineteenth century held up the ideal of combat as a noble, honorable, gentlemanly affair. This was never an accurate depiction of warfare, but this idealization colored the popular perception of what it meant to be a soldier. European society was not directly confronted with how wrong that idea was until it became locked in the brutal stalemate of trench fighting in the First World War. Although the romanticization of noble, gentlemanly combat had always been something of a fiction, the realities of the Western Front (as well as the other fronts) brought that falsehood to light.

Yet the people of the early twentieth century still longed for heroes. The lone fighter pilot seemed to fill that void. Fighters exemplified the characteristics of heroic, honorable combat in a way that ground fighters succumbing to mental and physical trauma in muddy, stagnant trenches did not. The technology of the pursuit aircraft itself helped to foster certain characteristics in pilots, which shaped the values of the then-emerging fighter pilot community.

Pilots could literally rise above the chaos on the ground. Pursuit pilots—as opposed to other types of aircraft—tended to fly alone. And air-to-air combat was a blood-pumping adventure that seemed to fill the need for a sense of chivalrous combat—although this interpretation required a dose of romanticism as well. These pilots created and adhered to the emerging stereotype of the “knights of the air.” This was more than just a label for an image of

⁷⁹¹ See Allan R. Millett and Peter Maslowski, *For the Common Defense: A Military History of the United States of America* (New York: The Free Press, 1984), 100, for an overview of this concept.

the pilot as a swashbuckling hero with their scarf blowing in the wind—it was a way of thinking about warfare, the individual’s role in it, and the relationship between men and technology.

Specifically, the knights of the air stereotype—the culture of the fighter pilot—assumed that the personality of the pilot was a main determinant of victory in the air, and thus certain personality traits should be celebrated and rewarded, while others were shunned. These traits revolved around five concepts. First, fighter pilots were to be aggressive. This sense of aggressiveness included a strong sense of competition with others in many, if not all, aspects of life, both inside and outside the cockpit. Second—and perhaps most important—fighter pilots were fiercely independent and individualistic. This could express itself in a number of ways, but often included a spirit read to resist authority. Fighter pilots tended to push back against authority figures, up to and including openly and brazenly disobeying orders. This attitude has become ingrained to such a large degree that traditions have formed around particular acts of protest against authority, celebrating small symbols of a rebellious attitude. However, by becoming traditions themselves, these symbols came to be appropriated by authority figures and become part of the system against which still others would rebel. The classic example of this phenomenon is “Mustache March,” a celebration of Robin Olds’ refusal to abide by grooming regulations.⁷⁹²

Third, fighter pilots tended to rely on heroic imagery to describe themselves and expected others to see them in that same heroic light. The very name “knights of the air” calls back to medieval images of heroic knights on quests to save their societies. Others instead referred to

⁷⁹² For a brief summary of this event, as well as some of the controversy surrounding it, see Stephen Losey, “Top USAF general sitting out this Mustache March,” *Air Force Times*, [<https://www.airforcetimes.com/news/your-air-force/2015/03/03/top-usaf-general-sitting-out-this-mustache-march/>], accessed December 31, 2017.

individualized heroes of Greco-Roman mythology. Later generations did the same, or invoked pilot heroes of previous wars. The Fighter Mafia and the Reformers knowingly adopted religious imagery and symbolism to describe their movement and how they saw it fitting in society.

Fourth, the knights of the air mythology had a specific relationship with technology, seeking to create technologies that enhance the traits they associate with successful heroic air-to-air combat while diminishing others. In the First World War, this included promoting SPAD fighters because of their durability in tight turning conflicts. This is essentially the same approach the Fighter Mafia argued for in the 1970s—praising cutting edge technology when it aided maneuverability and air-to-air characteristics, even if that technology was quite complex, such as fly-by-wire systems. Other technologies that did not enhance the vision of low-altitude, tight turning dogfights—such as large, long-range radar—were marginalized and actively discouraged.

Finally, the Fighter pilot community, as early as World War I, was a *distinct* community. They were a tight-knight group with similar values, and they saw those values as often at odds with those of the rest of the military around them. They were suspicious of outsiders and hostile toward authority figures who were not from that community. USAF was primarily identified with the strategic bombing mission (about as opposed to fighter pilot ideals as possible) from the 1930s through the 1960s, yet the fighter pilot community endured – remaining a small subculture within the Air Force and seeing itself as an oppressed minority. Only after the Korean War and then during and after the Vietnam War did a majority of former fighter pilots rise to leadership positions, finally able to impose fighter pilot cultural values on the Air Force at large, which eventually resulted in a service-wide restructuring of USAF as a whole. This rise of fighter pilots

to prominence in command positions in the Air Force was not the result of victory in an ideological debate. It was the result of circumstance and something close to accident.

In the early 1960s, especially by 1964, many of these fighter pilots thought that the role of traditional fighters, namely, air-to-air combat, had become lost, both in the sense of training and also in terms of technology. In a series of studies and panels, these pilots argued for the creation of fighter aircraft that held true to their vision of a single-seat dogfighter emphasizing small size, maneuverability, agility, and the consequent ability to recapture the spirit of old World War I “white scarf stuff” using modern technology. One key element in allowing this group to gain a stronger voice was John Boyd’s Energy Maneuverability Theory. Fighter pilots, who typically discussed their dogfighting scenarios using hand gestures to represent airplanes, often struggled to make engineers, designers, and their commanding officers understand exactly what they wanted—maneuverability, the ability to dogfight. These characteristics are not easily summed up by top speed or wing loading specifications, but instead by measuring the ability to switch between states quickly – to be agile and gain surprise in close-turning air combat duels. EMT gave them a language to communicate this. EMT could translate the characteristics that this segment of the fighter community hoped for into the language of engineers.

Boyd did not begin this movement, yet he did go to extremes in embodying the stereotypical characteristics of fighter jocks. When given the opportunity to influence the design of the F-X, which became the F-15 Eagle, he tried to imbue it with more maneuverability, a smaller size, and a specialization for close, tight-turning air-to-air combat. Gathering other like-minded people around him such as Sprey, Myers, Riccioni, Christie, and Hillaker, Boyd created a close-knit movement that was a microcosm of the broader movement of fighter pilots. Boyd began to be seen as a messianic figure for this subculture, and his co-workers and associates

were his Disciples. In one sense they were evangelists for their particular vision of what aircraft should be. In another sense, however, they held true to the concept of the Mafia, frequently holding clandestine meetings, creating of underground information networks, fiercely protecting for the other members of their “family,” and using intimidation to force their will upon larger organizations around them.

However, the F-15 did not meet their expectations. As the aircraft was saddled with more missions, more requirements, and more versatility, the Fighter Mafia rejected it as a failure. By holding secret meetings that skirted the edge of legality, as well as through their personal connections around the Air Force and the Pentagon, Boyd and Hillaker started a process that resulted in an aircraft that could hold more true to their vision: the F-16 Fighting Falcon. Yet, after years of careful work, this aircraft also failed to live up to the Fighter Mafia’s expectations, as the Air Force increased its size and added more capabilities to the plane.

