

**“NO ONE COMES CLOSE”: US AIRMEN  
AND THEIR TECHNOLOGICAL PARADIGM**

by

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## Abstract

“No one comes close” is a recent US Air Force (USAF) mantra, developed as both a recruiting slogan and service motto. It reflects both the physical altitude of their domain (sky and space) and conveys a sense of operational dominance. The saying also applies to the distinctive way the institution is shaped by technology. When it comes to descriptions of this culture, the same line is apropos: no one has come close to fully appreciating what it means for Airmen to have a technological mindset. The relationship between the organization’s culture and technology is not as simple as commonly asserted. Airmen may “worship at the altar of technology,” but that does not necessarily mean they pathologically “substitute technology for strategy.” To understand why, it is necessary to apply insights from the history of technology. Scholars in this field demonstrate the need to understand technology from the perspective of users, the stories they tell about their technical artifacts, and the rational and non-rational elements of those experiences. Even the word’s origins reveal that, since the time of the ancient poet Homer, technology is not just material, mechanical, or measurable. Indeed, the Promethean myth Homer and others crafted to explain how humans first became “technological” reveals its subjective, social, strategic, and even spiritual connotations. This dual nature is reflected in Airmen, despite the obvious fact their profession is based on advanced weapons systems. To represent the dynamism of this balance, it is helpful to enlist contrasting pairs of mythological characters familiar to Homer’s contemporaries: Apollo and Dionysius, Daedalus and

Icarus, and, lastly, Bia and Metis. The creative tension of each metaphorical pair is evident in a particular period of USAF history, specifically the social life of early aviators, the cultural response to aviation between the world wars, and the theories of air power developed by Airmen. This analysis challenges the orthodox, one-dimensional assessments of USAF culture, revealing a cyclical vacillation between political, pragmatic forces and its more inspirational – even playful – tendencies. Thus, to prevail in a dangerous and disorderly world the institution must realize and embrace the full spectrum of its technological paradigm.

## Disclaimer

The views expressed in this dissertation are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government

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did not always realize this myself in the moment, much to my regret, but I am forever grateful for their sacrifices. “No one comes close” is not just an Air Force public relations slogan. It describes the bond I feel with my family, and the type of father and husband I aspire to be for them as we continue on this heroic adventure together.

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## List of Abbreviations

ACSC	Air Command and Staff College
AFB	Air Force Base
AFIT	Air Force Institute of Technology
AFM	Air Force Manual
AOR	Area of Responsibility
AS	Aero Squadron or Air Superiority
ATO	Air Tasking Order
AWPD-1	Air War Plans Division-1
C2	Command and Control
CAS	Close Air Support
CENTCOM	Central Command
CENTAF	Central Command Air Forces
CINCCENT	Commander-in-Chief Central Command
COIN	Counterinsurgency
CSAF	Chief of Staff of the Air Force
EBO	Effects-Based Operations
FS	Fighter Squadron
OPLAN	Operation Plans
SAASS	School of Advanced Air and Space Studies



SAC	Strategic Air Command
SCOT	Social Construction of Technology
SHOT	Society for the History of Technology
SIOP	Single Integrated Operational Plan
TAC	Tactical Air Command
USAF	US Air Force

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## Prologue

**Prologue** \ 'proh-log\ *n.* - 1. an introduction [ancient Greek: *pro-* (before) + *logos* (story)]

Wilber and Orville Wright, creators of the first heavier-than-air vehicle capable of sustained, controlled flight, were gifted technologists. Though lacking in any formal engineering education, the brothers readily replaced orthodox aeronautical theories with their own. Their insights came from their sophisticated appreciation of the aircraft as a technological system and methodical experimenting with its various parts. Biographers emphasize their genius for turning abstract ideas into mechanical realities and self-confidence in their ability to master natural forces. Contemporaries described the two as prudent and impassive. In both the creative process and the political value of their creation, the Wrights were disciplined and eminently practical. Wilber in particular was described as emotionless, even in the face of danger. When the American demonstrated the aircraft in France, a fellow aviation pioneer wondered “Has he a heart? Has he loved? Has he suffered?”<sup>1</sup>

Other observers, however, eagerly converted Wilber into a poet, ascribing mystical qualities to the reserved brother. Journalists and illustrators took creative license to depict him as a heroic artist; jovial, yet also brooding; attuned to aesthetics and spiritually gifted. This image comported with the vision of those for whom flight was

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<sup>1</sup> Robert Wohl, *A Passion for Wings: Aviation and the Western Imagination, 1908-1918* (New Haven: Yale University Press, 1994), 11, 13, 23-7; Leon Delagrangé, “Impressions Sur L’aéroplane Wright,” *L’Illustration* 132 (August 15, 1908): 105. For general biographical information and records of the Wright’s personal correspondence, see: Marvin W. McFarland, ed., *The Papers of Wilbur and Orville Wright* (1953), Tom D. Crouch’s *The Bishop’s Boys* (1989), or Howard S. Wolko’s *The Wright Flyer: An Engineering Perspective* (1987).

more than a matter of technical brilliance, but a majestic experience – a realization of humanity’s long-standing and deep emotional connection to flight.<sup>2</sup>

Users of aviation technology actually sat at the intersection of these two opposing attitudes. This is precisely the distinction made by one early pilot. Flying could be factual and technical. At the same time, however, flight was “the essence of the spirit. It nurtures the soul. It is awesome. Often ethereal. Glorious. Emotionally wondrous and all-pervading. Intangible.” The aviatrix goes on to state, “We knew the ecstasy of discovery. Adventure – a part of every flight – was spine-tingling, inspiring.”<sup>3</sup>

The tension between the technical and the artistic, however, is not the only polarity in the story of human flight. Aviation history employs two opposing approaches borrowed from the history of technology. One presumes a technological imperative in which artifacts are inevitable and, once manifested, drive social changes. This deterministic view is countered by the perspective that the creation, use, and record of all technological products, whether ideas or objects, are altogether socially constructed.

The reality is that aviation operates between both sets of opposing forces. Regarding the first pair, the intellectual history of military airmen<sup>4</sup> in particular is a story about technological users embodying both technical rationality *and* strategic playfulness. This “airminded” perspective is palpable in the modern US Air Force as well as in its

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<sup>2</sup> Wohl, *A Passion for Wings*, 25, 27, 35.

<sup>3</sup> Louise M. Thaden and Peggy Wagstaff, *High, Wide, and Frightened*, Reprint edition (Fayetteville: University of Arkansas Press, 2004), xi-xii. The work was first published in 1938.

<sup>4</sup> Although Airman is a specific rank, it is used here – in accordance with current USAF practice – to denote all uniformed members of the service as well as its civilians. When not capitalized, airman is a generic term for aircrew members of any nation and any service. In all versions, it is gender neutral. Furthermore, unless stated otherwise, all references to military officers are members of the US Army Air Corps, US Army Air Force, or US Air Force.

predecessor air service organization. Specifically, it is evident in social practices of aviators, the writings of early military aviators who described the airplane's military potential as well as its psychological impact, and an institutional willingness to experiment with a variety of air power theories.<sup>5</sup> Secondly, this culture is neither technologically determined, nor a pure social construction.

Certainly, the technological paradigm airmen operate under is shaped by the airplane's inherent advantages of range, speed, flexibility, and altitude. In other words, the *subjective* framework that guides how they think, feel, and act regarding their highly technical arsenal is imbued with the *objective* characteristics of the artifacts. Yet, at the same time, the story of how sustained, controlled, heavier-than-air flight was invented, developed, and put to human ends is inseparable from aspirations and fears as old as humanity itself. Viewed holistically as one vast technological system, flight is always subject to material realities as well as the human psyche.

A wide body of literature describes the airplane or its users in a single dimension: the internal operations of aircraft, or its cultural impact; the heroism of its innovators and operators, or the economic and political impact of the aviation industry; airmen as technophiles, or prophets for a reformed way of war. What is missing is the multifaceted

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<sup>5</sup> Two specific examples include Frank Lahm and Benjamin D. Foulois, who both become US Army Air Corps generals (Foulois becoming the future chief). Each man helped create the earliest framework of an "airminded" culture within the US military (see Chapter One). Foulois, who flew balloons and then airplanes, made public appearances to promote aviation, encouraged the US government to increase funding for the technology, and chided the Army officer corps for its reluctance to accept the airplane. Lahm not only noted the military potential of aviation, but also remarked on the psychological thrills of flight and the national benefits aviation promised for the nation (Ronald G. Machoian, "Looking Skyward: The Emergence Of An Airminded Culture In The U.S. Army" (Student Research Paper, Air Command and Staff College, 2002), 9, 28; Frank P. Lahm, "Ballooning," *Journal of the Military Service Institution of the United States* 38 (May-June 1906): 510-13).

story of how military airmen interact with their technology intellectually: not the weapon's creation or its political and economic import, but beliefs about its operational and strategic value; not the tactics of aerial warfare, but how flight continues to shape social practices outside the cockpit; not a simple narrative of technical obsession *or* strategic wisdom, but a technological paradigm that embraces both. This is a narrative of how airmen occupy a space defined by the creative tension between dispassionate reason and playfulness, a space defined by *technological logos*.

Embedded in the origins of these two words are the contrasting forces that define US Air Force culture. Technology is as much about mentalities as it is about materialities. Likewise, *logos* is not just logic, but stories of the subjective, sensuous, and often spiritual relationship between airmen and their craft. Indeed, this is just one example of how all technology, to some degree, lies in the balance between the scientific and poetic, the material and the moral.

## Introduction

“No one comes close” is a recent US Air Force mantra, developed as both a recruiting slogan and service motto.<sup>1</sup> It reflects the physical altitude of their domain and conveys a sense of operational dominance. The saying is also applicable because of the distinctive way the institution is shaped by technology. Furthermore, when it comes to descriptions of this culture, the same line is still appropriate: no one has come close to fully appreciating what it means for Airmen to have a technological paradigm.

There is a single question guiding this project: what is the relationship between the organizational culture of the US Air Force (USAF) and technology? Is it as simple as is commonly asserted, that Airmen “worship at the altar of technology” and pathologically “substitute technology for strategy”?<sup>2</sup> The answer, which is negative, comes by applying insights from the history of technology. While this field may appear to be a natural resource to answer this question, the intellectual life of professional Airmen is rarely examined from this perspective.

The history of technology is defined by both its subject matter and its approach. It is not just a study of tools and machinery from the past, but also about the interaction between humanity and its artifacts, the nature of technological knowledge, and the very meaning of the word “technology.” A history of technology approach shows that the answer to the opening question is not as simplistic as some claim. Yes, technology is part

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<sup>1</sup> Matthew J. Lloyd, “From Recruiting Slogan To Air Force Motto: The Evolution of ‘Aim High...Fly, Fight, Win!’” (Student Research Paper, Air War College, 2011), 1, 4-5.

<sup>2</sup> Carl Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore, MD: Johns Hopkins University Press, 1989), 19; Brice Harris, *America, Technology and Strategic Culture: A Clausewitzian Assessment* (New York, NY: Routledge, 2015), 2.

of what could be labeled the theology – and sometimes the dogma – of Airmen. However, always inherent in their culture, even if rarely explicit, is a sense of playfulness, craftiness, and wisdom. Airmen, consequently, inhabit a world at the intersection of technological artifacts and strategic art; a technologically constructed paradigm that can be described as a *technological logos*. Embedded within each of these words are a variety of connotations, which is what allows a single phrase to capture such a complex phenomenon as organizational culture.

To understand the Greek term *logos*, and the multiple meanings implied by *technological*, it is first necessary to briefly describe how technology evolved from a depreciated issue to a topic worthy of serious scholarship. The following sections will also set the stage for the substance and style of the dissertation and a full working definition of *technological logos*.

### History of “Technology”

In the words of historian David Edgerton, “The very lowness and ubiquity of technology make it significant in history, but suspect in the academy.”<sup>3</sup> Prejudice against the scholarly treatment of technology can be traced back to the term’s etymological origins.<sup>4</sup> The word was seldom employed in Western societies until the first half of the twentieth century. Instead, the same notion was typically referred to as the “useful,” “industrial,” or “mechanical” arts. This sense of technology as a field of practical

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<sup>3</sup> David Edgerton, “Innovation, Technology, or History: What is the historiography of Technology About?” *Technology and Culture* 51, no. 3 (July 2010): 697.

<sup>4</sup> Peter Caws, “Praxis and Techno.” *The History and Philosophy of Technology*, Eds. G. Bugliarello and D. Doner (New York, NY: Harper and Row, 1978), 228. Likewise, Carl Mitcham, a philosopher of technology, suggests this is a “good place to begin the history of ideas” specifically in regard to this topic (Carl Mitcham, *Thinking through Technology: The Path between Engineering and Philosophy* (Chicago, IL: The University of Chicago Press, 1994), 117.



knowledge had displaced earlier connotations contained in the Latin *technologia*. This seventeenth century term included the useful arts as a field of study, the technical language of a particular art, and the language arts.<sup>5</sup> All of these meanings were implicit in the ancient Greek word *tekhnologia*. This ancestral version of “technology” was based on the Indo-European word *teks*, for weaving or fabricating. *Teks* became *tekne* in Greek as its meaning expanded beyond the specific task of interlacing branches to include the knowledge of carpenters, builders, and weavers.<sup>6</sup> The evolution of *tekne*, often transliterated as *techne*, did not stop there. The broadening of *techne* is marked by a story often referenced by historians of technology, the myth of Prometheus.<sup>7</sup>

The story of Prometheus starts with a war. In the ancient mythology of the historical peoples we combine under the label “Greek,” there was an epic clash. On one side were the Olympian gods, led by Zeus. On the other side were the Titans, the immortal race that preceded the Olympians. Prometheus was one of the few Titans who allied with Zeus, although he did so only after his own side refused to take advantage of his idea to win by deception. Living among the victors, he was granted the responsibility, along with his brother Epimetheus, of providing gifts to the living creatures of Earth. In one version of the story, the less intelligent sibling hastily spread all the skills among the

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<sup>5</sup> Eric Schatzberg, “Technik Comes to America: Changing Meanings of Technology before 1930,” *Technology and Culture* 47, no. 3 (August 7, 2006): 489.

<sup>6</sup> David Roochnik, *Of Art and Wisdom: Plato’s Understanding of Techne* (University Park, PA: Penn State University Press, 2007), 19. This is what John Staudenmier’s *Technology’s Storytellers* (1985) is appropriately subtitled “*Reweaving the Human Fabric*.” For more discussion on the evolution of “technology,” see Leo Marx, “Technology: The Emergence of a Hazardous Concept,” *Technology and Culture* 51, no. 3 (August 15, 2010): 561–77.

<sup>7</sup> According to the English professor, Janet Atwill, “the most significant mythic tradition of *techne* is found in various Prometheus accounts” (Janet M. Atwill, *Rhetoric Reclaimed: Aristotle and the Liberal Arts Tradition* (Ithaca, NY: Cornell University Press, 2009), 49).

other animals before realizing that humans were left with nothing to survive. Sympathetic to their situation, Prometheus secured fire from the gods. In another version, his sympathy for humanity manifested itself in a ruse. The ancient poet Hesiod wrote about a settlement between gods and mortal men in which Prometheus tricks Zeus into accepting the bones of sacrificial animals instead of the more valuable meat, which from then on would be available for human sustenance. As retribution, Zeus takes away their ability to cook the meat by denying them fire. Prometheus then steals fire and restores the gift, which becomes the means by which humans develop their ability to manipulate the physical world. Furious, Zeus ordered the creation of the first woman, Pandora, who brought with her misery, illness, and war. For Prometheus, who has forever altered the balance between mortal and god by providing humanity with immortal fire and the ability to fashion nearly immortal artifacts, the punishment is symbolically fitting: he is chained to a pillar where a bird of prey eats at his body, which grows back each night in time for another day of torture.<sup>8</sup>

Historians of technology use this myth for a variety of reasons and in a variety of ways. Some use it to highlight the connection between the technical and the subjective.<sup>9</sup>

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<sup>8</sup> Hesiod, *Theogony*, trans. Wm. Blake Tyrrell, [msu.edu/~tyrrell/theogon.pdf](http://msu.edu/~tyrrell/theogon.pdf). Accessed 3 October 2017, 535-570; Mark Cartwright. "Prometheus." *Ancient History Encyclopedia*, [www.ancient.eu/Prometheus](http://www.ancient.eu/Prometheus). Accessed 22 November 2017.

<sup>9</sup> For example, Langdon Winner's *Autonomous Technology* uses the image of Prometheus's punishment to highlight the vulnerabilities of technological dependence (Langdon Winner, *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought* (Cambridge, MA: The MIT Press, 1978), 334-5). In Oswald Spengler's *The Decline of the West*, Prometheus represents a specific cause of Western decay, the ambition to achieve god-like powers through machines (Oswald Spengler and H. Stuart Hughes, *The Decline of the West*, ed. Helmut Werner, trans. Arthur Helps and Charles Francis Atkinson (New York, NY: Oxford University Press, 1991), 164, 168, 340). Leo Marx, Carroll Pursell, and Arnold Pacey all examine references to the Titan to uncover attitudes towards technology (Leo Marx, *The Machine in the Garden: Technology and*

Others employ the Titan's name in their title with little to no explanation of the myth or its relevance to their work, suggesting such a familiar reference requires no further explication.<sup>10</sup> It is a way to ground the narrative in an ancient, but common, reference. It could also be – though rarely is – a useful way to introduce the latent dynamism inherent in the word “technology.”

By the fifth century BCE, around the same time writers recorded the story of Prometheus, *techne* encompassed a wide range of skills. At one end of the spectrum lay domains we rarely associate with modern technology, including skills of piloting a ship, providing medical care, crafting persuasive arguments, writing poetry, and even performing magic.<sup>11</sup> Unlike our modern dichotomies, *techne* melded art and science into one endeavor that combined both the subjective and the objective, and it did not draw a

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*the Pastoral Ideal in America*, 35th Anniversary edition (New York, NY: Oxford University Press, 2000), 202, 205-6, 297, 299; Carroll Pursell, *Technology in Postwar America: A History* (New York, NY: Columbia University Press, 2007), 64; Arnold Pacey, *The Culture of Technology* (Cambridge, MA: The MIT Press, 1985), 88, 96-7, 172).

<sup>10</sup> In addition to Landes's *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present* (1969) and Hughes's *Rescuing Prometheus: Four Monumental Projects that Changed the Modern World* (2000), other examples include Richard Hallion's edited volume *The Wright Brothers: Heirs of Prometheus* (1978), James MacLachlan's *Children of Prometheus: A History of Science and Technology* (1989), and Robert A. Wauzzinski's *Discerning Prometheus: The Cry for Wisdom in Our Technological Society* (2001). Other authors do make use of the myth within their texts, if just in passing reference: it appears in George Basalla's *The Evolution of Technology* (1988) as well as Lewis Mumford's *Technics and Civilization* (1934).

<sup>11</sup> Martha C. Nussbaum, *The Fragility of Goodness: Luck and Ethics in Greek Tragedy and Philosophy*, 2nd edition (New York, NY: Cambridge University Press, 2001), 94. On poetry as *techne*, see Gregory Nagy, *The Best of the Achaeans: Concepts of the Hero in Archaic Greek Poetry* (Baltimore, MD: Johns Hopkins University Press, 1998), 297, 300, or Everett Wheeler, *Stratagem and the Vocabulary of Military Trickery* (New York, NY: Brill, 1997), 28.

strict distinction between the artist and the artifact.<sup>12</sup> This conception of *techne* treated technical knowledge as relatively stable, but always contextual. It was, in other words, static enough to be transferable while flexible enough to adapt to the circumstances. This was critical because this sense of *techne* always implied a productive knowledge, an intervention in the physical world “associated with the transgression of an existing boundary – a desire for ‘more’ that challenges or redefines relations of power.” In the course of this technical performance intervening in the physical world, the performer – being part of that world – is also acted upon. The artist and the artifact co-construct human culture as distinct from nature and, in doing so, co-evolve.<sup>13</sup>

Many versions of the Promethean legend are clearly about this form of *techne*. First, fire is an example of knowledge that can be transmitted. In addition, fire’s strategic value is its flexible nature. Fire is malleable enough to accommodate a variety of competitive or cooperative tasks with a power that is both constructive and destructive. Indeed, the ability to create fire – unimpeded by the dearth of any scientific knowledge about it – is credited as the basis of human culture. It symbolizes the inseparable nature of humanity and technological knowledge.<sup>14</sup> Beyond this, in his ability to persuade Zeus through speech, Prometheus demonstrates an estranged application of *techne*, the

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<sup>12</sup> Andrew Feenberg, *Between Reason and Experience: Essays in Technology and Modernity* (Cambridge, MA: The MIT Press, 2010), 121.

<sup>13</sup> Atwill, *Rhetoric Reclaimed*, 48, 6-7, 68, 53-4.

<sup>14</sup> Roochnik, *Of Art and Wisdom*, 23. Atwill concurs, writing “As future versions of the myth attest, fire signifies more than the potential for craft and invention. *Techne* marks the transition from a nomadic gathering culture to one of cultivation and specialized labor, a transition that created the new forms of social identity that constituted the bonds of the city” (Atwill, *Rhetoric Reclaimed*, 7, 104). Also, see Prometheus’s speech after he is chained down by Hephaestus (Aeschylus, *Prometheus Bound* (New York, NY: Dover Publications, 1996), 444-464).

“technology” of rhetoric.<sup>15</sup> Lastly, when Prometheus crossed into the realm of the divine to steal fire, humans metaphorically earned the ability to transcend the boundaries of nature. Humans not only gained power unique among all the other living creatures of Earth – a power they would use to dominate those creatures – but also gained a degree of independence from the gods. This, in part, explains Zeus’ rage.

This more dynamic version of *techne* is not the only insight missing from a deeper appreciation of the myth. The root of Prometheus’ name is based on the noun *metis*. There is no equivalent in the English language, but it describes a strategic intelligence, making the name Prometheus literally mean “forethinker.”<sup>16</sup> Hesiod refers to him as “Prometheus the crafty” and describes him as “changing,” “nimble-minded,” “of changing counsels,” “crooked-minded,” and “much knowing.”<sup>17</sup> The Titan’s keen and crafty intellect obviously allows him to subvert Zeus’s will, but the very reason he is aligned with the god against the other Titans is that his own family had rejected his cunning stratagems.<sup>18</sup> Because those schemes inevitably involved technical skills, he is

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<sup>15</sup> According to Mitcham, “‘technologist’ used to refer to...rhetorician” (Mitcham, *Thinking through Technology*, 129).

<sup>16</sup> Atwill, *Rhetoric Reclaimed*, 103-4, 114.

<sup>17</sup> Hesiod quoted in *Hesiod, the Homeric Hymns, and Homerica*, trans. Hugh G. Evelyn-White, Revised edition (Cambridge, MA: Loeb Classical Library, 1914), 14; Hesiod, *Theogony* quoted in Alexander C. Loney, “Hesiod’s Incorporative Poetics in the Theogony and the Contradictions of Prometheus,” *American Journal of Philology* 135, no. 4 (December 2, 2014), 511, 521, 546, 616. According to the classicist Alexander C. Loney, “In the conventional language of heroic epithets, Hesiod thus acknowledges Prometheus’ multiple, shifting, sometimes contradictory meanings. The complexities of his character are profoundly traditional, extending back into pre-historical Indo-European myth and the archetypal universals of the trickster figure” (Loney, 504).

<sup>18</sup> Atwill, *Rhetoric Reclaimed*, 125-6; Loney, “Hesiod’s Incorporative Poetics in the Theogony and the Contradictions of Prometheus,” 505; “Prometheus,” *Ancient History Encyclopedia*. Two other authors note that, “Hesiod and Aeschylus are at one in recognizing in Prometheus that very type of wily intelligence, that same power of

an image of a shrewd strategist and a skilled craftsman. This is why Prometheus becomes an even more insightful character in a history of technology. Indeed, the forgotten conceptualization of *techne* is inseparable from the equally unknown concept of *metis*.<sup>19</sup>

*Metis*, commonly translated as “cunning intelligence,” spans a wide range of traits: from wisdom, expertise, and prescience to cleverness, deviousness, and craftiness. Whether employed as a reactive, adaptive strategy or as a proactive intervention, *metis* is at a premium in paradoxical or rapidly changing circumstances.<sup>20</sup> Given that *techne* could be the know-how to navigate and nudge the boundaries of an emergent, indeterminate system, the very conditions that called for *metis* were the same ambiguous conditions in which the transformative power of a craft could be leveraged. Recognizing when those situations arise and fashioning a strategy to maximize one’s advantage is a matter of *metis*. Yet, it is clear that cunning intelligence is equally reliant upon technical skills to realize a strategy in practice.<sup>21</sup>

Prometheus is not the only Greek character to demonstrate what classical historian Everett L. Wheeler describes as “intellectual capacity for practical knowledge, creativity, and the ability to grasp the possibilities of a given situation and to seize the

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deception which the Greeks called *metis*” (Marcel Detienne and Jean-Pierre Vernant, *Cunning Intelligence in Greek Culture and Society*, trans. Janet Lloyd (Chicago, IL: University of Chicago Press, 1991), 58).

<sup>19</sup> Atwill, *Rhetoric Reclaimed*, 56; Lowell Edmunds, *Chance and Intelligence in Thucydides* (Cambridge, MA: Harvard University Press, 1975), 106; Mitcham, *Thinking through Technology*, 118.

<sup>20</sup> Lisa Raphals, *Knowing Words: Wisdom and Cunning in the Classical Traditions of China and Greece* (Ithaca, NY: Cornell University Press, 1992), xii; Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 18.

<sup>21</sup> As one scholar puts it, “foremost, to be effective *metis* assumes the possession and mastery of a *techne*” (Cheryl De Ciantis. “The Gait of Hephaistos: Crooked Perceptions into Consilience.” *Icono 14 15*, no. 1 (2017): 136).

right moment for action.”<sup>22</sup> One of the central contributors to the Promethean myth is the legendary poet Homer, who offers other images that combine *techne* and *metis*.<sup>23</sup> The first is Hephaestus, the god of fire and metallurgy who is the Greek version of the Roman god Vulcan. A crippled blacksmith, Hephaestus was also known to ancient audiences for turning his bed into a trap for his adulterous wife, a tale that exemplifies craftiness in the sense of both *metis* and *techne*.<sup>24</sup> In the Promethean myth, the fire is stolen from his forge, and he is also the one who administers Zeus’s sentences: he uses his knowledge of metalworking to shackle Prometheus, and he also helps create Pandora. Hephaestus’s partner in the creation of Pandora is the goddess Athena, another deity closely associated with both *techne* and *metis*, and – particularly relevant for this dissertation – with the history of warfare.<sup>25</sup> Her role in the Trojan War and in the return of one of its famed warriors is described in Homer’s instructive example of literary *techne*.

The most famous accounts of the Trojan War come from Homer’s epics. *The Iliad* likely came first and centers around an episode in the decade-long battle between Greek city-states and Troy. *The Odyssey* begins with the end of that war and follows one of the heroes as he fights his way home through various trials. It is also one of the first known uses of the word *techne*. Indeed, Homer is an example of someone who kept the concepts of *techne* and *metis* tightly coupled. This is especially manifest in the characters of

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<sup>22</sup> Wheeler, *Stratagem and the Vocabulary of Military Trickery*, 30; Roochnik, *Of Art and Wisdom*, 23.

<sup>23</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 280; Roochnik, *Of Art and Wisdom*, 22-3.

<sup>24</sup> Ciantis. “The Gait of Hephaistos,” 129; Roochnik, *Of Art and Wisdom*, 23.

<sup>25</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 177-85; Raphals, *Knowing Words*, 217.

Odysseus and his wife, Penelope.<sup>26</sup> Furthermore, Homer’s deep influence, in antiquity and today, comes from his own mastery of a skill that combines technical mastery and strategic intelligence: storytelling.

Not only does Homer meld technology and storytelling into a singular concept of *techne* – which itself melds into *metis* as both the author’s explicit subject and his implicit method – but his epics demonstrate the immense potential of stories. As possibly “one of the best tales ever told,” *The Odyssey* influenced world leaders, modern strategists, and authors as famous as Shakespeare and Goethe.<sup>27</sup> His stories had particular resonance in the city that was famous as a center for Greek philosophy.<sup>28</sup>

A central component of Athenian education was learning and reciting Homer’s epics, and these works exemplified the “prerational play” that pervaded Greek culture. Warfare, festivals, mythology, and cunning manipulation (*metis*) were all influenced by

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<sup>26</sup> Atwill, *Rhetoric Reclaimed*, 47, 52-4; Nussbaum, *The Fragility of Goodness*, 94; Edmunds, *Chance and Intelligence in Thucydides*, 106; Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 54, 281.

<sup>27</sup> Charles Hill, *Grand Strategies: Literature, Statecraft, and World Order* (New Haven, CT: Yale University Press, 2011), 9, 254-5. *The Odyssey* was used by leaders such as Frederick the Great and T. E. Lawrence, who kept his copy in his camel’s saddlebags during WWI (Stephen V. Tracy, *The Story of the “Odyssey”* (Princeton, NJ: Princeton University Press, 1990), xi). The ancient historian Plutarch wrote that Alexander the Great carried *The Iliad* on his eastern campaign, “declaring that he esteemed it a perfect portable treasure of all military virtue and knowledge” (quoted in Hill, 2). According to Brian Boyd, professor of comparative literature, Homer was “a writer gifted enough to last three millennia—and to inspire authors as major as Virgil, Shakespeare, Goethe, and Joyce” (Brian Boyd, *On the Origin of Stories: Evolution, Cognition, and Fiction* (Cambridge, MA: Belknap Press, 2010), 256).

<sup>28</sup> Athens also worshipped Athena, Hephaestus, and – unique among all other Greek cities – Prometheus (Carol Dougherty, *Prometheus* (New York, NY: Routledge, 2006), 46; Lewis Richard Farnell, *The Cults of the Greek States: Volume 1* (Oxford: Adamant Media Corporation, 2002), 277; Robert Parker, *Polytheism and Society at Athens* (Oxford: Oxford University Press, 2007), 409; Loney, “Hesiod’s Incorporative Poetics in the Theogony and the Contradictions of Prometheus,” 504, 514).



this style of passionate, competitive, and intuitive play.<sup>29</sup> *The Iliad* and *The Odyssey* also, according to historian Donald Kagan, taught aristocrats about the interplay between politics and persuasive storytelling.

Oratory prowess was a typical ambition for aristocrats in the democratic city. Since the decision-making authority had begun to shift towards the assembly of citizens, or *demos*, persuasion served as a powerful source of influence.<sup>30</sup> Aristocrats began employing Sophists, or “wise men,” to improve their rhetorical skills. The tutors never thought of themselves as a coherent group with such a narrow focus. Indeed, *sophos* initially referred to expertise in any skill or to wisdom in general, a notion that again points to the coupling of *techne* and *metis*.<sup>31</sup>

Modern researchers have accumulated empirical evidence for the centrality of play and storytelling in human affairs. Indeed, stories are a form of cognitive play. Whether written or spoken, stories are more motivational, more contextual, and more relevant than other forms of communication.<sup>32</sup> In other words, while historians of technology describe humanity as *homo faber*, “man the maker,” scholars of story

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<sup>29</sup> Mihai I. Spariosu, *Dionysus Reborn: Play and the Aesthetic Dimension in Modern Philosophical and Scientific Discourse* (Ithaca, NY: Cornell University Press, 1989), x, 5, 144, 12-3.

<sup>30</sup> Donald Kagan, *Pericles Of Athens And The Birth Of Democracy* (New York, NY: Free Press, 1998), 21; John Thorley, *Athenian Democracy*, 2nd edition (London: Routledge, 2004), 10. Consider one man who was nicknamed Odysseus, described by Thucydides as reflective, prescient, adaptable, intuitive, and a persuasive speaker (Thucydides, *The Landmark Thucydides: A Comprehensive Guide to the Peloponnesian War* (New York, NY: Free Press, 2008), 1.14.3, 1.91-3, 1.138.3).

<sup>31</sup> Samuel E. Stumpf, *Philosophy: History and Problems*, 5th edition (New York, NY: McGraw-Hill, 1995), 30. Aeschylus describes Prometheus as a sophist before the term came to mean a tutor available for hire (Johan Huizinga, *Homo Ludens: A Study of the Play-Element in Culture* (Eastford, CT: Martino Fine Books, 2014), 146).

<sup>32</sup> Kendall Haven, *Story Proof: The Science Behind the Startling Power of Story* (Westport, CN: Libraries Unlimited, 2007), 108-9, 100.

reference *homo narrans*, the storytelling person, and some cultural historians describe “man the player,” *homo ludens*.<sup>33</sup> Indeed, the *techne* of early Promethean myths blurs the distinction between those labels. Furthermore, the ability to shrewdly craft, convey, and consume stories is indicative of *metis*, which itself can be described as an intellectual playfulness.<sup>34</sup> Despite the appreciation of these connections in ancient Greece and modern scholarship, there was a very specific point in the intellectual history of the West when stories were not valued, the ubiquity of “cunning intelligence” was dismissed, only “noble” play was acceptable, and the definition of *techne* became much less dynamic.

### Plato’s Prejudice

From approximately 431 to 404 BCE, the Hellenistic world was immersed in war. Eventually Sparta and its allies triumphed over the neighboring Athenian empire. After the decades-long Peloponnesian War with Sparta, the Athenian polis entered a period of decline while Plato was coming of age. His philosophy was a product of his time and his deep dissatisfaction with the politicians who wielded rhetorical skills to manipulate the people. In Plato’s view, a democracy was inherently unstable because the *demos* were simply too vulnerable to rhetorical influence. Emotional appeals convoluted their reason and led to unforgivable misjudgments, such as the death sentence for his mentor, Socrates.<sup>35</sup>

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<sup>33</sup> Walter R. Fisher, *Human Communication as Narration: Toward a Philosophy of Reason, Value, and Action* (Columbia, SC: University of South Carolina Press, 1989), 62.

<sup>34</sup> Atwill, *Rhetoric Reclaimed*, 55; Loney, “Hesiod’s Incorporative Poetics in the Theogony and the Contradictions of Prometheus,” 517; Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 307.

<sup>35</sup> As another example, the rhetorical skills they taught could be used one day to convince the assembly to slaughter the entire male population of a rebellious state and then to convince them to reverse that decision the very next day (Thucydides, *The Landmark Thucydides*, 3.36-49).

Out of this milieu, Plato constructed a philosophical system that became highly influential in Western traditions. Indeed, many claim he became the most influential philosopher in Western culture.<sup>36</sup> According to the classical historians Marcel Detienne and Jean-Pierre Vernant, “the concept of Platonic Truth...has never really ceased to haunt Western metaphysical thought.”<sup>37</sup> Plato’s themes included the promotion of abstract philosophy and political order over experience and democracy; the redefinition of *techne* and *metis*; and a scathing critique of sophists, rhetors, poets, and play. These elements are, in fact, all interrelated.

Consider Plato’s political ideas, which had widespread impact on Western mentalities. For Plato, democratic equality did not release creative energies from the masses, but only legitimized chaotic and selfish pursuits.<sup>38</sup> Democracy implied disorder and ineffective governance. Whereas democracy required pluralistic dialogue, only philosophers were qualified to have such discourse in Plato’s image of an ideal polis.<sup>39</sup> Thus, states need a philosopher-king to achieve orderly rule, just as a ship needs a captain to stay on course. The proper exemplar for this ideal ruler was Plato’s mentor, Socrates, and he communicated this through the allegory of the cave.

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<sup>36</sup> Stumpf, *Philosophy*, 46. Consider Alfred North Whitehead’s illustrative quote: “The safest general characterization of the European philosophical tradition is that it consists of a series of footnotes to Plato.” (Alfred North Whitehead, *Process and Reality*, 2nd edition (New York: Free Press, 1979), 39). In classicist Eric A. Havelock’s conclusion to *Preface to Plato*, he writes, “Europe still lives in the shadow [of Socrates and Plato] using their language [and] accepting their dichotomies” (Eric Havelock, *Preface to Plato* (Cambridge, MA: Belknap Press, 1982), 305).

<sup>37</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 318.

<sup>38</sup> Stumpf, *Philosophy*, 75.

<sup>39</sup> Lawrence Freedman, *Strategy: A History* (Oxford: Oxford University Press, 2013), 38-9. Plato’s criticism of democracy, for instance, persisted as a dominant image in Western philosophy through the Enlightenment (Kagan, *Pericles Of Athens And The Birth Of Democracy*, 268). Even America’s founders were reluctant to use the term (Hill, *Grand Strategies*, 147).

In the cave, people are restrained by chains and only able to look forward. Behind them is a fire. They can only see the shadows cast upon the wall in front of them as objects pass in front of the fire's light. The prisoner's sense of reality is limited to these representations. They assume that what they can see is all that really exists. Even if they were able to escape, the sun is another fire, behind which lie other objects that no mortal can perceive directly. These eternal, universal "forms" are the true essence of anything a human can perceive. The prisoners, however, are content with consuming the partial copies. In contrast, philosophers sense a bigger world. The best of them can even break through the bondage in order to escape the cave of illusions.<sup>40</sup> Outside the cave, they can begin to discern what those inside cannot fathom.