Dejected, the Fighter Mafia broadened their movement. They no longer focused on only aircraft design, but they spread their principles of maneuverability, surprise, and the ability to change between energy states quickly and to apply it to other military hardware as well as doctrine itself. Emphasizing the sense of individuality that was a cornerstone of the fighter pilot identity, the Fighter Mafia emphasized the role of man over machine, arguing that without highly trained, competent individuals that had the stereotypical fighter pilot characteristics of aggressiveness and competitiveness, no technology could be effective. In fact, as they saw it, advanced technology might be a hindrance. Thus, this broader movement, dubbing itself the Reformers, emphasized that weapons should be less complex. The fact that much of what they wanted was also less expensive was a boon to their arguments and helped sell their ideas, as they

believed spending inordinate amounts of money on complex weapons was detrimental to the military and to the United States as a whole.

The Reformers, also dubbed the Cheap Hawks, championed the buzzwords of “complex” versus “simple,” and “expensive” versus “cheap,” setting up an artificial binary lens through which they viewed and evaluated all defense technology procurement. In the non-technology realm, they applied fighter pilot concepts of agility, mobility, and surprise—the same elements they praised in close air dogfighting—to military doctrine as a whole, encouraging the adoption of Boyd’s particular form of *Blitzkrieg*, which resembled air-to-air combat, but on a large scale involving large troop units.

The movement was a bipartisan one, and it did—early on, at least—have appeal to several political ideologies. Certainly James Fallows, associated generally with the American left, made strange bedfellows with William Lind—a self-proclaimed monarchist, paleoconservative Trump advisor, who considered Western (white, Christian) civilization inherently superior to others. Lind was certainly the far extreme, and, although most participants in the Reform movement were conservative (increasingly so over time), few, if any, held the extreme nationalist and authoritarian views of Lind. However, the movement appealed to Fallows and others on the left for a variety of reasons, including seeing it as an avenue to decrease defense spending, make defense technology more effective, and achieve better defense for less money. Also, the sheer cult of personality that Boyd engendered among many of his followers was effective. Fallows seems to have been taken with Boyd’s personality and passion, and he saw Boyd’s efforts as an underdog story of a low-level colonel trying to fix a broken system against all odds. To any journalist, regardless of political leaning, that David and Goliath tale can appear as an exciting story worth telling.

For most observers and outsiders, the Gulf War seemed to discredit, if not destroy the Reform Movement. In that war, the new, advanced, complex and expensive technologies performed well—so well that many hailed the war as a “Revolution in Military Affairs.” Air-to-air combat did occur, but not in the close turning dogfighting duels of old. And the Lightweight Fighter that was supposed to be the ultimate symbol of air combat—the F-16—did not shoot down one single enemy plane in 1991. None of the kills were from guns—except for two helicopters shot down by the gun of a CAS aircraft, the A-10. Almost all of the air-to-air kills were from F-15s, firing long range missiles, taking advantage of the large radar that the Reformers had so vehemently opposed. The real damage of the air war in Iraq, however, was the bombing campaign of Instant Thunder, which was an enormous success. Yet, while it could be argued that the mastermind of the campaign, John Warden, was in some ways a product of the fighter pilot community just as Boyd was, the Instant Thunder campaign bore little, if any, resemblance to Boyd’s ideas and theories about the nature of war. It was the specter of Billy Mitchell and Giulio Douhet that hovered over the battlefield of Iraq in 1991, not that of Eddie Rickenbacker or the Red Baron. It was not the “white scarf stuff” that was so game-changing; it was an updated and modified version of strategic bombing theory, made effective largely due to complex, expensive technologies that the Reformers had opposed.

After the war, many of the Reformers themselves saw what they wanted to see, and they found ways to claim that the war vindicated their arguments. Their case bore little weight, however, and the movement fizzled. The Military Reform Caucus disbanded, and many who had been part of it drifted to other projects, although some continued on as policymakers, and continued to apply their ideas. Non-government organizations such as POGO, founded by members of the Reform Movement, continued to press these concepts. Some individuals wrote

books preaching the same causes, and still others, like Spinney, who by then was largely marginalized, kept fighting. Many key individuals from the movement continued to have a strong voice in policy. Newt Gingrich, and Dick Cheney were leaders in the Republican Party for many years, even as late as informing Trump's presidency. Lind also continued as an important voice in shaping the evolution of the Republican Party and influencing the Trump administration.

The ideas of the Reform Movement and the Fighter Mafia thus continually raised their heads for decades after their prime. The frequent arguments claiming that the F-22 or the F-35 were too complex and too expensive, or that one of the lightweight fighters (such as the F-16 or the F/A-18) could be more effective, were all right out of the Reform Movement playbook. Sprey continued to be a controversial figure in the media, leading the charge against the F-35 (including collaborating with a Vermont-based advocacy group called "Stop the F-35").⁷⁹³ In a 2012 interview for a Canadian news network, Sprey referred to the F-35 as "a turkey. It's inherently a terrible airplane. Because it's an airplane built for a dumb idea. As soon as you go to build a multi-mission airplane, you're sunk . . . you'll never get a good airplane out of that." His main complaint spoke to his focus on air-to-air combat and dogfighting. He claimed that the F-35 had improper wing loading and could not maneuver as well as other fighters in close turning dogfights. He argued: "In dogfighting it's hopeless. You can guarantee that a 1950s designed MiG-21 or French Mirage would just hopelessly whip the F-35."⁷⁹⁴ Sprey made similar arguments in several interviews, including the *Aviation Week* podcast, in which he argued with

⁷⁹³ [<http://www.stopthef35.com/>], accessed Dec 2 2017

⁷⁹⁴ "Extended Interview: Pierre Sprey," Sept 28, 2012, The Fifth Estate [<http://www.cbc.ca/fifth/blog/extended-interview-pierre-sprey>], accessed Dec 2, 2017.

an F-35 pilot about how the new stealth plane could be easily defeating in a maneuvering dogfight by “any old F-16.”⁷⁹⁵

Sprey’s arguments did not address that air-to-air combat seems to have completely disappeared from modern conflicts. However, fighter pilot culture still tends to focus on that role, to the point of longing for its return. The reaction from certain elements in the fighter pilot community to late events pointed to this focus on air-to-air combat as a sort of holy grail for some pilots. When an F/A-18 shot down a Syrian Su-22 in June 2017, it sparked a flurry of debate about whether air-to-air combat was “back” and what that meant for pilots.⁷⁹⁶ However, this seems to have been mostly an isolated event, and the very fact that the discussion centered around whether air combat had truly “returned” showed that it was not a main part of modern conflict.

Although the Air Force supports many missions, most of its personnel are not pilots, and most of its pilots do not engage in air-to-air combat or air combat training. Yet the institution continued to place air combat on a pedestal in unofficial and sometimes subtle ways. For example, at the Air Force Academy grounds, eight aircraft are on display. One is a B-52 bomber. The other seven are related to air-to-air combat. On the campus terrazzo, an F-15 and F-16 fighter are each on display, along with an F-105 Thunderchief, which was used as a hybrid

⁷⁹⁵ Lara Seligman, “Podcast: F-35 in the Crossfire, Part 1,” Aviation Week, [<http://aviationweek.com/combat-aircraft/podcast-f-35-crossfire-part-1?page=1>], Accessed Dec 2, 2017.