Implicit in Plato's metaphor was a critique of Sophists, the purveyors of rhetoric. He mischaracterized them as a homogenous group of moral and intellectual relativists who were only interested in teaching persuasive rhetoric for profit. Sophistry, he wrote, was "not an art, but the occupation of a shrewd and enterprising spirit."<sup>41</sup> To Plato, rhetoric was more like sorcery than reasonable discourse. In his words, storytelling "awakens and nourishes and strengthens the feelings and impairs the reason."<sup>42</sup> Reason is what future leaders need to uncover the true nature of reality and to escape the cave of illusions. Stories, on the other hand, are simply shadows of shadows that cripple the mind.<sup>43</sup> In Plato's assessment, this is exactly what led to the downfall of his home,

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<sup>40</sup> Plato, *The Republic*. Trans. Benjamin Jowett (Heritage Press, 1944), 514a-520a.

<sup>41</sup> Plato, *Gorgias*, 463a, quoted in Keith Crome, "Socrates and Sophistry," *Richmond Journal of Philosophy* 9 (Spring 2005): 1.

<sup>42</sup> Plato, *The Republic*, 10.605b-c.

<sup>43</sup> Admittedly, Plato offers to entertain an argument in defense of stories and concedes there is much charm in stories. Havelock argues in his *Preface to Plato*, however, that the burden of proof is so high and the charges are so damning that to think that his offer

Athens. This is why he famously bans the poets in the ideal polis he described in *The Republic*. It is, in fact, the component of the work Plato is most satisfied with.<sup>44</sup> This also explains why he altered the Greek sense of logic.<sup>45</sup>

Before Plato's attack on storytelling, *logos* meant "story, reason, rationale, conception, discourse, thought."<sup>46</sup> All forms of human expression and cognition were subsumed in this Greek word. Furthermore, for theologians and philosophers, it was *the* story: the divine and mystical force that gives meaning to all existence, the cosmos. After Plato, however, *logos* was no longer subjective, sensible, or soulful. Today the only dynamic connotation of *logos* in the West is the Christian idea of a sacred, ethereal system manifested in the physical world in the historical figure of Jesus Christ.<sup>47</sup>

Just as Plato divorced reason from the poetic and mystical, he stripped *techne* of its more dynamic qualities. For example, he required any specific *techne* to provide a rational account of itself (i.e. an explicable *logos*). Technical know-how ceased to be a category of philosophical knowledge or the "means of challenging, mitigating, and even changing, one's fate." Instead, it became narrowly associated with the production of a

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"amounts to a recantation profoundly mistakes his intention" (Havelock, *Preface to Plato*, 4-5). Furthermore, none of this precluded Plato from employing storytelling himself (such as the myth of Prometheus) or advocating it for the philosopher-king (who should employ "noble lies" to keep the politic content with illusions of reality) (Freedman, *Strategy*, 40).

<sup>44</sup> "Of the many excellences which I perceive in the order of our State, there is none which upon reflection pleases me better than the rule about poetry" (Plato, *The Republic*, 10.595a). According to Eric Havelock, roughly half of *The Republic* is devoted to disparaging the art of storytelling (Havelock, *Preface to Plato*, 4-15).

<sup>45</sup> Plato, *The Republic: Translated by Benjamin Jowett with His Introduction Analyses and Summary* (Heritage Press, 1944), 10.595a.

<sup>46</sup> Walter R. Fisher, *Human Communication as Narration: Toward a Philosophy of Reason, Value, and Action* (Columbia, SC: University of South Carolina Press, 1989), 5.

<sup>47</sup> I am indebted to Dr. Patrick Quinn, author and friend, for bringing this theological dimension of *logos* to my attention.

material good: manipulative, quantitative, normative, and less sophisticated than contemplative philosophy.<sup>48</sup> In this new version, *techne* exists only when the entire situation can be grasped and somewhat controlled. This implies a comprehensive plan prepared in advance, ready to account for all possible contingencies and seeking objective efficiency. In *Protagoras*, for example, Plato has his title character explain the myth of Prometheus in terms that emphasize numbering and precise measurements. In addition to *techne* losing its role in constituting human culture, the story also lacks the *metis* implied in other descriptions of Promethean *techne*.<sup>49</sup>

If *techne* at least survives Plato's revisions – albeit in diminished form – *metis* suffers an even worse fate. According to the landmark study by Marcel Detienne and Jean-Pierre Vernant, *Cunning Intelligence in Greek Culture and Society* (1978), the concept is “at the heart of the Greek mental world...[and] its influence is sometimes all-pervasive.” They offer examples ranging from technical crafts, medicine, military affairs, and politics. Indeed, Plato's denunciation of sophistry follows naturally, given that it is one of the prime examples of a *techne* showcasing *metis*.<sup>50</sup>

Despite the prevalence of *metis* in Greek culture, there are no tracts that directly address the idea. It has only recently been excavated by scholars of antiquity. The reason

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<sup>48</sup> Atwill, *Rhetoric Reclaimed*, 6, 161; John Wild, “Plato's Theory of τέχνη: A Phenomenological Interpretation,” *Philosophy and Phenomenological Research* 1, no. 3 (1941): 260-1; Nussbaum, *The Fragility of Goodness*, 104, 108-9; Mitcham, *Thinking through Technology*, 119. For more, see Robert P. Multhauf, “Some Observations on the Historiography of the Industrial Revolution.” *In Context: History and the History of Technology: Essays in Honor of Melvin Kranzberg*. Eds. Stephen Cutcliffe and Robert Post (London: Lehigh University Press, 1989) and Leo Marx, “The Invention of ‘Technology.’” *Major Problems in the History of American Technology*. Eds. Merritt Roe Smith and Gregory Clancey (Boston, MA: Houghton Mifflin, 1997).

<sup>49</sup> Atwill, *Rhetoric Reclaimed*, 151-2; Roochnik, *Of Art and Wisdom*, 45, 52-3.

<sup>50</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 307.

is clear. The very premise of an unstable world was anathema to Plato's ideals of clarity, reason, and universality. The philosopher could not ground his epistemology on a premise of transitory, ambiguous forces. Experiences that resist exact measurements or analytical reductions often demand intuition as well as indirect, playful strategies.<sup>51</sup> To the degree that this dissertation ultimately aims to reinvigorate the USAF's organizational culture, it is vital that this concept is reintroduced to Airmen.

### The Reconsideration of Platonic Objectivity

Plato offered a vision of a world without democracy, order over chaos, clarity over contingency. Play is about reducing chance and increasing knowledge of the Forms, not navigating the social messes of the lived experience. There is no Homeric *techne* that is contextual, subjective, or transformative for both material and mankind. There are no sophists and poets, whose *techne* had previously offered images of metic intelligence. What philosopher John Dewey described as Western philosophy's "quest for certainty" has no room for *metis*; no account of a world that is not just a world of being, but simultaneously a world of becoming.<sup>52</sup> These ideas impacted the study of technology for centuries.

It was not until the sixteenth century that technology began to recover from Plato's condemnation of the useful arts. Acceptance of technology, however, truly gained momentum during the long eighteenth century, the historiographical period from approximately 1660 to 1830 that includes the later decades of the Scientific Revolution as

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<sup>51</sup> Detienne and Vernant, 3-5, 317-8. Roochnik describes Plato's view of the more dynamic version of *techne* (what Roochnik labels *techne*<sub>2</sub>) as "epistemically unsatisfying" (Roochnik, *Of Art and Wisdom*, 228).

<sup>52</sup> John Dewey quoted in Timothy V. Kaufman-Osborn, *Creatures Of Prometheus Gender And The Politics Of Technology* (Lanham, MD: Rowman & Littlefield Publishers, 2000), viii.

well as the opening decades of the Industrial Revolution.<sup>53</sup> Still, the use of the word “technology” was rare until after World War I, a conflict defined by the industrialization of warfare.<sup>54</sup>

The increasingly common use of the term “technology” reflected the growing importance of the idea. The previous conceptualization of the “useful arts” was, according to historian Leo Marx, “inherently belittling.” He notes: “Ever since antiquity, moreover, the habit of separating the practical and the fine arts had served to ratify a set of overlapping and invidious distinctions: between things and ideas, the physical and the mental, the mundane and the ideal...This derogatory legacy was in some measure erased, or at least masked, by the more abstract, cerebral, neutral word ‘technology.’” Whereas mechanical or industrial arts implied an association with a particular type of manual, sensorial labor, the generalized and idealized concept was more sophisticated and celebrated.<sup>55</sup> It better captured the way technical know-how and artifacts are linked organizationally and philosophically. It also reflected the way technology was organized into systems and how those systems increasingly pervaded America’s economic, political, and social realms. The more conceptual term also captured how technology became a broad, seemingly autonomous force of inevitable progress that Americans integrated as part of their national identity. The semantic shift also put what had previously been merely knowledge of a craft on par with the esteemed rationality of

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<sup>53</sup> Multhauf, “Some Observations on the Historiography of the Industrial Revolution,” 42-9.

<sup>54</sup> Marx, “The Invention of ‘Technology,’” 3-4.

<sup>55</sup> Marx, “The Invention of ‘Technology,’” 2, 5.



science. Indeed, both technology and science were becoming increasingly intertwined and put into the service of corporations and governments.<sup>56</sup>

Techno-science, the label some scholars give to denote the growing interdependence of the two pursuits, was clearly demonstrated as states marshaled massive resources to fight the First World War.<sup>57</sup> Following the conflict, the American public reaped the benefits of wartime economic, scientific, and technological mobilization. While there were always dissenting opinions, historian Thomas Hughes notes “technological enthusiasm prevailed” among Americans who eagerly adopted technology as a fundamental element of their culture. The embrace of the mechanical was visible in architecture, consumer products, literature, and metaphors for both organizational management and individual character.<sup>58</sup> By the time the United States entered into the next global conflict, techno-science had also fully pervaded American military institutions.<sup>59</sup>

By World War II, the stage was set for a revolutionary shift in the relationship between technology, science, and war. Because of the conflict, governments around the globe increased funding for scientific research and initiated numerous institutional

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<sup>56</sup> For more, see Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca, NY: Cornell University Press, 1990).

<sup>57</sup> Also written without a hyphen, technoscience means that scientists are increasingly reliant upon technologies (e.g. computers, lasers, measuring apparatuses), that technology itself cannot be a body of knowledge independent of science, or both. This is an area of much debate and as been extensively developed by scholars in the Science and Technology Studies (STS) field. For more, see Rachel Laudan, ed., *The Nature of Technological Knowledge. Are Models of Scientific Change Relevant?* (Boston, MA: Springer, 1984) and Wybo Houkes, “The Nature Of Technological Knowledge.” *Philosophy of Technology and Engineering Sciences*, Ed. Anthonie W. M. Meijers, Vol. 9 (Amsterdam: North Holland, 2009), 343-4.

<sup>58</sup> Thomas P. Hughes, *Human-Built World: How to Think about Technology and Culture* (Chicago, IL: University of Chicago Press, 2005), 53, 120, 13, 39, 72.

<sup>59</sup> Alex Roland, “Science and War,” *Osiris* 1 (1985): 263.

endeavors. Radical innovations in military technology followed. Examples include radar, electronic computers, and the atomic bomb. Military historian Alex Roland argues these new weapons were not decisive in the conflict, but that their lasting influence was attributable to two elements. The first includes principles of management and operational research that emerged to develop, test, and employ new military systems. The second was the impression that techno-science, associated most acutely with the Manhattan project, deserved the credit for Allied victory.<sup>60</sup> As a result, technology and science seemed to be the key to resolving two different challenges: winning conflicts abroad and improving the quality of life at home. The first was reflected in increasingly sophisticated military systems supported by the military-industrial-university complex. Intercontinental ballistic missiles and the SAGE air defense system are two key examples.<sup>61</sup> The second emerged as the federal government turned to systems approaches to solve urban problems. Indeed, issues such as aging infrastructure revealed the ubiquity of technological systems in modern American life. The systems engineering approach, pioneered by organizations such as RAND, which began a think tank for the USAF, assumed that the same rational approach could work as well in civilian circumstances as it supposedly had in the war.<sup>62</sup>

In the words of historian Carroll Pursell, post-war Americans became “technology drunk” as they again enjoyed the reorientation of wartime production to mass consumption. In their inebriated state, many looked to what public intellectual Lewis

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<sup>60</sup> Roland, 265-6.

<sup>61</sup> Both are addressed in Pursell, *Technology in Postwar America*, and Hughes, *Human-Built World*.

<sup>62</sup> Hughes, *Human-Built World*, 77-85; Thomas P. Hughes, *American Genesis: A Century of Invention and Technological Enthusiasm, 1870-1970*, 2nd edition (Chicago, IL: University of Chicago Press, 2004), 6, 10, 12, 316.

Mumford derided as the “megamachine” as the means and ends of human progress.<sup>63</sup> Historian of technology Thomas P. Hughes states that symbols of “order, precision, and systematic control” diffused from the domain of technology into politics and culture writ large. This vision, however, was soon challenged as a sense of technology sobriety set in. Some even question the very premise of a technological society, inaugurating what the scholar Leo Marx calls “postmodern pessimism.”<sup>64</sup>

Systems management abstracts quantitative factors from an inherently unique and multifaceted context and then subjects them to analysis. This only works in an artificially static and superficial environment, however, and the consequences of applying a systems management approach to the war in Vietnam and to weapons development are well documented.<sup>65</sup> Likewise, environmental pollution, industrial accidents, and political debacles lowered the public’s confidence that technologists had the ability to control the systems that now permeated every facet of modern life. Ambitious attempts to apply systems management to urban problems also faltered.

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<sup>63</sup> Pursell, *Technology in Postwar America*, 134; Lewis Mumford, *Pentagon Of Power: The Myth Of The Machine, Vol. II* (San Diego, CA: Harcour Brace Jovanovich, 1974), 241. Examples include the interstate highway program and the rapid growth of suburbia.

<sup>64</sup> Hughes, *Human-Built World*, 84-5, 87-96. Examples include oil spills, 3 Mile Island, smog, acid rain, global warming, the Vietnam War, Watergate, and the Challenger shuttle accident.

<sup>65</sup> Eliot Cohen dismantles this argument in “Systems Paralysis: Social Scientists Make Bad Generals,” *The American Spectator* (November, 1980), 23-9. Charles Hitch, head of the Economics Division of RAND even admitted that “Operations research is the art of sub-optimizing, i.e. of solving some lower-level problems, and that difficulties increase and our special competence diminishes by an order of magnitude with every level of decision making we attempt to ascend...the proportion of the relevant reality which we can represent by any such model or models in studying, say, a major foreign-policy decisions, appears to be almost trivial” (quoted in Charles E. Lindblom, “The Science of ‘Muddling Through’” *Public Administration Review* 19, no. 2 (Spring, 1959), 79). Even the deterrence strategy, built upon mutual nuclear destruction, also seemed vulnerable to similar fallibilities. False alarms in US missile warning systems did nothing to ease the image of technological cynicism.

In a 1973 article, urban planners Horst Rittel and Melvin Webber developed the concepts of “tame” problems and “wicked” dilemmas to explain why technical and economic logic often failed in the face of local political and social contexts. A tame problem can be stated definitively and independently, its solution set is bounded, the problem itself is repeatable until a solution is found, and there are criteria by which the solution can be objectively verified. In contrast, any problem that involves values – that is, any political problem, in the global sense of the word – is “wicked” in that it resists solution. This resistance arises from the difficulties inherent in all social predicaments: every problem is interdependent and unique; the approach depends on the how the problem is defined; there is neither consensus on the definition nor objective measures of progress; no solution is final; and every attempt to solve the problem further alters the context.<sup>66</sup> Attempts to find even a temporary and partial solution requires “transdisciplinary imagination” and may hinge on openness to radical changes.<sup>67</sup> The concept has been adopted by fields outside of urban planning, including strategists, organizational theorists, those concerned with innovation, and literary critics.<sup>68</sup>

In literary terms, this dichotomy of wicked and tame is represented by the contrasting settings of Homer’s two epics. The setting for *The Iliad*, for example, is the siege of Troy. This “closed world” is tame, emphasizing bounded, presumably

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<sup>66</sup> Horst W. J. Rittel and Melvin M. Webber, “Dilemmas in a General Theory of Planning,” *Policy Sciences* 4 (1973): 155-169.

<sup>67</sup> Valerie A. Brown, John A. Harris, and Jacqueline Russell, *Tackling Wicked Problems: Through the Transdisciplinary Imagination* (Washington, DC: Routledge, 2010), 4.

<sup>68</sup> For examples, see, respectively, US Army Training and Doctrine Command Pamphlet 525-5-500; Jeff Conklin, *Dialogue Mapping: Building Shared Understanding of Wicked Problems*, Hoboken, NJ: Wiley, 2005; and Oswald A. J. Mascarenhas, “Innovation as Defining and Resolving Wicked Problems.” 11 May 2009, accessed April 28, 2015, [weaverjm.faculty.udmercy.edu/.../MascarenhasWickedproblems.doc](http://weaverjm.faculty.udmercy.edu/.../MascarenhasWickedproblems.doc).

autonomous, spaces with an acute sense of artificiality.<sup>69</sup> The natural world is missing, and machinery, especially military weapons, are foregrounded. Contests are decided by reason, political power, or technical skills.<sup>70</sup> In contrast, “open” or “green” worlds are natural, less bounded, and more complex. Their unpredictability requires *metis* and playfulness. In *The Odyssey*, for example, the images of the hero’s dual journeys, one physical and the other psychological, exemplifies engagement with mystical forces in a wondering, wandering journey home.<sup>71</sup> Some even began to question whether the pursuit of scientific knowledge was the “closed world” project envisioned since Plato.

Plato conceived of human knowledge as a cumulative uncovering of universal truths. In contrast, the last half-century has seen growing awareness that all information is partial. That is, it is both irrevocably incomplete and inherently biased. Thus, some aspects of the field under investigation cannot be explained and are, in fact, not even considered legitimate questions. A significant milestone in this appreciation of subjective and asymmetrical progress is Thomas Kuhn’s 1962 work, *The Structure of Scientific Revolutions*.

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<sup>69</sup> Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: The MIT Press, 1997), 12-3.

<sup>70</sup> Edwards, 307-311.

<sup>71</sup> The focus is on finding or restoring community and a sense of flow, often related to a quest: “The protagonist’s role is to remain open to this dizzying flux, riding the moment rather than trying to impose control, accepting and returning gifts of aid rather than trying to force a way alone...quest is integrative: comprehending complexity, transforming Others into mere others, and gathering forces for an eventual reunification” (Edwards, 13, 309-312.); See Eberle for descriptions of play that match “open worlds” (Scott G. Eberle, “The Elements of Play: Toward a Philosophy and a Definition of Play,” *American Journal of Play* 6, no. 2 (January 2014): 220). David Bergen also notes that play fulfills the criteria for nonlinear dynamic systems: it can be self-organizing, exhibits punctuated and variable stability, emergence, fractal qualities, sensitive to starting conditions, openness, interdependence (David Bergen, “Psychological Approaches to the Study of Play,” *The Handbook of the Study of Play*. Eds. James E. Johnson, et al. (Lanham, MD: Rowman & Littlefield Publishers, 2015), 62-3).

Kuhn's analysis of the history of science challenged the presumption that scientific advancements transpire only through a linear accumulation of facts and theories. Such "normal science" does occur, but the questions it seeks to answer, and the mechanisms it employs to get those answers, are both provided by a dominant paradigm.<sup>72</sup> Although Kuhn brought that term into widespread usage, his own work lacked definitional precision. By one scholar's count, "paradigm" was used in 21 different ways throughout *The Structure of Scientific Revolutions*.<sup>73</sup>

In adapting Kuhn's ideas to analyze organizational culture instead of technological knowledge, Gareth Morgan offers a typology useful for understanding the intellectual history of Airmen. Morgan distinguishes between three different uses of the term paradigm. In its most narrow conception, paradigms are the "puzzle-solving activities" researchers apply to solve specific questions. The particular processes, tools, and concepts operationalized therein arise from principles derived from the second level of paradigms. In that sense, a paradigm is "school of thought" informed by a coherent theory. Although their perspectives may differ, these communities can still emerge from a common paradigm in the third, most expansive connotation of that term: an implicit, often tacit, philosophical system that filters and interprets experience.<sup>74</sup> When describing

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<sup>72</sup> Thomas S. Kuhn, *The Structure of Scientific Revolutions: A Guide to Method*, 4th edition (Chicago, IL: University of Chicago Press, 2012), xi-5.

<sup>73</sup> Kuhn, *The Structure of Scientific Revolutions*, xix; Gareth Morgan, "Paradigms, Metaphors, and Puzzle Solving in Organization Theory." *Administrative Science Quarterly* 25, no. 4 (December 1980): 606.

<sup>74</sup> Morgan, "Paradigms, Metaphors, and Puzzle Solving," 605. "Paradigm," in its most expansive sense, is "metatheoretical or philosophical...denot[ing] an implicit or explicit view of reality. Any adequate analysis of the role of paradigms in social theory must uncover the core assumptions that characterize and define any given world view, to make it possible to grasp what is common to the perspectives of theorists whose work may otherwise, at a more superficial level, appear diverse and wide ranging" (Morgan, 606-7).

the organizational culture of the USAF the Greek word *logos* is another term useful to describe this sense of paradigm as a worldview.

First, the intellectual history of Airmen demonstrates a certain amount of reverence towards the machinery of flight. Thus, in the theological sense, the airplane is their sacred *logos*. Also, as understood outside of Plato's philosophy, *logos* can mean a guiding narrative. This conception has the advantage of highlighting the subjective nature of theories: how they are constructed, selected, and employed; that is, how a paradigm crafts a repertoire of stories that make sense of the world. Moreover, the *techne* of storytelling is more than just subjective and contextual. It privileges *metis*. New theories emerge in times of change, when old approaches are losing their appeal. Kuhn writes this is often through a "sudden and unstructured event" like a "flash of intuition." As his description implies, the rise of a new approach is rarely objective, instead appealing to subjective qualities such as an improved aesthetics or eloquence. Lacking evidence, he argues that the change is a decision that "can only be made on faith." The choice often hinges on what Kuhn later called a mature sensibility that holds rational and non-rational factors together in productive balance.<sup>75</sup> This process is also playful, holding contrasting metaphors in creative tension and "exploring constructive falsehood as a means of liberating the imagination."<sup>76</sup>

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<sup>75</sup> Kuhn, *The Structure of Scientific Revolutions*, 122, 154-5, 157; Marc Trachtenberg, *The Craft of International History: A Guide to Method* (Trenton, NJ: Princeton University Press, 2009), 21-2. For example, some physicists claim that physics is only five percent observation and "ninety-five percent speculation," and a philosopher of science concludes that "our chances of progress may be obstructed by our desire to be rational." (Jerome Bruner, *The Culture of Education* (Cambridge, MA: Harvard University Press, 1997), 123-4; Paul Feyerabend quoted in *Dionysus Reborn*, 296).

<sup>76</sup> Morgan, "Paradigms, Metaphors, and Puzzle Solving in Organization Theory," 611; Peter M. Senge, *The Fifth Discipline: The Art & Practice of the Learning Organization*

Contrary to Plato's incrimination of false ideas as shadows, there is wisdom in accepting each story as a partial truth. Consider Homer's epic poems, which were highly influential even though they were not objectively accurate.<sup>77</sup> For Plato, this demonstrated the untrustworthiness of the *demos* and the criminality of the Sophists: the former were liable to mistake shadows for substance, while the latter deliberately cultivated those shadows in the form of stories. Theories, however, are what Alfred North Whitehead calls a "useful fiction."<sup>78</sup> Kantian scholar Hans Vaihinger has a similar concept of scientific fictions: provisional, "artificial," constructs that cultivate creativity. Their utility lies not in their approximation of reality (which is what a hypothesis aspires to), but in the "almost mysterious" way they allow an "instinctive, almost cunning ingenuity," to surmount a difficult conceptual problem indirectly. He explicitly describes it as a metic, playful activity: "free creative play of psychical activity, expressing itself in arbitrary combinations and alternations of the elements existing in the world of fact." Without these fictions, the "satisfaction of understanding, the ordering of our chaotic

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(New York, NY: Doubleday Business, 1994), 142; Marty Neumeier, *The Designful Company: How to Build a Culture of Nonstop Innovation* (Berkeley, CA: New Riders, 2008), 40; Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd, Strategy and History* (New York, NY: Routledge, 2007), 103. Morgan encourages a mental promiscuity that engages in a variety of metaphors. "The ultimate challenge," he writes, "is not to be seduced by the power or attractiveness of a single metaphor – old or new – so much as to develop an ability to integrate the contributions of different points of view" (Morgan, xii).

<sup>77</sup> Jerome Bruner, *Making Stories: Law, Literature, Life* (Cambridge, MA: Harvard University Press, 2003), 98. While stories themselves, approximately half of both *The Iliad* and *The Odyssey* feature speeches or stories told by characters (Jasper Griffin, "The Speeches." *Cambridge Companion to Homer*, ed. Robert Fowler, (Cambridge, MA: Cambridge University Press, 2004), 156.)

<sup>78</sup> Paul Bate, *Strategies for Cultural Change* (Boston, MA: Butterworth-Heinemann, 1994), 269.



material...all advances in science, and finally all higher morality would be impossible.”<sup>79</sup> Einstein echoed these sentiments: “Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution. It is, strictly speaking, a real factor in scientific research.”<sup>80</sup>

Finally, the idea of technical know-how is still an element of *logos* as logic – and the USAF culture is a particularly apt example of a mindset shaped by technological reasoning. That this paradigm, their *logos*, could still be labeled playful at the same time may seem absurd. The justification for this approach, however, comes from the analytical insights from the history of technology as it evolved since the mid-twentieth century.

### History of Technology

The history of technology developed within the cultural, social, political, and academic milieu described above. A growing appreciation of the intricate interactions between technology and society – the same awareness that led to the very popularization of the term “technology” as a keyword – meant that some historians were no longer satisfied with detailed accounts of how machines worked. They increasingly critiqued the approach to technological history that focused largely on new, successful artifacts and heroic inventors, and technology as both an autonomous historical force and the principal determinant of prosperity for both individuals and empires.<sup>81</sup>

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<sup>79</sup> Hans Vaihinger quoted in Spariosu, *Dionysus Reborn*, 248-56.

<sup>80</sup> Albert Einstein, *Einstein on Cosmic Religion and Other Opinions and Aphorisms*, Dover edition (Mineola, NY: Dover Publications, 2009), 97.

<sup>81</sup> John M. Staudenmaier, *Technology's Storytellers: Reweaving the Human Fabric* (Cambridge, MA: The MIT Press, 1989); Wiebe E. Bijker, Thomas Parke Hughes, and T. J. Pinch, eds., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, MA: The MIT Press, 2012); Svante

A significant milestone in the field was the creation of the Society for the History of Technology (SHOT) in 1958. As is natural for a new endeavor, there was much ink spilled defending the field as coherent, distinct, and meaningful. The man most responsible for SHOT's creation was Melvin Kranzberg. In his words, "all history is relevant but the history of technology is the most relevant." He defended this bold statement by observing "man could not have become *homo sapiens*, 'man the thinker,' had he not at the same time been *homo faber*, 'man the maker.'" <sup>82</sup> These ideas are obviously contrary to Plato's diminution of *techne*. Indeed, Kranzberg specifically cited the Greek philosopher as a source of the prejudice against the scholarly study of technology. <sup>83</sup>

Early SHOT members argued passionately for increased sophistication in the history of technology in order to reclaim its position in academia. For example, in 1975, Angus Buchanan called for a "synoptic approach" to the history of technology as an all-encompassing and creative force in historical change. His contextualist approach, or what

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Lindqvist, *Changes in the Technological Landscape: Essays in the History of Science and Technology* (Sagamore Beach, MS: Watson Publishing International, 2011); John McDermott, "Technology: The Opiate of the Intellectuals," *New York Review of Books*, July 31, 1969, 24.

<sup>82</sup> Melvin Kranzberg, "One Last Word – Technology and History: 'Kranzberg's Laws.'" *In Context: History and the History of Technology: Essays in Honor of Melvin Kranzberg*. Eds. Stephen Cutcliffe and Robert Post (London: Lehigh University Press, 1989), 251, 255. Elsewhere, Kranzberg wrote that "every thinking man" should be "concerned with the development of technology and its relation with society and culture" (Melvin Kranzberg, "At the Start," *Technology and Culture* 1, no. 1 (Winter 1959), 2). Carroll Pursell, a former SHOT president, wrote that a better understanding of technology, offers "a better understanding of ourselves" (Pursell, *Technology in Postwar America*, xvi). In the same spirit, in his *Prometheus Bound*, "Aeschylus reflects a broadened conception of *techne*...one which implies an essential relationship between humanity itself and *techne*" (Roochnik, *Of Art and Wisdom*, 42).

<sup>83</sup> Kranzberg, "At the Start," 3.

another SHOT member called the integration of design and ambience, was even reflected in the title of SHOT's journal, *Technology and Culture*.<sup>84</sup>

Within three decades, contextualist approaches were more common in SHOT's journal than the previous "internalist" accounts that "opened the black box" of a specific technology without situating the artifact's mechanical components within a broader context (or what John Staudenmaier memorably calls the "cultural ambience").<sup>85</sup> At the other end of the continuum, there are "externalist" narratives that leave the black box closed, as if the "nuts and bolts" matter not at all. The line between these accounts and non-historical analyses offered by sociologists, economists, political scientists, or philosophers is often blurred – since all eschew technical details – but externalism still retains a focus on the artifact as its main character. For example, consider a work about the use of aircraft in a particular conflict that does not explore the links between its employment and its mechanical design.<sup>86</sup>

Contextualism, situated in the middle of the spectrum, mitigates the extremes of the other two. While internalism privileges the object and externalism privileges the context, contextualism is a dialectical synthesis of the two, opening the box to varying degrees, showing how the material, mechanical qualities of the thing are shaped by social

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<sup>84</sup> Angus Buchanan, "Technology and History," *Social Studies of Science* 5, no. 4 (1975): 490; John M. Staudenmaier, *Technology's Storytellers*, xiv. The title, explained Kranzberg, "reveals the breadth of our definition of culture and indicates our awareness of the complex and intricate interrelationship of all aspects of technology." (Kranzberg, "At the Start," 1). Some critics worried that "culture" would be equated with fine arts and harken back to Plato's prejudice.

<sup>85</sup> Staudenmaier, *Technology's Storytellers*, 21.

<sup>86</sup> One example is David Edgerton's *England and the Aeroplane: Militarism, Modernity and Machines* (2013).

forces and then how the thing goes on to become a social force itself.<sup>87</sup> The latter naturally leads to a focus on users, both how technology can influence their paradigms, and how such paradigms influence the use of those tools. Again, in the case of the USAF, organizational thinking is so oriented to technology that it is fair to label theirs a technological paradigm. Furthermore, it leads to an approach to – and with – technology that can be described as playful.

Playfulness and paradigms are not unknown topics in the history of technology. Kuhn is “the one model that really dominates us all” according to one historian, and many have applied his insights into the subjective and imaginative nature of technological change.<sup>88</sup> One example is *Men, Machines, and Modern Times* (1966) by Elting E. Morison, in which he discusses how new technology emerges from objective data as well as “a tangle of memories, prejudices, emotional needs, aspirations, [and] common decencies.” Many other historians cite the importance of imagination to foresee or break through technical problems, as well as the inherent playfulness in invention (e.g. toys often are entry point for technology).<sup>89</sup> Phillip Scranton, for instance, describes the

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<sup>87</sup> Staudenmaier, xxiv.

<sup>88</sup> Alex Roland, “Theories and Models of Technological Change: Semantics and Substance,” *Science, Technology, & Human Values* 17, no. 1 (1992): 95. Examples include Krohn, et al, *Dynamics of Science and Technology* (1978), David Wojick’s chapter “The Structure of Technological Revolutions” in *The History and Philosophy of Technology* (1979), Giovanni Dosi’s “Technological paradigms and technological trajectories” (*Research Policy* 11 (1982), 147-62), Richard Nelson and Sidney Winter’s “In search of useful theory of innovation” (*Research Policy* 6 (1977), 6-76), and Edward W. Constant’s *The Origins of the Turbojet Revolution* (1980). Arguments against applying the Kuhn’s model of scientific knowledge to technological knowledge – and the more persuasive counterarguments – can be found in Laudan’s edited volume, *The Nature of Technological Knowledge: Are Models of Scientific Change Relevant?* (1984).

<sup>89</sup> Elting E. Morison, *Men, Machines, and Modern Times* (Cambridge, MA: The MIT Press, 2016), 76. Arnold Pacey, Eugene S. Ferguson, William Ogburn, Brooke Hindle, and Bayla Singer all cite imagination or playfulness in their histories of in design,

process of creating aircraft jet engines amidst the anxiety of the Cold War as messy, irrational, and full of passion.<sup>90</sup> For some scholars, such as George Basalla, necessity is always subordinated to “fantasies, longing, wants, and desires.” In *The Evolution of Technology* (1989), Basalla goes on to argue that artificial novelty owes less to economic or biological demands and more to “technological imagination...[that] often exceeds the boundaries of rationality as it contemplates the improbable and the impossible.”<sup>91</sup>

Basalla’s work also starts off by acknowledging the role of cognitive play and the analytical power of metaphors.<sup>92</sup> Likewise, historians in the field are increasingly looking at stories for insight into technological attitudes. Perhaps the best example is David E. Nye’s *Narratives and Spaces: Technology and the Construction of American Culture* (1997), which combines the social history of technology and literary theory to reveal the narrative quality of historical representations as well as the public’s reactions to contemporaneous technological change.<sup>93</sup> Of course, history is itself a form of

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invention, or technological problem-solving (Arnold Pacey, *The Maze of Ingenuity: Ideas and Idealism in the Development of Technology* (Cambridge, MA: The MIT Press, 1992); Arnold Pacey, *Meaning in Technology* (Cambridge, MA: The MIT Press, 1999); Eugene S. Ferguson, *Engineering and the Mind’s Eye* (London: The MIT Press, 1994); William Fielding Ogburn, *The Social Effects of Aviation* (Houghton Mifflin Company, 1946); Brooke Hindle, *Emulation and Invention* (ACLS Humanities E-Book, 2008); Bayla Singer, *Like Sex with Gods: An Unorthodox History of Flying* (College Station, TX: Texas A&M University Press, 2003)).

<sup>90</sup> Philip Scranton, “Urgency, Uncertainty, and Innovation: Building Jet Engines in Postwar America,” *Management & Organizational History* 1, no. 2 (May 1, 2006): 127–57, <https://doi.org/10.1177/1744935906064096>.

<sup>91</sup> George Basalla, *The Evolution of Technology* (New York, NY: Cambridge University Press, 1989), 14, 77.

<sup>92</sup> George Basalla opens his book stating “Metaphors and analogies are at the heart of all extended analytical or critical thought” (Basalla, 3). He goes on to construct a theory of technological change using similarities between biological evolution and technological change.

<sup>93</sup> David Nye, *Narratives and Spaces: Technology and the Construction of American Culture* (New York, NY: Columbia University Press, 1998). Other examples are Daniel

storytelling, using not only illustrative narratives, but even mythological images – useful fictions such as Prometheus – to analyze and describe the subject.<sup>94</sup>

The story that follows builds upon these precedents, while also filling in some historiographical gaps. It takes playfulness seriously, acknowledging the many forms of play that Airmen embody, from storytelling to strategy. Yet, it is also playful in its approach, using contrasting pairs of mythological characters in a format that is, like Paul Edwards's work on the USAF during the Cold War, "kaleidoscopic, often more collage than linear narrative." Also, like Edwards's work and many other recent books by the SHOT community, it employs new, often transdisciplinary, approaches to history.<sup>95</sup>

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Dinello's *Technophobia! Science Fiction Visions of Posthuman Technology* (2006), Kaufman-Osborn's *Creatures of Prometheus*, Fred Erisman's *Boys' Books, Boys' Dreams, and the Mystique of Flight* (2006), and Rosalind H. Williams, "Opening the Big Box," *Technology and Culture* 48, no. 1 (February 7, 2007): 104–16.

<sup>94</sup> Historians of technology seem progressively comfortable with the idea of relating their work to the narrative turn in academia. In addition to Nye, consider Rebecca Herzig's assertion that telling stories is "what holds SHOT together after all," and Ronald R. Kline's 2012 Presidential address to SHOT in which he argued "strengthening the foundations of the stories we tell about technology will make a difference in the wider world" (Rebecca Herzig, "A Thing for Stories," *Technology and Culture* 50, no. 3 (July 19, 2009): 614; Ronald Kline, "Foundational Stories," *Technology and Culture* 54, no. 1 (February 21, 2013): 127). An example particularly relevant for this dissertation is Carolyn C. Cooper's argument "to view myths and legends about inventors not merely as false history but as stories from which to learn about the storytellers" (Carolyn C. Cooper, "Myth, Rumor, and History: The Yankee Whittling Boy as Hero and Villain" (*Technology and Culture* 44, no. 1, January 2003, 96). John Staudenmaier comments on this in his 2002 article, noting, "the past ten years fairly bristle with signs of SHOT's move into larger worlds of discourse" (John M. Staudenmaier, "Rationality, Agency, Contingency: Recent Trends in the History of Technology," *Reviews in American History* 30, no. 1 (March 1, 2002): 170).