⁷⁹⁶ For the story itself, see Oriana Pawlyk, “US F/A-18E Shoots Down Syrian Su-22 in Air-to-Air Kill,” Military.com [<https://www.military.com/daily-news/2017/06/18/us-navy-fa18e-shoots-down-su22-over-syria.html>], accessed December 31, 2017; for some discussion of the fighter pilot community’s reaction, see Stephen Losey, “Air-to-air combat is back: How will the Air Force respond as the war over Syria heats up?” Air Force Times, [<https://www.airforcetimes.com/news/your-air-force/2017/06/26/air-to-air-combat-is-back-how-will-the-air-force-respond-as-the-war-over-syria-heats-up/>], accessed December 31, 2017.

fighter-bomber during the Vietnam War. The prized possession on display there is the F-4 Phantom flown by Richard Steven Ritchie, in which he shot down five MiG fighters to become the first Air Force ace pilot of the Vietnam War. Near the Prep School, the F-100 Super Sabre flown by fighter pilot Robbie Risner is on display. The Super Sabre is, as the name implies, an upgraded version of the F-86 Sabre that engaged in so many dogfights during the Korean War. Also on display south of the cadet area are an F-5 fighter—the very same aircraft that the Fighter Mafia wanted to buy in large numbers instead of purchasing the F-15—and an A-10. The A-10 is of course a ground support airplane, but the plaque in front of the A-10 indicates that this particular aircraft scored an air-to-air kill in the Gulf War in 1991 by shooting down an Iraqi helicopter. Even when displaying ground attack planes, the Academy emphasizes the air-to-air role.

None of this emphasis is necessarily wrong, and this work should not be construed as criticism of a passion for air-to-air combat. What it does argue is that the culture and beliefs of the relatively small fighter pilot community had a large effect on decision-making about technology in the Air Force. Williamson Murray and Mark Grimsley have stated: “Many, if not most, case studies of the making of strategy would make no sense without consideration of the role of belief systems.”⁷⁹⁷ What they argue of strategy is also true for technology. Military technology does not develop along a predetermined linear path of advancement, nor does it have a mind of its own. When designing new technologies, institutions such as the US Air Force would do well to remember that their technological decisions are (at least) strongly influenced by cultural prejudices. This is not meant as a criticism, since prejudices such as these are inherent in

⁷⁹⁷ Williamson Murray and Mark Grimsley, “On Strategy,” in *The Making of Strategy: Rulers, States, and War*, Murray, Macgregor Knox, Alvin Bernstein, eds., (New York: Cambridge University Press, 1994), 13.

human beings. But they must be considered and assessed. Militaries should not attempt to convince themselves that pure utility or mission requirements are the only reasons to build a piece of hardware (or software) in a particular way. Technology is an outgrowth of culture. Its development is shaped by belief systems. Humans build things, including weapons, at least in part because their culture has led them to think that certain weapons are cool.

The Reformers thought air-to-air combat was cool, and they wanted to build airplanes that excelled at that role. This view was rooted in the culture of fighter pilots from World War I, which created the vision of gentlemanly dogfights and the mythology of “knights of the air.” The Reformers’ attempt to recapture this idealized past created patterns of thinking: the emphasis on the individual, the idea that personality is the determiner of victory, the conviction that governmental bureaucracy lacks the skill or understanding to produce victory. In many cases they took those ideas to radical extremes. In their aggressive pursuit of their views, and in their often-invoked allegory of themselves as a religious order with reform as “the Lord’s work,” they were less like knights of the air—they were Templars.

Bibliography

Secondary Sources

———. “Intelligence Community Assessment of the Lieutenant Commander Speicher Case.” 27 March 2001. FOIA Electronic Reading Room. CIA. 10 September 2006.

———. “Jet Strategic Bombardment,” *Air University Review Quarterly*, 5, Spring 1952, 19.

———. *Gulf War Air Power Survey: Volume V: A Statistical Compendium and Chronology*, Washington D.C., 1993.

Anderegg, C. R. *Sierra Hotel: Flying Air Force Fighters in the Decade after Vietnam*. Washington, D.C.: Air Force History and Museums Program, 2001.

Appy, Christian G. *American Reckoning: The Vietnam War and Our National Identity*. New York: Viking Press, 2015.

Aronstein, David C., and Albert C. Piccirillo, *The Lightweight Fighter Program: A Successful Approach to Fighter Technology Transition*. Reston: American Institute of Aeronautics and Astronautics, 1997.

Aronstein, David C., and Albert C. Piccirillo. “The F-16 Lightweight Fighter: A Case Study in Technology Transition.” in Jacob Neufeld, George M. Watson, Jr., and David Chenoweth, eds., *Technology and the Air Force: A Retrospective Assessment*. Washington, D.C.: Air Force History and Museums Program, 1997.

Atkinson, Rick. *Crusade: The Untold Story of the Persian Gulf War*. New York: Houghton Mifflin, 1993.

Barlow, Jeffrey G., ed., *Reforming the Military*. Washington, D.C.: The Heritage Foundation, 1981.

Biddle, Stephen. *Military Power: Explaining Victory and Defeat in Modern Battle*. Princeton: Princeton University Press, 2006.

- Blesse, Frederick C. *“Check Six,” A Fighter Pilot Looks Back*. New York: Ivy Books, 1987.
- Boyne, Walter J. *Phantom in Combat*. Washington: Smithsonian Institution Press, 1985.
- Brandt, Thomas C., Howard E. Bethel, and Wallace B. Frank, Jr. “Mission-Area Resource Allocation for Air Force R&D,” *Defense Systems Management Review* 2 (Spring 1979, issue 2).
- Brown, Shannon A. *Providing the Means of War: Historical Perspectives on Defense Acquisition, 1945-2000*. Washington, D.C.: Government Printing Office, 2005.
- Bugos, Glenn E. *Engineering the F-4 Phantom II: Parts into Systems*. Annapolis: Naval Institute Press, 1996.
- Builder, Carl H. *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force*. Somerset: Taylor and Francis, 1994.
- Builder, Carl H. *The Masks of War: American Military Styles in Strategy and Analysis*. Baltimore: Johns Hopkins University Press, 1989.
- Burton, James. *The Pentagon Wars: Reformers Challenge the Old Guard*. Annapolis, Naval Institute Press, 1993.
- Busek, Joseph R. “A Historical Analysis of Total Package Procurement, Life Cycle Costing, and Design to Cost.” June 1976, Master's Thesis, Air Force Institute of Technology, Air University.
- Call, Steve. *Selling Air Power: Military Aviation and American Popular Culture After World War II*. College Station: Texas A & M University Press, 2009.
- Citino, Robert. *Blitzkrieg to Desert Storm: The Evolution of Operational Warfare*. Lawrence, University of Kansas Press, 2004.
- Citino, Robert. *The German Way of War: From the Thirty Years' War to the Third Reich.* Lawrence: University Press of Kansas, 2005.

- Clodfelter, Mark. *The Limits of Air Power: The American Bombing of North Vietnam*. Lincoln: University of Nebraska Press, 2006.
- Cogan, Charles. "Desert One and Its Disorders," *The Journal of Military History* 67 (January 2003), 201-216.
- Coram, Robert. *Boyd: The Fighter Pilot Who Changed the Art of War*. New York: Little, Brown, and Company, 2002.
- Correll, John T. "The Reformers." *Air Force Magazine* (Feb. 2008), 40-44.
- Crane, Conrad C. *American Airpower Strategy in Korea, 1950-1953*. Lawrence, KS: University Press of Kansas, 2000.
- Crane, Conrad C. *Bombs, Cities, and Civilians: American Airpower Strategy in World War II*. Lawrence: University Press of Kansas, 1993.
- Cunningham, Randy. *Fox Two: The Story of America's First Ace in Vietnam*. Mesa, Arizona: Champlin Fighter Museum, 1984.
- Davis, Richard G. *On Target: Organizing and Executing the Strategic Air Campaign Against Iraq*. Washington D.C.: Air Force History and Museums Program, 2002.
- Elliot, William. "The Development of Fly-by-Wire Control," *AFMC Historical Study* 7, December 1996.
- Ethell, Jeff. *F-15 Eagle*. Shepperton: Ian Allan Ltd., 1984.
- Fallows, James. "America's High-Tech Weaponry." *The Atlantic Monthly*, 247, May 1981.
- Fallows, James. "Muscle-Bound Superpower: The State of America's Defense." *The Atlantic Monthly*, October 1979.
- Fallows, James. *National Defense*. New York: Random House, 1981.
- Fallows, James. *National Defense*. New York: Vintage, 1984.

- Fehr, Ernst, and Urs Fischbacher. "The Nature of Human Altruism." *Nature* 425, no. 6960 (2003): 785.
- Fino, Steven A. *Tiger Check: Automating the US Air Force Fighter Pilot in Air-to-Air Combat, 1950-1980*. Baltimore: Johns Hopkins University Press, 2017.
- Fino, Steven. "Breaking the Trance: The Perils of Technological Exuberance in the U.S. Air Force Entering Vietnam," *Journal of Military History* 77 (Spring 2013).
- Fino, Steven. "Doubling Down: AIMVAL-ACEVAL and US Air Force Investment in TacAir post-Vietnam," *Vulcan 2* (2014).
- Fitzgerald, A. Ernest. *The High Priests of Waste*. New York: Norton, 1972.
- Frieser, Karl-Heinz. *The Blitzkrieg Legend: The 1940 Campaign in the West*. Annapolis, Naval Institute Press, 2013.
- Fritzsche, Peter. *Nation of Fliers: German Aviation and the Popular Imagination*. Cambridge: Harvard University Press, 2009.
- Fussell, Paul. *The Great War and Modern Memory*. London: Oxford University Press, 1975.
- Futrell, Robert F. *The United States Air Force in Korea, 1950-1953*. Washington, D.C.: Air Force History and Museums Program, 2000, 1983.
- Gaddis, John Lewis. *Strategies of Containment: A Critical Appraisal of American National Security Policy During the Cold War*. Oxford: Oxford University Press, 2005.
- Galland, Adolf, trans. Mervyn Savill. *The First and the Last: The Rise and Fall of the German Fighter Forces, 1938-1945*. New York: Bantam, 1978, originally published New York: Henry Holt and Company, 1954.
- Gentile, Gian P. *How Effective Is Strategic Bombing? Lessons Learned from World War II and Kosovo*. New York: New York University Press, 2001.

- Gintis, Herbert, Samuel Bowles, Robert Boyd, and Ernst Fehr. "Explaining altruistic behavior in humans." *Evolution and Human Behavior* 24, no. 3 (2003): 153-172.
- Gorn, Michael H. *Harnessing the Genie: Science and Technology Forecasting for the Air Force, 1944-1986*. Washington, D.C.: Office of Air Force History, U.S. Air Force, 1989.
- Grant, Zalin. *Over the Beach: The Air War in Vietnam*. New York: Pocket Books, 1986.
- Greenhous, Brereton. "The Israeli Experience." in Benjamin Franklin Cooling, ed., *Case Studies in the Achievement of Air Superiority*. Washington D. C., Air Force History and Museums Program, 1994.
- Hagopian, Patrick. *The Vietnam War in American Memory Veterans, Memorials, and the Politics of Healing*. Amherst: University of Massachusetts Press, 2012.
- Hallion, Richard. *Storm Over Iraq: Air Power and the Gulf War*. Washington: Smithsonian Institution Press, 2002.
- Hammond, Grant. *The Mind of War: John Boyd and American Security*. Washington D.C.: Smithsonian, 2001.
- Hankins, Michael. "The Phantom Menace: The F-4 In Air Combat in Vietnam," Thesis, University of North Texas, 2013.
- Hankins, Michael. "The Teaball Solution: The Evolution of Air Combat Technology in Vietnam, 1968-1972," *Air Power History* 63 (Fall 2016).
- Hannah, Craig C. *Striving for Air Superiority: The Tactical Air Command in Vietnam*. College Station: Texas A&M University Press, 2002.
- Hart, Gary, and William S. Lind. *America Can Win: The Case for Military Reform*. Bethesda: Adler & Adler, 1986.
- Hart, Peter. *Aces Falling: War Above the Trenches, 1918*. London: Phoenix, 2008.

- Heatherly, Charles L. *Mandate for Leadership: Policy Management in a Conservative Administration*. Washington, D.C.: Heritage Foundation, 1981.
- Herring, George. "Preparing Not to Refight the Last War: The Impact of the Vietnam War on the U.S. Military." in Charles E. Neu, ed., *After Vietnam: Legacies of a Lost War*. Baltimore: Johns Hopkins University Press, 2000.
- Holwill, Richard N. *Agenda '83*. Washington, D.C.: Heritage Foundation, 1983.
- Jones, Frank L. "A 'Hollow Army' Reappraised: President Carter, Defense Budgets, and the Politics of Military Readiness." Carlisle: Strategic Studies Institute: U.S. Army War College, 2012.
- Kamps, Charles Tustin. "Operation Eagle Claw: The Iran Hostage Rescue Mission." *Air & Space Power Journal International Edition - Spanish*, 18 (Third Quarter, 2006).
- Keaney Thomas A. and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report*, Washington D. C., 1993.
- Koskinas, Ioannis. "Black Hats and White Hats: The Effect of Organizational Culture and Institutional Identity on the Twenty-third Air Force," CADRE Paper No. 24. Maxwell AFB: Air University Press, 2006.
- Kross, Walter. "Military Reform: Past and Present." *Air University Review* 32 (July-August 1981).
- Lambeth, Benjamin. *The Transformation of American Air Power*. Ithaca: Cornell University Press, 2000.
- Laslie, Brian D. *Architect of Air Power General Laurence S. Kuter and the Birth of the US Air Force*. Lexington, Kentucky: University Press of Kentucky, 2017.
- Laslie, Brian. *The Air Force Way of War: U.S. Tactics and Training after Vietnam*. Lexington: The University Press of Kentucky, 2016.
- Lowery, John. "Have Doughnut," *Air Force Magazine* (June 2010).

- Mahnken, Thomas G. *Technology and the American Way of War Since 1945*. New York: Columbia University Press, 2008.
- McFarland, Stephen Lee. *America's Pursuit of Precision Bombing, 1910-1945*. Tuscaloosa: University of Alabama Press, 2008.
- Mets, David. "Boydmania." *Air and Space Power Journal*, 18 (Fall 2004), 98-108.
- Michel, Marshall. "The Revolt of the Majors: How the Air Force Changed After Vietnam." PhD Diss., Auburn University, 2006.
- Michel, Marshall. *Clashes: Air Combat Over North Vietnam: 1965-1972*. Annapolis, Naval Institute Press, 1997.
- Millet, Allan R. and Peter Maslowski. *For the Common Defense: A Military History of the United States of America*. New York: The Free Press, 1984.
- Minutaglio, Bill. "Tales of the Fighter Mafia." *Dallas Life Magazine*, May 3, 1987.
- Momyer, William W. *Air Power in Three Wars: WWII, Korea, Vietnam*. Washington D.C.: Office of Air Force History, 1978.
- Mrozek, Donald J. *The US Air Force After Vietnam: Postwar Challenges and Potential for Responses*. Maxwell AFB: Air University Press, 1988.
- Murray, Williamson, and Mark Grimsley. "On Strategy." in *The Making of Strategy: Rulers, States, and War*. Murray, Macgregor Knox, and Alvin Bernstein, eds. New York: Cambridge University Press, 1994.
- Murray, Williamson, and Wayne W. Thompson. *Air War in the Persian Gulf*. Baltimore: Nautical & Aviation Publ. Co. of America, 1997.
- Nowak, Martin A. "Five rules for the evolution of cooperation." *Science* 314, no. 5805 (2006): 1560-1563.