<sup>95</sup> Edwards, *The Closed World*, xv. Another example, and an inspiration for this approach, is Bayla Singer's *Like Sex with Gods: An Unorthodox History of Flying* (2003) in which the historian does not just start with an event and work backwards in time to uncover antecedents, but weaves together multifarious elements extant in the ancient past as a means of reframing what is already known about more recent events.

One such novel tact is focusing on where most interactions occur with technology. They are not, as the weight of historiography implies, at the point of creation. Rather, as Edgerton and Svante Lindqvist argue, it is with extant artifacts. The lived experience of “technology-in-use” lacks sufficient study and the recent trends towards users and consumption does not automatically correct this issue. Studies of users are pervasive in the Social Construction of Technology (SCOT) approach, but those users are those shaping artifacts’ initial invention and development.<sup>96</sup>

Political, economic, and social constructivist perspectives tend to discount the lived experience of technology. Indeed, in *Meaning in Technology*, Pacey states that “few authors of either school get close to what seems to me the most important aspect of the practice of technology...how human imagination deals with practical experience of the material world.”<sup>97</sup> The approach used throughout this project also fulfills the need for more analyses of what historian Kristen Haring labeled “technical cultures,” as in the specific reactions of organizations and individuals to technology.<sup>98</sup> In doing so, I heed the

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<sup>96</sup> Ruth Schwartz Cowan and Ruth Oldenziel are two examples of this critique, which is discussed by Edgerton, Constant, and Lindqvist (David Edgerton, “Innovation, Technology, or History: What Is the Historiography of Technology About?,” *Technology and Culture* 51, no. 3 (August 15, 2010): 680–97; Lindqvist, *Changes in the Technological Landscape*; Edward W. Constant, “A Tale of Two Bonanzas: How Knowledgeable Communities Think about Technology,” *Technology and Culture* 47, no. 2 (June 29, 2006): 253-285). Constant notes that SCOT lacks focus on “simple folk” or what happens after “closure.” Two works that do include such a focus are Alan Meyer’s *Weekend Pilots* (2016) and Mats Fridlund, “Buckets, Bollards and Bombs: Towards Subject Histories of Technologies and Terrors,” *History and Technology* 27, no. 4 (December 1, 2011): 391–416.

<sup>97</sup> Pacey, *Meaning in Technology*, 4.

<sup>98</sup> Haring defines a technical culture as “a culture built around and establishing an ideology about technology” (Kristen Haring, *Ham Radio’s Technical Culture* (Cambridge, MA: The MIT Press, 2008), xv). Williams demonstrates the fruits of an organizational approach in her *Retooling: A Historian Confronts Technological Change* (2002).

warnings against ignoring how mythological references are used to conceptualize human flight.<sup>99</sup>

Additionally, after decades of SCOT analysis seeking to “demystify” technology, the argument herein reclaims a place for passion as more than just a derided label.<sup>100</sup> In the first sense, this is similar to what Dipesh Chakrabarty claims for the historian, as described by a reviewer: “a right to re-enchant a world that has been disenchanted by the nihilism of modernity.”<sup>101</sup> It comports with David Edgerton’s admonition to stop ignoring popular accounts, or what is often derided as “buff” literature, and Bruno Latour’s plea to uncover “the passion beneath rationality” in technological practices. It also matches Lewis Mumford’s own version of internalism, described by Rosalind Williams as “the interplay between technology and the internal world of personality, creativity, desires,

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<sup>99</sup> As one earlier history of aviation exclaimed, “progress in aviation is not solely due to efforts of the present generation...but presents the process of a gradual evolution of ideas which have grown out of the imagination, endeavors, experiments, triumphs, and failures of many past ages...there is no field of human exertions in which imagination and romantic dreams have played a greater role and have proved more fertile than in the development of aviation. Intuition, romance, and adventure are its leading motives...this conquest goes back to the trend of man's mind toward the romantic and adventurous. Describing merely the gradual perfection of mechanical devices does not make a complete history of aviation. It is the spirit and the idea behind the devices that count...the idea itself means everything” (Berthold Laufer, *The Prehistory of Aviation* (Chicago, IL: Field Museum of Natural History, 1928), 10-1).

<sup>100</sup> Historian David Noble wants to “demystify” all technology. Pisano seems fixated on demystifying aviation in particular (David F. Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (Oxford: Oxford University Press, 1979), xix; Dominick A. Pisano, “The Social and Cultural History of Aviation and Spaceflight, Part I,” US Centennial of Flight Commission, accessed July 27, 2016, <http://www.centennialofflight.net/essay/Social/SH-OV2.htm>; Dominick A. Pisano, Thomas J. Dietz, and Joanne M. Gernstein, *Legend, Memory, and the Great War in the Air* (Seattle, WA: University of Washington Press, 1992)).

<sup>101</sup> Jacques Pouchepadass, “Pluralising Reason.” *History and Theory* 41, no. 3 (September 2002), reviewing Dipesh Chakrabarty’s *Provincializing Europe: Postcolonial Thought and Historical Difference* (Princeton, NJ, 2000).



values, meaning.”<sup>102</sup> In the words of historian Eugene Ferguson, “If we fail to note the importance of enthusiasm that is evoked by technology, we will have missed a central motivating influence in technological development.”<sup>103</sup>

The field of aviation history, often cited for excessive displays of enthusiasm, is particularly ripe for this corrective. In his 1989 article, “Aviation History in the Wider View,” James Hansen critiqued the field’s extant works for their narrow technical focus and silence on sociocultural issues. Unlike the broader field of technological history, histories of aviation had not experienced the same “crowded narrative frame.”<sup>104</sup> At the

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<sup>102</sup> Edgerton, “Innovation, Technology, or History”; Bruno Latour quoted in Philip Scranton, “Urgency, Uncertainty, and Innovation: Building Jet Engines in Postwar America,” *Management & Organizational History* 1, no. 2 (May 1, 2006): 129, <https://doi.org/10.1177/1744935906064096>; Rosalind Williams, “Lewis Mumford’s *Technics and Civilization*.” *Technology and Culture* 43, no. 1 (2002), 147. This is Pacey’s attention to “personal experience,” Jeremy Black’s call for more analysis of the impact of technology on morale, as well as Bruno Latour’s desire to show humanists that machines are “cultural objects worthy of their attention and respect,” while showing technologists “they cannot even conceive of a technological object without taking into account the mass of human beings with all their passions and politics and pitiful calculations, and that by becoming good sociologists and good humanists they can become better engineers and better-informed decision makers” (Pacey, *Meaning in Technology*, 7-8; Jeremy Black, “Determinisms and Other Issues,” *The Journal of Military History* 68, no. 4 (September 23, 2004): 1220, <https://doi.org/10.1353/jmh.2004.0169>; Bruno Latour, *Aramis, or the Love of Technology* (Cambridge, MA: Harvard University Press, 1996), viii.

<sup>103</sup> Eugene S. Ferguson, “Toward a Discipline of the History of Technology,” *Technology and Culture* 15, no. 1 (1974): 21. Likewise, per Merritt Roe Smith, “Integral to this process of innovation is an enthusiasm for technological change that often borders on the fanatical...a compulsive interest in technically elegant problem, an almost childlike fascination for new things, and, of course, a patriotic commitment to national defense...Such enthusiasm is a conspicuous feature of the West’s ideology of progress, which so often manifests itself in the ideology of progress, which so often manifests itself in the institutional search for ‘order’ and ‘system’” (Merritt Roe Smith, ed., *Military Enterprise and Technological Change* (Cambridge, MA: The MIT Press, 1985), 29).

<sup>104</sup> James R. Hansen, “Aviation History in the Wider View,” *Technology and Culture* 30, no. 3 (July 1, 1989): 643–56; Staudenmaier, “Rationality, Agency, Contingency,” 173. By failing to embrace new methodologies and by not incorporating other disciplines,

same time, however, excitement over flight should remain part of the historiographical toolkit, as both content for examination and the historian's own inspiration. As Rosalind Williams, past president of SHOT, described, "In the history of technology, passion serves an epistemological purpose. Strong emotion acts as a probe. It takes historians into a subject and motivates them to keep digging further."<sup>105</sup> A prime example of William's advice, and an exemplar of the "New Aerospace History," is Bayla Singer's *Like Sex with Gods: An Unorthodox History of Flying* (2003). Not only does the historian show the interplay of psychological aspects of flight with its technical aspects, she embraces the playfulness of her approach.<sup>106</sup>

Lastly, perhaps because many argue that the "essence" of the field is found in the material object, there are few works that offer a history of ideas and attitudes about technology.<sup>107</sup> This is particularly troublesome for the USAF, a service supposedly born as an "embodiment of an idea." If, as Singer notes, "human flight is not a simple matter of science and technology [but] a continuing epic of dreams and obsession, of yearning

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aviation history had, according to Hansen, failed to deliver a broad synthesis capable of making the field more "meaningful in the overall record of human existence."

<sup>105</sup> Williams, "All That Is Solid Melts into Air," 667.

<sup>106</sup> Dominick A. Pisano, "New Directions for the History of Aviation," *American Studies* 53, no. 3 (2014): 66; Singer, *Like Sex with Gods*, 4-5. Pisano notes a "New Aerospace History," that is "committed to relating the subject to larger issues of society, politics, and culture, taking a more sophisticated view of the science, technology, and individual projects than historians previously held."

<sup>107</sup> Brooke Hindle, *Technology in Early America: Needs and Opportunities for Study*. (Chapel Hill, NC: University of North Carolina Press, 1966), 4-5, 10. Buchanan notes that, "definitions that emphasize the 'earthy' quality of technology...ensure attention for the hard core of factual evidence by students of the history of technology. But they probably give too little attention to those aspects of technology such as knowledge, thought and design" (Buchanan, "Technology and History," 491). Also, Wybo Houkes notes that, "after the publication of Walter Vincenti's *What Engineers Know and How They Know It* (1990), research concerning the nature of technological knowledge seems to have come to a standstill. Historians of technology have lost interest in the topic" (Houkes, "The Nature Of Technological Knowledge," 309).

and striving to harness the intellect in the service of the emotions,” then those ideas are not just technical speculations, but also dreams and fears.<sup>108</sup> Thus, this dissertation aspires to follow Edwards’s description of his own project: “a story neither of ideas alone nor of machines and their effects, but of ideas, experiences, and metaphors in the their interaction with machines and material change.” As such, it follows other historians in detailing technical information only as necessary to tell the story.<sup>109</sup> Indeed, the very working definition of technology used herein points to such an approach.

Technology is just as difficult to define as play or politics, but a working definition is useful nonetheless. In terms of framing this project, technology is all of the human mental, physical, and social activities – including research, design, production, transfer, alteration, use, repair, and discard – necessary for realizing the creative manipulation of material world. Like fire, which itself is the manifestation of a technological system when it is deliberately used for human goals, technology (1) emerges from a base of knowledge; (2) comes in many forms, but always involves materiality; (3) changes in ways that are sometimes predictable (often when viewed macroscopically) and sometimes not (especially when viewed microscopically); (4) can be used for many purposes (including non-rational ends); (5) shapes, and is shaped by,

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<sup>108</sup> Builder, *The Masks of War*, 32; Singer, *Like Sex with Gods*, 3.

<sup>109</sup> Edwards, *The Closed World*, xv, xiii. Roland notes that some of the most respected authors leave the box closed, including many works honored by SHOT awards (at the time, 6 of 11 Dexter Prize winners, 3 of 11 Usher Prize winners). He specifically cites Noble’s *America by Design*, Layton’s *Revolt of the Engineers* (1971), Cowan’s *More Work for Mother* (1983), and McDougall’s *Heavens and the Earth* (1985).

the surrounding environment, both physical and cultural; and (6) is fundamental to what it means to be human.<sup>110</sup>

This tentative explanation showcases multiple themes. First, in using fire as an analogy for technology, it showcases the formative role of metaphor in human communication. It highlights the predominance of technology over science, since the science of combustion followed the technology of fire. The metaphor also harkens to a site of play, the campfire, which includes the playful practice of storytelling. Finally, fire and technology are directly linking to the history of warfare, particularly projectile technology, which has been described as “throwing fire.” Military aviation is firmly associated with this image. Indeed, its practitioners are the exemplar recipients of Prometheus’s gift of fire, a gift associated with not only technological knowledge and material artifacts, but with art, inspiration, and political power.<sup>111</sup>

### Chapter Summaries

Prometheus is obviously a useful myth for histories of technology, but there are others as well. For example, many writers invoke the image of Apollo to represent order, control, and objective reason. In one sense, technology can only exist to the degree the material world can be manipulated in predictable ways. In contrast, the god Dionysius characterizes the realm of surrender, subjectivity, and surprise; in a word, play. Chapter

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<sup>110</sup> Inspirations for this definition come from the works already cited by Eugene S. Ferguson, Thomas Hughes, Alex Roland, Brooke Hindle, and Arnold Pacey. Others include Thomas Misa, Robert Adams, and Johan Goudsblom (Thomas J. Misa, “Theories of Technological Change: Parameters and Purposes,” *Science, Technology, & Human Values* 17, no. 1 (1992): 3–12; Robert M. Adams, *Paths of Fire* (Princeton, NJ: Princeton University Press, 1996); Johan Goudsblom, *Fire and Civilization* (London: The Penguin Press, 1993).

<sup>111</sup> Alfred W. Crosby, *Throwing Fire: Projectile Technology through History* (Cambridge: Cambridge University Press, 2010); Dougherty, *Prometheus*, 19.

One shows how WWI aviators lived at the nexus between these two contrasting images. The technical, Apollonian traits of their cutting edge machines – specifically *range* and *speed* – afforded them the opportunity for Dionysian playfulness, at least when not flying. Not all were physical activities. These early airmen had a penchant for storytelling, a form of cognitive play with immense benefits.

Even though WWI demonstrated the destructive potential of aviation, its overall effect was to enhance its reputation. In contrast to the image of savage and primordial hand-to-hand combat taking place in cramped muddy trenches, genteel chivalry and storybook gallantry characterized the aerial combats fought overhead. Fights were depicted as aerial duels, and the most successful pilots became national heroes. These technological heroes portended a new age for humanity, one that, in the period following the war, increasingly embraced both the political and psychological benefits of aviation. The former could be represented by Daedalus, described by Homer as the greatest craftsman among mortals, and a regular creator of military weapons. In contrast, a common image for the aspirational aspects of flight was his son, Icarus, who perished after becoming too enthralled with the experience of flight. Chapter Two describes how, in the interwar period, attitudes towards aviation embraced the values of both characters: flight was both technical and playful. This “airmindedness” was a function of the multidimensional *perspectives* afforded by flight; new altitudes conferred new attitudes that shaped Western society. As part of that society, it shaped how Airmen believed this new technology would change the character of war.

Leading up to the Second World War, air-minded thinkers produced a variety of theories to guide the use of air power.<sup>112</sup> The most famous (or infamous) of these concerned high-altitude, daylight strategic bombardment. While the historiographical record is heavily weighted towards this particular use, the reality is that WWII exhibited a variety of aerial operations, including close air support to land and naval forces. Even before the conflict, Airmen debated a variety of ideas regarding air power. The same can be said of the next time Airmen produced their own air power theory, which was not until decades later. In histories of Operation Desert Storm (ODS), the concept of strategic paralysis gets most of the scholarly attention, despite a multifaceted air campaign. Both cases demonstrate the innate *flexibility* of air power. And in both cases, the historical narrative is skewed by the way Airmen themselves selectively framed air operations in a way that hyped operational flexibility while ignoring strategic flexibility. In other words, instead of celebrating their moment of strategic playfulness, the institution coalesced around a single, seemingly validated model. Chapter Three examines this process in terms of the Kuhnian evolution of knowledge, as scholars have adopted and adapted it to the study of technology.

Air power theories are a species of technological knowledge, subject to what renowned scholar Sir Lawrence Freedman labels the “most powerful dichotomy in all strategic thought”: the contrasting images of destruction or intellect embodied in the

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<sup>112</sup> The phrase “air power” means the ability to wage war in and through the air. Like the Prussian military theorist Carl von Clausewitz’s *On War*, this dissertation’s focus is *on fighting* through the air (“air power”) and not on other air power capabilities (e.g. airlift) or the other domains of “airpower” (i.e. space, and cyberspace) even though all missions and domains are increasingly vital for the employment of aircraft for kinetic effect.

Greek gods, Bia and Metis.<sup>113</sup> Before their names became associated with the impersonal qualities of brute force and cunning intelligence, these two gods were part of the fabric of Greek mythology. Though not as familiar as the other mythological characters used metaphorically thus far, they each have a central role in the pantheon – and in the paradigm of Airmen. Bia is an agent of Zeus; “the goddess or personified spirit of force, power, might, bodily strength and compulsion.”<sup>114</sup> She is the one, in fact, that delivers Prometheus to Hephaestus to carry out the punishment Zeus ordered.<sup>115</sup> Metis is the first wife of Zeus, who swallows her in an attempt to avert the prophecy that her children will challenge his rule.<sup>116</sup> In the process, he symbolically subsumes her considerable powers of metamorphosis, wisdom, and guile. Still, she is able to perform one more feat, emblematic of what her name will come to represent: within Zeus she births a daughter, Athena, and manufactures armor that will not only protect the new goddess, but also cause such pain that Zeus demands Hephaestus relieve him by striking him upon the skull with one of the blacksmith’s metal instruments.<sup>117</sup> As a result of the blow, Athena emerges, geared for war and imbued with the same craftiness as her mother.

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<sup>113</sup> Lawrence Freedman, *Strategy: A History* (New York, NY: Oxford University Press, 2013), 42.

<sup>114</sup> “Bia - Greek Goddess of Force, Might & Power,” Theoi Project, accessed July 2, 2017, <http://www.theoi.com/Daimon/Bia.html>.

<sup>115</sup> Hesiod, *Theogony*, 385-94. This element is also in the versions by Plato and Aeschylus.

<sup>116</sup> Hesiod, *Theogony*, 886–900.

<sup>117</sup> Atwill, *Rhetoric Reclaimed*, 50; Hesiod, *Theogony*, 886, 924. In some versions, such as Pseudo-Apollodorus’s *Bibliotheca*, it is Prometheus that is called upon to hit Zeus’s skull. Another variation, relevant to this dissertation, comes from the Orphic religion of ancient Greece. In their theogonies, Zeus is replaced by Dionysius who “represents the total unity of the dispersed, multiple, individualized, shifting world over which he comes to extend...of all the Greek deities, his is the only divine career which incorporates this alternating equilibrium, this oscillation between the one and the multiple, the same and the other, between the concentration of the whole and its dispersion...men can themselves

Airmen do not fit wholesale into one category of the other. Their technological paradigm has overt references to violence (*bia*), as well as appeals to *metis*, which operate without the benefit of any synthesis for Airmen to draw upon. Indeed, like the earlier chapters, choosing between images is a false dilemma. The question should not be Dionysius *or* Apollo, Daedalus *or* Icarus, Bia *or* Metis.<sup>118</sup> Instead, following the examples of Prometheus, Hephaestus, and Athena, they embody the creative tension within all of these contrasting pairs. Thus, when it came to strategy, they wisely selected a variety of ways to apply force – at least until, in retrospect, a particular approach hardened into dogma. This decline in intellectual playfulness occurred after both WWII and Operation Desert Storm.

The historical moment following air operations over Iraq corresponds with another organizational shift in the USAF. For the first time since gaining its organizational independence in 1947, Airmen incorporated airmindedness into their doctrine. Yet, just as *metis* waned in the aftermath of the Gulf War, “airminded” no longer incorporated the playfulness it had in the interwar period. Chapter Four returns to the intellectual history of airmindedness, using the discourse among Airmen in the years since Desert Storm. Even though a body of “airminded” scholarship exists, none of it addresses this use of the term in the USAF.

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return through Dionysus to the lost unity and find once more the golden age” (Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 134.)

<sup>118</sup> Instead of seeking the singular Platonic ideal, this perspective follows the cardinal rule of improvisational acting: “yes, and...” (Chris Trew and Tami Nelson, *Improv Wins* (S.L.: lulu.com, 2013), 10, 118-20). That is, if asked to choose between science and art, between emotion and reason, between continuity and change, the answer is affirmative of both. The goal is not resolving paradox, but capitalizing upon it: stress, not stasis. The analogy with improv is fitting for a metaphor inspired by the same Greek god that is associated with early Greek theater (see Chapter One).



In summary, this project proceeds via a set of “case stories.” They flow into each other in a chronological sense, but their selection emerged organically as a result of trying to answer the initial intellectual problem: what does it mean for the USAF to have a technological culture? The answer, as should be expected for something so elusive, revealed itself in not only these different time slices, but also in different guises for each of those periods. It was only after those narratives were digested and filtered through the theoretical framework offered by – and projected from, or appended to – the history of technology, that the *technological logos* concept materialized as the answer. So, while Chapter One describes some of the tangible practices of early airmen, Chapter Two delves into aviation’s more intangible cultural influences in the interwar period. Flight shaped the feelings and thoughts of Western culture, including those of airmen. Out of this social milieu, they applied this style of thinking and sense of transformation to the character of war. Chapter Three describes the results: their pre-war debates of various strategic theories, their diverse use of air power in WWII, and, finally, how airmen in the following decades became content with a simplified narrative of air power. The chapter also demonstrates how this cycle repeated itself at the other end of the Cold War era, in Operation Desert Storm. The results of that dogmatic approach to air power – with only traces of its earlier sense of aspiration and revolutionary change – is reflected in the way Airmen discuss airmindedness in the decades since the first Gulf War. In this discourse, the ideas of play, wicked dilemmas, and *metis* are as important as they are unknown.

The Conclusion speculates on why the USAF should revitalize this more dynamic side of their intellectual history; why they should embrace the playful side latent in their century-old *technological logos*. The theoretical foundations laid out in this introduction

and the historical case studies that make up each chapter all furnish the multiple compartments captured in that expressive phrase, which is fully unpacked in the final chapter. A somewhat unwieldy working definition must suffice until then: *technological logos* is a paradigmatic story that intertwines the rational, the irrational, and the non-rational elements of ideas, attitudes, and actions regarding technology, which itself contains a host of common and forgotten meanings ranging from the artifactual to the artistic, from proto-scientific precision to rhetorical playfulness, from the explicable to the tacit, and from the tactical to the strategic. Next, the Conclusion reveals the author's rationale for the use of mythological metaphors and Homeric images throughout this work, which may have appeared as arbitrary or ornamental. Lastly, it divulges the dissertation's own *logos*.

The *raison d'etre* of the project – or, to use the Greek equivalent of that well-known French phrase, the *lógos ýparxis* (story of existence) – has two elements. First, it reflects an attempt to push the scholarly boundaries of the discipline of history, and the study of technology in particular, while analyzing the intellectual history of a technological organization. It is grounded in analytical perspectives and subjects familiar to historians, such as exploring technological experiences, the interplay between machines and mentalities, or the nature of technical know-how. Yet, it also stretches the styles and subject matters considered by historians of technology. Some of these innovations, such as taking allusions to mythological metaphors and the etymology of some keywords more seriously, appear as natural evolutions of extant practices. More radical novelties arise from importing approaches from other fields (a trend scholars of

technology have demonstrated in kind, though not in these specific categories).<sup>119</sup>

Examples include links between technology and rhetoric, military theory as technological knowledge, and the need for playful, “crafty” strategies heralded by urban designers, psychologists, and philosophers. Another animating purpose, however, grew out of this initial scholarly agenda.

Highlighting the psychological consequences of the physical characteristics of air power – its revolutionary capacity for range, speed, and altitude – is not merely a chance to explore the invitation by some members of SHOT to consider “the forbidden fruit of technological determinism.”<sup>120</sup> Reframing the narrative of USAF culture also evolved into a pragmatic objective for the author: to give Airmen a deeper understanding of their own culture. A more coherent and credible story of what being an Airman has meant in the past, and should mean today, could catalyze the organization towards truly fulfilling the claim that “no one comes close.” This reformulation is not a critique of technical logic or the piety towards the airplane; after all, these elements are implicit within the origins of “technology.” It is, instead, a plea for balance, for preserving the service’s theology while avoiding dogmatism, and for nurturing a culture of strategic wisdom for a wicked world that is disorderly and dangerous.

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<sup>119</sup> One of the risks of this trans-disciplinary mash-up is the very incommensurability Thomas Kuhn highlighted in the process of paradigm shifts. In other words, while there is some validity in judging the import on the basis of utility alone (i.e. “is it useful?”; see footnotes 85 and 87 in Chapter One), the aspirant trans-disciplinary scholar shoulders the burden of doing justice to the original intent of authors with disparate purposes, styles, and terminology. Indeed, the resulting need for nuance (and thus academic peril) is a likely reason academic specialization is difficult to resist. A minor objective of this project is to, like Airmen, get comfortable with the risk of playing in these interstitial spaces.

<sup>120</sup> Rosalind H. Williams, “Opening the Big Box,” *Technology and Culture* 48, no. 1 (February 7, 2007): 104.

## Chapter 1

### Dionysius And The Social Life Of WWI Aviators



**Figure 1. “Bonne Chance” by James Dietz.** The background portrays a French country house repurposed to serve as the unit’s mess. A copy of this print served as inspiration for the 27th FS to renovate their squadron bar in 2001. Harkening back to the role of useful fictions, even though the artist’s inspiration came from a Hollywood film, and not from a historically accurate scene, it still captures the essence of such places.<sup>1</sup>

*A natural place to examine an organization’s culture is at its birth. Therefore, one key to understanding airmen as technological users is their experiences in World War I. The machines and missions are well documented. Among historians, there is relative silence, however, on the vast amount of time spent between flights. Examining the stories written by airmen themselves, however, reveals a clear sense of playfulness despite the gravity of their duties and the technical nature of their craft. Indeed, the mechanical*

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<sup>1</sup> James Dietz, e-mail message to author, November 2, 2015.

*properties of their weapon produced a tempo of war that afforded aircrew time to play in a variety of forms. The descriptions of some activities are reminiscent of notorious episodes of modern aviators. There is, however, another, more subtle and substantial, practice. It is a form of cognitive play that is increasingly valued for its ability to inspire, teach, and make sense of a messy world; a type of techne that would be familiar to ancient Greeks; and the very source of this chapter's primary evidence: storytelling.*

## Introduction

In 2012 an enlisted member of a US Air Force fighter squadron at Shaw Air Force Base (AFB) filed an administrative complaint for systemic and intentional sexual discrimination. As evidence of the unprofessional environment, the claimant cited unit books containing “obscene, violent, and misogynistic language and pornographic images”; written recordings of unit stories; and the practice of singing explicit songs, some celebrating sexual acts.<sup>2</sup>

The accusation was reminiscent of the scandal surrounding the 1991 Tailhook Convention. The annual meetings of the Tailhook Association, an organization of US naval aviators, had a reputation for cultivating “boorish, reckless, and misogynistic” behavior.<sup>3</sup> At this particular meeting in Las Vegas, allegations of sexual assault

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<sup>2</sup> “Complaint,” TSgt Jennifer Smith Administrative Complaint, accessed December 11, 2015, [http://protectourdefenders.com/downloads/Final\\_Smith\\_Admin\\_Complaint.pdf](http://protectourdefenders.com/downloads/Final_Smith_Admin_Complaint.pdf); A professionally produced video, available on-line, shows the 95th FS, engaged in similar actions circa 2001 (see “Eagle Rage” accessed October 25, 2015, <http://www.youtube.com>).

<sup>3</sup> Peter Karsten, *Encyclopedia of War and American Society* (Thousand Oaks, CA: SAGE Publications, 2005), 817.

precipitated additional revelations of such unprofessional activities as indecent exposure or drunk and disorderly conduct.

Those who defended the Navy flyers portrayed their actions as natural traditions. James Webb, a combat veteran from Vietnam and previous Secretary of the Navy, defended the importance of the “warrior culture” in the Navy.<sup>4</sup> Another defender was more explicit, writing to a newspaper, “Perhaps they don’t understand this happens to be a normal occurrence in any social gathering but with a lot more intensity when pilots are partying...Pilots by nature are energetic, competitive, aggressive and perhaps a little egocentric. Pilots party when they have the opportunity.”<sup>5</sup>

The earlier scandal garnered more national attention, but the reaction to the 2012 Shaw AFB incident was similar. Many, in uniform and out, recoiled. Some, however, retrenched. Indeed, the evidence itself preemptively disclaims “This book is our thoughts, our songs and our games...The songs contained in this book are held as sacred by those of us that have [flown fighter aircraft]. Those people [who have not flown fighters] do not know, nor will ever know what it means to be a fighter pilot. This book is not for them...it is for us! The Fighter Pilot’s Handbook is a collection of over 75 years of tradition.”<sup>6</sup>

Many other flyers also trace the origins of their culture to World War I. In many ways, this is logical – there were simply no military flying traditions to draw from before the Great War. Additionally, organizational founders always have a disproportionate

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<sup>4</sup> Karsten, 818.

<sup>5</sup> D. A. Walden, “In Defense of ‘Tailhook’ Participants” The Telegraph, May 26, 1993, accessed November 21, 2015, Google News.

<sup>6</sup> “Exhibit B,” TSgt Jennifer Smith Administrative Complaint, accessed December 11, 2015, [http://protectourdefenders.com/downloads/Smith\\_ExhibitSelects\\_20121101.pdf](http://protectourdefenders.com/downloads/Smith_ExhibitSelects_20121101.pdf).

influence on a group's culture.<sup>7</sup> The foundational role of WWI is also echoed in scholarly treatments of aviation. For example, in *The First Air War*, historian Lee Kennett notes that WWI “endowed [military aviation] with a past that was rich and storied, for all its brevity. The aviators had stocked their pantheon with heroes, and the war left them a harvest of totems and traditions to be honored.”<sup>8</sup>

Some of those traditions – addressed only briefly by historians, if at all – is about what airmen did when not flying. Unit histories, diaries, memoirs, and personal letters reveal that early flyers did indeed exhibit a sense of playfulness, often to an extreme degree. These sources reveal reckless debauchery, philandering, and contests of masculine physicality, along with less offensive practices. Their barbaric behavior, what Kennett likens to a fraternity house, sits at odds with the modernity of their aircraft.<sup>9</sup> The social life of World War I aircrews, however, was shaped by aviation technology, not in spite of it. In other words, this juxtaposition should not appear contradictory, but inherent among military airmen who operate in the overlap between the worlds of Apollo and Dionysius.

Many authors use the two gods as metaphors, with the Apollonian realm representing the rational and ordered, and the Dionysian image representing the artistic, intuitive, and emotional.<sup>10</sup> The former is “measured, balanced, rational, imbued with

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<sup>7</sup> Edgar H. Schein, *Organizational Culture and Leadership*, 4th edition (San Francisco, CA: Jossey-Bass, 2010), 3.

<sup>8</sup> Lee B Kennett, *The First Air War 1914-1918* (New York, NY: Simon & Schuster, 1999), 226-7.

<sup>9</sup> Kennett, 135.

<sup>10</sup> These metaphors, while inspired by Greek mythology, are not strictly based on Greek usage. The interpretation used herein is prominently associated with Nietzsche's *The Birth of Tragedy* (1872). The terms, however, were used before and since. For more, see Adrian Del Caro, Camille Paglia's *Sexual Personae* (Chapter Three), or Nassim Taleb's

reason and self-restraint.”<sup>11</sup> It invokes Plato’s concept of forms, which the philosopher seeks to grasp: “those changeless, eternal, and nonmaterial essences of patterns of which the actual visible objects we see are only poor copies.”<sup>12</sup> Uncovering those immortal principles is an endeavor for an individual mind to undertake, and not necessarily achievable for those poor souls stuck inside the cave of illusions. Like the image of Socrates escaping the shadows, the Apollonian model pursues ideas abstracted from context as well as knowledge abstracted from values. The search is for universals, not particulars; explanations, not observations. The paradigm presumes that a complicated object or process or concept can be broken down into its constituent parts. Studying the individual parts, and the causal relationships between them, reveals the whole. Over time, the story of reason over passion, control over chaos, became a story of science prevailing over intuition, scientific methodology over myth, and purposefulness over playfulness. Order and objectivity reign supreme in the Apollonian perspective.

This perspective assumes humans themselves are most productive when emotion and passion do not cloud their ability to think rationally and to perceive the world objectively. This is the paradigm of Plato, but it is important to note that qualification: it is still only a paradigm. It is only one paradigm and, like all paradigms, it is partial: incomplete and biased.

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*Antifragile* (Adrian Del Caro, “Dionysian Classicism, or Nietzsche’s Appropriation of an Aesthetic Norm,” in *Journal of the History of Ideas*, Vol. 50, No. 4 (Oct-Dec, 1989): 589–605; Camille Paglia, *Sexual Personae: Art and Decadence from Nefertiti to Emily Dickinson* (New York, NY: Vintage Books, 1991); Nassim Nicholas Taleb, *Antifragile: Things That Gain from Disorder* (New York, NY: Random House Trade Paperbacks, 2014).

<sup>11</sup> Taleb, *Antifragile*, 255.

<sup>12</sup> Samuel E. Stumpf, *Philosophy: History and Problems*, 5th edition (New York, NY: McGraw-Hill, 1995), 58-9.



An alternative perspective is the Dionysian force. It is described as “visceral, wild, untamed, hard to understand, emerging from the inner layers of our selves;” the realm of uncertainty, variability, chaos, volatility, randomness, and error that values the “rich texture of empiricism” and the opportunity to “gain from disorder.”<sup>13</sup> This view embraces a dynamic world of inter-subjectivity, artistry, intuition, mystery, passion, adaptability, novelty, and surprise.<sup>14</sup> Philosopher Martha Nussbaum points out that Dionysius is the only Greek god who dies and who is not self-sufficient: he is “no use for teaching young citizens the ‘god’s eye’ point of view.” His ritual death and resurrection “suggests that an unstable city, an unstable passion, might grow and flourish in a way truly appropriate to a god – a thought that has no place in the theology of [Plato’s] ideal city.”<sup>15</sup>

In the last century, the Dionysian perspective has gained traction throughout academia and popular culture. In science, new approaches such as Chaos Theory and Complexity Theory directly challenge Apollonian assumptions of linearity and mechanical determinism. Organizational theorists increasingly embrace what T. Irene Sanders describes as the “shift from a deterministic universe of atomistic agents to a dynamic world of inter-subjectivity, from rigid hierarchies to adaptive networks, from reductionism to synergism, from rational and discrete planning to reflective practice and emergent opportunities.”<sup>16</sup> Likewise, Bart Kosko describes an increasing appreciation for

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<sup>13</sup> Taleb, *Antifragile*, 255, 13, 256.

<sup>14</sup> Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (Cheltenham: Routledge, 2006), 88.

<sup>15</sup> Martha C. Nussbaum, *The Fragility of Goodness: Luck and Ethics in Greek Tragedy and Philosophy*, 2nd edition (New York, NY: Cambridge University Press, 2001), 194-5.

<sup>16</sup> T. Irene Sanders, *Strategic Thinking and the New Science: Planning in the Midst of Chaos, Complexity, and Change* (New York, NY: Free Press, 2010), 146-50.

informal logic, much neglected in formal education, which resists binary thinking and philosophical uniformity in favor of nuance, relativity, and ad hoc approaches.<sup>17</sup> New images also emerged in other fields as well, such as biology, sociology, political science, and psychology.<sup>18</sup> Even the American defense establishment is increasingly explicit about the Dionysian nature of modern warfare. Consider the acronym VUCA (“volatile, uncertain, complex, and ambiguous”), the increasing focus on the human domain, and the use of the concept of wicked dilemmas in official documents.<sup>19</sup>

These approaches, in and out of the military context, offer a new framework to account for a growing list of anomalies in the Apollonian paradigm: the fundamentally social nature of humanity, the central role of emotions and values in cognition, the inability to understand a whole by isolating its components, the futility of master plans,

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<sup>17</sup> Bart Kosko, *Fuzzy Thinking: The New Science of Fuzzy Logic* (New York, NY: Hyperion, 1994). Atwill (98-9) points out the connection between this “fuzzy thinking” and what Rootchik calls *techne*<sub>2</sub> (Janet M. Atwill, *Rhetoric Reclaimed: Aristotle and the Liberal Arts Tradition* (Ithaca, NY: Cornell University Press, 2009), 98-9).

<sup>18</sup> Examples include Henry Mintzberg’s *Rise and Fall of Strategic Planning* (2013), Robert Jervis’s “Complexity and the Analysis of Political and Social Life” (*Political Science Quarterly* 112, no. 4 (1997–98): 569-93), Dean Rickles, et al., “A Simple Guide to Chaos and Complexity” (*Journal of Epidemiology and Community Health* 61, no. 11 (2007): 933–937), or Peter Senge’s *The Fifth Discipline* (1994). As early as 1932, one author remarked, “All the notions we thought solid, all the values of civilized life, all that made for stability...all this seems badly compromised...Never has humanity combined so much power with so much disorder, so much anxiety with so many playthings, so much knowledge with so much uncertainty” (Paul Valery, quoted in Peter Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World* (New York, NY: Currency Doubleday, 1996), 1).