- Nye, David. *America as Second Creation: Technology and Narratives of New Beginnings*. Cambridge: MIT Press, 2004.
- Nye, David. *Technology Matters: Questions to Live With*. Cambridge: MIT Press, 2007.
- Olds, Robin. *Fighter Pilot: The Memoirs of Legendary Ace Robin Olds*. New York: St. Martin's Press, 2010.
- Olsen, John Andreas. "Boyd Revisited: A Great Mind with a Touch of Madness." *Air Power History* (Winter 2016), 7-16.
- Olsen, John Andreas. *John Warden and the Renaissance of American Air Power*. Dulles: Potomac Books, 2011.
- Osinga, Frans P. B. "The Enemy as a Complex Adaptive System: John Boyd and Airpower in the Postmodern Era." in John Andreas Olsen, ed., *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd*. Annapolis: Naval Institute Press, 2015.
- Osinga, Frans P. B. *Science, Strategy and War: The Strategic Theory of John Boyd*. London: Routledge, 2007.
- Peck, Jr., Gaillard R. *America's Secret MiG Squadron: The Red Eagles of Project Constant Peg*. Long Island City: Osprey Publishing, 2012.
- Poncar, Jerry V., and James R. Johnston, III. "History and Analysis of the C-5A Program: An Application of the Total Package Procurement Concept," Thesis, Wright-Patterson Air Force Base, Ohio: Air Force Institute of Technology, October 1970.
- Poole, Walter S. *Adapting to Flexible Response, 1960-1968*. Washington, D.C.: Historical Office, Office of the Secretary of Defense, 2013.
- Putney, Diane T. *Airpower Advantage: Planning the Gulf War Air Campaign, 1989-1991*. Washington D.C.: Air Force History and Museums Program, 2004.
- Rasimus, Ed. *Palace Cobra: A Fighter Pilot in the Vietnam Air War*. New York: St. Martin's Press, 2006.

- Rasor, Dina. *The Pentagon Underground*. New York: Times books, 1985.
- Riccioni, Lieutenant Colonel Everest E. "The Air Superiority Fighter, A Modern Analysis," FR 39919. Research Report, Air War College, Air University, Maxwell AFB, Alabama, April 1968.
- Riley, Jonathan. "At the Fulcrum of Air Force Identity: Balancing the Internal and External Pressures of Image and Culture," Drew Paper No. 11. Maxwell AFB: Air University Press, 2014.
- Robertson, Linda R. *The Dream of Civilized Warfare: World War I Flying Aces and the American Imagination*. Minneapolis: University of Minnesota Press, 2003.
- Romjue, John L. "The Evolution of the Airland Battle Concept," *Air University Review*, May-June 1984.
- Rutowski, Edward S. "Energy Approach to the General Aircraft Performance Problem" *Journal of the Aeronautical Sciences*, 21 (March, 1954).
- Smith, Frederick H. "Current Practice in Air Defense," *Air University Review*, 6, Spring 1953, 31-39.
- Smith, G.K. et al., "The Use of Prototypes in Weapon Systems Development." RAND Project Air Force Report, number R-2345-AF, March 1981.
- Smith, Perry McCoy. *The Air Force Plans for Peace, 1943-1945*. Baltimore: Johns Hopkins University Press, 1970.
- Stephens, Alan. "The Air War in Korea, 1950-1953," in John Andreas Olsen, ed., *A History of Air Warfare*. Washington, D.C.: Potomac Books, 2010.
- Sutherland, J. P. "Fly-By-Wire Control Systems," Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio, AD 679 158, September 3, 1968.
- Thompson, Wayne *To Hanoi and Back: The United States Air Force and North Vietnam, 1966-1973*. Washington, D.C.: Smithsonian Institution Press, 2000.

- Thornborough, Anthony M. *The Phantom Story*. New York: Arms and Armour Press, 1994.
- Thornborough, Anthony M. *USAF Phantoms: Tactics, Training, and Weapons*. New York: Arms and Armour Press, 1988.
- Tilford, Earl H. *Crosswinds: The Air Force's Setup in Vietnam*. College Station: Texas A&M University Press, 1993.
- Tomayko, James E. "Blind Faith: The United States Air Force and the Development of Fly-By-Wire Technology," in Jacob Neufeld, George M. Watson, Jr., and David Chenoweth, eds. *Technology and the Air Force: A Retrospective Assessment*. Washington D. C.: Air Force History and Museums Program, 1997.
- Van Staaveren, Jacob. *Gradual Failure: The Air War Over North Vietnam*. Washington, D.C., Air Force History and Museums Program, 2002.
- Warden, John A. *The Air Campaign: Planning for Combat*. San Jose: ToExcel, 1998.
- Werrell, Kenneth P. *Chasing the Silver Bullet: U.S. Air Force Weapons Development From Vietnam To Desert Storm*. Washington, D.C.: Smithsonian Books, 2003.
- Werrell, Kenneth P. *Sabres over MiG Alley: The F-86 and the Battle for Air Supremacy in Korea*. Annapolis: Naval Institute Press, 2005.
- Wheeler, Winslow T. *The Pentagon Labyrinth: 10 Short Essays to Help You Through It: from 10 Pentagon Insiders, Retired Military Officers and Specialists with Over 400 Years of Defense Experience*. Washington, D.C.: Center for Defense Information, 2011.
- Wheeler, Winslow T. *The Wastrels of Defense: How Congress Sabotages U.S. Security*. New York: Naval Institute Press, 2013.
- Wilcox, Robert K. *Scream of Eagles: The Dramatic Account of the U.S. Navy's Top Gun Fighter Pilots and How They Took Back the Skies Over Vietnam*. New York: Pocket Star Books, 1990.
- Williams, Amy E. *The American Fighter Plane*. New York: Barnes and Noble Books, 2004.

Wohl, Robert. *A Passion for Wings: Aviation and the Western Imagination, 1908-1918*. New Haven: Yale University Press, 1996.

Wolk, Herman. *The Struggle for Air Force Independence, 1943-1947*. Washington D.C.: Air Force History and Museums Program, 1997.

Worden, Mike. *Rise of the Fighter Generals: The Problem of Air Force Leadership, 1945-1982*. Maxwell AFB: Air University Press, 1988.

Yeager, Chuck, and Leo Janos. *Yeager, an Autobiography*. Toronto: Bantam Books, 1986.

Ziemke, Caroline F. "In the Shadow of the Giant: USAF Tactical Air Command in the Era of Strategic Bombing, 1945-1955" PhD diss., Ohio State University, 1989.

Newspapers

———. Congressional Record, Extensions of Remarks, "Complex Technology Causing Military Readiness Problems," House of Representatives, May 29, 1980, 12752.

———. "General Dynamics' F-16 Selected as Air Force's New Jet Fighter," *St. Louis Post-Dispatch* (St. Louis, Missouri), Tue, January 14, 1975.

———. "Military Reform Caucus criticizes inflation figures." *Statesman Journal* (Salem, Oregon), Fri, May 24, 1985.

———. "Military reformer fired from project." originally for the *Chicago Sun-Times*, reproduced in *The Odessa American* (Odessa, Texas), Sat, March 27, 1982.

———. "Pentagon worried by Military Reform Caucus." *The Des Moines Register* (Des Moines, Iowa), Wed, December 28, 1983.

- . “Problem areas are the same.” *The Palm Beach Post* (West Palm Beach, Florida), Mon, March 9, 1998.
- . “Tactician urges U.S. to adopt blitz warfare,” *Arizona Republic* (Phoenix, Arizona) · Mon, Mar 23, 1981.
- . “U.S. Decision in ‘Fighter-Plane Sweepstakes’ Is Due Jan. 15.” *New York Times*, December 26, 1974.
- . “Veteran fighter pilot does a solo for the military.” for *The Washington Post*, reproduced in *Asbury Park Press* (Asbury Park, New Jersey), Sun, May 3, 1981.
- . “Warning to Reagan.” *Longview News-Journal* (Longview, Texas), Mon, August 23, 1982.
- . “Weapons,” *St. Louis Post-Dispatch* (St. Louis, Missouri), Thu, June 10, 1982.
- . “Whitehurst Seeks Less Costly Weapons.” *Daily Press* (Newport News, Virginia), Wed, August 12, 1981.
- Adams, Bob. “‘Cheap Hawks’ preach reform.” *St. Louis Post-Dispatch* (St. Louis, Missouri), Fri, June 11, 1982.
- Adams, Bob. “Fight Brewing Over Complex, ‘Goldplated’ Arms.” *St. Louis Post-Dispatch* (St. Louis, Missouri), Sun, June 6, 1982.
- Baker, Max B. “How the F-16 fighter jet put Fort Worth on the aerospace map.” *Fort Worth Star-Telegram*, November 24, 2017.
- Becker, Robert. “Post-Cold War crisis challenges defense budget.” *Daily Press* (Newport News, Virginia), Thu, Aug 9, 1990.
- Biddle, Wayne. “Northrop F-20 gets a fighting chance.” *The San Bernardino County Sun* (San Bernardino, California), Sat, June 8, 1985.

- Bogino, Charles H. "F-16 gains higher stature at Langley, Monument honors role in Gulf War." *Daily Press* (Newport News, Virginia), Fri, October 25, 1991.
- Brooke, James. "Maj. Gen Donald Morelli, 51; Helped Design Strategic Plan." *New York Times*, July 4, 1984.
- Church, George, and Christopher Redman. "Pariah at the Pentagon," *Time* 121, March 7, 1983.
- Cohen, Celia. "An unlikely team: Bill Roth and Barbara Boxer: Delawarean, Californian unite to fight Defense waste." *The News Journal* (Wilmington, Delaware), Sun, May 14, 1989.
- Eason, Henry. "'Small Voice' Lobbies for Aggressive Defense." Cox News Service, *The Palm Beach Post* (West Palm Beach, Florida), Sun, July 11, 1982.
- Eason, Henry. "Mobility, maneuver concept tossed at traditional Pentagon thinking." for the *Atlanta Constitution*, reproduced in *Stevens Point Journal* (Stevens Point, Wisconsin) · Tue, March 24, 1981. Also reproduced as "New warfare theory attracts attention." in *Great Falls Tribune* (Great Falls, Montana), Mon, March 23, 1981, and as "A new way of thinking about land warfare." in *The Greenwood Commonwealth* (Greenwood, Mississippi), Wed, March 25, 1981.
- Farnsworth, Clyde H. "Gen. Dynamics' 'Contract of the Century.'" insert, "David S. Lewis Comments on Winning F-16 Contract." *St. Louis Post-Dispatch* (St. Louis, Missouri), Tue, July 29, 1975.
- Feulner, Edwin. "Military reform important, but not Hart's plan." *The Daily Reporter* (Greenfield, Indiana), Wed, July 6, 1983.
- Garamond, Jack, and Jules Whitcover. "Butter and Guns Dilemma." *Chicago Sun-Times*, August 19, 1981. Reproduced in *Honolulu Star-Bulletin* (Honolulu, Hawaii), Wed, August 19, 1981; *Argus Leader* (Sioux Falls, South Dakota), August 20, 1981; *Pensacola News Journal* (Pensacola, Florida), August 20, 1981; *Press and Sun Bulletin* (Binghamton, New York), August 20, 1981; *Star Gazette* (Elmira, New York), August 20, 1981; and *The Jackson Sun* (Jackson, Tennessee), August 20, 1981.

Gay, Lance. "General blames rules for loss of several copters in Greneda." *The Pittsburgh Press* (Pittsburgh, Pennsylvania), Sat, June 23, 1984.

Getler, Michael. "Air Conflicts Used as Strategic Pattern," for the *Washington Post*, reproduced in *Hartford Courant* (Hartford, Connecticut), Fri, March 13, 1981.

Getler, Michael. "Air Conflicts Used as Strategic Pattern." originally for the *Washington Post*, reproduced in *Hartford Courant* (Hartford, Connecticut), Fri, March 13, 1981.

Goldstein, Robin. "Courter: watchdog of the military." *Asbury Park Press* (Asbury Park, New Jersey), Fri, June 8, 1984.

Good, Stephen, "F-16 fighters beginning to roll off production line." *The Morning News - Sunday News Journal* (Wilmington, Delaware), Originally for the *Dallas Times Herald*, Sun, October 15, 1978.

Halloran, Richard. "Hart military book has '88 in mind." *Detroit Free Press* (Detroit, Michigan), Fri, May 2, 1986.

Hutchinson, Ron. "F-16 Falcon Fights for Life," originally for the *Ft. Worth Star Telegram*, reproduced in *The Montgomery Advertiser* (Montgomery, Alabama), Wed, October 23, 1991.

Ingersoll, Bruce. "Ace of the fighter pilots has a new theory of war." *Chicago Sun-Times*, reproduced in *Detroit Free Press* (Detroit, Michigan), Wed, May 5, 1982.

McCoy, Tidal W. "Arms quality is vital priority." *Chicago Tribune* (Chicago, Illinois), Tue, June 28, 1983.

McGowan, William. "Cost analyst blew whistle on Air Force." *Pensacola News Journal* (Pensacola, Florida) · Mon, November 5, 1984.