<sup>19</sup> For example, consider the following Army publications: *Institutionalizing the Human Domain* (Nicole Jobe, 1 January 2014, <http://www.tradoc.army.mil/stlp/docs/Pubs/140325%20Institutionalizing%20Human%20Domain.pdf>, accessed 5 September 2004), *Strategic Leadership Primer* (Col (Ret) Stephen J. Gerras, ed., Army War College, 3<sup>rd</sup> edition, <http://www.au.af.mil/au/awc/awcgate/army-usawc/sprimer.pdf>, accessed 3 December 2014), and *Commander’s Appreciation and Campaign Design* (TRADOC Pamphlet 525-5-500, 28 January 2008, <http://www.tradoc.army.mil/tpubs/pams/p525-5-500.pdf>, accessed 22 January 2015).

the realization that *homo economicus* is psychopathic, and the value of a fundamental activity of humanity – play. Despite the seriousness of a dangerous world, the Dionysian image implies a role for the very activity associated with the Greek god.<sup>20</sup>

While Dionysius is also known for representing forces of ecstasy, fertility, lushness, and winemaking, these are directly connected to the festivals honoring the patron god of Greek theater. In Athens, festivals to honor Dionysius became widespread in the sixth century BCE. These celebrations, known as *Dionysia*, centered around competitions among poets and storytellers. The events were also known for dancing, music, sports, and wild revelry. The participants, which even included members of the upper class, believed this intoxicated masquerading provided catharsis and creative inspiration.<sup>21</sup> The experience, according to historian E. R. Dodds, produced an “abnormal inner experience” and inspired “poetry as a revelation apart from reason and above reason.”<sup>22</sup> Nussbaum summarizes the symbolism as “a supple, flowing structure that moves in, and takes its character from darkness and mystery; a speech that is humanly artful, and yet responsive to strangeness...the power of the strange and sudden; of the world’s indissoluble intermingling of ecstasy and danger, of light and shadow.”<sup>23</sup> Plato,

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<sup>20</sup> Mihai I. Spariosu, *Dionysus Reborn: Play and the Aesthetic Dimension in Modern Philosophical and Scientific Discourse* (Ithaca, NY: Cornell University Press, 1989), 144.

<sup>21</sup> E. R. Dodds, *The Greeks and the Irrational*, vol. 25, Sather Classical Lectures (Berkeley, CA: University of California Press, 1951), 76-7, 79. Similarly, Henricks writes about a “play-festival-rite” complex, arguing, “public play events are important elements of archaic and traditional societies...public gatherings where community members consider some of their society’s most important themes, albeit in a joyful, creative, and spontaneous way...[honoring] play’s profound civilizing functions” (Thomas S. Henricks, “Sociological Perspectives on Play” in *The Handbook of the Study of Play*, Eds. James E. Johnson et al. (Lanham, MD: Rowman & Littlefield Publishers, 2015), 102.

<sup>22</sup> Dodds, *The Greeks and the Irrational*, 82.

<sup>23</sup> Nussbaum, *The Fragility of Goodness*, 82.

unsurprisingly, was not impressed by much of what occurred, and disparaged it as “uncivilized.”<sup>24</sup>

In contrast to Plato’s ideal of dispassionate order and cold logic, *Dionysia* were all about *play*. The term captures what happened in, around, before, and after the theatrical performances held in Dionysius’ name. There are some indications that it also describes air combat missions. One aviator, whose words capture the feelings of many, proclaimed aerial combat as “the greatest form of sport on earth.”<sup>25</sup> Images of airmen as heroic knights jousting in a competition are commonly recorded in the many histories of WWI aviation. Yet, what is mostly missing from the vast historiography – and what is even more playful – is what they did when not airborne.

#### The Playfulness of WWI Airmen

Flying units were organized into squadrons of approximately ten to twenty young men with a dozen or so aircraft located at a single “aerodrome.” There are no scholarly treatments focused on the daily life around the airfield. At most there are only brief references to what WWI aviators did when not airborne, such as when Kennett describes squadron life as *Bacchanalia*, the Roman equivalent of *Dionysia*.<sup>26</sup> In the view of one observer in the Royal Flying Corps, “the RFC began by being a party, and continued being a party, in comparison [to the army].”<sup>27</sup>

Despite these characterizations, sometimes time on the ground was spent quietly. When not flying, we “did nothing but lounge about with your hands in your pockets,”

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<sup>24</sup> Plato, *Laws* 815cd, quoted in Dodds, *The Greeks and the Irrational*, 95.

<sup>25</sup> Quoted in Kennett, *The First Air War 1914-1918*, 168.

<sup>26</sup> Kennett, 135.

<sup>27</sup> Hubert Griffith, *R. A. F. Occasions* (London: The Cresset Press, 1941), 9.

according to one veteran.<sup>28</sup> The diary of an English flyer, Guy M. Knocker, recalls trips to the movies and to the eventual construction of their own cinema on the airfield.<sup>29</sup> Going to church, reading, playing card games, or dining in nearby cities were other common diversions. Knocker wrote that these activities “provided sufficient relaxation into which everyone entered with gusto...This appealed to me as the most comfortable method of waging war...In the evenings, it was our custom to sit round the tennis court listening to the gramophone and arguing about theatres, sport and the war.”<sup>30</sup> In airmen’s diaries and letters, however, what gets as much attention as these quiet hobbies is time spent singing, dancing, playing sports, drinking, and even theater; all actions reminiscent of Dionysian revelry.

Sometimes the records just allude to Dionysian behavior. Quoting from a member’s diary of the time, one squadron history notes: “Every night we have our usual music and games. Some nights it gets more riotous than others.”<sup>31</sup> Often the evidence is more explicit. One pilot’s diary entry simply recorded, “Binge after dinner. Sang a ‘wee DD’!” Then again on Christmas Eve he noted, “To dinner at the Club. All 70 Squadron there – Huge show! Stood on table and sang songs.”<sup>32</sup> Another describes a drinking game involving a liquor-soaked sponge pressed upon an individual’s head, which devolved into a wrestling match. “They collapsed, chairs dripping, tunics soaking, walls running,

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<sup>28</sup> Anna Malinovska, *Voices in Flight: Conversations with Air Veterans of the Great War* (Barnsley, England: Pen & Sword Aviation, 2006), 115.

<sup>29</sup> Guy Mainwaring Knocker, *The Diary and Letters of a World War I Fighter Pilot* (Barnsley, England: Pen & Sword Aviation, 2008), 66, 119.

<sup>30</sup> McScotch, *Fighter Pilot* (London: Greenhill Aeolus, 1985), 57.

<sup>31</sup> Percival Gray Hart, *History of the 135th Aero Squadron from July 25 to November 11, 1918* (Chicago, IL: Battery Press, 1939), 106.

<sup>32</sup> Knocker, *The Diary and Letters of a World War I Fighter Pilot*, 95, 117.

laughing, shouting, swearing, on to the puddled floor” before someone then poured whisky down the gramophone. “This was the life!” the author proclaimed.<sup>33</sup>

Sometimes the drunken antics spilled over into flying. Once a newfound source of booze led to mass mid-day inebriation. The group then decided to play an aerial version of follow-the-leader. Eighteen of the unit’s aircraft went weaving around the aerodrome until one of them decided it would be more fun to repeatedly buzz a visiting general who was surveying the runway.<sup>34</sup>

Singing was another popular pastime. Unit histories often contain a list of their own personalized tunes. The 135th Aero Squadron (AS) history lists nine pages of their “new crop of songs, inspired by our recent experiences, [in] the manner of ancient ballads.”<sup>35</sup> Some squadrons had an official group of singers, and one commander even built a respectable orchestra by having experienced musicians transferred into his unit.<sup>36</sup>

Squadrons were equally interested in manning respectable sports teams. Baseball games between units were common, as were tennis and soccer. Where facilities did not exist, some took the effort to construct them. One RFC pilot writes about building a swimming pool and a tennis court. Another pilot started a riding school. The same man’s diary from 6 September, 1917, is particularly interesting for the banal juxtaposition of combat and recreation: “I saw an [aircraft] brought down in flames. It was a ghastly sight

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<sup>33</sup> Cecil Lewis, *Sagittarius Rising* (London: P. Davies, 1936), 87-9.

<sup>34</sup> Lewis, 211-3.

<sup>35</sup> Hart, *History of the 135th Aero Squadron from July 25 to November 11, 1918*, 83, 169-178.

<sup>36</sup> Daniel Parmelee Morse, *The History of the 50th Aero Squadron*, The Great War Series 6 (Nashville, TN: Battery Press, 1990), 75; James Thomas Byford McCudden, *Flying Fury* (London: Aviation Book Club, 1930), 159-60.

and we saw the two occupants fall out. I played badminton in the evening.”<sup>37</sup> In a reflection of many of these activities, another pilot recorded these lines in his 18 May 1918 diary entry: “umpired a ball game between the officers of the two squadrons,” then, after recounting the menu, he continued, “[dinner was] interspersed with songs, cheers, a strong orchestra...and some very good dancing by a young pilot...Truly does not seem like war. Well, it is a good thing to forget it occasionally.”<sup>38</sup> The only regular distraction he did not mention was theater.

In addition to enjoying Parisian theaters on occasion, units often staged their own theatrical performances. The 20th AS history reports shows occurring on a nearly weekly basis.<sup>39</sup> Sometimes travelling troupes provided the entertainment, but some units had their own ensembles ranging from vaudeville acts to fully rehearsed, fully costumed musical dramas.<sup>40</sup>

“The RAF way of life of those days,” one aviator recorded later, “was governed by a very simple formula, obviously countenanced and backed by authority on high: ‘Carry out your flying to the utmost limit of your endurance. Apart from that, get all the fun that you can.’”<sup>41</sup> Sometimes that fun was found in France’s large metropolitan cities. The author of *The Unsubstantial Air*, himself a WWII pilot, contends that, “the leaves

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<sup>37</sup> Peter Liddle, *The Airman’s War 1914-1918* (Poole, England: Blandford, 1987), 62.

<sup>38</sup> Frank Purdy Lahm, *The World War I Diary of Col. Frank P. Lahm, Air Service, A.E.F.*, ed. Albert F. Simpson (Maxwell Air Force Base, AL: Historical Research Division, Aerospace Studies Institute, 1970), 79.

<sup>39</sup> C. G. Barth, *History of the Twentieth Aero Squadron: First Day Bombardment Group, First Pursuit Wing, Air Service, First Army, American Expeditionary Forces* (Nashville, TN: Battery Press, 1990), 19.

<sup>40</sup> Malinowska, *Voices in Flight*, 21; Liddle, *The Airman’s War 1914-1918*, 119-20.

<sup>41</sup> Griffith, *R. A. F. Occasions*, 5.

spent in Paris [during WWI] sound more like binges than parties.”<sup>42</sup> When weather prevented the 95th AS from departing the capital, most of them took in a show at the La Femina Theatre “where they witnessed a show that [one] described as ‘the rottenness exhibition of naked women I’ve ever seen on stage.’” When they were unable to depart for two more days “women, wine and theatres” were their companions (except for the one “puritanical” member of their group).<sup>43</sup>

Some Allied aircrews were fortunate enough to be stationed close to the French capital. In April 1918, a flyer assigned to nearby Orly Field discovered a favorite bar in which even the imposition of German bombers could not interrupt the party.<sup>44</sup> Other big cities were also popular destinations. The Liegeoise café in Nancy is mentioned in multiple memoirs. “Many happy afternoons and evenings were passed [at the café] eating, drinking and visiting with aviators from other squadrons and French officers who happened to be present...two of the local sirens, were always on hand to entertain, and were seemingly impressed by our group singing.”<sup>45</sup> After being destroyed in a bombing attack, one squadron claimed the surviving couch and piano for their own airfield.<sup>46</sup>

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<sup>42</sup> Samuel Hynes, *The Unsubstantial Air: American Fliers in the First World War* (New York, NY: Farrar, Straus and Giroux, 2014), 238.

<sup>43</sup> Charles Woolley, *Echoes of Eagles: A Son’s Search for His Father and the Legacy of America’s First Fighter Pilots* (New York, NY: Dutton, 2003), 73-4. In multiple sources, there are individuals who abstain from these behaviors, but these are the exemptions that prove the rule. Writers note the rareness of these individuals, but there is no insinuation of being less militarily effective by their disciplined choices.

<sup>44</sup> Ezra Bowen, *Knights of the Air, The Epic of Flight* (Alexandria, VA: Time-Life Books, 1980), 152.

<sup>45</sup> Hart, *History of the 135th Aero Squadron from July 25 to November 11, 1918*, 102.

Note the reference to the sirens, Greek mythological characters described in Homer’s *The Odyssey*.

<sup>46</sup> Malinowska, *Voices in Flight*, 168.



Many of the airfields, however, were much more remote. For them, the best entertainment was after a nearby village or sometimes the hospitality of a local farmer. For their part, the members of the 95th AS discovered a nearby US hospital and began socializing with the nurses at dances sponsored by the hospital.<sup>47</sup>

### The Unit Mess

Regardless of the availability of party spots outside the airfield, each unit had a common area for its social gatherings. The “officer’s mess” was part dining area, part gathering place, and part ready room for aircrew on alert. It was also a bar, and the scene of much of the singing, dancing, drinking, and roughhousing described above. Some sources note that the first thing a unit would do upon arrival at a new airfield was to set up the mess. These spaces, one participant observed, allowed for a “a good life” of “peace-time warfare.”<sup>48</sup>

Each nation’s flying units had these places, which originated from the traditional practice of army officers dining together while on campaign (and air forces worldwide largely arose from their nations’ armies). For the French airmen, it was called the *popote*. For German flyers, the name was indicative of the type of activities contained within: the *kasino*. In fact, its origins can be traced back to time of Homer. In Plutarch’s *Life of Lycurgus*, he described how the Spartan ruler instituted mandatory communal meals among his soldiers. These common messes, or *syssitia*, were designed to boost camaraderie and acculturate young warriors.<sup>49</sup>

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<sup>47</sup> Woolley, *Echoes of Eagles*, 113-4.

<sup>48</sup> Kennett, *The First Air War 1914-1918*, 135; Griffith, *R. A. F. Occasions*, 53.

<sup>49</sup> Thomas R. Martin, *Ancient Greece: From Prehistoric to Hellenistic Times* (New Haven, CT: Yale University Press, 1996), 77-8.

Like the Spartan dining halls, airfields were located away from the battlefield. Typically 15 to 20 miles behind the front lines, airmen were far from the immediate effects of trench warfare. Stagnation of the Western front meant that squadrons could expect to remain in the rudimentary accommodations for long periods of time.<sup>50</sup> When the battle lines became more fluid again, at least one pilot bemoaned the inconvenience in a letter home: “All squadrons are moving up, and we are more or less prepared to live in discomfort for some time. It will be canvas tents when we move up, they say. Canvas, in November! Ugh!”<sup>51</sup>

Attachment to their familiar airfield was strengthened by the unit’s great efforts to make their mess as comfortable as possible. As one unit history recorded:

Anyone surprising us between patrols in those first weeks would have seen pilots and commanding officer standing on trestle-tables or piled gasoline boxes, painting the ceiling of the shack white and the little beams a pale green, or busily laying old canvas on the rough floor. They did not despise comfort and some touch of beauty. They came in from fighting the Hun to roll the tennis court – an operation that consisted in dragging an old cement beam behind a Fiat truck round and round in the mud in front of the Mess.<sup>52</sup>

This particular American unit even made trips to Calais for furnishings, including artwork, musical instruments, and droplights made from polished shell cases. Likewise, consider this first-hand description of a Royal Flying Corps mess and its resident activities:

[It] was no more than a glorified hut, though it had its only charm – with a couple of well-worn settees and some easy chairs crowding about a half-size billiard-table, an upright piano in the corner where the Squadron orchestra gathered on guest night, at the far end the cast-iron stove that

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<sup>50</sup> Kennett, *The First Air War 1914-1918*, 136-7.

<sup>51</sup> Lewis, *Sagittarius Rising*, 249.

<sup>52</sup> Frederick Mortimer Clapp, *A History of the 17th Aero Squadron* (Nashville, TN: Battery Press, 1990), 19-20.

roared red-hot on wintry days; against one wall papers and magazines littered a table next to the narrow doorway through which, before dinner, the mess orderly shuffled incessantly bearing trays of tepid drinks; in the opposite wall the wider, main door led out to the long porch where, off duty, the pilots loitered swapping tales of combat or yarns of home. In this rectangular green-painted hut that had accompanied the Squadron from field to field and had echoed to many a youthful voice once keen, now forever silent, there hung in those days a three-ply board simply framed. Above it was fixed a propeller from a captured aircraft; black canvas crosses cut from other vanquished enemies dropped to either side; and upon the board itself were inscribed the score or so names of those who had won distinctions since the Squadron's first forming.<sup>53</sup>

Decorating with war trophies was common in other squadrons, as well. Despite the protests of intelligence officers, downed enemy airplanes were quickly scavenged to adorn the mess. As one author describes, "Many a mess in the American Air service had cut-out black crosses, numbers, unit markings, propellers, and instruments adorning their walls."<sup>54</sup>

Pictures of women were also common. The mess in Hubert Griffith's unit had an "everlasting series of mild pornographies from the '*Vie Parisienne*' decorating their walls."<sup>55</sup> Another airman wrote, "In the Mess at the aerodrome hung a half a dozen Kirchner drawings, showing exquisite creatures in various states of nudity – but never, of course, quite nude or all the illusion would be gone."<sup>56</sup>

While big cities and local bars were the scene of many of their antics, the mess is the most commonly referenced location for airmen to exhibit Dionysian behavior. Although the quality of the food or drink may not have warranted a celebration worthy of

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<sup>53</sup> McCudden, *Flying Fury*, vi.

<sup>54</sup> James J. Cooke, *The U.S. Air Service in the Great War, 1917-1919* (Westport, CN: Praeger, 1996), 182.

<sup>55</sup> Griffith, *R. A. F. Occasions*, 52-3.

<sup>56</sup> Lewis, *Sagittarius Rising*, 74.

the god of winemaking, “what was lacking in quality was made up for in quantity, and the spirit of gaiety which invariably ruled compensated for the want of variety.”<sup>57</sup> In addition to the drinking, there were the rowdy singsongs: “the Mess is in an awful state, everyone crashing about singing!”<sup>58</sup>

In the records, some units seem tamer than others. The 17th AS history states:

There were unwritten rules of the Mess. One had to be more or less dressed for dinner; one had to come up to the [Commanding Officer] and formally apologize if one were late; one did not begin one’s soup until he did; one did not light a cigar or cigarette until he had lighted his...No excuse was valid for breaking any of these rules, or by speech or act disturbing the decorum of the Mess. Not that we were quiet or gloomy. Far from it! We soothed our digestion with laughter and endless poking fun at one another. And nothing brought forth such peals of merriment as the infraction, though thoughtlessness, of any of our rules. The offender bought drinks or cigars or both all around, depending upon the gravity of his crime, to shouts of “Randolph, Randolph, take an order!”<sup>59</sup>

When the 135th AS finished dinner, the officer in charge of the mess “would solemnly rise and pound on the table for order, and when all was quiet would announce, ‘Gentlemen, there will be music and games in the Red Cross hut.’”<sup>60</sup>

Contrast that example with Squadron No. 216, the Bedouins, the same unit that stole the piano and couch from the Liegeoise café: “The senior officer in the squadron was the ‘Chief of the Bedouins.’ We had all sorts of rituals. We had a ‘sacred camel’ made from esparto grass. The Chief of the Bedouins wore a ‘scared blanket’ and he had a hunting horn. When he blew his horn, it was the signal for a sing-song or a get-together.”<sup>61</sup>

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<sup>57</sup> Hart, *History of the 135th Aero Squadron from July 25 to November 11, 1918*, 29.

<sup>58</sup> Knocker, *The Diary and Letters of a World War I Fighter Pilot*, 118-9.

<sup>59</sup> Clapp, *A History of the 17th Aero Squadron*, 20.

<sup>60</sup> Hart, *History of the 135th Aero Squadron from July 25 to November 11, 1918*, 29.

<sup>61</sup> Malinowska, *Voices in Flight*, 168.

None of these descriptions should insinuate a lack of intensity in aerial combat. First, consider the environment of a WWI airplane. There was noise and vibration from an unmuffled engine only feet away. The open-air, unheated cockpits exposed the aircrew to wind at high speeds, exacerbating the frigid temperatures of higher altitudes. Then there was the act of trying to control these crude machines. Flying required deft skills and more than a little muscle to compensate for aerodynamic forces pressing back against the control surfaces and against the propeller's torque, which threatened to send the nose slicing to the side.<sup>62</sup> Now add to this the actual combat. The hunters on constant alert for their targets, and all aircraft on constant alert to avoid becoming a target themselves. Then, once engaged in a fight, the episode may only last a few minutes. But it was a blurred, three-dimensional melee of men pushing their machines, and themselves, to the limits.

Arguably, this environment attracted young men who were naturally bold, adventurous, and resistant to military discipline.<sup>63</sup> One pilot noted this logic in his journal, "Can you imagine a lot of boys – naturally wild or they wouldn't be in this game."<sup>64</sup> This served them well in the uncharted domain of aerial warfare, where such characteristics fit the context. Indeed, the social life of WWI aviators can be partially explained as a spillover of their approach to airborne operations. History, however, is

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<sup>62</sup> Kennett, *The First Air War 1914-1918*, 75. The task was made more difficult as the practice of formation flying emerged during the conflict.

<sup>63</sup> Hynes, *The Unsubstantial Air*, 5; McScotch, *Fighter Pilot*, 242; Richard Townshend Bickers, *The First Great Air War* (Endeavour Press, 2015), 6-7. The flyboys' informality in speech, dress, and behavior was infamous among other military branches.

<sup>64</sup> Hynes, *The Unsubstantial Air*, 238. Note the way the author links war to playing a game, a point developed in Chapter Three.

silent on how their playfulness in the mess was also determined by the rhythm of aerial combat – a tempo shaped by the nature of aviation technology.

### The Tempo of War

For the armed forces engaged in World War I, there was no break in the fighting season and units remained in the throes of combat until rotated off of the front lines. The overall war effort was continuous. For airmen, however, the fighting was intermittent. For them, this was one of the “many compensations” for the risky business of flying combat missions. According to that same airman, “When we returned to the aerodrome our war was over. We had a bed, a bath, a mess with good food, and peace until the next patrol.”<sup>65</sup>

There were periods, days or even weeks long, when there was little flying.<sup>66</sup> Even during normal periods of operations, though, aviator memoirs noted the undulating rhythm. One British airmen observed “If one believes his account of his own doings, he divides his time fairly equally between lounging idly in his billet, playing frivolous or deleterious games of chance, and amusing himself vainly in the nearest big town. Occasionally he spends a while in being horribly frightened over the enemy’s lines.”<sup>67</sup> Another relayed a fellow pilot’s “idyllic” description of daily life in a flying squadron: “‘First we went bathing, and then we did some flying; then we went out shooting rabbits, and then we saw a swarm of bees and went bee-taking...’ The life half hectic and half

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<sup>65</sup> Lewis, *Sagittarius Rising*, 137.

<sup>66</sup> Kennett, *The First Air War 1914-1918*, 157.

<sup>67</sup> Quoted in Kennett, *The First Air War 1914-1918*, 138.

pastoral!”<sup>68</sup> “We always had plenty of spare time, so we thoroughly enjoyed it,” one airman recalled.<sup>69</sup>

According to historian Peter Liddle, it is too simplistic to say “in contrast to the soldier, the airman lived at peace and went daily to war, that he slept and ate under civilized conditions undisturbed by the war and then during the day visited the war, became a part of it but even then detached from it.” This caricature, however, does have a tinge of fidelity and Liddle asserts airmen “would almost certainly recognize it as having a fundamental basis of truth.”<sup>70</sup> One such writer poetically recorded these corroborating lines: “So the days went hurrying along. Days of sunshine, flying bullets, and excitement. Days of rain, mud, reading and ‘bunk fatigue.’ Sporadic outbursts of drinking, periods of revulsion and temperance. Nights of wild hilarity and mornings of ‘hangovers’ and depression.”<sup>71</sup>

This tempo was also noted in the observations of non-flyers. For instance, a medical work for treating airmen included this analysis, based on both world wars:

Physical stress of combat is severe but not as prolonged or as debilitating as the physical strain to which combat troops on the ground experience: long marches, little sleep, many hours of fighting, inadequate food, mud, insects, rain, noise; in contrast, air warfare stress is intermittent rather than continual, and in general much less exhausting. When not on a combat mission, they are usually in safe and comparatively comfortable quarters...As a general rule, they sleep away from the sounds of gunfire, and have a fair opportunity for rest and relaxation in their bivouac areas. Boredom is usually more of a problem than acute discomfort.<sup>72</sup>

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<sup>68</sup> Griffith, *R. A. F. Occasions*, 73.

<sup>69</sup> McCudden, *Flying Fury*, 183.

<sup>70</sup> Liddle, *The Airman's War 1914-1918*, 9.

<sup>71</sup> Harold Buckley and George Puryear, *Squadron 95* (Paris: The Obelisk Press, 1933), 28.

<sup>72</sup> Roy R. Grinker and John P. Spiegel, *Men Under Stress* (Philadelphia, PA: Blakiston, 1945), 29.

The rhythm of air warfare was determined by the nature of their technology. First of all, the range and speed of airplanes affords air forces the advantage of staging themselves away from the front lines. The fragility of their craft, essential for them to perform well in flight, necessitates a retreat to such relative safety as well. Other weaknesses shaped the tempo as well. For example, flight times were limited by the aircraft's fuel capacity or mechanical problems. The inhospitable nature of the air domain and the expense of replacing aircraft and crew required more caution than ground-based assets. For the same reasons, airmen were required to depart a fight if outnumbered, which could easily happen since air power lacked the persistence of land forces. In other words, the inability to hold territory meant that any given piece of sky in the combat zone could be filled with either side's aircraft. Often those skies were simply empty as sorties cancelled due to the inability to fly in bad weather, the need to repair aircraft, or inadequate communication with the supported forces.

Interestingly, this pattern of fighting – moments of intensity followed by extended periods of tranquility – was not novel. Aviation technology, as modern as it was, actually facilitated a return to a tempo familiar in the history of war. Even in the midst of battle, primitive fighters sometimes agreed to pause their confrontations in order to rest or avoid bad weather.<sup>73</sup> Likewise, Greek fighters left the battlefield to recover or consolidate captured goods.<sup>74</sup> The sporadic timing of battles ensured copious time between fights as well. Tribal warfare, for instance, was dominated by brief raids. Some scholars even

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<sup>73</sup> Azar Gat, *War in Human Civilization* (Oxford: Oxford University Press, 2008), 115-7, 120, 124.

<sup>74</sup> Hans Van Wees, "The Homeric Way of War: The 'Iliad' and the Hoplite Phalanx (I)," *Greece & Rome*, Second Series, 41, no. 1 (April 1, 1994): 1-18.



assert the emergence of a distinct Western way of war in which horrific, but sporadic, battles became the conventional means of deciding political contests.<sup>75</sup>

Ancient warriors and WWI flyers did not just share the same episodic pattern of fighting. They also participated in some of the same Dionysian behaviors. For instance, Spartan *syssitia* required its members to undergo rites of initiation before they could participate in moderate drinking, singing traditional paeans, and endure harsh commentary from the appointed jester.<sup>76</sup> Victor David Hansen's book *The Western Way of War* (2000) has an entire chapter on the role of alcohol and ancient warfare. Yet, there is one other shared behavior that has not yet been mentioned: telling stories. Communal bonds among pre-historical people as well as ancient Greeks were strengthened by storytelling, and those stories often spun tales of fighting. The earliest known oral epics, including Homer's works, revolve around their characters performing such acts of oratory *techne*, as well as being exemplary stories themselves.<sup>77</sup> Modern airmen are still known for their vivid storytelling.<sup>78</sup>

Telling meaningful stories is inherently subjective, creative, and tacit – the exact opposite values of the Apollonian mode of thinking. Storytelling is actually a form of

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<sup>75</sup> Victor D. Hanson, *Western Way of War: Infantry Battle in Classical Greece*, 2nd Edition (Berkeley, CA: University of California Press, 2009).

<sup>76</sup> Plutarch, *Life of Lycurgus* in "Mess Hall," Lapham's Quarterly, accessed November 2, 2015, <http://www.laphamsquarterly.org/food/mess-hall>.

<sup>77</sup> Gat, *War in Human Civilization*, 185.

<sup>78</sup> While this dissertation focuses on officers, enlisted members of the air service are just as keen on telling tales. For example, a recent program created by a handful of enlisted Airmen encourages bases to hold large-scale events with a handful of Airmen prepared to tell a personal story. These presentations, known as "Storytellers," offer a combination of TED talk and "coffee-house vibe," and have been replicated around the USAF. The initiative, which has an on-line guide and a presence on social media, uses the tagline: "Every Airman has a Story. What's yours?" (*Storytellers – The Guide*, in author's possession; "Storytellers," accessed 24 March 2018, <https://www.facebook.com/afstorytellers>).

playful thinking, as the next section explains, which further strengthens the connection between airmen and Dionysius.

### Storytelling

In *On the Origin of Stories*, Brian Boyd argues that storytelling, like all art, is an adaptive function founded on the mammalian instinct for play. Animals that play do so because playful activity enhances the fitness of their species, and thus those animals have evolved to intrinsically enjoy it.<sup>79</sup> Its self-rewarding nature ensures the practice is repeated. Repetition reinforces neural pathways, creating an evolutionary advantage: strengthening skills applicable to that species' niche.

Like other mammals, physical play is a critical component of our childhood development. But humans also play, and play for much longer throughout their life, in the domain we command: the so-called cognitive niche. Our evolutionary advantages in this niche accrue from intelligent decisions. Thus, we instinctually yearn for information, particularly anything that reveals a pattern.<sup>80</sup> And the most significant example of cognitive play is stories.<sup>81</sup>

Stories do not have to be devoid of emotion or perfectly accurate to be useful. As long as it is internally coherent, relevant to one's life, faithful to one's perspective of reality, and in accordance with one's culture and character, humans innately expect them to contain valuable insight.<sup>82</sup>

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<sup>79</sup> Brian Boyd, *On the Origin of Stories: Evolution, Cognition, and Fiction* (Cambridge, MA: Belknap Press, 2010), 1.

<sup>80</sup> Boyd, *On the Origin of Stories*, 14.

<sup>81</sup> Boyd, 15.

<sup>82</sup> Walter R. Fisher, *Human Communication as Narration: Toward a Philosophy of Reason, Value, and Action* (Columbia, SC: University of South Carolina Press, 1989), 47.

Storytelling, in fact, is not just a practice. It is its own form of reasoning, a narrative intelligence on par with other types of intelligence (social, emotional, and so on). Political scientist and communications scholar Walter Fisher labels this the logic of good reasons. Good reasons come from what we subjectively *feel* to be true and useful and valuable. In other words, they are *good*, as in persuasive, as well as *good*, as in appealing to our sense of morality.<sup>83</sup> This particular form of reasoning still has a place for Platonic logic.

Like the multiple elements within the word *logos* before Plato, this rationality is never purely objective or ordered, though it sometimes is. Apollonian phenomena are puzzles to be solved by technical discourse. The puzzle-solving techniques are highly specialized. Experts in specific domains of knowledge are masters of arguing in accordance with the conventions of their discipline.<sup>84</sup> Still, answers to technical arguments are subsumed by the larger question of “so, what?”; what is the value of that puzzle’s solution? The answer to this question is always subjective and hence based on the logic of good reasons. In other words, the logic of reasons provides insights on things, but fails to account for understanding people. And we need knowledge of both realms: the truth, as partial as it will be, and how this incomplete and biased knowledge is invested with meaning.<sup>85</sup>

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<sup>83</sup> Fisher, *Human Communication as Narration*, 47-8, 111.

<sup>84</sup> Fisher, *Human Communication as Narration*, 59-60. Bruner calls this logic a “powerful prosthetic device,” which has “been developed over the millennia” to guide analysis and application of Apollonian phenomena (Jerome Bruner, *Actual Minds, Possible Worlds* (Cambridge, MA: Harvard University Press, 1987), 13).

<sup>85</sup> Fisher, *Human Communication as Narration*, 78. Dolman writes, “Truth and accuracy are only rarely the same. Facts are not truth, and the truth is only partially factual. Truth is a matter of utility; accuracy is not...A theory is considered *true* – or more properly valid – to the extent that it is *useful*. That is, to the extent to which it aligns our

This issue of verisimilitude gets to the heart of the matter: the deeper contribution of stories lies not in their factual data, but with the fact that the process itself is formative. Facts cannot function without values, values are formed inter-subjectively, and inter-subjective communication is founded on stories. Stories told amongst a group may have begun with gossip as a form of “verbal grooming:” quasi-truths tracking members’ relationships and moral transgressions.<sup>86</sup> The cognitive ability to track that social data strengthened our ability to hold each other’s attention. It also enhanced our capacity for mental dexterity, since social interactions are contextual, variable, and unpredictable – the very traits denied by the Apollonian perspective in its search for universal truths.

To Plato’s chagrin, however, timeless truth is not the only – nor the central – issue. Of course, to have purchase on our minds, stories must be true *enough*. Verisimilitude, the *appearance* of accuracy, trumps veracity. We do not, and should not, obsess over truth when it comes to storytelling. In fact, accuracy probably subverts the power of a story.<sup>87</sup> Surprise and intensity come easier outside the conventions of truth, and these additional elements drive us to devote our mental resources to a story; to *pay* attention. It can be a worthy investment.

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expectations of the future and in this way makes our actions *meaningful*...greater truth is in no way the result of greater accuracy. Indeed, as we shall see later, greater accuracy quite often obscures the truth” (Everett C. Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (London: Routledge, 2005), 72).

<sup>86</sup> Boyd, *On the Origin of Stories*, 57-8.

<sup>87</sup> Interestingly, modern fighter pilot squadrons honor what is known as the “10% truth” rule as a minimum required when telling stories. This is ostensibly meant to “protect the innocent” but it also allows for more colorful liberties when storytelling. There is an oblique analogy within academia, evidenced when scholars argue that the explanatory power of a theoretical model is more important than how well the model comports with reality (e.g., see Kenneth N Waltz, *Theory of International Politics* (Long Grove, IL: Waveland Press, 2010), 6-7, 14-6).

“Our compulsion to tell and listen to stories with no relation to the here and now or even to any real past,” Boyd writes, “improves our capacity to think in the evolutionary novel, complex, and strategically invaluable way[s].” He continues, “By developing our ability to think beyond the here and now, storytelling helps us not to *override* the given, but to be less restricted by it, to cope with it more flexibly and on something more like our own terms.”<sup>88</sup> This directly contributes to the ability to follow Morgan’s advice to remain unattached to any one image, to cultivate a “mosaic of competing and complementary insights.”<sup>89</sup> It allows what Albert Einstein called “combinatory play.”<sup>90</sup>

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<sup>88</sup> Boyd, *On the Origin of Stories*, 49-50. This is also what Landy calls the ability to “dwell in metaphor”: “There is something over and above the local deployment of metaphors for strategic or aesthetic purposes, and that is what we might call a *figurative state of mind*...cultivating a generalized love for the figurative – if we come to *dwell* in metaphor, as Emily Dickinson would say – then our stance toward existence becomes subtly but powerfully shifted: the world becomes less concrete and more abstract, less impersonal and more humanized, its components less monadic and more interconnected. And as everything we see begins to point sideways to what is like it, rather than backward to what preceded it or forward to what follows, we find ourselves released from the tyranny of time” (Joshua Landy, *How to Do Things with Fictions* (Oxford: Oxford University Press, 2014), 64). Note the “sideways” reference that is reminiscent of *metis*.

<sup>89</sup> Gareth Morgan, *Images of Organization* (New York, NY: SAGE Publications, Inc, 2006), 343.

<sup>90</sup> Einstein’s full quote is also noteworthy for the emphasis on productivity of playfulness: “The words or the language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The physical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be ‘voluntarily’ reproduced and combined. There is, of course, a certain connection between those elements and relevant logical concepts. It is also clear that the desire to arrive finally at logically connected concepts is the emotional basis of this rather vague play with the above-mentioned elements. But taken from a psychological viewpoint, this combinatory play seems to be the essential feature in productive thought – before there is any connection with logical construction in words or other kinds of signs which can be communicated to others” (quoted in Stanley I. Greenspan and Beryl Lieff Benderly, *The Growth of the Mind: And the Endangered Origins of Intelligence* (Reading, MA: Da Capo Press, 1998), 20).

Stories provide “an ancient virtual reality technology that specializes in simulating human problems.”<sup>91</sup> These vicarious experiences then combine with first-hand experiences to generate theories about ourselves, others, and how to prevail in the world around us. Flexibility, agility, and adaptability are precisely the appropriate reactions to the contextual, subjective regime of Dionysius. Wisdom is thus accumulated playfully, that is, by wandering and wondering. Dionysian logic fulfills F. Scott Fitzgerald’s criteria for “first rate intelligence”: holding “two opposed ideas in the mind at the same time and still retain[ing] the ability to function.”<sup>92</sup> From the Platonic view, this kaleidoscopic approach is illogical. From an artist’s view, it is irreplaceable.

What we gain from stories is a way to navigate and nudge the world in strategic and novel ways. The ability to mentally grasp other people, their intentions, their capabilities, their relationships, and their social status is possibly the single greatest benefit of our advanced intelligence.<sup>93</sup> It is a practice and mode of thought enjoyed, in fact, by early airmen as they occupied the space between Dionysius and Apollo.

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<sup>91</sup> Jonathan Gottschall, *The Storytelling Animal: How Stories Make Us Human* (Boston, MA: Mariner Books, 2013), 59.