McManus, Michael. "Support growing for better defense spending." *Democrat and Chronicle* (Rochester, New York), Thu, January 21, 1982. Reproduced in *The Morning Call* (Allentown, Pennsylvania), Thu, January 21, 1982; *The News Journal* (Wilmington,

- Delaware), Thu, January 21, 1982; and *Asbury Park Press* (Asbury Park, New Jersey), Sat, January 23, 1982.
- Mohr, Charles. "Arms Numbers Decline as Costs Climb." *Daily Press* (Newport News, Virginia), Sun, October 24, 1982.
- Mohr, Charles. "Pentagon Budget Planning Criticized by 2 Studies." *New York Times*, January 12, 1983.
- Peters, Tom. "Don't leap to hasty conclusions in the wake of war." *Chicago Tribune* (Chicago, Illinois), 25 Mar 1991.
- Record, Jeffrey. "Has America's military lost its fighting effectiveness?" originally for the *Washington Post*, reproduced in *The Age* (Melbourne, Victoria, Australia), Mon, June 4, 1984.
- Record, Jeffrey. "Unprepared: Can U.S. make war even if it wants to?" *The Montgomery Advertiser* (Montgomery, Alabama), Thu, February 2, 1984
- Ricks, Thomas. "Whatever Happened To ... Pierre Sprey?" *Washington Post*, May 16, 2006.
- Ringle, William. "Caucus wants answers on defense windfall." *Pensacola News Journal* (Pensacola, Florida), Fri, May 24, 1985.
- Ringle, William. "Conservative GOP'ers lead team that stamps out government abuse." *Florida Today* (Cocoa, Florida), Tue, June 3, 1986.
- Schneider, Greg. "Leading an assault on the Pentagon." *The Baltimore Sun* (Baltimore, Maryland), Sun, March 8, 1998.
- Stewart, Jim. "Report: Disband Joint Chiefs." *The Palm Beach Post* (West Palm Beach, Florida), Thu, October 17, 1985.
- Thomas, Evan, John Barry, Amm McDaniel, and Douglas Waller. "No Vietnam." *Newsweek*, December 10, 1990, 24.

Tyler, Rick. "Newt Gingrich is a Military Expert." *Chicago Tribune* (Chicago, Illinois), Mon, March 6, 2006.

Online Sources

- . Factsheet, "555th Fighter Squadron 'Triple Nickel,' 31st Fighter Wing Public Affairs Office.
[<https://web.archive.org/web/20131217184107/http://www.aviano.af.mil/library/factsheet/s/factsheet.asp?id=4353>], accessed Nov 18, 2017.
- . Foreign Relations of the United States, 1969–1976, Volume I, Foundations of Foreign Policy, 1969–1972 Document 29 [<https://history.state.gov/historicaldocuments/frus1969-76v01/d29>] accessed August 28, 2017.
- . "EF-111A RAVEN," Cactus Air Force Wings and Wheels Museum.
[http://www.cactusairforce.com/inventory_item/ef-111a/], Accessed November 11, 2017.
- . "Extended Interview: Pierre Sprey," Sept 28, 2012, *The Fifth Estate*.
[<http://www.cbc.ca/fifth/blog/extended-interview-pierre-sprey>], accessed Dec 2, 2017.
- . "Korean War 1950-1953 Teacher Resource Guide," National Museum of the United States Air Force, no date (after 2010),
[http://www.nationalmuseum.af.mil/Portals/7/documents/education/teacher_resource_korean_war.pdf], accessed February 10, 2018.
- . "The Fighter Aces," *War Stories*, Fox News, aired September 2009, interview conducted on unknown date in 2007. Footage of the interview available:
[<https://www.youtube.com/watch?v=w0ezJLuUsdI>], information about the episode available here: [<http://www.foxnews.com/on-air/war-stories/2009/09/25/fighter-aces>], both accessed Nov 18, 2017.

- . “The History of SETP.” [<http://www.setp.org/about-setp/history.html>], Accessed June 14, 2017.
- . Biography of Brigadier General Garry A. Willard, Jr. [<http://www.af.mil/About-Us/Biographies/Display/Article/105256/brigadier-general-garry-a-willard-jr/>], accessed June 4, 2017.
- . Boyd Papers collection [<http://www.ausairpower.net/APA-Boyd-Papers.html>]
- . Code of Federal Regulations. Washington, D.C.: U.S. Government Printing Office. 1 January 1969, 63.
[<https://books.google.com/books?id=POY6AAAAIAAJ&dq=%22Total%20Package%20Procurement%22&pg=PA63>], accessed June 7, 2017
- . Col. Richard Hallock Papers Biographical Note. Columbia State University.
[<https://archives.columbusstate.edu/findingaids/mc284.php>], accessed September 24, 2017.
- . Obituary for John Henry Axley. *The Palm Beach Post*. April 4, 2015.
[<http://www.legacy.com/obituaries/palmbeachpost/obituary.aspx?pid=174575094>], accessed June 4, 2017.
- Aboulafia, Richard. “Trump's Strange Fixation with The Super Hornet: Sorting the Fake From The Real,” *Forbes*, September 11, 2017.
[<https://www.forbes.com/sites/richardaboulafia/2017/09/11/trumps-super-hornet-assertions-sorting-fake-from-real/#5e79e6643254>], accessed November 27, 2017.
- Bush, George. “Remarks to the American Legislative Exchange Council.” March 1, 1991/
Online by Gerhard Peters and John T. Woolley. *The American Presidency Project*.
[<http://www.presidency.ucsb.edu/ws/?pid=19351>], Accessed November 14, 2017.
- Cooper, Tom. “In January 1991, Both Iraq and America Claimed Fictional Air-to-Air Victories.”
War is Boring, September 28, 2017 [<http://warisboring.com/45910-2/>], accessed February 26, 2018.

- Daddis, Gregory. "The Importance of the Vietnam War's Tet Offensive." *War on the Rocks*. January 29, 2018. [<https://warontherocks.com/2018/01/importance-vietnam-wars-tet-offensive/>], accessed February 11, 2018.
- D'Costa, Ian. "The EF-111 Raven Managed to Take Down an Iraqi Mirage... Without Ever Firing a Shot." *Tactical Air Network*, [<https://tacairnet.com/2013/09/10/unarmed-kill/>], Accessed November 11, 2017.
- Hinton, Martin. "Producer's Perspective: Life and Times of Robin Olds," Fox News, July 6, 2007 [<http://www.foxnews.com/story/2007/07/06/producer-perspective-life-and-times-robin-olds.html>], accessed Nov 18, 2017.
- Johnsen, Frederick A. "Astronaut Armstrong Recalls the Origins of Test Pilot Society," NASA Public Affairs Office, October 1, 2005. [https://www.nasa.gov/missions/research/armstrong_speech.html], accessed June 14, 2017.
- Kopp, Carlo. "Operation Desert Storm: the Electronic Battle Parts 1 – 3." Air Power Australia, 1993. [<http://www.ausairpower.net/Analysis-ODS-EW.html>] accessed Nov 11, 2017.
- Lind, William. "The Next Conservatism," *Traditional Right* [<https://www.traditionalright.com/the-next-conservatism/>], accessed December 22, 2017.
- Losey, Stephen. "Air-to-air combat is back: How will the Air Force respond as the war over Syria heats up?" *Air Force Times*. [<https://www.airforcetimes.com/news/your-air-force/2017/06/26/air-to-air-combat-is-back-how-will-the-air-force-respond-as-the-war-over-syria-heats-up/>], accessed December 31, 2017.
- Losey, Stephen. "Top USAF general sitting out this Mustache March," *Air Force Times*. [<https://www.airforcetimes.com/news/your-air-force/2015/03/03/top-usaf-general-sitting-out-this-mustache-march/>], accessed December 31, 2017.
- Miller, Jay. "F-16 Design Origins," *Code One Magazine*, February 4, 2014. [http://www.codeonemagazine.com/article.html?item_id=131], accessed September 16, 2017.