<sup>92</sup> F. Scott Fitzgerald, *The Crack-Up*, ed. Edmund Wilson, reprint edition (New York, NY: New Directions, 2009), 69.

<sup>93</sup> Academic literature is full of studies showing the wisdom of storytelling, including: Roger Schank and Gary Saul Morson, *Tell Me a Story: Narrative and Intelligence* (1995); Steven Pinker, *How the Mind Works* (2009); S. Ragan and E. Wittenberg-Lyles, “Narrative Medicine and Education in Palliative Care,” in *Narratives, Health, and Healing* (2005); Deborah Sole and Daniel Wilson, “Storytelling in Organizations: The Power and Traps of Using Stories to Share Knowledge in Organizations” in *The Knowledge Management Advantage* (2004); Lewis Mehl-Madrona, *Coyote Wisdom: The Power of Story in Healing* (2005); and Peter Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World* (1996). Of course, the value of stories or narrative intelligence does not excuse the offensives that happened at Shaw AFB or the Tailhook Convention, that only token disciplinary action occurred, or that the military today still has problems curbing sexual misconduct.

## Stories of Storytelling

In addition to the more boisterous activities, flyers also practiced another form of play: they were rabid storytellers. Indeed, the practice of exchanging stories, or “hanger flying,” remains a part of aviation culture. It is how some defend the utility of gatherings such as the Tailhook Convention and Friday night “roll calls” in USAF fighter squadron bars. For example, in an article unrelated to either scandal, one general officer wrote in 2000, “I’m a firm believer that aviators learn more from experiences than we do from books. Exchanging a ‘There I was...’ or ‘war’ story is an extremely valuable, time-honored part of a flyer’s education. By learning from other people’s experiences we hopefully don’t have to learn the hard way. There are very few new ways of crashing planes; it’s simply new pilots repeating old mistakes they personally haven’t yet experienced.”<sup>94</sup> This pedagogical function served a valuable purpose during the early years of military aviation and the practice started along with an airman’s first days of flight school.

Consider the letters and sketches of Penrose Vass Stout, a member of the 27th Pursuit Squadron. One of his pencil drawings of stateside training depicts young men engaged in conversation with the caption, “Barracks flying is the favorite sport of the cadet.”<sup>95</sup> The phrase comes up again in Harold Buckley's colorful description of the tradition of telling each other stories about the day’s sorties:

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<sup>94</sup> Larry Arnold, “‘There I Was...,’” *Combat Edge* 9, no. 6 (November 2000): 4.

<sup>95</sup> “Penrose Vass Stout Sketchbook: Alabama Photographs and Pictures Collection,” accessed December 11, 2015, <http://digital.archives.alabama.gov/cdm/compoundobject/collection/photo/id/27733/rec/1>. This behavior is evident in other areas studied by historians of technology, including automobile enthusiasts and their version of barracks flying known as “bench racing” (Robert C. Post, *High Performance: The Culture and Technology of Drag Racing, 1950-2000* (Baltimore, MD: Johns Hopkins University

Among other simple pleasures ‘barracks flying’ was in high favor. This re-hashing of the exciting moments of the day, close calls, hairbreadth escapes, forced landings, and crack-ups, was a favorite pastime with all of us, though with some it was really a disease. The heroes of the various episodes recounted minute descriptions of all that had happened, losing nothing in the telling. Agile hands described the exact position of the plane at each instant, agile brains retold their innermost emotions at every stage, and throughout the modest refrain, the masterful skill and airmanship which had saved the day, were plain to be seen. It was marvelous, the dare-devil and death-defying stunts which took place every night around the big iron stove...all of us did the best flying of our careers right then, comfortable and warm, with both feet on the ground.<sup>96</sup>

Once in combat, the practice continued – with more grist for the storyteller’s mill.

Most days of the war, at least those days when they actually flew, had a similar rhythm for WWI aircrew. Preparatory briefings occurred and aircraft were given their pre-flight inspections. After the mission, the aircraft were inspected for battle damage or mechanical issues. Once debrief reports were filed, the mess was typically the next stop. One aviator recorded their daily routine in his 1917 book, *An Airman's Outings*: “Dinner over, the usual crowd settle around the card-table, and the gramophone churns out the same old tunes...From the babel of yarning emerges the voice of our licensed liar.”<sup>97</sup> Similarly, another pilot wrote: “We land, piece together our report, and count the bullet-holes on the machines. In ten minutes' time you will find us around the mess-table, reconstructing the fight over late afternoon tea.”<sup>98</sup>

As more and more replacement pilots – with less and less experience – filled vacancies in front line squadrons, “dinner-table conferences on tactics” offered valuable,

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Press, 2001), 3; H. F. Moorhouse, *Driving Ambitions: An Analysis of the American Hot Rod Enthusiasm* (New York, NY: Manchester University Press, 1991), 39).

<sup>96</sup> Buckley and Puryear, *Squadron 95*, 20-1.

<sup>97</sup> Alan Bott and W. S. Brancker, *An Airman's Outings*, 4th edition (London: William Blackwood and Sons, 1917), 191.

<sup>98</sup> Bott and Brancker, 246-7.



if vicarious, training.<sup>99</sup> Not only did new pilots lack combat experience, but flying was so new that all aviators were essentially test pilots. Aircrews were constantly trying out new techniques – including how to position the aptly named “joy-stick” – and pushing the limits of their crude machines.<sup>100</sup> The dearth of written instructional materials and the inability to communicate verbally while airborne meant that learning came in the form of stories.<sup>101</sup> Thus, the mess was the scene of “everlasting technical ‘shop’ talk – about the behaviour of aircraft in the air, the best ways of directing an artillery shoot, at what speed [our aircraft] could be made to dive without its wings folding back and dropping off...and so forth and so on.”<sup>102</sup>

Not only was every piece of information useful to their survival, but it also contributed to their morale and shared identity. In fact, the 50th AS unit history catalogs a corpus of “wild tales” apparently so familiar that the author felt it sufficient to reference each one using only a single fragmentary phrase (e.g. “the famous ‘Zumm’ [Sain] and [Thompson] made over the hanger,” “how ‘Bill’ Frayne got his burning plane down,” or how two of them “raised hell with the Hun troops and artillery on the road near Sy”).<sup>103</sup>

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<sup>99</sup> McScotch, *Fighter Pilot*, 57.

<sup>100</sup> According to the Oxford English Dictionary, the first known use of the word “joystick” was in 1910 (“joy, n.”. OED Online. June 2017. Oxford University Press. <http://www.oed.com.spot.lib.auburn.edu/view/Entry/101795?redirectedFrom=joystick&> (accessed January 03, 2018). For a discussion on the possible links between the term and play, see “Joystick,” Michael Quinion, *World Wide Words*, <http://worldwidewords.org/qa/qa-joy1.htm>, accessed 17 December 2016.

<sup>101</sup> One flyer noted the lack of textbooks on tactics and suggests a 30 page pamphlet in May 1917 may have been the first (Hynes, *The Unsubstantial Air*, 117). Another author states early US airmen trained at the French *Ecole d’Aviation Militaire* received only an eight page booklet “Flying School of Tours – Instruction of the American Pupils” (Woolley, *Echoes of Eagles*, 41).

<sup>102</sup> Griffith, *R. A. F. Occasions*, 17.

<sup>103</sup> Morse, *The History of the 50th Aero Squadron*, 74-5.

The 135th AS history describes a pilot's retelling of a kill "with great histrionic ability, simulating the tactics of the Hun by spreading his arms out and bending at impossible angles, and then grabbing for his pair of imaginary machine guns and firing them with devastating effect. An added touch of realism was once provided when he lost his balance and fell to the floor."<sup>104</sup> Another flyer proclaimed:

I have listened to an incalculable number of hundreds of hours' conversation based on the technique of flying, and particularly of active-service flying – the takeoff, the landing, the navigation during the voyage, how to spot [the enemy] in the distance, how to deal with (or avoid) [the enemy] once spotted, the respective advantages of close-formation and of open formation when flying in company – and because all the talk was 'vital' talk, in the sense that one's own and other people's lives depended on its conclusions, and also, perhaps, because a crisp, lucid and racy vernacular seems to be the peculiar inheritance of all who fly in the air – I have never been bored by a single second of it.<sup>105</sup>

Frequent practice apparently made them proficient storytellers, at least in their own assessments.

### Conclusion

Among early aviators, there was no shortage of writers or poets to weave Dionysian tales about their Apollonian machines. Their storytelling did not end with the war, either. Indeed, the evidence for play – of all types – comes largely from the stories WWI airmen continued to tell after the conflict. Their letters, diaries, memoirs, and squadron histories, whether written for themselves or others, at the time or years later, for entertainment or for posterity, are exemplars of airmen as both *homo narrans* and *homo ludens*. And, by virtue of how technology facilitated these behaviors, these airmen also highlight the techno-social nexus of life as *homo faber*.

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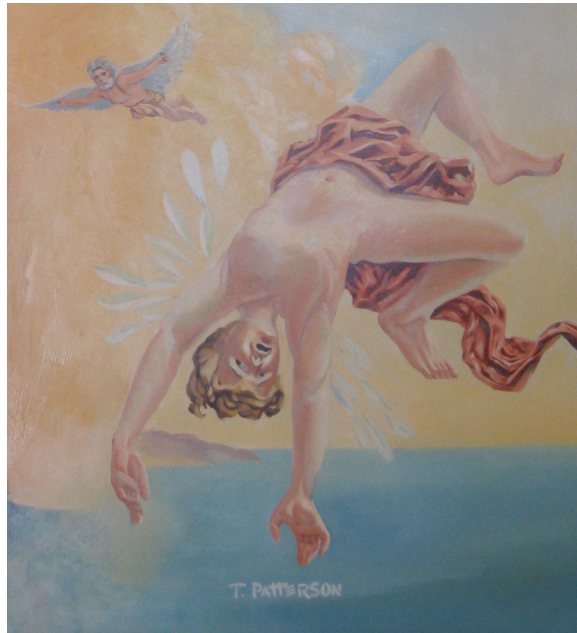
<sup>104</sup> Hart, *History of the 135th Aero Squadron from July 25 to November 11, 1918*, 20-1.

<sup>105</sup> Griffith, *R. A. F. Occasions*, 17-8.

Aviation did not just have this effect on flyers, either. The airplane became a cultural phenomenon across Western civilization. The impact of the technology was, in fact, aided by stories such as those told by these aviators. This technologically constructed social world is the subject of the next chapter. It will demonstrate how the perspective conferred by aviation – the mode of thought manifested in airmen’s storytelling – fuses the technical and the poetic, the practical with the playful.

## Chapter 2

### Icarus And Daedalus: Airmindedness In The Interwar Period



**Figure 2. Section of Untitled Painting.** The US Air Force Art Program adopted the painting by an unfamiliar artist, T. Patterson, in 2011.

*Source: “Dusty paintings make Air Force history.” Peterson Air Force Base, 20 June 2011, accessed 5 November 2016, <http://www.afspc.af.mil/News/Photos/igphoto/2000245076>.*

*To exist at the intersection of two worlds – one of order, engineering, and reason; the other, one of chaos, art, and play – airmen in the Great War relied on the two technical qualities of their machines: range and speed. This chapter is about how a third characteristic, altitude, changed the physical and metaphorical perspectives of early flyers as well as Western societies. Flight as an escape from gravity became equally symbolic of an escape from outdated ideas and technological limitations. Practical and*

*aspirational considerations came together in a cultural phenomenon of “airmindedness.” Although increasingly referenced by scholars over the last few decades, the concept’s definition seldom reflects the full dimensions of this consciousness, which infected both the public writ large and professionals of the American air force. Expanding the aperture, or, more appropriately, viewing airmindedness from a higher vantage point, it is clear that key founders of USAF culture echoed the way interwar reactions to flight easily combined pragmatic and psychological elements. They imbued the institution with a paradigm of “progress unhindered by custom.”*

## Introduction

There are two institutions of higher learning in the US Air Force. One is Air University, located on Maxwell AFB, Alabama, and the other is the US Air Force Institute of Technology (AFIT) on Wright-Patterson AFB, Ohio. Each base has a statue of a Greek mythological character, and their presence reveals something about the organization’s culture. The first, at Maxwell AFB, is a sculpture of Daedalus dedicated in 2017. It honors the association of WWI military pilots, the National Order of Daedalians, which was established at the base in 1934.<sup>1</sup> The second statue is Daedalus’s son, Icarus, erected in memory of AFIT graduates who met the same fate as the adventurous young boy.

Multiple versions of the mythological pair exist, but they share the same general outline. The father and son are imprisoned in a maze and use artificial wings to escape. In

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<sup>1</sup> “Maxwell Unveils Daedalus Statue Commemorating WWI Pilots,” Maxwell Air Force Base, 7 April 2017, <http://www.maxwell.af.mil/News/Display/Article/1145712/maxwell-unveils-daedalus-statue-commemorating-wwi-pilots/>. Apropos to the last chapter, the National Order of Daedalians uses a web portal named after Apollo.

most retellings, the boy serves as cautionary figure. He became too enamored with flight and the wax holding the bird feathers together melted when he recklessly got too close to the sun. The young boy abused the power of flight for his own pleasure instead of using it to escape imprisonment, as his father intended when he crafted the two sets of wings. One of the earliest known written versions of the tragic story appears in Ovid's *Metamorphoses* (which also describes Prometheus).<sup>2</sup> Only four paragraphs long, the poem's central theme clearly contrasts Daedalus's rational calculations and pragmatic motivations with the playfulness and high spirits – literally and metaphorically – that led to Icarus's downfall.

Homer's *The Iliad*, which is the oldest direct reference to Daedalus, highlights the man as the greatest craftsman among mortals. He produced statues that were so accurate, the legend goes, that they appeared to be animate agents instead of technical artifacts.<sup>3</sup> The father and son are trapped, in fact, in an intractable labyrinth of Daedalus's own design. Not only was he the “archetypal craftsman,” but he also demonstrated that trait so closely coupled with *techne – metis*. The construction of the wings, and the strategy to exit the maze vertically, serve as a double example of these related qualities. Literary critic Piero Boitani, in analyzing mythological flight as a motif in art and literature,

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<sup>2</sup> Ovid, *The Metamorphoses*, trans. A. S. Kline, 2nd edition (CreateSpace Independent Publishing Platform, 2014), VIII: 183-235. Other writers, such as Homer and Plato, however, mention the characters centuries earlier (Necip Fikri Alican, *Rethinking Plato: A Cartesian Quest for the Real Plato* (New York, NY: Rodopi, 2012), 245). Ovid's reference to Prometheus occurs in 78ff.

<sup>3</sup> Homer and Bernard Knox, *The Iliad*, trans. Robert Fagles (New York, NY: Penguin Classics, 1998), XVIII, XIX 13-19; Jacob E. Nyenhuis, *Myth and the Creative Process: Michael Ayrton and the Myth of Daedalus* (Detroit, MI: Wayne State University Press, 2003), xx; Miller, Walter, “Daedalus and Thespis,” in *The University of Missouri Studies: A Quarterly of Research, Volume VI*. Columbia, Missouri: The University of Missouri Press, 1931, 342.

shows the strong association between Daedalus and Odysseus. Likewise, Francoise Frontisi-Ducroux, scholar of mythology and Hellenism, calls Daedalus the exemplar *par excellence* of Greek artisans, a “hero of intelligence.”<sup>4</sup> Bruno Latour, philosopher of technology, reiterates that comparison in his writings and again links the two concepts in his idea of “a labyrinth that is curved, veering from the straight line, artful but fake, beautiful but contrived.”<sup>5</sup>

The mythological father and son are common references among flyers and those who study them. According to Berthold Laufer’s *Prehistory of Aviation* (1928), “Of all flying stories of classical antiquity it is this one which has left a lasting impression on future generations and fired the ambition of many imitators; and it is on this point, its moral effect, that the importance of the story rests.” The twentieth century, in fact, produced more artistic treatments of the myth than all previous eras.<sup>6</sup> The tale also figures prominently in scholarly works about the cultural “prehistory” of flight, but it also

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<sup>4</sup> Piero Boitani, *Winged Words: Flight in Poetry and History* (Chicago, IL: University of Chicago Press, 2007), 35. Frontisi-Ducroux uses Daedalus’s name to create a word, *daidalon*, to “encompass all kinds of traps and ruses under the appearances of seduction” (Frontisi-Ducroux quoted in Roland A. Champagne, *The Methods of the Gernet Classicists* (New York, NY: Routledge, 2015), 174). Indeed, the wings he creates for him and his son are to escape the labyrinth he has designed to contain the Minotaur recalls the “crooked path” in Hephaestus’s myth.

<sup>5</sup> Bruno Latour, “A Collective of Humans and Non-humans: Following Daedalus’s Labyrinth” in *Readings in the Philosophy of Technology*, 2nd edition, Ed. David M. Kaplan (Lanham, MD: Rowman & Littlefield Publishers, 2009), 157; Nyenhuis, *Myth and the Creative Process*, 211. For the symbolism of Hephaestus’s “crooked” feet as it relates to *techne* and *metis*, see Cheryl De Ciantis. “The Gait of Hephaistos: Crooked Perceptions into Consilience.” *Icono 14 15*, no. 1 (2017): 128-148.

<sup>6</sup> Berthold Laufer, *The Prehistory of Aviation*, Field Museum of Natural History ; Anthropological Series, 253 v. 18, no. 1 (Chicago, IL: Field Museum of Natural History, 1928), 63; Nyenhuis, *Myth and the Creative Process*, 54-5, 57. Elsewhere Nyenhuis suggests the reason for its widespread appeal is in how well the story resonates with the current technological age (Jacob E. Nyenhuis, “Daedalus and Icarus: A Symbol of Our Time?” *Graduate Comment 10*, no. 4 (1967): 223-38).

surfaces in more conventional histories as well.<sup>7</sup> Furthermore, it is not just artists and academics, but aviators as well. In addition to the recent USAF statues, pioneering air power theorist Giulio Douhet referred to aircraft as “Daedalus’ large devices,” and Icarus is mentioned in the writings of “Hap” Arnold, possibly the central cultural founder of the US Air Force.<sup>8</sup>

In the conventional interpretation of the myth’s moral, Daedalus is the paragon of a mature craftsman; his son, a passionate, rebellious, self-destructive artist. Writers have variously attributed Icarus’ disgrace to hubris, ambition, excessive dreaming, and the lure of instant gratification. His name has been invoked by psychiatrists as a condition characterized by narcissism, fascination with fire, isolation, or an imagination that exceeds capabilities, dooming one to failure and mental conflict.<sup>9</sup> One author used the image to criticize American foreign policies as overly adventurist, titling his work *The Icarus Syndrome: A History of American Hubris* (2011).<sup>10</sup>

For many other historians writing about aviation, the father and son represent varying emphases on the two different functions of flight. Daedalus characterizes its

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<sup>7</sup> For examples of the former, see *Like Sex With Gods* (Singer, 2003), *The Prehistory of Flight* (Hart, 1985), *Taking Flight* (Hallion, 2003), *Prehistory of Aviation* (Laufer, 1928), or *Winged Words* (Boitani, 2007). For examples of the latter, see *Dictatorship of the Air* (Palmer, 2006), *The Rise of American Air Power* (Sherry, 1987), or *Chasing Icarus* (Mortimer, 2010). These authors did not restrict their analyses to Western culture, highlighting analogies to Daedalus and Icarus in other cultures.

<sup>8</sup> Quoted in Azar Gat, *A History of Military Thought: From the Enlightenment to the Cold War* (Oxford: Oxford University Press, 2002), 574. See Chapter Four for Arnold’s use of the mythological figure.

<sup>9</sup> Michael A. Sperber, “Albert Camus: Camus’ the Fall: The Icarus Complex,” *American Imago* 26 (1969): 269-280; “Icarus complex,” *McGraw-Hill Concise Dictionary of Modern Medicine*, November 1 2016, <http://medical-dictionary.thefreedictionary.com/Icarus+complex>; Nyenhuis, *Myth and the Creative Process*, 48.

<sup>10</sup> Peter Beinart, *The Icarus Syndrome: A History of American Hubris* (New York, NY: Harper, 2010).



pragmatic and political aspects. Icarus embodies its aspirational and enthralling qualities. For instance, in *A Nation of Fliers* (1994), Peter Fritzsche reminds readers that the allegory is not just about individuals escaping the bonds of gravity. Fundamentally, it is a story of nationalism and geopolitical power.<sup>11</sup> Indeed, the whole reason the famous inventor from antiquity is forced to flee with his son is to escape captivity by King Minos, for whom he had been creating weapons. According to legend, Daedalus' skills in applying mechanical arts to warfare exceeded all others.<sup>12</sup> Following his escape, he offered his services to yet another kingdom.

Each time modern authors repeat the story, the father and son are presented as mutually exclusive examples. Furthermore, it is clear which model is superior. Icarus represents narcissism, hubris, self-destruction, and many other negative connotations. This bias is evident in the USAF statutes as well as other cultural artifacts. For example, its Squadron Officer College – which every active duty officer attends – uses a war-gaming exercise named Icarus “to instill a sense of dire consequence if we do not fully understand our role as Airmen.”<sup>13</sup>

It may seem surprising then, that at the peak of Western society's excitement over aviation, both images were embraced by the so-called “airminded” public. This cultural phenomenon is yet another demonstration of how aviation technology brings together the technical and artistic.

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<sup>11</sup> Peter Fritzsche, *A Nation of Fliers: German Aviation and the Popular Imagination* (Cambridge, MA: Harvard University Press, 1994), 2.

<sup>12</sup> Robert Graves, *Greek Gods and Heroes* (New York, NY: Dell Laurel Leaf, 1960), 55. See the ancient poetry of Pindar for further connections between Daedalus' skills and warfare.

<sup>13</sup> Quote taken from a plaque displayed at Squadron Officer College that explains the origins and purpose of the exercise. The explanation also cites Carl Builder's *Icarus Syndrome* (see Chapter Four).

## The Origins of “Airmindedness”

In the decades after heavier-than-air flight became a reality, flying remained ineffective for many of the practical functions it would eventually perform in transportation, commerce, and war. Indeed, decades passed before aviation began to influence the way most people lived their daily lives. Its psychological impact, however, registered much sooner.

According to historian Robert Wohl, who traced the cultural impact of flying in the decades immediately after the Wright brothers demonstrated their Flyer in France, the airplane became a symbol of societal regeneration. It allayed the concerns of those who feared that the legacy of industrialization was a disenchanting world. Aviation disproved the “prophets of despair and the doomsayers [who] had complained that the twentieth century lacked passion and that materialism would leave the ‘soul’ without transcendent tasks.”<sup>14</sup> In America, the sky became the frontier that the wide-open West had once been. Opportunities abounded for both the bold individual adventurer and for a nation able to continually renew itself through expansion.<sup>15</sup> Historian Michael Sherry characterized this “Age of Fantasy” in a similar tone: “The airplane was the instrument of flight, of a whole new dimension in human activity. Therefore it was uniquely capable of stimulating fantasies of peacetime possibilities for lifting worldly burdens, transforming man’s sense

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<sup>14</sup> Robert Wohl, *A Passion for Wings: Aviation and the Western Imagination, 1908-1918* (New Haven, CT: Yale University Press, 1994), 136.

<sup>15</sup> Frederick Jackson Turner famously applied a frontier thesis to America’s continental expansion and commented on how the closing of *the* frontier impacted the nation. In contrast, David Courtwright argued the American frontier did not close. Instead, “it became multidimensional, with continuous, technologically premised, socially constructed, and mutually reinforcing movement on the land, in the nighttime, and through the sky” (David T. Courtwright, *Sky as Frontier: Adventure, Aviation, and Empire* (College Station, TX: Texas A&M University Press, 2004), 14).

of time and space, transcending geography, knitting together nations and peoples, and releasing humankind from its biological limits.”<sup>16</sup> One history, interestingly titled *The Wright Brothers: Heirs of Prometheus*, notes how the brothers became “giants in the American Pantheon of popular heroes.”<sup>17</sup> Even the outbreak of World War I in 1914, and the associated acceleration of aviation’s destructive potential, failed to tarnish the airplane’s reputation.

The 1920s inaugurated the era historians dub the “Golden Age of Flight.” During this period, the technology matured in every way, making the airplane an increasingly useful tool. Distance, payload, speed, and altitude records were repeatedly broken, to the celebrations of an increasingly supportive and excited public. In America, flying became a popular hobby for those who had enough cash and courage. Aviation became a popular subject for publishers and Hollywood filmmakers. The latter took advantage of the surplus of planes and pilots after the war to stage elaborate dogfights for the silver screen. Barnstorming tours were another way newly idle machines and fliers exposed even remote communities to firsthand experience with aviation. Many observers believed everyone would soon enjoy an age of “aerial mobility” when “flying would become as

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<sup>16</sup> Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven, CT: Yale University Press, 1987), 2.

<sup>17</sup> Richard Hallion, ed., *The Wright Brothers: Heirs of Prometheus* (Washington, D.C.: Smithsonian Institution Press, 1978), x. Note the allusion to Greek mythology, “Pantheon,” and the point – which corroborates the point made in the introduction – that, despite the subtitle, the work contains no substantial use of Promethean myth. Others, such as the poet D’Annunzio, do link the myth to the Wrights (see Wohl, *A Passion for Wings*, 120). Likewise, French aviator Edmond Rostand’s 1911 poem, “Le Cantique de l’aile” [The Canticle to the Wing], ends with this allusion to Prometheus (and some of the same themes reiterated throughout this chapter): “Higher! always higher, pilot! and glory to men / of great will! / Glory to these stealers of flame that we are! / Glory to Humanity! / Glory to the old Enchanted One who, guessing the joy / of soaring when his turn came, / Studied the wings of the Vulture, / While it gnawed away at his innards!” (quoted in Wohl, 262).

common as riding or even walking.” Contemporary sources boasted that “democracy would prevail in the sky,” and Americans could soon expect an “airplane in every garage.”<sup>18</sup> Children and their teachers were also on board. Aviation was the main theme in technologically oriented series aimed at young Americans such as the “Bill Bruce” books in which the main character claims “nothing that he did gave the zest to life than the thrills of aviation had given him.”<sup>19</sup> Advocates urged curriculum changes and some classrooms even received flight simulators.<sup>20</sup>

This enthusiasm for aviation became known as airmindedness. According to the *Oxford English Dictionary*, which dates the first appearance to 1927, “air-minded” means to be “interested in or enthusiastic for the use and development of aircraft.”<sup>21</sup> The term was widely used during the interwar years.<sup>22</sup> For example, *The Saturday Evening Post* published a short story, titled “Air-Minded,” which described the “inspiring symbol” of “the steel bird.”<sup>23</sup> Multiple jazz musicians, including the former WWI Army Air Corps officer Glenn Miller, recorded their rendition of the song, “The Airminded Executive,” who was the “man of the year.” One reviewer of the Broadway play and Hollywood movie about flying, “Ceiling Zero,” gushed that “everyone” in high society was there,

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<sup>18</sup> Joseph J. Corn, *The Winged Gospel: America’s Romance with Aviation* (Baltimore, MD: The Johns Hopkins University Press, 2002), 12-3, 32, 91.

<sup>19</sup> Henry H. Arnold, *Bill Bruce, the Flying Cadet* (New York, NY: A.L. Burt Company, 1928), 239.

<sup>20</sup> Steve Call, *Selling Air Power: Military Aviation and American Popular Culture after World War II* (College Station, TX: Texas A&M University Press, 2009), 40-1.

<sup>21</sup> “air, n.1,” OED Online. January 2018. Oxford University Press. <http://www.oed.com.spot.lib.auburn.edu/view/Entry/4366?redirectedFrom=air-minded> (accessed January 19, 2018).

<sup>22</sup> According to Google nGram, which has some inherent flaws, it appeared most frequently in print between 1920 and 1950 (Alan Vick, *Proclaiming Airpower: Air Force narratives and American Public Opinion from 1917 to 2014* (Santa Monica, CA: RAND, 2015), 27).

<sup>23</sup> Guy Gilpatric, “Air-Minded,” *The Saturday Evening Post*, March 21, 1931, 14.

and “any air-minded person is bound to love it.”<sup>24</sup> Finally, an article in *Childhood Education*, “Air-Minded Seven-Year-Olds,” described how “enthusiastic interest overwhelmed” the students on a field trip to the municipal airport.<sup>25</sup>

#### Dimensions of Airmindedness – Pragmatic and Romantic

A comprehensive review of aviation historiography reveals a variety of meanings embedded in the definition of airminded. First, in a practical sense, airmindedness can be an appreciation of what aviation technology can achieve, or airmindedness can be the condition of having realized that potential. For example, an airminded nation may appreciate what aviation can do for the country, and therefore support aviation development. Or, an airminded nation may be one that already enjoys those developments. Likewise, an airminded individual may be someone who appreciates the advantages of flying, someone who possessed the ability to fly, or both. The simple ability to fly an airplane, however, was not the only – or the most interesting – element of the airminded condition. Nor was the excitement over human flight simply about the practical aspects of flight.

The ceaseless pace of material advancements in aviation transmuted into expectations for advancing the individual’s spirit – just as Daedalus’ *techne* enabled Icarus’ transcendence. As aviation was imbued with the power of spiritual rebirth, airmindedness gained a sense of religious fervor. The oft-referenced “miracle” of flight seemed to portend a new age for humanity, a sign of progress bringing the world closer to God. Sometimes the prophecies linked to spiritual matters in figurative ways: an airplane

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<sup>24</sup> Florence Fisher Parry, “On With the Show,” *The Pittsburgh Press*, 16 April 1935, 18.

<sup>25</sup> Kathryn L. Canisius, “Air-Minded Seven-Year-Olds,” *Childhood Education* 11, no. 7 (1935), 311.

symbolizing the Star of Bethlehem or the shadow of the crucifix.<sup>26</sup> Charles Lindbergh's historic Atlantic crossing was celebrated as a "heroic adventure of Christian life," and he became a prophet of this "gospel of aviation." Marcel Proust, writing in 1919, described watching a pilot in an equally mythologized manner:

I was as moved as a Greek would be who saw for the first time a demi-god...The aviator seemed to hesitate in choosing his way; I felt there lay open before him – before me, if habit had not held me prisoner – all the routes of space, of life; he flew away, glided for a few instants over the sea, then brusquely making his decision, seeming to surrender to an attraction the opposite of that of gravity, as if returning to his homeland, with a light movement of his golden wings, he ascended straight up toward the sky.<sup>27</sup>

Other times it was more literal, as when a woman asked Lindbergh how much it would cost for a ride to heaven.<sup>28</sup>

Whether heralded in religious terms or not, some thinkers speculated that aviation could change individuals, altering how they perceived the world, how they thought, how they felt, and how they interacted with others. Therefore, becoming airminded could also be the degree to which a person embodied this potential and became what some contemporaries called the "aerial person." In this view, aviators became supermen in the spirit of Nietzsche. In their new machines, these "virile technological knights" would power a "new age of boundless revolutionary potential, moral and civilization-transforming forces."<sup>29</sup> This concept was also reflected by the publisher and aviation enthusiast, Alfred Lawson. In 1916, he penned an article, "Natural Prophecies," predicting that, by the year 3000, a new species would emerge among those who spent

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<sup>26</sup> Corn, *The Winged Gospel*, 12, 30; Robert Wohl, *The Spectacle of Flight: Aviation and the Western Imagination, 1920-1950* (New Haven, CT: Yale University Press, 2005), 59.

<sup>27</sup> Marcel Proust, *A la Recherche du Temps Perdu, Vol. II*, trans. Wohl, *The Spectacle of Flight*, 280.

<sup>28</sup> Corn, *The Winged Gospel*, 27, 23, 13.

<sup>29</sup> Gat, *A History of Military Thought*, 563.

sufficient time airborne. In another seven millennia “Alti-man” would emerge and completely inhabit the air niche. The changes would be both physical and mental: these “superhumans” would know “great truths” and rule upon the those below.<sup>30</sup> According to Joseph Corn, whose 1983 *The Winged Gospel* resurrected the term airmindedness among academics, these apparently fanatical statements accurately reflected the public’s general attitude toward aviation throughout the interwar period.

Others locate similar sentiments even before the invention of heavier-than-air flight. Michael Paris, in “The Rise of the Airmen: The Origins of Air Force Elitism,” argues that the heroic image of WWI British pilots was not just based on the events of the war. The “cult of the airman” emerged from preexisting attitudes towards aviation.<sup>31</sup> Another writer describes how a pioneering balloonist and aerial photographer supposedly crossed “a cognitive threshold” as he developed technical means to capture the aerial view that was previously relegated to literary, intellectual, or religious traditions.<sup>32</sup>

To complicate matters further, this version of airmindedness may have nothing to do with knowing how to fly or physically viewing the world from above. Instead, it may simply be a revolutionary imaginative capacity accessible to anyone willing to embrace aviation as a metaphor for freedom, a literal and symbolic transcendence from the limits

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<sup>30</sup> Alfred Lawson, “Natural Prophecies,” *Aircraft* VI (Oct 1916) reprinted in Cy Q. Faunce, *The Airliner and Its Inventor, Alfred W. Lawson* (Ann Arbor, MI: University of Michigan Library, 1921), 195-201.

<sup>31</sup> Michael Paris, “The Rise of the Airmen: The Origins of Air Force Elitism, c. 1890-1918,” *Journal of Contemporary History* 28, no. 1 (January 1993): 129.

<sup>32</sup> Mark Dorrian and Frédéric Pousin, eds., *Seeing from Above: The Aerial View in Visual Culture* (London: I. B. Tauris, 2013), 86, 83.

of time and space.<sup>33</sup> This connects to a larger body of literature regarding the ability of technology to impact people psychologically.

Historians, commenting on the social effects of human flight on Americans, have noted that aviation is a particularly strong example of “the technological sublime,” the sense of wonder and awe generated by large-scale technical projects.<sup>34</sup> In *American Technological Sublime*, Nye states that “19th-century engineers, architects, inventors were hardly rational technicians...They often embraced transcendental ideas; along with clergy, writers, artists, they imbued technology with moral values; practical goals with political and spiritual regeneration.” Other technologies, such as railroads, electricity, and steamships inspired similar reactions, but none were highly anticipated by humanity or linked to a sense of hope, freedom, or divinity as was the airplane.<sup>35</sup>

Aviation had a unique capacity for inspiration – literally, and figuratively, above all other emerging technologies. According to Nye, “human flight long remained the most exciting form of the dynamic sublime...[with] an element of romance.”<sup>36</sup> Dominick

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<sup>33</sup> Wohl, *A Passion for Wings*, 257.

<sup>34</sup> Others argue the relationship between the technical and the sublime may not necessarily be a symptom of modernity. Atwill discusses the pre-Plato concept of *techne* as the ability to craft “objects designed to evoke wonder and awe” (Janet M. Atwill, *Rhetoric Reclaimed: Aristotle and the Liberal Arts Tradition* (Ithaca, NY: Cornell University Press, 2009), 54).

<sup>35</sup> David E. Nye, *American Technological Sublime* (Cambridge, MA: The MIT Press, 1996), xx; Jerome Tharaud quoted in *A Passion for Wings*, 290. Regarding the technological sublime, also reference the following histories: John F. Kasson’s *Civilizing the Machine* (1976) and Leo Marx’s *Machine in the Garden* (1964). For a specific example of “seeing from above,” White argues that viewing the Earth from space can induce a mental shift in perspective that replaces the divisions and conflicts down on Earth with a holistic view of humanity (Frank White, *The Overview Effect: Space Exploration and Human Evolution* (Boston, MA: Houghton Mifflin, 1987). He does not use the term, but one may could cite this as a component of “spacemindedness,” but this would again confuse *awareness* of the effect with the effect itself.

<sup>36</sup> Nye, *American Technological Sublime*, 202.



Pisano, a historian at the Smithsonian Air and Space Museum, argues the entertainment value of aviation will remain, regardless of its practical utility:

The public's fascination with flying as a source of amusement and entertainment, thrills and fun, however, will continue because...only sport provides "the glorification of chance and the unexpected," the feeling of being truly alive. That a machine such as the airplane can provide such a feeling in a technologically complex and increasingly mechanized and dehumanized world may be ironic, but it is not likely to change.<sup>37</sup>

The easiest and most common way to partake of this new consciousness was simply to witness the images of flight. This occurred in two ways. First, there was what Wohl calls the "spectacle of flight," the visual representations that formed most peoples' experience with aviation before mass commercial air travel.<sup>38</sup> For instance, an aviation correspondent for an English newspaper, witnessing the first flight to cross the English Channel, reported an "overpowering rush of excitement which I find almost everyone has experienced who has seen a man fly. It is an exhilaration, a thrill, an ecstasy...when the machine leaves the ground and with a soaring movement really flies upon its spreading wings, one feels impelled to shout, to rush after it, to do anything which will relieve the overcharged emotion."<sup>39</sup> Later, aviation was coupled with motion pictures, another spectacular technology of the time, to make flyers such as Lindbergh the first modern celebrities. The first Academy Award for Best Picture, in fact, was a 1927 American

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<sup>37</sup> Dominick A. Pisano, "The Greatest Show Not on Earth: The Confrontation between Utility and Entertainment in Aviation," in *The Airplane in American Culture*, ed. Dominick A. Pisano (Ann Arbor: University of Michigan Press, 2003), 69. For instance, the beverage company Red Bull has sponsored an Air World series since 2003 ("History: All You Need to Know About the History of the Red Bull Air Race World Championship," [http://airrace.redbull.com/en\\_US/article/history](http://airrace.redbull.com/en_US/article/history), accessed 22 January 2018).

<sup>38</sup> Wohl, *The Spectacle of Flight*, 4.

<sup>39</sup> Harry Harper, *Daily Mail*, 26 July 1909 quoted in Wohl, *A Passion for Wings*, 66.

silent film set during World War I, *Wings*. Other examples include *The Air Mail* (1925), Disney's *Plane Crazy* (1928), *Hell's Angels* (1930), and *Dawn Patrol* (1930).<sup>40</sup>

In addition to images of flight, the public consumed images enabled by flight. The views captured by airborne cameras were also thought to impact human consciousness. Since vision is our dominant sense, a change in visual perspective influences the cognitive perspectives of individuals and cultures. It was also the dominant mode of sensing the technological sublime, according to Nye.<sup>41</sup> Humans seem to naturally accord authority to the view from above: we fallaciously conflate the difficulty in obtaining the view with its veracity; we perceive aerial images as objective, rational, scientific, and epistemologically sound; and the “God’s eye view” is associated with divinity, superiority, and omniscience.<sup>42</sup> One modern author describes how scientists, artists, and politicians had engaged the aerial view for a century and this tradition paved the way for

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<sup>40</sup> Wohl, *The Spectacle of Flight*, 4; Call, *Selling Air Power*, 15; Roger Bilstein, *Flight Patterns: Trends of Aeronautical Development in the United States, 1918-1929* (Athens, GA: University of Georgia Press, 1984), 150.

<sup>41</sup> Nye, *American Technological Sublime*, 284. Wohl writes “one of the great attractions of flight for the men and women who engaged in it during the 1920s and 1930s was the visual excitement that it offered” (Wohl, *The Spectacle of Flight*, 4).

<sup>42</sup> William L. Fox, *Aereality: On the World from Above* (Berkeley, CA: Counterpoint, 2009), 50-1, 99; Peter Adey, Mark Whitehead, and Alison Williams, eds., *From Above: War, Violence, and Verticality* (New York, NY: Oxford University Press, 2014), 2; Jason Weems, *Barnstorming the Prairies: How Aerial Vision Shaped the Midwest* (Minneapolis, MN: University of Minnesota Press, 2015), xiv. For a critique of the assumptions regarding the “god’s eye view,” see *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (1998) by James C. Scott. Linking Scott’s overconfident statist planners with the ideas of aviation, some “prehistorians” of aviation note that “the will to fly is the will to conquer,” and dreams of flight have always involve power and conflict (even as they are playful) (Berthold Laufer, *The Prehistory of Aviation* (Chicago, IL: Field Museum of Natural History, 1928), 11; Richard P. Hallion, *Taking Flight: Inventing the Aerial Age, from Antiquity through the First World War* (New York, NY: Oxford University Press, 2003).

aviation to become the “twentieth-century Enlightenment project.”<sup>43</sup> Another identifies the view from above as one of the “oldest imaginative resources” in Western intellectual currents.<sup>44</sup> Others show its deep resonance across time and space, pointing to a universal spatial hierarchy across human speech that correlates altitude with value. “Up” is associated with the gods, growth, hope, light, freedom, and ecstasy, as in the feeling of being “on top of the world.” “Down” connotes death, vulgarity, poverty, and the practical, as in “down to earth.”<sup>45</sup> This matches Plato’s hierarchy wherein the “head,” representing rational thought is literally and metaphorically higher than the heart, representing emotions, or the hands, representing the manual labor of *techne*.

Whether the object of the gaze was the aircraft itself or the images it enabled – or just knowing these options were now available to humanity – the experience encouraged many to think beyond conventional limits. In his survey of aviation and culture, Wohl concludes that flight “became a metaphor for the transformation of consciousness, its liberation from the constraints of normal day-to-day existence, and the redefinition of time and space.”<sup>46</sup> A more technologically oriented historian sounded a similar tone in the edited work, *Innovation and the Development of Flight*: “For the twentieth century no set of technological innovations is more intriguing than that associated with aviation...Perhaps no technological development in this century has more fundamentally

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<sup>43</sup> Jeanne Haffner, *The View from Above: The Science of Social Space* (Cambridge, MA: The MIT Press, 2013), 14, 16.

<sup>44</sup> Jean-Marc Besse, “Aerial Geography,” in eds. Alex S. MacLean et al., *Designs on the Land: Exploring America from the Air* (New York, NY: Thames & Hudson, 2003), 339.

<sup>45</sup> Stephen Kern, *The Culture of Time and Space, 1880-1918*, 2nd edition (Cambridge, MA: Harvard University Press, 2003), 242; Bayla Singer, *Like Sex with Gods: An Unorthodox History of Flying* (College Station, TX: Texas A&M University Press, 2003), 14-5. Interestingly, the idiom “on top of the world” is reportedly from 1920, around the same time as the Golden Age of Aviation.

<sup>46</sup> Wohl, *A Passion for Wings*, 162.

transformed human life...[airplanes] brought a sea change [*sic*] in the collective mind-set.”<sup>47</sup>

These notions were first expressed by the *avant-garde*, for whom the airplane became a recurring theme. Consider, as examples, Thomas Hart Benton’s painting *Instruments of Power* with a plane emerging out of a amalgam of mechanical images. It was not merely a new object or a new view, but, in the words of museum art curator Anne Collins Goodyear, a “new understanding of materials and mythologies...the mystical and political dimensions of human flight.”<sup>48</sup> In art, flying served as an inspiration for radical experiments in technique that, like the airplane itself, challenged conventional perspectives. Poets, such as the Italian Gabriele D’Annunzio, wrote about the possibilities of a “vaster life” in which utilitarian concerns could still be subservient to dreams. Thus he called for the invention of a new language to “describe this unprecedented spectacle.”<sup>49</sup> Russian painter and composer Mikhail Matyushin – particularly affected by aviation – issued a manifesto for unconventional art forms that would be intelligible only to those able to lift their minds “with a single stroke of their wings.” Flight also entered the world of popular with the “Lindy Hop” in honor of Charles Lindbergh and the creation of “aerodance,” choreography which was described at

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<sup>47</sup> Roger D. Launius, ed., *Innovation and the Development of Flight* (College Station, TX: Texas A&M University Press, 1999), 4. Mistakenly replacing “sea change” with “see change” is ironic, given the relationship between a new physical perspective and a new psychological perspective.

<sup>48</sup> Anne Collins Goodyear, “The Effect of Flight on Art in the Twentieth Century,” in Roger D. Launius and Janet R. Daly Bednarek, eds., *Reconsidering a Century of Flight* (Chapel Hill, NC: The University of North Carolina Press, 2003), 237.

<sup>49</sup> Gabriele D’Annunzio quoted in Wohl, *A Passion for Wings*, 164-5, 310; Mikhail Matyushin quoted in Wohl, *Passion*, 164.

the time by a Futurist artist as “exaltation of flight...it is a lyrical flight, a flight of the spirit...its movement is beautiful like that of Icarus.”<sup>50</sup>

Beyond the arts, the culture at large also experienced the urge to take the technical achievement of flight and celebrate its ability to raise human imagination and spur spiritual reawakening. In doing so, Wohl concluded that Western society finally achieved “an epic poetry of technological deeds” it had “secretly desired.”<sup>51</sup> Lindbergh epitomized this new era in which American society navigated a machine age without losing its sense of individualism.<sup>52</sup> Charles and Mary Beard used an aircraft image for “The Machine Age” chapter in *The Rise of American Civilization* (1934). Even Lewis Mumford, noted in Chapter One for his criticism of technology, held up aviation as a model for engineering.<sup>53</sup> T. E. Lawrence, already famous for his heroics in WWI and living a comfortable life as a writer, told a companion that aviation was “the only first-class thing that our generation has to do.” When he exclaimed, “everyone should either take to the

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<sup>50</sup> Bilstein, *Flight Patterns*, 149; Anton Giulio Bragaglia quoted in Gerald Silk, “Our Future Is in the Air,” in *The Airplane in American Culture*, ed. Pisano, 285.

<sup>51</sup> Wohl, *A Passion for Wings*, 2, 24. Jeffrey T. Schnapp, a professor of Italian and comparative literature, expresses a similar conclusion: “instinct and science...technical progress and the return to primordial forces...humankind’s final frontier: a last remaining source of mystery, miracles, novelty and the unknown...a last place of transcendence in a resolutely secular age” (Jeffrey Schnapp, “Propeller Talk,” *Modernism/Modernity* 1, no. 3 (September 1994): 170).

<sup>52</sup> John W. Ward, “The Meaning of Lindbergh’s Flight,” *American Quarterly* 10 (Spring 1958): 14-16.

<sup>53</sup> Commentary on plate XI, “Airplane Shapes” (image 1): “the airplane has set the pace for refined and exact engineering” and then comments on how aircraft design improved comfort and power of automobiles and trains as an example of “experimental and possibly somewhat romantic attempt to adapt to surface transportation the advantages of airplane and dirigibles...the airplane has freed the inventor from the stereotypes of wheel-locomotion” (Lewis Mumford, *Technics and Civilization* (London: Routledge & Kegan Paul PLC, 1934), Plate XI).

air themselves or help it forward,” he meant it – enlisting in the RAF under a pseudonym on two separate occasions.<sup>54</sup>

In a study of culture and technology at the end of the twentieth century, one author concluded that flight represented “the one universal directional shift” in humanity’s otherwise variable visions of progress.<sup>55</sup> Echoing those from a century earlier, some recent scholars still claim airmindedness has altered our capacity to “think, feel, and act,” “is central to the modern imagination,” or that “aerial imagination” is the world’s most transformational force, opening up “new cognitive possibilities.” Not surprisingly, flyers themselves often note a broader sense of consciousness.<sup>56</sup> For example, the famous American ace Eddie Rickenbacker wrote of how flying endowed one with a “vision of the air.”<sup>57</sup> The ace wrote the majority of the 1920s cartoon strip, *Ace Drummond*, which was carried in over 100 newspapers, furthering the cultural impact of aviation and, as in Chapter One, showcasing airmen as storytellers.

Airmindedness, therefore, is the *realization* of aviation’s potential, in both senses of the term: to be aware of something and to bring it into reality. Again, those benefits are both practical and psychological. That is, aviation is a tool and a muse; aviation heightens our ability to be industrious and our capacity for imagination. Furthermore, that potential

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<sup>54</sup> T. E. Lawrence quoted in Gat, *A History of Military Thought*, 594; Robert S. Dudley, “Lawrence of Airpower.” *Air Force Magazine* 95, no. 4 (April 2012), 66-70.

<sup>55</sup> Kern, *The Culture of Time and Space, 1880–1918*, 241-2.

<sup>56</sup> Peter Adey, *Aerial Life: Spaces, Mobilities, Affects* (Malden, MA: Wiley-Blackwell, 2010), 9; Mark Dorrian and Frédéric Pousin, “Introduction,” in *Seeing from Above: The Aerial View in Visual Culture*, eds. Mark Dorrian and Frédéric Pousin (London: I.B.Tauris, 2013), 1; Fox, *Aereality*, 3; Schnapp, “Propeller Talk,” 154; Jonathan F. Vance, *High Flight: Aviation and the Canadian Imagination* (Toronto: Penguin Canada, 2002), 101.

<sup>57</sup> Samuel Hynes, *The Unsubstantial Air: American Fliers in the First World War* (New York, NY: Farrar, Straus and Giroux, 2014), 125; Bilstein, *Flight Patterns*, 151.

can be framed at different scales. Its impact on all humanity makes it a global phenomenon. Its employment in warfare frames the story of aviation in terms of nation-states. So far, however, this explanation has focused on the individual. A person can appreciate the impact of flight on human thinking as well as represent the fulfillment of that new thinking. The poles of airmindedness – as a way of thinking – are represented by the technical skills to fly at one end and transformational creativity at the other. Yet, another option exists in between those extremes.

This middle way evokes Thomas Kuhn’s description of paradigms (or, more accurately, what Morgan and this dissertation refer to as the level of “theory” or “school of thought”) that frame both the content and the style of thinking: mental models that establish which problems are legitimate, what methods of solution are valid, and all of the associated terms of discourse that pervade these processes. In this context, an airminded person is attuned to the need to consider aviation as a means to solve problems and the need to solve the problems of aviation. These problems, which include areas such as transportation, commerce, industry, education, and national defense, can be manifested at the individual level or even around humanity itself. Most commonly, however, this version is bracketed by national borders.

Those national brackets are very explicit in one of the earliest synoptic studies of aviation, sociologist William Ogburn’s 1946 work, *The Social Effects of Aviation*. Examining technological trends, he argued that aeronautics would continue to advance “our social heritage,” by which he meant the development of governmental power. By increasing “opportunities for greater efficiency and usefulness” of the state, aviation

would naturally lead to larger administrative units. This, according to Ogburn, even included the possibility for “a single political organization of the peoples of the world.”<sup>58</sup>

Scholars since Ogburn have continued to analyze the growth of aviation in specific nations as both a consequence and cause of national development.<sup>59</sup> In every instance, the airplane could deliver an interrelated set of physical and psychological benefits to the country. Airplanes enabled large-scale government endeavors such as infrastructure projects, urban planning, or internal security. Another example of the advantages aviation could deliver was the benefit to manufacturing. Aviation stimulated production where advanced industries already existed and in places that performed the extensive work of producing aircraft under license. Respectively, this reflected national attitudes that had already embraced industrialization and altered such attitudes in places heretofore resisting it. In some cases, aviation was able to improve communications across large distances or rough terrain. In places such as Canada, Russia, and South America, this capability cultivated nationalism among a widely dispersed population. Similarly, in 1928, a businessman in Kenya pleaded with an Englishman to “educate the

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<sup>58</sup> William Fielding Ogburn, *The Social Effects of Aviation* (Boston, MA: Houghton Mifflin Company, 1946), 705.

<sup>59</sup> As examples, see *England and the Aeroplane* (Edgerton, 1991), *A Nation of Fliers* (Fritzsche, 1992), *Conquistadors of the Sky* (Hagedorn, 2010), *Dictatorship of the Air* (Palmer, 2006), or *High Flight* (Vance, 2002). Most of these works, citing Corn and sometimes Wohl, use “airmindedness” to label the enthusiastic appreciation of the power of flight to impart tangible and intangible advantages onto a nation. Palmer alters the term, offering a nuanced distinction between “airminded” and “airmindedness.” The first is still about enthusiasm. The second is about the specific ways a culture nurtures and expresses that enthusiasm.



people...in ‘air-mindedness’” so they would become more aware of how the airplane could help the colonialists conquer the problems of time and distance in Africa.<sup>60</sup>

Another important practical benefit of aviation was the ability to use air forces to achieve national military objectives. For example, the Chinese government applied air power internally throughout their civil war with the communists. In the case of the British mandates in the Middle East, airplanes played an important role as instruments of colonial control. Such air-mindedness not only imparted a sense of security and patriotic pride in the nation’s aerial prowess, often showcased in airshows, but sometimes led to an outright sense of national superiority.<sup>61</sup> As the airplane was the quintessential symbol of modernity, states eagerly sought to establish national airlines and viable air forces. To stunt the growth of aviation would endanger the cultural renaissance many anticipated, and was tantamount to relinquishing a nation’s global power. It may even invite attack from others with more advanced air power.

Aviation’s military potential reveals the dark side of air-mindedness not captured in the dictionary definition. For all of its practical and psychological benefits, whatever power it conferred was also available to one’s enemies. Appreciating the potential of aircraft meant individuals and nations needed to prepare to mitigate its dangers instead of merely cultivating its promise.<sup>62</sup> Therefore, an air-minded nation could also be one that was aware of how this new weapon increased its vulnerability. This ambivalence is well

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<sup>60</sup> Murray F. Sueter, *Airmen or Noahs: Fair Play for our Airmen; The Great ‘Neon’ Air Myth Exposed* (London: Isaac Pitman & Sons, 1928), 296.

<sup>61</sup> On airshows, see Gordon Pirie, Gordon, “British air shows in South Africa, 1932/33: ‘Air-mindedness,’ Ambition and Anxiety,” *Kronos* 35, no. 1 (November 2009): 48-70.

<sup>62</sup> Contemporaries would not have used “air-mindedness” to describe this decidedly unenthusiastic aspect of aviation, but scholars such as Holman and Fritzsche have profitably extended the term. Contemporaries would, however, agree with these two that this “air-mindedness” could obtain on the ground.

illustrated by British sentiments during the interwar years, when aviation was viewed as both the threat and the solution to national defense of the isles.<sup>63</sup> Indeed, many airminded individuals, in and out of uniform, made passionate arguments for military air power.

In WWI, combatants explored almost every way the airplane could be employed in warfare. Still, there was not enough empirical evidence to support one theory of air power over another. While some postulated that independent bombing missions targeting the enemy's ability to support its own forces could have a decisive effect, they were unable to prove those ideas before the armistice. When war ended in 1918, the fledgling American air forces had only performed 150 bombing missions.<sup>64</sup> Even the oft-cited airpower contribution at the battle at Saint-Mihiel was really just a large use of tactical airpower.<sup>65</sup> The lack of experience did not dissuade advocates of strategic bombing.<sup>66</sup> As the next chapter will describe, they continued to develop their theory, likening the enemy system to a web; a web in which the destruction of critical points would lead to catastrophic failure of the entire system. As odd as the juxtaposition may seem, there was an element of playfulness in this approach, because Airmen did not presume to know exactly where and how much destruction this required. It would be a matter of trail and error. In fact, considered in total, air power itself was handled with an element of Icarian

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<sup>63</sup> Brett Holman, "The Next War in the Air: Civilian Fears of Strategic Bombardment in Britain, 1908-1941" (PhD diss., University of Melbourne, 2009), 12. For another example, see Peter Fritzsche, "Machine Dreams: Airmindedness and the Reinvention of Germany," *The American Historical Review* 98, no. 3 (June 1, 1993): 685–709.

<sup>64</sup> Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base, AL: Air University Press, 1989), 26-27.

<sup>65</sup> Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven, CT: Yale University Press, 1987), 19.

<sup>66</sup> "Billy" Mitchell, introduced below, boasted: "I was sure that if the war lasted air power would decide it" (quoted in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, vol. 1 (Maxwell Air Force Base, AL: Air University Press, 1989), 27).

play. That is, Airmen explored a variety of ways air power could be used to revolutionize warfare. Despite a diversity of ideas, their common thread was the airminded assumption that aviation technology was a powerful transformative agent of change.

### The Image of Icarus

This survey above demonstrates that airmindedness is much more than just the enthusiastic support for aviation. To be airminded is to be aware of aviation's multidimensional possibilities – physical and psychological; positive and negative; individually, nationally, and globally – as well as the degree that aviation's potential is achieved in practice. In other words, in the interwar period, to be airminded could be any combination of its two symbols, Daedalus and Icarus.

Icarus perishes of his own imprudence, making him an odd candidate for anyone to celebrate. But, just as definitions of airmindedness evolve and diverge, so too does the retelling and reinterpretation of myth. This particular story has undergone multiple iterations and revisions, including versions in which Icarus survives the fall. Some accept the conventional ending but reverse the moral of the allegory, valuing Icarus for his boldness, his creativity, his playfulness, and as Ovid himself put it, his “daring art.”<sup>67</sup> The boy variously symbolizes innovation, genius, passion, and even a spiritual savior (mirroring the *logos* of Jesus Christ).<sup>68</sup> A nineteenth century historian surmised that, in the Romantic Movement, “The fate of Icarus frightened no one. Wings! wings! wings! they cried from all sides, even if we should fall into the sea. To fall from the sky, one

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<sup>67</sup> Nyenhuis, *Myth and the Creative Process*, 46-7, 54; Ovid quoted in Boitani, *Winged Words*, 33. Overall, there is “rich diversity of interpretation and creative expression” surrounding the myth of Icarus and Daedalus (Nyenhuus, *Myth and the Creative Process*, 45).

<sup>68</sup> Boitani, *Winged Words*, 35, 46; Nyenhuis, *Myth and the Creative Process*, 53, 44-6.

must climb there, even for but a moment, and that is more beautiful than to spend one's whole life crawling on the earth."<sup>69</sup>

The myth has had special attraction for twentieth century artists who recognized its implications in the era of air and space travel.<sup>70</sup> For the poet Gabriel D'Annunzio, flying's potential for death was the very reason it could produce a sublime experience.<sup>71</sup> He also revised the story, portraying Icarus as the creative genius behind the idea to escape using manufactured wings. Daedalus is still the master craftsman, but his son is the inspiration. Their mutual dependence – that is, the robust concept of *techne* before Plato's redefinition – is highlighted by the end of the myth cycle: without his son, the wings become the father's last great invention.

Artists and writers were not the only ones to adopt – and adapt – the image of Icarus. Some psychologists treat the Icarian urge to explore as a vital stimulus to human maturation.<sup>72</sup> Studies of playfulness show how it is associated with resilience, creativity, adaptability, inquisitiveness.<sup>73</sup> One researcher situates play at the center of a quest for self-realization, which he describes in ways that match the description of *metis*.<sup>74</sup> Early

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<sup>69</sup> Theophile Gautier quoted in Nyenhuis, *Myth and the Creative Process*, 53.

<sup>70</sup> Nyenthuis, xvii. Wohl's *Passion for Wings* reproduces a painting of "a defiant Icarus [as he] spreads his wings to protect his twentieth-century heirs," aviators in the earliest aircraft models (262).

<sup>71</sup> Wohl, *A Passion for Wings*, 66, 263.

<sup>72</sup> Nyenthuis, *Myth and the Creative Process*, 56.

<sup>73</sup> Barnett, L. & Owens, M. "Does play have to be playful?" in *The Handbook of the Study of Play*. Eds. James E. Johnson et al., (Lanham, MD: Rowman & Littlefield Publishers, 2015), 453-459); Stuart Brown and Christopher Vaughan, *Play: How It Shapes the Brain, Opens the Imagination, and Invigorates the Soul* (New York, NY: Avery, 2010), 5; René T. Proyer and Willibald Ruch, "The Virtuousness of Adult Playfulness: The Relation of Playfulness with Strengths of Character," *Psychology of Well-Being: Theory, Research and Practice* 1 (October 24, 2011), 4.

<sup>74</sup> Thomas S. Henricks, "Play as Self-Realization: Toward a General Theory of Play," *American Journal of Play* 6, no. 2 (Winter, 2014) 190-213.

airmen rarely invoked the image of Icarus explicitly. The same is true of Daedalus. They did not, however, ignore the spirit of either.

### US Military Airmindedness through World War II

During the first half of the twentieth century, American advocates for military air power capitalized on an idea that already had high social currency. Even though leaders in the nascent US air service demonstrated the enthusiasm that was later termed airmindedness, the best examples are three individuals whose own airmindedness emerged in the same period as the term itself: Alexander P. de Seversky, William “Billy” Mitchell, and Harold “Hap” Arnold. Each appreciated the potential of aviation for national development and as a novel way of approaching the problems of war. At the same time, they *realized* aviation’s interconnections to innovation and creativity. While this led to some specific ideas for air warfare (discussed in Chapter Three), the point here is how their airmindedness played out in their recommendations for the US defense establishment and for the character of warfare; namely, promoting a separate air service capable of winning wars through independent strategic bombing.

Mitchell is the best-known “martyr” for the gospel of military air power. He eagerly sought and was eventually granted a position among the first military aviators. Then, during WWI, he commanded all American air combat units in France. Following his experiences in Europe, Mitchell was convinced that building a fully developed air force was a national imperative. He passionately worked out a theory while serving as an Army Staff College instructor.

Emulating Alfred Thayer Mahan’s earlier plea for a “seafaring” nation, an argument that helped stimulate a worldwide naval arms race in the late nineteenth

century, Mitchell saw aviation as the key to the nation's future.<sup>75</sup> And the prerequisite for that development was, naturally, airmindedness—at least airmindedness as an appreciation of aviation's potential. Of course, to realize the advantages of aviation in practice, it was important to have leaders who were airminded in a paradigmatic sense; leaders who could think differently about both the problems of aviation and the problems to be solved by aviation.

Mitchell's own airmindedness comes out most strongly when he is referring to the military, even though air power in this form was only one part of his program. Thus, the foreword to his *Winged Defense* (1925) opened with the claim that “few people outside of the air fraternity itself know or understand the dangers that these men face, the lives that they lead and how they actually act when in the air...what they actually do in improving the science and art of flying and how they feel when engaged in combat with enemy aircraft.” He went on to exclaim, “no one can explain these things except airmen themselves,” and to label senior Army and Navy leaders as “psychologically unfit to develop this new arm to the fullest extent practicable.”<sup>76</sup> This sense of exclusive airmindedness and urgency of the cause justified his accusations of the War and Navy departments, claiming their insufficient attention to aviation's promise demonstrated “incompetency, criminal negligence, and almost treasonable administration.”<sup>77</sup> This comment led directly to his court-martial in 1925. Found guilty of insubordination,

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<sup>75</sup> Mark Clodfelter, “Molding Airpower Convictions: Development and Legacy of William Mitchell's Strategic Thought” in *The Paths to Heaven: The Evolution of Air Power Theory*, ed. Phillip S. Meilinger (Maxwell Air Force Base, AL: Air University Press, 1997), 101.

<sup>76</sup> William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power* (Tuscaloosa, AL: University of Alabama Press, 2009), vii, 21.

<sup>77</sup> “Both Insubordination and Folly,” *New York Times*, 1925.

Mitchell refused to remain silent out of uniform. His credibility, however, was permanently damaged, and others such as Alexander P. de Seversky took up the cause.<sup>78</sup>

In his 1942 work, *Victory Through Airpower*, which was dedicated to Mitchell, de Seversky showcased his own airmindedness:

I want to focus attention on the *new principles of warfare* shaped by the emergence of military aviation...a dynamic, expanding force, the growth of which must be anticipated by *courageous minds*. It happens to be a force that *eludes static, orthodox minds* no matter how brilliant they may be. *Air power speaks a strategic language* so new that translation into the hackneyed idiom of the past is impossible. It calls not only for new machines and techniques of warmaking but for *new men unencumbered by routine thinking* [emphasis added].<sup>79</sup>

Later in the book, which was turned into a World War II propaganda film by Walt Disney, de Seversky referred to those who were “aviation-minded” as “emancipated minds.” In contrast, those “raised in totally different traditions,” that is, those in the Navy or Army, “seem psychologically incapable of recognizing aviation in its primary character as the new military force which...dominates the world.” Instead, they merely “tolerate [semi-independent military aviation] as a concession to modernity [and] the spirit of the times.”<sup>80</sup> Although much more modest in its tone, this claim is corroborated by US Army psychologists in the North African campaign of 1942-43 who noted how the airplane – the “central unifying force” among Airmen – transformed the thinking of Air Corps officers.<sup>81</sup>

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<sup>78</sup> Alfred F. Hurley, *Billy Mitchell: Crusader for Air Power* (Bloomington, IN: Indiana University Press, 2006), 10.

<sup>79</sup> Alexander P. de Seversky, *Victory Through Air Power*, Book Club edition (New York, NY: Simon and Schuster, 1942), 5-6.

<sup>80</sup> De Seversky, *Victory Through Air Power*, 84, 219-20.

<sup>81</sup> Roy R. Grinker and John Paul Spiegel, *War Neuroses in North Africa; the Tunisian Campaign, January-May 1943* (New York, NY: Josiah Macy, Jr. Foundation, 1943), 99-

The third example, “Hap” Arnold, believed in a unique, air-minded way of thinking. He exhibited such thinking himself in his writings and his professional duties. Along the way to becoming the Commanding General of the Army Air Forces, he promoted air-mindedness by granting interviews with journalists and coupling his organization to the embryonic aerospace industry. He was also an avid storyteller, publishing multiple works for popular audiences.

Arnold’s publications include three works co-authored with fellow Airman Ira Eaker: *This Flying Game* (1936, reprinted 1943), *Winged Victory* (1941), and *Army Flyer* (1942). He also independently wrote books for children, including the series mentioned earlier, *Bill Bruce and the Pioneer Aviators* (1928). Additionally, after his retirement in 1946, he published another book, *Global Mission* (1949). Throughout all of his promotional writings, Arnold presented “this new and thrilling game” as the last frontier for adventure and romance for air-minded youth.<sup>82</sup> In giving career advice to Airmen, he highlighted themes of awe, enhanced cognition, novelty, and perspective:

*Flying offers the greatest recompense to the human being; ...he sees [the world] in broader outline...As his knowledge and his vision is greater, so also are his responsibilities, the requirements of his profession. No other fighter is so alone as the airman who rides above the clouds in the vastness of the sky...He has more duties to perform in any other fighter; they are more complicated and less normal to simple pursuits...The terrific pace and speed of air combat calls for a mental alertness and muscular reaction wholly foreign to all the other pursuits of man either military or nonmilitary...The normal rules of human kind are indoctrinated by long practice...Not so with military aviation. Many of the requirements of the aviator and combat are new, strange and unusual [emphasis added].<sup>83</sup>*

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100. This resurfaces in Air Force Manual (AFM) 1-1, Volume II, *Basic Aerospace Doctrine* (March 1992) as discussed in Chapter Four.

<sup>82</sup> Henry H. Arnold, *This Flying Game* (Funk & Wagnalls, 1936), xviii-xix.

<sup>83</sup> Henry H. Arnold and Ira C. Eaker, *Army Flyer* (Harper & Bros., 1942), 8-9.



Months prior to his retirement and soon after WWII, in his capacity as the head of the air service, Arnold delivered the *Third Report of the Commanding General of the Army Air Forces to the Secretary of War*. In the chapter titled “Air Power and the Future,” he wrote a line – much quoted in USAF doctrine – that also revealed his grasp of the other dimensions of air-mindedness. “Since military Air Power depends for its existence upon the aviation industry and the air-mindedness of the nation,” Arnold wrote, “the Air Force must promote the development of American civil Air Power in all of its forms, both commercial and private.”<sup>84</sup> Unlike those who treat air-mindedness as an actualized condition, he differentiated capacity (“aviation industry”) from society’s appreciation of why that capacity is a worthy investment (“air-mindedness of the nation”). Like Mahan and Mitchell, he connected military power with its civilian counterpart and, more importantly, he linked both to the nation’s overall security and prosperity.

For Mitchell, de Seversky, and Arnold, the United States needed to realize the significance of the airplane. Commerce, diplomacy, and defense all required aviation power. In turn, aviation required air-minded individuals who appreciated its capabilities and could approach these issues with new, creative perspectives. Thus, while not explicitly employing the same celebratory, inspirational language used by the cultural

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<sup>84</sup> Henry H. Arnold, *Third Report of the Commanding General of the Army Air Forces to the Secretary of War*, 12 November, 1945 (Washington, D.C.: Government Printing Office), 70. This is essentially the same line he used in a 1946 article for *National Geographic Magazine* (February 1946, 193). Also, in “If War Comes Again,” he stated, “an air-minded public is the broad base of American air power” (*New York Times Magazine*, 18 November 1945, 39). Note that Arnold’s “air power” is equivalent to my use of “aviation power,” since current usage associates air power with military aviation. Mitchell’s usage, however, matches his protégés when he wrote “air power...is, and will be, a dominating factor in the world’s development” (Mitchell, *Winged Defense*, 119).

*avant-garde*, they certainly endorsed a sense of airminded thinking as radically different. Indeed, *Proficimus More Irretenti* was the motto of the Air Corps Tactical School: “We Make Progress Unhindered by Custom.”<sup>85</sup>

Custom is what inhibited military officers in other services from taking full advantage of air power. Their lack of airmindedness seemed to stunt, at least in the eyes of Airmen, the ability to realize the myriad ways in which aviation technology could and should alter the character of war. Most famously, but not exclusively, this manifested in the idea of strategic bombing – a theme in the next chapter. Given the widely-held perception that industrialized cities consisted of tightly coupled infrastructure, then aircraft could hypothetically fly straight to the most critical points in this web and win conflicts decisively by disrupting the enemy’s ability to wage war. This, of course, required airminded military leaders, and the sketch above clearly shows that Airmen sensed no such consolation in the existing defense establishment.

Early Airmen’s drive for organizational independence was therefore a natural, seemingly inevitable, path for the air power narrative to take. It was not as self-interested as some authors charge.<sup>86</sup> Indeed, airmen’s logic appeared self-evident: aviation

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<sup>85</sup> Robert T. Finney, *History of the Air Corps Tactical School 1920-1940*, 3rd edition (Arlington, VA: Air Force History and Museums Program, 1998), v.

<sup>86</sup> For more historical analysis on this institutional thesis – which sometimes has the distinct hint of a predetermined narrative – see Clodfelter, Biddle, Moy, and Franklin (Mark Clodfelter, *Beneficial Bombing: The Progressive Foundations of American Air Power, 1917-1945* (Lincoln, NE: University of Nebraska Press, 2013); Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas About Strategic Bombing, 1914-1945* (Princeton, NJ: Princeton University Press, 2002); Timothy Moy, *War Machines: Transforming Technologies in the U.S. Military, 1920-1940* (College Station, TX: Texas A&M University Press, 2001); H. Bruce Franklin, “‘Peace is Our Profession’: The Bombers Take Over” in *The Airplane in American Culture*, ed., Dominick A. Pisano (Ann Arbor, MI: University of Michigan Press, 2003)).

technology conferred new capabilities and new perspectives to those who were air-minded; only air-minded individuals could direct air power's growth and subsequent employment, all others were stuck in the past; and to realize its revolutionary possibilities, including the ability to win wars through independent bombing campaigns, this technology must be given its full respect in an autonomous air force. Until then, Airmen would continue work somewhat "under the radar" to turn their ideas – including, but not limited to strategic bombing – into specific operational theories, based on the larger sense of air-mindedness's problems and possibilities.

### Conclusion

The exponential growth of aviation technology throughout the first half of the twentieth century demonstrates two points. First, many found those arguments persuasive and acted upon them. Second, advocates for military air power had to formulate theories – without the benefit of empirical examples – regarding how to employ air power. It is a task of noted difficulty, even by someone as eloquent as Winston Churchill, who claimed, "Air-power is the most difficult of all forms of military force to measure, or even to express in precise terms."<sup>87</sup> Yet, the historical record implies there is something about airmen's ability to understand, if not fully communicate in their stories, the potential of their revolutionary technology. As one WWI flyer asserted, airmen naturally have "a different point of view, a new perspective, a more consistent aim coordinating and correlating circumstances and conditions for the common good."<sup>88</sup> Or, to cite a much

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<sup>87</sup> Winston S. Churchill, *The Gathering Storm*, Vol. I (Boston, MA: Mariner Books, 1986), 100.

<sup>88</sup> Cecil Lewis, *Sagittarius Rising* (London: Penguin, 1977), 83. The book was first published 1936.

earlier source, the sixth century poet Boethius declared that the very idea of flying offers “wings to your mind.”<sup>89</sup>

In WWI, such flights of fancy were manifested in airmen’s playful behaviors and particularly in their storytelling. In the interwar period, “airmindedness” captured an even deeper realization of aviation’s possibilities, and airminded officers reflected a combination of its twin dimensions: the image of Icarus counterbalanced that of Daedalus. Airmen, although not aspiring to the artistry some called for, began to play with the possibilities of air power and craft theories. Furthermore, like the social life of WWI aircrew and interwar airmindedness, these theoretical stories emerged from a paradigm shaped by technology. Specifically, while the *range* of aircraft enabled the first military airmen to practice Dionysian behaviors between missions, the *altitude* at which they operated conferred a different perspective upon interwar theorists. The perspective was not only physical, but also psychological. In their mind, the enemy was a system – a system that could be breached without repeating the horrors of the stalemated battle lines. It would be an approach based on technological innovation and strategic playfulness; it would enact destruction, but selectively, and for cumulative effect. It would, in other words, put Bia in service of Metis.

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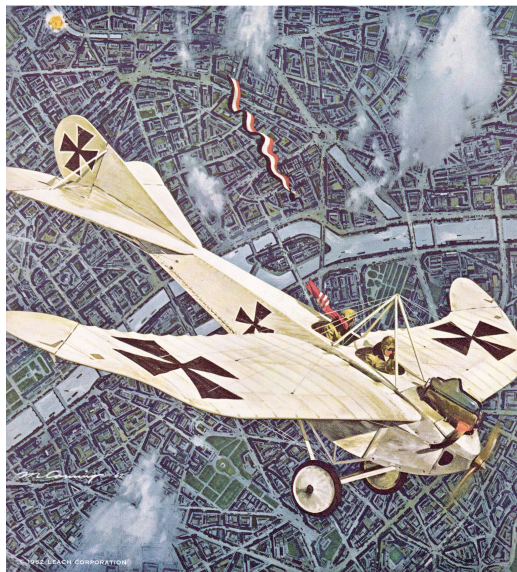
<sup>89</sup> Boethius, *Consolation of Philosophy*, quoted in Nyenhuis, *Myth and the Creative Process*, 40.

## Chapter 3

### Metis And Bia: Air Power Theory



**Figure 3. Section of “Paris Shot Achilles With An Arrow” by Peter Paul Rubens.** The 17th century painting shows the potentially decisive results of precise destruction.