- Mitchell, Ellen. "Trump wants 'goddamned steam' catapults on new aircraft carriers." *The Hill*, May 11, 2017. [<http://thehill.com/policy/defense/333040-trump-wants-goddamned-steam-catapults-on-new-aircraft-carriers>], accessed Nov 27, 2017.
- Pawlyk, Oriana. "US F/A-18E Shoots Down Syrian Su-22 in Air-to-Air Kill." *Military.com* [<https://www.military.com/daily-news/2017/06/18/us-navy-fa18e-shoots-down-su22-over-syria.html>], accessed December 31, 2017.
- Prine, Carl. "Q & A with Merrill 'Tony' McPeak," *San Diego Union Tribune*, November 23, 2017. [<http://www.sandiegouniontribune.com/military/sd-me-mcpeak-speaks-20171113-story.html>], accessed December 22, 2017.
- Schwartz, Moshe. "The Nunn-McCurdy Act: Background, Analysis, and Issues for Congress." Congressional Research Service, 7-5700, R41293. [<https://fas.org/sgp/crs/misc/R41293.pdf>], accessed October 27, 2017.
- Seligman, Lara. "Podcast: F-35 in the Crossfire, Part 1." *Aviation Week*. [<http://aviationweek.com/combat-aircraft/podcast-f-35-crossfire-part-1?page=1>], Accessed Dec 2, 2017.
- Snow, Shawn. "What counts as an aerial victory? Drones change the face of aerial combat," *Air Force Times*. June 24, 2017. [<https://www.airforcetimes.com/articles/what-counts-as-an-aerial-victory-drones-change-the-face-of-aerial-combat>], Accessed June 27, 2017.
- Spinney, Franklin. "Defense Facts of Life," December 5, 1980. Office of Secretary of Defense. [<http://pogoarchives.org/labyrinth/defense-facts-of-life-1980.pdf>], accessed 27 November 2016.
- Sprey, Pierre. "The Case for More Effective, Less Expensive Weapons Systems." United States Military Academy Senior Conference XX: "The Military Reform Debate: Directions for the Defense Establishment for the Remainder of the Century." June 1982. [<http://pogoarchives.org/labyrinth/11/12.pdf>], accessed 27 November 2016.

Vlahos, Kelley Beaucar. “40 Years of the ‘Fighter Mafia’” *The American Conservative*, September 20, 2013. [<http://www.theamericanconservative.com/articles/40-years-of-the-fighter-mafia/>], accessed August 25, 2017.

Wetzel, Tyson. “Changing the USAF’s Aerial ‘Kill’ Criteria.” *Balloons to Drones*. June 26, 2017. [<https://balloonstodrones.wordpress.com/2017/06/26/changing-the-usafs-aerial-kill-criteria/>], accessed June 27, 2017.

Unpublished Sources

University of Texas at Dallas – George H. Williams, Jr., World War I Aviation Library

Ola Slater Collection

George H. Williams Collection

Henry Clay Papers

James Kerr Papers

Air Force Historical Research Agency, Maxwell Air Force Base

———. “Have Doughnut: Volume II (U), Tactical,” Defense Intelligence Agency, FTD-CR-20-13-69-INT Vol. II, 1 August 1969.

———. PACAF Tactics and Techniques Bulletin: Counter-Air Tactics Bulletin #45, 26 July 1966.

———. Weapons System Evaluation Group Report 116: Air-to-Air Encounters in Southeast Asia. Red Baron Report 1, Vol. 2: F-105 Events Prior to March 1967, September 1968, 35-38;

———. Weapons System Evaluation Group Report 116: Air-to-Air Encounters in Southeast Asia. Red Baron Report 1, Vol 3: Events From 1 March 1967 to 1 August 1967 and Miscellaneous Events, February 1969

Alison, Major General John. Corona Ace Interview, January 27, 1977, USAF Historical Research Agency, K239.0512-1065.

Boyd, John. Corona Ace Oral History Interview, Jan 22, 1977, USAF Historical Research Agency, K239.0512-1066.

Boyd, John. Oral History Interview, May 23, 1973, USAF Historical Research Agency, #859: K239.0512-859.

Burns, Major General John J. Oral History Interview, March 22, 1973, USAF Historical Research Agency, K239.0512-961.

Christie, Thomas. Oral History Interview, October 3, 1973, USAF Historical Research Agency, K239.0512-962.

Gailer, Brigadier General Frank L. Corona Ace Interview, January 19, 1977, USAF Oral History Program, USAF Historical Research Agency, K239.0512-1061.

Hill, Colonel David Lee "Tex." Corona Ace Interview, January 20, 1977, USAF Historical Research Agency, K239.0512-1063.

Neufeld, Jacob. "The F-15 Eagle: Origins and Development, 1964-1972," Office of Air Force History, November 1974.

Ritchie, Captain Richard S. United States Air Force Oral History Program, Interview #K239.0512-630, 11 Oct 72 and 30 Oct 72.

U.S. Air Force Academy, McDermott Library, Clark Special Collections Branch

Agan, Lieutenant General Arthur C. Oral History Interview, April 19-22, 1976, United States Air Force Oral History Program, K239.0512-900.

Disosway, General Gabriel P. Oral History Interview, October 4-6, 1977, United States Air Force Oral History Program, K239.0512-974.

Everest, General Frank F. Oral History Interview, August 23-25, 1977, United States Air Force Oral History Program, K239.0512-957.

Kent, Lieutenant General Glenn A. Oral History Interview, August 6, 1974, United States Air Force Oral History Program, K239.0512-970.

Myers, Charles E. Oral History Interview, by Jacob Neufeld, United States Air Force Oral History Program, K239.0512-971, 18 July 1973.

Rhodarmer, Major General Roger K. Oral History Interview, United States Air Force Oral History Program, March 29, 1973, K239.0512-972.

Sprey, Pierre. Oral History Interview, June 12, 1973, United States Air Force Oral History Program, K239.0512-969.

President Gerald Ford Presidential Library

White House Central Files Subject Files - ND 1 Aircraft 3/1/75-6/30/75

Martin R. Hoffmann Papers

Appendix A - Abbreviations

ACEVAL Air Combat Evaluation
ACMI Air Combat Maneuvering Instrumentation
ACTS Air Corps Tactical School
AFSC Air Force Systems Command
AIM Air-Intercept Missile
AIMVAL Air Intercept Missile Evaluation
AMRAAM Advanced Medium Range Air-to-Air Missile
ASD Aeronautical Systems Division
AWACS Airborne Early Warning and Control
BVR Beyond Visual Range
CAS Close Air Support
CCV Control Configured Vehicle
CFP Concept Formulation Package
DCP Development Concept Paper
DDR&E Director of Defense Research and Engineering
DoD Department of Defense
EMT Energy Maneuverability Theory
FBW Fly-by-Wire
FDL Flight Dynamics Laboratory
FIG Fighter-Interceptor Group
FWS Fighter Weapons School
IAF Israeli Air Force
LWF Lightweight Fighter
MRC Military Reform Caucus
NASA National Aeronautics and Space Administration
NATO North Atlantic Treaty Organization
OSD Office of the Secretary of Defense
PACAF Pacific Air Forces
POGO Project On Government Oversight

RFP Request for Proposals
RMA Revolution in Military Affairs
SAC Strategic Air Command
SAM Surface-to-Air Missile
SPO Special Projects Office
STOL Short-Takeoff and Landing
TAC Tactical Air Command
TFW Tactical Fighter Wing
TPP Total Package Procurement
USAF United States Air Force
USAFE United States Air Forces Europe