**Figure 4. “The Five o'clock Taube” by Merv Corning, An American Artist (1926 - 2006).** Three centuries after Ruben’s painting, a similar attempt for surgical precision, again delivered through the air, is evident in the upper left-hand corner as a single German aircraft drops three bombs and leaflets on Paris, demanding France’s surrender. The connection between air power and Paris, the mythological character, was made explicit in Basil H. Liddell Hart’s 1925 work, *Paris, or the Future of War*.

*Conventionally, commentators on US Air Force culture claim the institution fosters a focus on the tactical over the strategic, the artifacts of warfare over art of war, and bureaucratic autonomy over institutional integrity. This partial view is often derisively labeled as “technological,” but such accusations overlook the more dynamic themes inherent in that term’s history. To demonstrate these missing elements, which include craftiness, rhetoric, and adaptability, this chapter examines one manifestation of USAF culture: air power theory. As a form of technological knowledge, ideas about the proper employment of US air forces reflect the dual legacy of air-mindedness – a mental flexibility that uses intellectual playfulness to combine technological capabilities for strategic effects. As in the earlier chapters, this metaphorical component of Air Force culture parallels the operational flexibility conferred by the technical qualities of aviation. Indeed, the ability to go almost anywhere, anytime – but not everywhere at once – implies the need to design intelligent theories to guide the use of this powerful, but precious, asset. Indeed, in moments of geopolitical crisis, such as World War II and the first Gulf War, Airmen have successfully lived into the more dynamic connotations of their “technological” mindset. Yet, the standard trope holds true for most of the organization’s life: moments of revolutionary theorizing morph into periods of normalized principles and dogmatic practices. In heralding the creation, but forsaking the creative process, Airmen lose sight of the playful side of their technological paradigm, which cycles back in its dormant state.*

### Introduction

The start of Chapter One displayed a print by artist James Dietz. The image served as the inspiration for the 27th Fighter Squadron’s remodeling of their squadron

bar, what Airmen euphemistically call a “heritage room,” at Langley AFB, Virginia. The Airmen had talked about the renovations for some time, but, amidst the demanding tempo of operations, the project had not begun.

That changed one September morning. Only days after returning from a deployment to enforce the Southern no-fly zone over Iraq, the squadron looked forward to restarting their normal training regiment – and possibly to finally upgrading the modern version of the “officer’s mess.” It would be a long time, however, before normal home station operations returned. In fact, what made the demolition and rebuilding of the bar possible were the 24-hour operations the unit began that day. The changes, in both the bar and in the unit’s daily activities, actually took place against the background of much larger changes in US national security and popular attitudes towards air power.<sup>1</sup>

As the workday began at Langley field, four sets of terrorists were hijacking commercial airliners, and – in a perversion of interwar airmindedness, at least in its optimistic form – would soon turn those airplanes into weapons of mass destruction. The US military command responsible for safeguarding American skies since 1957, the North American Aerospace Defense Command (NORAD), failed to anticipate a threat ever coming from within its borders. Forced to improvise on that Tuesday morning, the air defense response from the command, which is largely run by the US Air Force, was mired by poor communication with external governmental agencies and a lack of

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<sup>1</sup> “27th Fighter Squadron,” Joint Base Langley-Eustis, accessed January 25, 2018, <http://www.jble.af.mil/About-Us/Fact-Sheets/Display/Article/257733/27th-fighter-squadron/>; Keith “Squat” Feaga, Col., USAF (ret.), e-mail message to author, 25 January 2018. The author was a member of the squadron from July 2002 to September 2004, and participated in many of the ongoing air defense sorties that began that morning under the name Operation Noble Eagle. Also, the 27th Fighter Squadron was originally the 27th Pursuit Squadron mentioned in Chapter One.

coordination within its various units. Some squadrons launched without weapons capable of destroying a commercial airliner, or without clear instructions. The F-15s of the 27th, for example, were vectored to Washington, D.C. and directed to search all approaches to the capitol. Other units, who had been on air defense alert, were scrambled. All the Airmen's efforts were to no avail, a story that has been well documented.<sup>2</sup>

Despite a directive preventing any fighter aircraft from firing upon hijacked aircraft, even if they had intercepted them, the USAF faltered in the eyes of many.<sup>3</sup> The combat that followed in Afghanistan displayed a novel coordination between air power and special forces operating on the ground, but congratulatory reactions were soon overshadowed by events in Iraq.<sup>4</sup> Far from the robust, well-publicized air campaign that prepared the way for the ground offensive during Operation Desert Storm in 1991, there were no press conference videos of guided weapons to awe Americans. The only

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<sup>2</sup> "Kamikaze: F-16 Pilots Planned to Ram Flight 93," msnbc.com, September 9, 2011, [http://www.nbcnews.com/id/44459345/ns/us\\_news-9\\_11\\_ten\\_years\\_later/t/kamikaze-f-pilots-planned-ram-flight/](http://www.nbcnews.com/id/44459345/ns/us_news-9_11_ten_years_later/t/kamikaze-f-pilots-planned-ram-flight/); "Could Fighter Jets Have Stopped 9/11 Attacks?," msnbc.com, June 15, 2004, [http://www.nbcnews.com/id/5215957/ns/us\\_news-security/t/could-fighter-jets-have-stopped-attacks/](http://www.nbcnews.com/id/5215957/ns/us_news-security/t/could-fighter-jets-have-stopped-attacks/); Michael Bronner, "9/11 Live: The NORAD Tapes," The Hive, accessed January 25, 2018, <https://www.vanityfair.com/news/2006/08/norad200608>; National Commission on Terrorist Attacks, *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks Upon the United States Including the Executive Summary* (Baton Rouge, LA: Claitor's Law Books and Publishing, 2004), 465. This led to many conspiracy theories about the US government's foreknowledge of the attacks ("Our Porous Air Defenses on 9/11." *New York Times*, 13 Aug. 2006, WK9, [www.nytimes.com/2006/08/13/opinion/13sun2.html](http://www.nytimes.com/2006/08/13/opinion/13sun2.html)).

<sup>3</sup> National Commission on Terrorist Attacks, *The 9/11 Commission Report*, 14-45; Thomas H. Kean and Lee H. Hamilton, *Without Precedent: The Inside Story of the 9/11 Commission* (New York, NY: Vintage, 2007), 259-62; "Aircraft Piracy (Hijacking) And Destruction Of Derelict Airborne Objects," Chairman Of The Joint Chiefs of Staff Instruction J-3 CJCSI 3610.01a, 1 June 2001, A-1.

<sup>4</sup> For more on the "Afghan Model," see Stephen Biddle, "Afghanistan and the Future of Warfare," *Foreign Affairs* 82, no. 2 (Mar-Apr, 2003): 31-46 or Max Boot, "The New American Way of War." *Foreign Affairs* 82, no. 4 (Jul-Aug, 2003), 41-58.



preemptive air strike in Operation Iraqi Freedom was a single mission of two aircraft. The attempted decapitation strike against Saddam Hussein failed, not because the underground bunkers were empty, but because the bunkers did not even exist. The air operations that followed – as operationally successful as they were – did not play the leading role during the three weeks of major combat operations. There was no repeat of the independent air campaign, and most of the embedded journalists told the story of the ground forces. Even if air power had been more visible to the US public, in the subsequent morass, kinetic air power seemed to be the least relevant use of military might.

Secretary of Defense Robert Gates, speaking in 2008 at Air University (the USAF organization for post-graduate education), observed that getting Airmen to adapt to counterinsurgency was “like pulling teeth.”<sup>5</sup> Around the same time, General James Mattis, Commanding General of the US Joint Forces Command, dealt another blow to the US Air Force and a keystone of airmen’s doctrine, Effects-Based Operations (EBO). The 2006 Israel–Hezbollah War and a US military assessment both seemingly invalidated the model, which presumed that particular strategic outcomes could be predetermined by the application of precise and minimal force. In the aftermath, Mattis made a bold and public pronouncement against it.<sup>6</sup> Criticism of the USAF even went as far as calls for its

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<sup>5</sup> Charles J. Hanley, “Air Force Must Do More for War, Gates Says,” msnbc.com, April 21, 2008, [http://www.nbcnews.com/id/24238978/ns/world\\_news-mideast\\_n\\_africa/t/air-force-must-do-more-war-gates-says/](http://www.nbcnews.com/id/24238978/ns/world_news-mideast_n_africa/t/air-force-must-do-more-war-gates-says/). [http://www.nbcnews.com/id/24238978/ns/world\\_news-mideast\\_n\\_africa/t/air-force-must-do-more-war-gates-says/#.WlOJOJM-f6A](http://www.nbcnews.com/id/24238978/ns/world_news-mideast_n_africa/t/air-force-must-do-more-war-gates-says/#.WlOJOJM-f6A)

<sup>6</sup> Office of the Secretary of Defense, “Joint Capability Technology Demonstration: Advanced Concept Technical Demonstration of Theater Effects Based Operations” (February, 2010), [http://www.dtic.mil/descriptivesum/Y2011/OSD/stamped/0603648D8Z\\_PB\\_2011.pdf](http://www.dtic.mil/descriptivesum/Y2011/OSD/stamped/0603648D8Z_PB_2011.pdf); William M. Arkin, *Divining Victory: Airpower in the 2006 Israel-Hezbollah War* (Maxwell Air Force Base, AL: Air University Press, 2007), xix. “It

dissolution as a separate service.<sup>7</sup> Critiques against American air power are not new and, in fact, link to a long history of disparaging those who specialize in projecting tactical force over distance.

In primitive warfare, missile warfare was ubiquitous, but seldom decisive. Prehistoric battles tended to start with a volley of projectiles such as stones, spears, or arrows. Sometimes no further escalation occurred. These confrontations demonstrated strength and resolve. In other words, they were coercive, exacting little destruction from either side. The most deadly form of warfare came from surprise raids. These infrequent, but intense, assaults capitalized on the attackers' ability to mass forces at an enemy vulnerability.<sup>8</sup>

As civilizations grew bigger and politically, socially, and technologically more sophisticated, wars grew in terms of duration, distance, and destruction. The open battlefield replaced stealthy raids. Sporadic, but horrific, battles became the conventional means of deciding political contests.<sup>9</sup> Within these encounters, belligerents eschewed coercion. Instead, they concentrated destruction into a single event wherein forces literally clashed into one another until a victor was obvious. Opposing sides willingly endured great costs to secure increasingly valuable, increasingly accumulated resources

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is my view that EBO has been misapplied and overextended to the point that it actually hinders rather than helps joint operations” (J. N. Mattis, “Memorandum for US Joint Force Command” (Washington D.C., 14 Aug. 2008), 1).

<sup>7</sup> For example, see Robert M. Farley’s *Grounded: The Case for Abolishing the United States Air Force* (2014).

<sup>8</sup> Azar Gat, *War in Human Civilization* (Oxford: Oxford University Press, 2008), 115-7, 124, 135.

<sup>9</sup> Victor D. Hanson, *The Western Way of War: Infantry Battle in Classical Greece*, 2nd edition (Berkeley, CA: University of California Press, 2009), 17, 198.

of another people.<sup>10</sup> In this pursuit of decisiveness, there was no place for subterfuge or stratagems, but only force against force. Likewise, there was no place for the missileers' kinetic effects at a distance, at least amongst the celebrated elements of warfare: killing – heroic killing, worthy of honoring in stories – occurred in close quarters.

Warfare is inherently about organized violence, and the bond amongst members of a warring group has always been strengthened by storytelling. Naturally, those stories often revolved around accounts of fighting. Indeed, the earliest known oral epics revolve around such tales, with Homer's poems perhaps the most obvious example.<sup>11</sup> A common theme of those stories is the denigration of projectile warfare. For example, Paris is the only major character in *The Iliad* who uses a bow. He is chastised by others for it, as when another character states, "My way is not to fight my battles standing far away from my enemies."<sup>12</sup> Some scholars even assert the preference for this close-in, destructive, decisive character of warfare as a distinct Western way of war.

In the preface to his *The Western War of War*, Victor David Hanson acknowledges "that the Greeks' stark way of battle left us with what is now a burdensome legacy in the West: the presumption that battle [should be] a no-nonsense,

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<sup>10</sup> Gat, *War in Human Civilization*, 186.

<sup>11</sup> Gat, *War in Human Civilization*, 185.

<sup>12</sup> Robert L. O'Connell, *Of Arms and Men: A History of War, Weapons, and Aggression* (New York, NY: Oxford University Press, 1990), 48. This sentiment is found throughout the history of warfare. For example, French armies of the Middle Ages exhibited what historian A. T. Hatto called a "noble prejudice" against archery, despite repeatedly witnessing its efficacy (quoted in Rick Fields, *The Code of the Warrior in History, Myth, and Everyday Life* (New York, NY: Harpercollins, 1991), 312). McNeill describes a similar bias against the advancements in artillery (William Hardy McNeill, *The Pursuit of Power: Technology, Armed Force, and Society Since A.D. 1000* (Chicago, IL: University of Chicago Press, 1984), Chapter Five).

head-to-head confrontation between sober enemies.”<sup>13</sup> What was intended to be too brutal to be continuous instead morphed into something else when transported into a different context. Thus, by World War I, obsession with the decisive battle combined with the means supplied by industrialization to yield its opposite: a war of continuous, stalemated bloodletting that was ultimately decided by politicians instead of military victory. The appalling conditions of trench warfare threatened to wipe away any vestige of the heroic idealism associated with decisive battles.

There was one group of fighters who seemed to escape the corruption of modern warfare: the airmen who rose above the trenches to become celebrated as the knights of the air. For instance, British statesman David Lloyd George famously admired aviators as “the knighthood of the war, without fear and without reproach. They recall the old legends of chivalry, not merely the daring of their exploits, but by the nobility of their spirit, and amongst the multitudes of heroes, let us think of the chivalry of the air.”<sup>14</sup> Yet, instead of descending from hoplite infantry, as the knights had, pilots could more accurately be described as the modern version of the original throwing warriors. Even if their modes of destruction were not as thorough as direct combat, both projected physical effects to achieve a coercive, psychological effect.<sup>15</sup> While characters in *The Iliad* may

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<sup>13</sup> Hanson, *The Western War of War*, xi.

<sup>14</sup> Quoted in Dominick A. Pisano, Thomas J. Dietz, and Joanne M. Gernstein, *Legend, Memory, and the Great War in the Air* (Seattle, WA: University of Washington Press, 1992), 29). In fact, hundreds of fighter pilots were knighted by their nations (O’Connell, *Of Arms and Men*, 262).

<sup>15</sup> Projecting effects over distance may be so fundamental to humanity that we could also be known as *homo hurler*: the throwing animal. There is a theory that human cognition developed from our unique ability to throw projectiles hard enough, and accurate enough, to kill prey and then consume their nutrient dense organs. Interestingly, the same type of mental representations and forecasting are present in storytelling; both “project” effects across distance. This may be another reason airmen have an aptitude for stories. See

have mocked this indirect approach to warfare, it capitalized on the very trait Homer honored in *The Odyssey*.

Homer's epic poetry has provided images of mythological characters, insights into Greek conceptions of technology, and an exemplar of storytelling, including the most famous accounts of the Trojan War. His epics also illustrate the two fundamental approaches to strategy, based on the goddesses Bia and Metis. Writing in his magnum opus *On Strategy*, the renowned Sir Lawrence Freedman declares "the most powerful dichotomy in all strategic thought was the one first introduced by Homer as the distinction between *bia* and *metis*, one seeking victory in the physical domain and the other in the mental, one relying on being strong and the other on being smart, one depending on courage and the other imagination, one facing the enemy directly and the other approaching indirectly."<sup>16</sup> Homer juxtaposed Metis's intelligence and Bia's strength in his two main characters, Odysseus and Achilles.

Across the entire Western canon, the mortal most identified with *metis* is Odysseus. Though he did employ force at times, his default was, according to Freedman, "indirect and psychological...seeking to confuse, disorient, and outwit opponents."<sup>17</sup> His

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Alfred W. Crosby, *Throwing Fire: Projectile Technology through History* (Cambridge: Cambridge University Press, 2010), 115-24 and William H. Calvin, "Did Throwing Stones Shape Hominid Brain Evolution?," *Ethology and Sociobiology* 3, no. 3 (January 1, 1982): 115-24; L.C. Aiello, "Brains and Guts in Human Evolution: The Expensive Tissue Hypothesis," *Brazilian Journal of Genetics* 20, no. 1 (March 1997), 141-148.

<sup>16</sup> Lawrence Freedman, *Strategy: A History* (New York, NY: Oxford University Press, 2013), 42.

<sup>17</sup> Freedman, 24; Gregory Nagy, *The Best of the Achaeans: Concepts of the Hero in Archaic Greek Poetry* (Baltimore, MD: Johns Hopkins University Press, 1998), 47; Lisa Raphals, *Knowing Words: Wisdom and Cunning in the Classical Traditions of China and Greece* (Ithaca, NY: Cornell University Press, 1992), xii, 193, 213. According to Detienne and Vernant, Homer offers the "first testimony" of *metis* [(Marcel Detienne and

Trojan Horse ruse tipped the war in the favor of the Greeks, but the quintessential example of *metis* is Odysseus's escape from the Polyphemus.<sup>18</sup>

As the Trojan War ends and Odysseus starts his journey home, his ships landed on an island of one-eyed giants. Imprisoned by one of them, Polyphemus, Odysseus crafts a plan. Only the Cyclops can move the stone blocking the prisoners inside a cave so killing Polyphemus would strand them. Having tricked the captor into drinking too much, Odysseus blinds him instead. The next morning, when the giant moves the stone to let his flock graze, the men escape by strapping themselves underneath the sheep. The sophisticated part of the plan plays out next. To ensure that no other Cyclopes pursue him and his men, Odysseus had introduced himself as “no one” during the previous night's drinking. As they flee, the other Cyclopes ask Polyphemus who is responsible for his blindness. He replies, as Odysseus foresaw, “no one,” and they leave him to suffer alone in his apparently self-inflicted pain. Interestingly, in Greek, “no one” is *me tis*, which is phonetically equivalent to *metis*.<sup>19</sup> To Greek audiences, Homer's clever reference would have been obvious.

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Jean-Pierre Vernant, *Cunning Intelligence in Greek Culture and Society*, trans. Janet Lloyd (Chicago, IL: University of Chicago Press, 1991), 12.

<sup>18</sup> Brian Boyd, *On the Origin of Stories: Evolution, Cognition, and Fiction* (Cambridge, MA: Belknap Press, 2010), 260. Alternatively, many cite Book XXIII of *The Iliad*, recounting how a weaker charioteer can overcome his opponents in races despite weaker horses: “It is through *metis* rather than through strength that the wood-cutter shows his worth. It is through *metis* that the helmsman guides the speeding vessel over the wine-dark sea despite the wind. It is through *metis* that the charioteer triumphs over his rival” (Homer quoted in Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 11-6).

<sup>19</sup> Nagy, *The Best of the Achaeans*, 321. Those familiar with the tale know what happens next and may question this episode as an exemplar of *metis*. Odysseus cannot refrain from revealing his identity once safely away from shore. This allows the Cyclops to call upon his father, Poseidon, to curse the mortal. The subsequent obstacles Odysseus faces adds a decade to his journey and thus seemingly contradicts him as a paragon of *metis*. Homer,

In a landmark study, *Cunning Intelligence in Greek Culture and Society* (1978), Marcel Detienne and Jean-Pierre Vernant note the coherence and centrality of *metis*. The concept, they argue, remained fundamentally unchanged for more than a thousand years. The two historians established the most widely accepted interpretation of *metis*: “a type of intelligence and of thought, a way of knowing; it implies a complex but very coherent body of mental attitudes and intellectual behavior which combine flair, wisdom, forethought, subtlety of mind, deception, resourcefulness, vigilance, opportunism, various skills, and experience acquired over the years.”<sup>20</sup> Other scholars have taken up the topic, but the resulting discourse has clarified the concept rather than rejecting it.<sup>21</sup> For example, Odysseus is not the only character in the work that exemplifies *metis*.

Detienne and Vernant focus on masculine activities of seizing, holding, and controlling. This style of thinking is largely predictive, manipulative, and artifactual. Odysseus remains the paragon of this non-passive *metis*, as he seeks a degree of control over outcomes. Martha Nussbaum identified another dimension, equally prevalent in Greek culture, exemplified by Odysseus’s wife, Penelope. This form of *metis* accepts a lack of control and inadequate foresight and thus embraces vulnerability. Its approaches thus privilege social communion, intellectual wonder, and more passive and subtle

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however, employs this as the exception that proves the rule. Odysseus’s mistake serves as a contrast to the consistent thoughtlessness of many other characters as well as highlighting Odysseus’s inner journey of growth. Indeed, he has to show even more restraint upon returning home (see Boyd, *On the Origin of Stories*, 261-265).

<sup>20</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 307, 3-4.

<sup>21</sup> The main challenger is Martha C. Nussbaum, but another major voice – though relatively unacknowledged (judged by footnotes in other works) – is Lisa Raphals (Martha C. Nussbaum, *The Fragility of Goodness: Luck and Ethics in Greek Tragedy and Philosophy*, 2nd edition (New York, NY: Cambridge University Press, 2001); Raphals, *Knowing Words*). My interpretation draws heavily from Raphals’s work, which is admittedly much larger as she then employs the synthesized version to compare Greek and Chinese ideas of cunning intelligence.

designs. While it also relies upon visceral experiences, tacit skills, and indirect approaches to volatile contexts, it is more flexible, organic, and tolerant of uncertainty. If the image of the first is the army general or hunter, then the second is symbolized by a woman weaving fabrics or tending to plants – both requiring cooperation with nature. Instead of the goal-directed behavior of the trapper, it is the process-orientation and provisional growth of an ivy vine. Between the couple, Homer provides a robust portrayal of *metis* and its complementary components, and establishes both as equally important for strategic success.<sup>22</sup> It is an idea with significant ramifications in the history and future of Airmen.

Throughout the literature on *metis* – which remains untapped by either historians of technology or air power theorists – activities described as metic are diverse; from sophistry, weaving, navigation, or politics, to the way an invasive plant spreads, an octopus changes shape and color, or water flows.<sup>23</sup> Yet, the fundamental qualities are always the same. When framed around human agents, as opposed to animals or inanimate materials, the paradigm of *metis* is a psychological orientation towards time, experience, and change. It has cognitive, affective, and social dimensions that, moreover, resonate with the post-Platonic themes highlighted in this project.

*Metis* is a way of thinking that is pragmatic and playful, reasoned and passionate, systemic and yet still specific. It is an instrumental intelligence, meant to resolve a

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<sup>22</sup> Raphals, *Knowing Words*, 207-8, 211, 215, 221, 230; Nussbaum, *The Fragility of Goodness*, 19-20. For example, “The reunion of Odysseus and Penelope ends not with faithful and rejoicing Penelope falling into the arms of triumphant Odysseus but with her final and unassailable test of his identity. Odysseus comes to the surprising and happy realization that Penelope’s *metis* exceeds even his own and that his own attainment is not quite what he thought it was” (Raphals, *Knowing Words*, 211).

<sup>23</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 2, 17-18, 307, 313; Nussbaum, *The Fragility of Goodness*, 20.



particular problem without any insinuation that its solutions are universal or, like speculative philosophy, that any consequent idea is an end in itself. Its methodology toolkit is, like those inaugurating Kuhnian revolutions, a combination of objective logic and subjective inspiration, from both rigorous experimentation and serendipity; a degree of evidence combined with a dose of irrational faith.<sup>24</sup> *Metis* embraces these creative tensions. It cultivates Morgan's mosaic instead of becoming attached to a single image or metaphor that is inevitably partial and perishable. It "bears on fluid situations which are constantly changing and which at every moment combine contrary features and forces that are opposed to each other," according to the authors of *Cunning Intelligence*.<sup>25</sup> Its means are premised on a wicked world: every effort counts because every action or thought alters the context, making the past useful, but not authoritative; all perspectives are partial, both biased and incomplete, making total solutions impossible and making even the most sophisticated solutions merely temporary.<sup>26</sup>

*Metis*, however, does not just accept unresolvable paradox, systemic uncertainty, and unpredictable change, but leverages these conditions to secure an advantage. Its response is a playful one: experimental, improvisational, vigilant, and attuned to how

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<sup>24</sup> Barnouw described this intelligence as being as much "visceral as intellectual," less an "impassive weighing of alternatives," and more a prioritizing of aims or impulses that are most desired. It reflected more "the strength and depth of passion as the work of reason" (Jeffrey Barnouw, *Odysseus, Hero of Practical Intelligence: Deliberation and Signs in Homer's Odyssey* (Lanham, MD: UPA, 2004), 2-3, 33).

<sup>25</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 5, 18.

<sup>26</sup> Gareth Morgan, *Images of Organization* (New York, NY: SAGE Publications, Inc, 2006), 343. Experience of the past serves as to equip the playground of the metic mind, not as principles (Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 14). This approach avoids the very Platonic "teleological fallacy," which Taleb describes as "the illusion that you know exactly where you are going, and that you knew exactly where you were going in the past, and that others have succeeded in the past by knowing where they were going" (Nassim Nicholas Taleb, *Antifragile: Things That Gain from Disorder* (New York, NY: Random House Trade Paperbacks, 2014), 169).

events unfold in time and space. The metic thinker works to disprove her own assumptions as she crafts artful – and often unpredictable – recombinations of ends, ways, and means, in the spirit of *bricolage*. This attitude expects the unexpected and is rewarded for its prescience.<sup>27</sup>

In sharp contrast to these qualities, the protagonist of *The Iliad* is known for his physical courage, strength, and agility in combat. Achilles deplores duplicity, stating, in reference to Odysseus, “I hate like the gates of Hades, the man who says one thing and hides another inside him.”<sup>28</sup> In the same scene, he highlights the failure of subterfuge to

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<sup>27</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 14, 18, 313; Nussbaum, *The Fragility of Goodness*, 82, 300, 310; James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1999), 324, 329, 352; Freedman, *Strategy*, 554-5; Ian Bogost, *Play Anything: The Pleasure of Limits, the Uses of Boredom, and the Secret of Games* (New York, NY: Basic Books, 2016), 47. Chia and Holt emphasize the idea of vigilance in *metis*: “To be vigilant is to remain alive to vague and diverse and seemingly minor occurrences; it is to look beyond the abstract confines of data-based analysis; it is to absorb contradictions; and all of this is *metis*. It becomes a cultivated art for reversing unfavourable or disorienting or even unrecognized situations into ones replete with potential that involves alertness, sensitivity and a peculiar disposition that is particularly attuned to emerging opportunities contained in unfolding circumstances” (Robert C. H. Chia and Robin Holt, *Strategy without Design: The Silent Efficacy of Indirect Action* (Cambridge: Cambridge University Press, 2011), 197). Nussbaum uses phrases such as “wonder and openness,” “room for surprise, room for both the cognitive insecurity and the human vulnerability that the Platonic scientific conception is seeking to avoid,” “orderly mystery,” and yielding to “the tension of distinct and separate beauties” (Nussbaum, *The Fragility of Goodness*, 310, 302, 82). Scott describes *bricolage* as a stochastic method of trial and error yielding “practical solutions without benefit of scientific method.” He also notes, “*Metis*, far from being rigid and monolithic, is plastic, local, and divergent. It is in fact the idiosyncrasies of *metis*, its contextualness, and its fragmentation that make it so permeable, so open to new ideas” (Scott, *Seeing like a State*, 329, 332).

<sup>28</sup> Homer, *The Iliad*, trans. Stephen Mitchell (New York, NY: Atria Books, 2012), VI 307–11. Regarding Dionysius as a metic figure, Detienne and Vernant specifically cite him as lacking in *metis* (Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 279). The image of Greek god used here, however, incorporates a separate tradition in which Dionysius is a more well-rounded character who eventually replaces Zeus: “the Orphic Dionysus indeed represents the total unity of the dispersed, multiple,

bring victory in the Trojan War. Yet, the culmination of that conflict later came with the ruse of the Trojan Horse, a ploy Achilles missed, having been killed during one of his renowned battlefield rages. According to one classicist, Homer's insinuation here and throughout proves that, "the humane heroism of Odysseus, based as it is on intelligence and endurance, is set above the quicksilver glory of Achilles."<sup>29</sup>

To Plato, however, the operative contrast was not between *metis* and *bia* (which evolved into common nouns), but between *metis* and speculative philosophy. The latter, built on the premise of a world amenable to the reason of an elite few, placed the philosopher above all.<sup>30</sup> As earlier mentioned, this included the technician, leading to Plato's redefinition and devaluing of *techne*. While *techne* was devalued, *metis* was discarded. The Platonic paradigm simply could not acknowledge a multi-dimensional, practical intelligence that "applied to situations which are transient, shifting, disconcerting and ambiguous, situations which do not lend themselves to precise measurement, exact calculation or rigorous logic." Philosophers instead focused on less capricious, more reliable matters such as theoretical knowledge amenable to generalizations. Thus, the explicit use of the concept never makes it into the Western canon, thanks to the prejudice of Plato.<sup>31</sup>

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individualized, shifting world over which he comes to extend...of all the Greek deities, his is the only divine career which incorporates this alternating equilibrium, this oscillation between the one and the multiple, the same and the other, between the concentration of the whole and its dispersion" (Detienne and Vernant, 136).

<sup>29</sup> Jenny Strauss Clay, *The Wrath of Athena: Gods and Men in The Odyssey* (Lanham, MD: Rowman & Littlefield Publishers, 1996), 96.

<sup>30</sup> Hence, Plato's "philosopher king" has *techne* regarding the state as a ship (both in terms of constructing and navigating the political structure).

<sup>31</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 3-5; Chia and Holt, *Strategy without Design*, 194. The metic figure "turns up everywhere and yet he is strangely absent, at least from history as we know it. It may well seem paradoxical

In the twentieth century turn away from the Platonic paradigm, the concept of *metis* gained recognition among scholars. It is, however, absent among military professionals even though Wheeler argues *metis* “characterizes the entire stratagemic vocabulary.”<sup>32</sup> Despite its absence in the lexicon of warfare, it has always been implicit in the paradigm of one group of warriors – airmen. That is, the *technological logos* of airmen contradicts Plato, not just in the wisdom of storytelling or the dynamic nature of *techne*, but also in how they imagine air power prevailing in a world that is wicked once over.

#### “Technological-ness” of Air Power Theories

Although unaware of the Greek term, *metis* is precisely what airmen aspired to embody as they imagined how air power technology could be leveraged against an enemy. Just as the range and speed of Apollonian aircraft allowed Dionysian behaviors in WWI, and just as flight elevated airmen’s perspective – literally and cognitively – in a way that embraced the images of Daedalus and Icarus, the *metis* within their paradigm also arises from qualities of their technological artifact.

To begin with, the airminded appreciation of aviation as a radically new capability primed airmen with a sense of change and excitement. *Metis* thrives in such a context, as well as in the context of a power disparity, which airmen experienced in two ways during the first half of the twentieth century. One was on the modern battlefield, wherein limited military capabilities of air power paled in comparison to the destructive

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that a type of intelligence as fundamental and as well represented in a society such as that of ancient Greece should have remained so neglected” (Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 308).

<sup>32</sup> Everett Wheeler, *Stratagem and the Vocabulary of Military Trickery* (New York, NY: Brill, 1997), 26.

potential of land forces. The other imbalance was organizationally within the US defense establishment, where the future of an American air force depended upon airmen's ability to craft a persuasive narrative of its combat effectiveness. Most fundamental to inculcating *metis*, however, is another trait commonly cited as one of the unique attributes of air power.

The "key to air power is flexibility," according to General "Hap" Arnold, Chief of the Army Air Forces in WWII. It is a quote USAF officer trainees have been required to memorize for years.<sup>33</sup> A WWII War Department Manual sanctified this belief: "the inherent flexibility of air power is its greatest asset. This flexibility makes it possible to employ the whole weight of the available air power against selected areas in turn; such concentrated use of the air striking force is a battle-winning factor of the first importance."<sup>34</sup> Restated, the nature of air warfare also includes the ability to span the battlespace and shift from one type of mission to another. For bomber advocates that meant large-scale bombing missions against two different targets in as many days. Fighter aircraft could shift missions multiple times a day and even within the same sortie.

This sentiment remains part of USAF culture today. "Airpower's inherent speed, range, and flexibility combine to make it one of the most versatile components of military power," according to the service's basic doctrine. "Its versatility allows it to be rapidly employed against strategic, operational, and tactical objectives simultaneously. The versatility of airpower derives not only from the inherent characteristics of air forces

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<sup>33</sup> Again, given the focus here in on fighting, in the spirit of Clausewitz's *On War*, this analysis is not about the flexibility of air power to do many non-kinetic missions. However, the fact that the USAF can perform a wide range of tasks, from disaster relief to intelligence gathering to airlift operations only strengthens the point here.

<sup>34</sup> War Department Field Manual (FM) 100-20, *Command and Employment of Air Power*, (21 July 1943), 1-2.

themselves, but also from the manner in which they are organized and controlled.”<sup>35</sup>

Even though conventional air power does not have the staying presence and overt destructive capacity of an army on the ground, the nature of the technology allows it to converge upon a single point in time and space, much like the raids of primitive warfare. A Homeric example is how Paris the archer uses his missile to strike Achilles’s one vulnerability.

There is no lack of violence in air strikes, surprise raids, or in the death of Achilles, Homer’s embodiment of *bia*. The use or threat of physical destruction is the essence of warfare; but *metis* is the degree to which that destructive force is guided by an overarching strategic intelligence. For the metic strategist, violence is never force for its own sake; nor is it necessarily organized sequentially, moving in a linear progression along a universally valid solution. Traditional land campaigns had little choice but to progress by pushing the enemy’s front lines further and further back.<sup>36</sup> Eventually the

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<sup>35</sup> Air Force Manual (AFM) 1, *Basic Doctrine* (27 Feb 2015), 35. Note the need for air power to be under the control of an airman in both. FM 100-20: “Control of available air power must be centralized and command must be exercised through the Air Force commander if this inherent flexibility and ability to deliver a decisive blow are to be fully exploited” (FM 100-20, 2). Likewise, in current USAF doctrine: “Because of airpower’s unique potential to directly affect the strategic and operational levels of war, it should be controlled by a single Airman who maintains the broad, strategic perspective necessary to balance and prioritize the use of a powerful, highly desired yet limited force. A single air component commander, focused on the broader aspects of an operation, can best balance or mediate urgent demands for tactical support against longer-term strategic and operational requirements. The ability to concentrate the air effort to fulfill the highest priorities for effects and to quickly shift the effort can only be accomplished through centralized control. On the other hand, the flexibility to take advantage of tactical opportunities and to effectively respond to shifting local circumstances can only be achieved through decentralized execution” (AFM 1, 67).

<sup>36</sup> This is how Wylie describes the “sequential” approach: “Normally we consider a war as a series of discrete steps or actions, with each one of this series of actions growing naturally out of, and dependent on, the one that preceded it. The total pattern of all the discrete or separate actions makes up, serially, the entire sequence of the war...each step

desired resource would be secured or the seat of government destroyed. Within the limits of range, airplanes offered the ability to apply force almost any place the commander desired, including on the opponent's political leadership, without the requisite destruction along the way.

Air forces could go almost anywhere, but could be not everywhere. This implies a need to know where and when its modest strength would be most efficiently applied. Colin Gray calls air power's "militarily unique flexibility and adaptability" the "the natural gift of its environment," but notes that this creates "ever-growing problems of choice" for airmen.<sup>37</sup> The *metis* within the *technological logos*, however, views these problems as opportunities to exploit; opportunities to craft a different type of story. It is a story still oriented to their beloved technical artifact and still playful, but the plot is how air power can prevail through selective actions and accumulated effects. These storytelling airmen offered technological theories, but not in the mold of Plato's abstract philosophy or his dehumanized *techne*. Instead, their stories – their *logos* – offered theories for action that were grounded in context, born in imagination, unburdened by tradition, and inspired – and indeed shaped – by their cherished machines.<sup>38</sup>

Explaining how airmen formulate and communicate their own theories of employing air power goes a long way towards understanding the service's organizational culture. Indeed, Colin Gray, a theorist as reputable as Freedman, explains that "theory is

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could be clearly seen by the strategist ahead of time, could be clearly appraised in terms of its expected result" (J. C. Wylie, *Military Strategy: A General Theory of Power Control* (Annapolis, MD: Naval Institute Press, 1989), 22-3).

<sup>37</sup> Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base, AL: Air University Press, 2012), 77.

<sup>38</sup> Strategist Bernard Brodie's familiar quotation is, "above all, strategic theory is a theory for action" (quoted in Colin S. Gray, *Modern Strategy* (New York, NY: Oxford University Press, 1999), 3).

not all that matters in the grand historical narrative of air power, but it does matter most, and it always has.”<sup>39</sup>

There is room for much confusion regarding the relationship between strategy and theory. “Strategic,” as used here, does not reference a level of government, a weapon system with great range, decisiveness of an action, or nuclear weapons. Strategy is a constellation of ideas regarding the art and science of realizing a “continuing advantage.”<sup>40</sup> Strategy is what guides politics, in the grand sense of politics as any contest for and with power (or, using the famous phrase of Sidney Hillman’s famous phrase, competition over “who gets what, when, and why”).<sup>41</sup> Strategy is obviously also applicable to politics in the narrow sense of government, as well as games, business, and, warfare. The very word arose from a military context. The ancient Greek word for a military general was *strategos*, and this military context is presumed from here on.

According to Gray, there is a general theory of strategy that is “is authoritative for all periods, universally, and that commands all kinds of military forces in all geographies.”<sup>42</sup> There is a subsidiary “general theory of airpower” that is equally

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<sup>39</sup> Colin S. Gray, “Understanding Airpower: Bonfire of the Fallacies,” *Strategic Studies Quarterly* 2, no. 4 (March 31, 2009): 54. For a definition of theory by an Airman, see Harold R. Winton, “A Black Hole in the Wild Blue Yonder: The Need for a Comprehensive Theory of Airpower,” *Air Power History* 39 (Winter 1992), 3.

<sup>40</sup> Everett Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York, NY: Routledge, 2005), 6. This, Dolman argues, is precisely *not* victory: “Strategy is thus an unending process that can never lead to conclusion. And this is the way it should be: continuation is the goal of strategy – not culmination...the strategist must concentrate less on determining specific actions to be taken and far more on manipulating the structure within which all actions are determined...strategy is not about winning...victory is but a moment in time, a point of reference in a continuously changing web of history. It is never an end. It is ever a new beginning” (Dolman, 4-5, 9).

<sup>41</sup> Gray, *Airpower for Strategic Effect*, 7. Gray is paraphrasing the famous quip, attributed to Sidney Hillman, that “politics is the science of who gets what, when and why.”

<sup>42</sup> Gray, 31-2.



universal, but is restricted to the use of one type of military force. Subordinate to that are specific theories that underwrite air strategies. Again, strategy is a singular concept. Strategies (plural) are attempts to realize an advantage in a more constrained, less universalized, setting. *Air* strategies that address the use of air power is one such category. Two particular cases are relevant for this study. The first is the 1941 US Army Air Corps plan for strategic bombing prior to the nation's entry into World War II, Air War Plans Division 1 (AWPD-1). The second is the US Air Force plan for an air campaign developed in the weeks following Iraq's 1990 invasion of Kuwait, the Instant Thunder Air Campaign Plan.

The foundations of those two air strategies came from respective operational theories, stories of how to arrange kinetic air power to prevail.<sup>43</sup> In the first case it was the Industrial Web Theory, which imagined modern societies as a set of interdependent processes undergirded by manufacturing. Targeting key nodes in the economic network would supposedly not only wreck an enemy's physical ability to wage war, but would naturally curtail the political and popular will for fighting. The second air strategy arose from the theory of Strategic Paralysis, which postulated that near simultaneous attacks of multiple sectors – industrial production, but also political leadership, infrastructure, and supplies – was a more reliable method to disable the enemy system. This shifted focus away from the enemy's morale onto their ability to understand the situation and control

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<sup>43</sup> Adopting Clausewitz's focus on *fighting* (Carl von Clausewitz, *On War*, trans. and ed. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1989), 128), these operational theories explain how fighting through the air ("air power") will meet the war's purpose. This of course, is a *useful fiction* as other air power capabilities (e.g. airlift) and the other domains of "airpower" (i.e. space, and cyberspace) are increasingly vital for the employment of aircraft for kinetic effect.

their forces.<sup>44</sup> Again, these theoretical stories emerge from a paradigm justly labeled a *technological logos* for at least two reasons. First, this mindset is about technology and second, the attributes of that very technology – the range, perspective, and flexibility – shape the way airmen create and employ these stories.

According to Morgan, the link between a paradigm and puzzle-solving is theory. The theories of air power crafted by airmen emerged from a common worldview, a paradigm that is technological, in more than one sense. Technology is their subject. It guides their style. It shapes their logic. It is the guiding *logos* of their stories, which again, in any context, are narratives about how to prevail. And, just as *logos* here is employed in its more robust, pre-Platonic connotation, the *techne* of airmen is more than

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<sup>44</sup> This has also been called “inside-out” warfare as it concentrated on the center of the five rings and anticipated effects flowing outward. Strategic paralysis, parallel warfare, or inside-out warfare were all names that came into usage after Operation Desert Storm. Still, however labeled, the impetus was Warden’s *The Air Campaign* and the theoretical ideas he continued to develop after its publication (John A. Warden III, *The Air Campaign* (Washington, D.C.: National Defense University Press, 1988); Edward C. Mann, *Thunder and Lightning: Desert Storm and the Airpower Debates, Volume II* (Maxwell Air Force Base, AL: Air University Press, 1995), 35). The focus herein is on the more recent of the two theories. This is due to the availability of primary sources on technological users, and because it is not as mined for intellectual history purposes as interwar strategic bombing theory. Additionally, it is more useful to Airmen right now since the USAF culture is still shaped by the repercussions of the Desert Storm story. What is not in this chapter is an evaluation of how well AWPD-1 or Instant Thunder matched their parent theories or if Industrial Web Theory and Strategic Paralysis are actually the same theory of air power (for more on that issue, see James R. Cody, “AWPD-42 to Instant Thunder: Consistent, Evolutionary Thought or Revolutionary Change?” (MPhil Thesis, School of Advanced Air and Space Studies, 1996)). Finally, there is no examination into how the operational orders – the tasking of specific forces – matched the theory or the original plan, or the overall effectiveness of those operations. There are other works appraising these theories in light of the general theory of strategy, including Gray’s *Airpower for Strategic Effect* and Olsen’s *Strategic Air Power in Desert Storm*. Robert A. Pape’s work should only be read when paired with Barry Watt’s review of it (Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996); Barry D. Watts, “Ignoring Reality: Problems of Theory and Evidence in Security Studies,” *Security Studies* 7, no. 2 (December 1, 1997): 115–71).

just mechanical skill. It is, in accordance with Homer's usage, a form of technological knowledge that is subjective, improvisational, and sensible – and inseparable from *metis*.

*Metis* is present in both the paradigm, the *technological logos*, and in the individual theories generated from within that mindset. In other words, there is some degree of strategic wisdom within each individual air power theory as well as *metis* within the paradigm that guides how airmen craft an overall strategy from a menu of theories. This project focuses on the paradigmatic level, but it necessarily entails some insight into “puzzle-solving.”

When theories are operationalized, the result is a specific plan on how to use specific technical abilities to achieve the desired effects. Thus, AWPDP-1 was based on Industrial Web Theory and Instant Thunder was based on Strategic Paralysis.<sup>45</sup> These plans were never the sole ones regarding the use of air power in their respective conflicts. For both, other combat missions included close air support (“CAS,” requiring detailed integration and close coordination with the friendly forces on the ground that aircraft are directly supporting), air interdiction (stemming the flow of resources to the battlefield), or air superiority (the ability to operate freely in the air domain while denying the same to the opposing air force).<sup>46</sup> Each of these examples had parent theories guiding air power employment, and determining which ones to use and in what ratios requires *metis*.

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<sup>45</sup> AWPDP-42 is not addressed because it was of the same spirit and occurred after hostilities began. AWPDP-1 and Instant Thunder Air Campaign Plan were developed before US troops were engaged and were constructed by Airmen before they came under the direct influence of other military leaders.

<sup>46</sup> These are modern doctrinal terms but are closely related to the concepts of earlier airmen. Of course, this does not even mention sorties without a kinetic mission: cargo, intelligence, and so on. While these were dangerous and equally critical, they were not technically “on fighting” (see footnote 43 above).

### Metis at Maxwell AFB

The conventional wisdom is that Airmen approached WWII with a single theory of air power: mass aerial raids exacting precise destruction from key nodes in the industrial fabric of an enemy state would lead to victory through air power. The prophets of air power were zealots proselytizing the gospel of the strategic bombing at Air Corps Tactical School. At best, they exhibited flexibility only when forced to deal with the messy realities of war. In this view, one would be hard-pressed to find any meaningful semblance of *metis* wisdom within their thinking.<sup>47</sup>

This narrative ignores the nature of ACTS, what it taught, how the airmen equipped their young force, how they eventually employed it, and how *metis* runs through it all. First, as the air service was still part of the US Army, ACTS was just one of many branch schools. Each existed to advance the art and science of their specific *techné*, be it infantry, artillery, cavalry, or aviation. A large portion of the ACTS curriculum, in fact, included lessons by and about these other branches. When it did come to the half of the course that addressed air power, the time was split between various air force theories.

In the wake of World War I, airmen played with a variety of theories. Some considered a population centric approach advocated by Douhet, wherein the citizens of an enemy nation were the primary targets. Others retained the Italian's focus on independent air operations, but changed the focus from terrorizing urban inhabitants with firebombs

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<sup>47</sup> For instance, see David E. Johnson's *Fast Tanks and Heavy Bombers* (1998), Timothy May's *War Machines* (2001), H. Bruce Franklin's chapter "Peace is Our Profession: The Bombers Take Over" in *The Airplane in American Culture* (ed. Dominick A. Pisano) and Brad Gladman's "The Development of Tactical Air Doctrine in North Africa, 1940-1943," in *Air Power History* (2002).

and chemical weapons to incapacitating the enemy's industrial infrastructure through precise destruction. Airmen debated whether fighter escorts were more effective as a sweep, clearing the skies of enemy aircraft, or tied closely to the bombers to fend off direct aerial attacks. Some disagreed over whether bombers needed protection at all, since the technology of larger aircraft seemed to have more potential for technical advancements. Multi-engine bombers, for example, were flying faster and higher with each new model while single-engine performance had leveled off. Still others believed air power's capabilities would be maximized in support closer to surface forces (directly as in CAS or Air Interdiction, or indirectly as in Air Superiority missions). The Air Force, Bombardment, and Combined Arms courses, those that are most closely linked to the legacy of ACTS, actually constituted a tenth of the curriculum and involved no more than a quarter of the faculty.<sup>48</sup> Lastly, the theory of unescorted strategic bombardment was not accepted wholesale at ACTS.<sup>49</sup>

Even if ACTS faculty had been fully invested in Industrial Web Theory, the school was not a hegemonic influence upon Airmen. Officers in the field challenged the theory of unescorted strategic bombardment.<sup>50</sup> Publications by airmen also show more

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<sup>48</sup> Peter R. Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower" in *The Paths of Heaven: The Evolution of Airpower Theory*, ed. Phillip S. Meilinger (Maxwell Air Force Base, AL: Air University Press, 1997), 212. For a single representative sample, see "Syllabus, 1938-39," 27 April 1939, AFHRA, Maxwell Air Force Base, AL, file 248.2208B. Meilinger points out that in 1935 there were more periods dedicated to horseback riding than bombing (Phillip S. Meilinger, *Airpower: Myths and Facts* (Maxwell Air Force Base, AL: Air University Press, 2015), 18).

<sup>49</sup> For example, see Orvel Cook, transcript of oral history interview by Hugh N. Ahmann and Maj Richard Emmons, 4-5 June and 6-7 August 1974, 101, AFHRA, file no. K239.0512-740.

<sup>50</sup> Faber, "Interwar US Army Aviation and the Air Corps Tactical School," 223; Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force*

diversity than often attributed. As examples, consider William C. Sherman's *Air Warfare* (1926) and Mitchell's more famous *Winged Defense* (1925), both of which addressed the full spectrum of air power missions (including logistics, continental defense, reconnaissance, and air-to-air combat). Additionally, all procurement plans throughout the World War II era invested in a variety of air power platforms.<sup>51</sup> Lastly, key leadership roles were never restricted to the apostles of the bomber.<sup>52</sup>

What these theories had in common, apart from revolving around aviation technology, was the sense that air power could leverage its range, altitude, and flexibility to make warfare more effective and, as the argument went, more civilized. A victory that is less vicious overall, one that ends sooner and more decisively, was supposed to reduce total casualties and costs on both sides. The result, according to Mitchell, would be a "distinct benefit to civilization."<sup>53</sup> In the words of Arnold, "War, no matter how it may be glorified, is unspeakably horrible in every form. The bomber simply adds to the extent of the horror, especially if not used with discretion; but when used with the proper degree of understanding, it becomes the most humane of all weapons."<sup>54</sup> Advocates of other air power theories applied similar logic, claiming, for instance, that air superiority could be

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*1907-1960*, vol. 1 (Maxwell Air Force Base, AL: Air University Press, 1989), 82-4. In a point that will be addressed in the conclusion, some Airmen seemed resistant to the very notion of theory.

<sup>51</sup> Tactical airframes outnumbered long-range bombers in various expansion plans approved by the War department between 1933 and 1945, despite the evidence that the larger aircraft had more potential for technological breakthroughs and that bombers were necessary for hemispheric defense (Futrell, 67, 69, 79, 80, 101, 132).

<sup>52</sup> Meilinger, *Airpower*, 21-3.

<sup>53</sup> Mark A. Clodfelter, *Beneficial Bombing: The Progressive Foundations of American Air Power, 1917-1945* (Lincoln, NE: University of Nebraska Press, 2010), 38.

<sup>54</sup> H. H. Arnold to All Air Force Commanders in Combat Zones, June 10, 1943 (marked "as rewritten by Gen. Arnold"), bombing folder, box 41, Arnold Papers, Library of Congress. This project does not delve into the obvious moral issues surrounding bombing.

achieved solely through aerial combat or that interdiction could achieve the same ends as strategic bombing.<sup>55</sup> Arguments in favor of tactical aviation was based in part on the ability to shift rapidly back and forth between offensive and defensive tasks.<sup>56</sup> Of course, this required an organizational structure that did not spread scarce air resources by assigning small packets of aircraft to all the ground commanders in the theater (an attempt to have some air power available almost everywhere).<sup>57</sup> Furthermore, these benefits were possible only if airmen thought in terms analogous to their technology's qualities: effects across distance, a systems perspective, and adaptability. These traits are also valued in *metis*, as is their airminded sense of change and opportunity.

Airmen believed they were in the midst of a revolutionary shift in warfare. They eagerly questioned extant concepts about warfare as well as each other's ideas. Mitchell claimed "There has never been anything that has come which has changed war the way the advent of air power has."<sup>58</sup> A 1938 ACTS manual stated strategic bombing was "the most important and far reaching development of modern times." Airmen outside the

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<sup>55</sup> Futrell, *Ideas, Concepts, Doctrine*, 82. For examples of vocal opponents of strategic bombing, see Futrell (82, 85) or Elwood R Quesada, "Tactical Air Power," *Air University Quarterly Review* 1, no. 4 (Spring 1948): 44-45.

<sup>56</sup> Thomas H. Greer, "The Development of Air Doctrine in the Army Air Arm, 1917-1944," USAF Historical Study 89 (Maxwell Air Force Base, AL: Research Studies Institute, 1955), 60-66.

<sup>57</sup> This of course was the lesson internalized by airmen after the failure of air support in North Africa during Operation Torch (Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Washington, D.C.: Air Force History and Museums Program, 1993), 174-84). In that debacle, aircraft were spread out to various land units in compliance with FM 31-35, Aviation in Support of Ground Forces (9 April 1942). This diffusion, along with poor coordination between ground and air forces, precluded the ability to shift air power in relation to the changing battlefield conditions.

<sup>58</sup> Consider the ACTS motto, *Proficimus More Irretenti* or "We Make Progress Unhindered by Custom," and a 1938 ACTS lecture: "Battles have been won too often by the judicious violation of doctrine" (Capt Laurence S. Kuter, "Operations against Naval Objectives," lecture, Air Corps Tactical School, Maxwell Field, AL, 2 March 1938).

“bomber mafia” portended equally radical roles for tactical air power. Either way, these were changes that only air-minded officers could understand. To reiterate a point from the last chapter, the style of thinking was, in fact, how some earlier airmen defined air-mindedness – a creative combination of various air power missions to achieve cumulative effects.<sup>59</sup>

Given the emphasis on a unique way of thinking, all airmen agreed that air power functions best under the command of a single airman in that theater. Even the Army – a service known for treating aviation as just another tool for ground forces – issued a 1943 *Command and Employment of Air Power* manual that accepted this point: “Control of available air power must be centralized and command must be exercised through the Air Force commander if this inherent flexibility and ability to deliver a decisive blow are to be fully exploited.” Current USAF doctrine reflects the same, and does so in a way that reflects qualities of *metis*: “Because of airpower’s *unique potential to directly* affect the strategic and operational levels of war [relative to land or sea power], it should be controlled by a single Airman who maintains the *broad, strategic perspective necessary to balance and prioritize the use of a powerful, highly desired yet limited force* [emphasis added].<sup>60</sup>

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<sup>59</sup> Air Corps Tactical School, *Air Force*, Part 1, *Air Warfare* (1 February 1938) 1; Elwood R Quesada, “Tactical Air Power,” *Air University Quarterly Review* 1, no. 4 (Spring 1948): 44-45. An ACTS faculty member stated, “The military high command must learn from the fatal mistakes of defense-mindedness and ground-mindedness; the new kind of warfare called for flexible thinking and a high degree of *air-mindedness*” (Col Donald Wilson, quoted in Herman S. Wolk, *Cataclysm: General Hap Arnold and the Defeat of Japan* (Denton, TX: University of North Texas Press, 2010), 27).

<sup>60</sup> Report of Air Corps Board, “Modernization of the Organization of the Army,” Study 21, 9 January 1936; War Department Field Manual 100-20, *Command and Employment of Air Power*, 21 July 1943, 1-2; AFM 1, Basic Doctrine, 27 Feb 2015, 35, 67.



## Industrial Web Theory and Air War Plans Division-1

When strategic planning began for joining the fight against the Axis powers, the White House needed an estimate of future production requirements to support likely US involvement in the deepening war. The War Plans Division of the War Department began the analysis. When it came to air power, they posed a seemingly simple question to the Air War Plans Division: how many air squadrons would be needed? The planners were products of ACTS, and, in the words of Haywood “Possum” Hansell, they “had one valuable asset going for us. We embraced a common concept of air warfare and we spoke a common language.”<sup>61</sup> They knew that the answer to the “how many airplanes” question was predicated on the more fundamental question of how they would be used. What they produced included a variety of aircraft types and only suggested that independent bombing could be decisive. Still, it was an opportunity for these men to apply their particular story of air power – a theory with enough appreciation of psychological influences, non-linear effects, and contextual subtleties to be considered somewhat meticulous. This, however, is not the crux of this argument. In emphasizing Industrial Web Theory and in evaluating the strategic wisdom within it, scholars have ignored the *metis* that existed in the overarching paradigm from which it came.

In the waning interwar period, and then into the second global conflict of the twentieth century, geopolitical turmoil and technological advancements cultivated worldwide tumult, which is exactly the conditions in which *metis* thrives. Indeed, the young air service’s intellectual climate was rampant with innovative thinking, as the

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<sup>61</sup> Haywood S. Hansell Jr., “USAAF Plans and Strategic Effects,” in James Parton, *Impact the Army Air Forces’ Confidential Picture History of World War II*, vol. 4 (Washington, D.C.: Air Force Historical Foundation, 1980), v.

examples above demonstrate. When it came time to operationalize its ideas, the organization did not abandon creativity by choosing a singular theory of air warfare. There were times when, contrary to conventional wisdom, airmen did not turn to a “specific formula” for success.<sup>62</sup> For example, when the vulnerability of unescorted bombers became clear, Arnold demanded a study to remedy the problem. A Fighter Command School was established to bolster non-bomber theories.<sup>63</sup> Even before the war, internal research suggested the need to develop an intercept aircraft.<sup>64</sup> Furthermore, when precision bombing from high altitude proved unachievable – whether due to weather, intelligence, or weapons systems – airmen shifted to incendiary bombing.<sup>65</sup> Indeed, one

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<sup>62</sup> Consider Clodfelter’s assessment: “a modern vision of air power that focuses on the lethality of its weaponry rather than on that weaponry’s effectiveness as a political instrument...air power’s political efficacy varies according to many diverse elements, and that no specific formula guarantees success...this lesson might prove the most difficult of all for air leaders to learn” (Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York, NY: Free Press, 1989), 203-4).

<sup>63</sup> Futrell, *Ideas, Concepts, Doctrine*, 96-7, 101, 133; Thomas H. Greer, *The Development of Air Doctrine in the Army Air Arm, 1917-1941* (Washington, D.C: Office of Air Force History, U.S. Air Force, 1985), 116-7. Another study, commissioned in 1941, recommended development of high- and low-altitude interceptors, night fighters, and long-range multiplace fighter escorts (Futrell, *Ideas, Concepts, Doctrine*, 107). Arnold himself wrote: “During daylight in good weather, when pursuit aviation is present in strength in an area, it can pretty nearly bar the air to the bomber” (Henry H. Arnold and Ira C. Eaker, *Winged Warfare* (New York, NY: Harper, 1941), 176.

<sup>64</sup> Futrell, *Ideas, Concepts, Doctrine*, 82-3.

<sup>65</sup> One internal analysis during the war estimated that, for the two dozen radar bombing missions conducted towards the end of 1943, only five percent of the bombs landed within one mile of the aim point. The Pacific theater was worse. Precision bombing in the Pacific was constrained by unfamiliar environmental obstacles: cloud coverage often obscured targets and forecasting capabilities were severely limited. High winds at altitude made it difficult to navigate and difficult to accurately calculate fuel requirements. Additionally, the technological limitations of the Norden bombsight made it difficult to compensate for the newly discovered jetstream. Consequently, only two percent of aircraft were able to drop payloads within a thousand feet of their aim point. Furthermore, the B-29s – which were often required to take off overloaded – were plagued with mechanical problems such as engine failures and fires. Lastly, unlike the detailed analysis of Germany, “strategic air intelligence was simply non-existent” for Japan, whose

of the architects of AWPD-1, Hansell, was fired from his position commanding bombers in the Pacific when he did operate outside the Industrial Web Theory.

When Hansell was directed to conduct area bombing against a residential area by the 20th Air Force Chief of Staff, he pleaded for more time to perfect the execution of the bombing doctrine, not to make changes to its underlying premise: “I have with great difficulty implanted the principle that our mission is the destruction of selected primary targets by sustained and determined attacks using precision bombing methods both visual and radar.” He continued, “The temptation to abandon our primary targets for secondary area targets is great and I have been under considerable pressure to do so, but I have resisted so far. I am concerned that a change to area bombing of the cities will undermine the progress we have made.”<sup>66</sup>

The new commander, Curtis LeMay, decided to, in the words of his staff, “revolutionize our whole process and go over Japanese targets at low altitudes.”<sup>67</sup> Lower altitudes permitted greater payloads, allowed bombers to get underneath the clouds, reduced the susceptibility to anti-aircraft guns that were designed to reach high-flying aircraft, and saved fuel. The other momentous change was a shift to flying at night, which reduced the threat of Japanese fighters. Consequently, the defensive systems and personnel who operated them could be removed from the bombers, which saved further

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economy did not fit the industrial web model (Mark Clodfelter, *Beneficial Bombing: The Progressive Foundations of American Air Power, 1917-1945* (Lincoln, NE: University of Nebraska Press, 2013), 143, 203, 206; Max Hastings, *Retribution: The Battle for Japan, 1944-45* (New York, NY: Vintage, 2009), 288; Herman S. Wolk, *Cataclysm: General Hap Arnold and the Defeat of Japan* (Denton, TX: University of North Texas Press, 2010), 79, 126.

<sup>66</sup> Hansell to Norstad, telecommunication, “Incendiary Attack of City of Nogoya,” quoted in E. Bartlett Kerr, *Flames over Tokyo* (New York, NY: Dutton Adult, 1991), 118.

<sup>67</sup> Quoted in Wolk, *Cataclysm*, 122.

weight and risked fewer personnel.<sup>68</sup> Night missions precluded precise bombing, but LeMay changed the payloads to incendiary bombs, which required no such accuracy. Moreover, firebombing better suited the flammable nature of Japan's buildings and the dispersed nature of its industries. The March 9 attack against the Japanese capital was the start of ten days of similar firebombing missions that were all designed to target both industry and morale. It only culminated once both the stock of incendiary bombs and the aircrews delivering them were exhausted. "Hap" lavishly praised LeMay. Around the Army Air Force, the news of the Tokyo raid produced self-congratulation and excitement.<sup>69</sup>

Despite emphasis on long range strategic bombing – both at the time and in historical analyses since – in reality, the US pursued a multidimensional air strategy. Anti-shipping and defense operations complimented long-range bombing as well as close range support of land power. This approach, made possible by a highly industrialized society mobilized for total war and codified in the 1943 Army Field Manual 100-20, made air power a decisive factor in the war.<sup>70</sup> This balanced investment in all kinds of air power, however, is not reflected in historiography. A disproportionate weight is placed upon strategic bombardment. The problem is the post-war story with a single air strategy as its main character.

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<sup>68</sup> Sherry, *The Rise of American Air Power*, 272.

<sup>69</sup> Wolk, *Cataclysm*, 132; Sherry, *The Rise of American Air Power*, 282; Hastings, *Retribution*, 297, 308.

<sup>70</sup> R. J. Overy, *The Air War, 1939-1945*, Cornerstones of Military History (Washington, D.C.: Potomac Books, Inc, 2005), 6, 204.

After World War II, Industrial Web Theory became a sanctioned belief. Gone were the counterexamples found in the air campaigns over China, Spain, and England.<sup>71</sup> Gone was the memory that the Anglo-American Combined Chiefs of Staff only accepted a modified version of AWPDP-1. Gone was the appreciation of technical limits (evident in both the plans and the operational execution). Gone was the acknowledgement that finding vital centers in the industrial web was a process of trial and error, or a process that could easily slip into destruction for its own sake.<sup>72</sup> Gone even was the pretense of precision. Once hostilities broke out in Korea, the commander of the Far East Air Force Bomber Command immediately suggested they “do a fire job on the five industrial centers of northern Korea.”<sup>73</sup> Gone also was the appreciation for tactical air power, such as the technical and organizational innovations made by General Quesada in Europe and General Kenney in the Pacific, as described by historians Thomas E. Griffith and Thomas A. Hughes, respectively. One senior Airman even declared that atomic weapons might

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<sup>71</sup> Clodfelter, *Beneficial Bombing*, 101.

<sup>72</sup> Futrell, *Ideas, Concepts, Doctrine*, 157; David MacIsaac, “Voices from the Central Blue: The Air Power Theorists,” in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton, NJ: Princeton University Press, 1986), 636. Also implicit in the selection of multiple “centers of gravity” was the presumption that air power could paralyze Germany’s ability to wage war “by the destruction of not more than five or six industries” (quoted in Clodfelter, *Beneficial Bombing*, 125-6). In the section of his book titled “The Sources of Technological Fanaticism,” Sherry writes, “Their plans revealed a kind of strategic distance on the consequences of their actions that paralleled and reinforced the distance created by their professional pursuit of technique, by the command and bureaucratic arrangements they made to organize that technique, and by the language and methodology they employed to use it” (Sherry, *The Rise of American Air Power*, 239).

<sup>73</sup> Mann, *Thunder and Lightning*, 51; Major General Emmett O’Donnell quoted in Conrad C. Crane, *American Airpower Strategy in Korea, 1950-1953* (Lawrence, KS: University Press of Kansas, 2000), 7, 32.

have made tactical air forces “as old-fashioned as the Maginot line.”<sup>74</sup> Strategic Air Command (SAC) seemed to hold the keys to US national defense.<sup>75</sup>

The post-war narrative also ignored how that single theory of air power was insufficient in the face of changing political and strategic contexts. During the war, airmen were as strategically flexible as their artifact was tactically flexible. For example, they accommodated the timeline for the Allied invasion of Europe by allowing efficiency to give way to effectiveness. Likewise, an objective of unconditional surrender meant that coercion gave way to annihilation; selective destruction of key nodes – even if technically possible – would not preclude the enemy’s ability and will to make war in the near future.<sup>76</sup> Furthermore, air power adapted to shifting the domestic opinion that privileged retribution and indignation over prewar emphasis on moral superiority and

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<sup>74</sup> Col Philip D. Cole quoted in Futrell, *Ideas, Concepts, Doctrine*, 173; Thomas E. Griffith, Jr., *MacArthur’s Airman: General George C. Kenney and the War in the Southwest Pacific* (Lawrence, KS: University Press of Kansas, 1998); Thomas Alexander Hughes, *Overlord: General Pete Quesada and the Triumph of Tactical Air Power in World War II* (New York, NY: Free Press, 2002).

<sup>75</sup> For example, see The Joint Congressional Aviation Policy Board report, Senate, National Aviation Policy (3,10), Lt Col John P. Healy, “Air Power and Foreign Policy,” *Air University Quarterly Review* 2, no. 2 (Fall 1948): 15-26, or the Chairman of the Joint Chiefs of Staff statement about the primary of atomic warfare in House, Mutual Defense Assistance Act of 1949: Hearings before the Committee on Foreign Affairs, 81<sup>st</sup> Congress, 1<sup>st</sup> sess., 1949, 1-9, 69-72. As CSAF, Hoyt Vandenburg stated “To be really effective, we must have an air defense capable of killing enemy air power at its source. We ourselves must strike effectively before much else can be done by anybody. As was the case in the last war it is up to the Air Force to carry the war to the enemy and to gain air superiority before surface operations in force can be successively undertaken” (“Air Force Policies and Planning” quoted in Futrell, *Ideas, Concepts, Doctrine*, 287).

<sup>76</sup> This was manifested, for example, in shifting focus from industrial targets to the Luftwaffe prior to D-Day (Futrell, 152-3; Clodfelter, *Beneficial Bombing*, 132). The 1943 Casablanca Directive established the objective of the Combined Bomber Offensive as “the progressive destruction and dislocation of the German military, industrial and economic system, and the undermining of the morale of the German people to a point where their capacity for armed resistance is fatally weakened” (quoted in Wolk, *Cataclysm*, 107).

civility. Most famously, in July of 1942, Army Air Force and Royal Air Force bombers conducted incendiary attacks on the German city of Hamburg, killing over forty two thousand civilians and leaving twenty times that number without shelter. The results of a second incendiary attack against Hamburg in 1943 and Dresden in 1945 impressed US political and military leaders even more: civilian death estimates were 900,000 and 25,000, with 25 million and 500,000 homeless, respectively.<sup>77</sup> Likewise, the divergence from precision bombing exhibited over Tokyo raised no robust objections from the US public. In fact, a June 1945 survey by Fortune magazine concluded, “the people are sold on peace through air power.”

The official AAF history, published soon after WWII, noted that “Never in the history of war had such colossal devastation been visited on an enemy at so slight a cost to the conqueror...The 1945 application of American Air Power...forced an enemy’s surrender without land invasion for the first time in military history...Very long range air power gained victory, decisive and complete.”<sup>78</sup> So, airpower was not only decisive, it was also new, it was also cheaper, and it also reflected an American style of fighting.

As Annette Simmons writes in *The Story Factor*, “In the end, the best story wins. Not the right story, not even the most frequently told story, but the story that means the most to the greatest number of people – the one that is remembered.”<sup>79</sup> By the time airmen achieved institutional autonomy in 1947, all of this metric flexibility was absent

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<sup>77</sup> Sherry, *The Rise of American Air Power*, 154; Clodfelter, *Beneficial Bombing*, 149. This shift was also evident in Air Interdiction missions: Operation Clarion’s attacks against road traffic and small towns, designed to convince the population of their defenselessness, anticipate “over 95%” civilian casualties (quoted in Clodfelter, 179).

<sup>78</sup> Sherry, *The Rise of American Air Power*, 117, 139, 141, 185, 290; Hastings, *Retribution*, 317.

<sup>79</sup> Annette Simmons, *The Story Factor*, 2nd edition (New York, NY: Basic Books, 2006), 149-50.

from the newly created US Air Force. Their technological paradigm had hardened into a dogmatic belief. The Industrial Web Theory, supposedly validated by World War II, had become hegemonic. If the historical record of that recent conflict contradicted their heralded theory, Airmen could explain away anomalies as merely unfair tests of air power.<sup>80</sup> What was recognized as wicked at the time was afterwards presumed tame. What was aberrant was discarded. Therefore, when the US Air Force went to war on the Korean peninsula, just five years after WWII ended, the main expert on tactical aviation in WWII was never contacted. They tried to force a limited war against a non-industrialized enemy into their model of total war against an industrialized nation. And when this did not work, and they were forced to relearn the theories of tactical aviation of WWII, they labeled the experience as “a rather bizarre war” that could lead to “an awful lot of bad habits.”<sup>81</sup> The war in Vietnam was similarly approached, with an initial strategic bombing campaign to target 94 key sites over the course of 16 days.<sup>82</sup> In both cases, supporters of the Industrial Web Theory interpreted the conflict as either too politically controlled to offer a fair test of their theory, or as corroboration that preparing for total war was sufficient preparation for limited conflicts. The narrative of air power centered around a single theory that not only serves as an instance of technological knowledge, but is subject to how such knowledge evolves. Indeed, as the next section will reveal, this is yet another way in which airmen’s worldview is technological.

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<sup>80</sup> Futrell, *Ideas, Concepts, Doctrine*, 146-7. For example, the authors of AWPDP-1 left open the possibility of air power forcing Germany’s surrender without a land operation. When that did not happen, they could easily point to how bombing resources were diverted from strategic bombing to interdiction missions in preparation for the D-Day invasion (see footnote 139, this chapter).

<sup>81</sup> Major General Emmett O’Donnell, Jr., testimony to Congress quoted in Crane, *American Airpower Strategy in Korea, 1950-1953*, 185.

<sup>82</sup> Clodfelter, *Limits of Air Power*, 51.



## The Evolution of Technological Knowledge

Historians of technology often use the phrase “technological knowledge” to mean the same thing as *techne*. Some see a pattern in how a field of such knowledge changes, largely appropriated from Thomas Kuhn’s history of science. Kuhn’s 1962 work, *The Structure of Scientific Revolutions*, challenged the presumption that scientific advancements transpire only through a linear accumulation of facts and theories. Such “normal science” does occur, but the questions it seeks to answer, and the mechanisms it employs to get those answers, are both provided by a dominant paradigm.<sup>83</sup> Because all paradigms are partial, some aspects of the field under investigation cannot be explained and are, in fact, not even considered legitimate puzzle solving activities. The rise of a new paradigm is explained, in part, by being able to account for a wider range of phenomena. According to Kuhn, however, this is only a partial explanation for how new ideas arise and gain popularity.

The rejection of the old paradigm does not necessarily occur deliberately. Instead, it is often through a “sudden and unstructured event” like a “flash of intuition.” In its embryonic stage, the new paradigm is often unable to compete with existing conventions. Instead, it appeals to more subjective qualities, such as an improved aesthetics. The decision to adopt a new paradigm, which has not yet established the same level of cumulative evidence, is a decision that “can only be made on faith.”<sup>84</sup> The choice between two incompatible paradigms often hinges on what Kuhn later called a mature

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<sup>83</sup> Thomas S. Kuhn, *The Structure of Scientific Revolutions: A Guide to Method*, 4th edition (Chicago, IL: University of Chicago Press, 2012), xi-5.

<sup>84</sup> Kuhn, *The Structure of Scientific Revolutions*, 122, 154-5, 157.

sensibility that holds rational and non-rational factors together in productive balance.<sup>85</sup>

For example, some physicists claim that physics is only five percent observation and “ninety-five percent speculation.”<sup>86</sup>

Of course, there are differences between technology and science. Technological knowledge does not demand the same level of explication. It can remain tacit, communicated indirectly (through stories or metaphors), and transferred through guided, reflective practice. Also, technical acumen is more pragmatic and contextual.<sup>87</sup> Despite their differences, scientific knowledge and technological knowledge both follow a similar cycle. Within a given field of technological know-how, there is a period of “normal” activity. Knowledge is extended incrementally within the boundaries of what that regime of knowledge considers to be valid problems and valid processes by which to solve them. Next, there is a period in which the field’s consensus is challenged as some divergence between reality and its explanations is realized. This can even apply to anticipated divergences, according to historian Edward Constant. He notes how some technologists anticipated what he labels “presumptive anomalies,” as when aviation engineers knew existing propulsion systems would be the limiting factor as other aspects of aircraft

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<sup>85</sup> Marc Trachtenberg, *The Craft of International History: A Guide to Method* (Trenton, NJ: Princeton University Press, 2009), 21-2. Feyerabend concludes that “our chances of progress may be obstructed by our desire to be rational” (quoted in Mihai I. Spariosu, *Dionysus Reborn: Play and the Aesthetic Dimension in Modern Philosophical and Scientific Discourse* (Ithaca, NY: Cornell University Press, 1989), 292).

<sup>86</sup> Jerome Bruner, *The Culture of Education* (Cambridge, MA: Harvard University Press, 1997), 123-4.

<sup>87</sup> For more on why machines and operating manuals do not constitute full technological transfer, see Daniel R. Headrick, *The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850-1940* (New York, NY: Oxford University Press, 1988).

performance advanced.<sup>88</sup> The debate over whether a body of knowledge still “works” is socially constructed and highly subjective.<sup>89</sup> Eventually, a shift occurs and the field undergoes a revolutionary change, or a new field of technological knowledge is created.

The entire process of discovery, invention, and innovation is often characterized in terms reminiscent of a leap of faith or play.<sup>90</sup> Additionally, early adopters are frequently aided by relative isolation from the regime’s enforcers and a degree of serendipity. Moreover, they often act on the basis of intuition and imagination. In fact, the gap between the tight knit framework of information that had developed within the now obsolete regime and the sense there is a better way is often bridged by recourse to

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<sup>88</sup> Edward Constant, II, *The Origins of Turbojet Revolution* (Baltimore, MD: The Johns Hopkins University Press, 1980), 15, 138.

<sup>89</sup> The degree to which technological knowledge is subjectively constructed is itself debated. For example, see the dialogue that played out in the pages of *Technology and Culture* between Constant, Law, Singleton, and Scranton (Edward W. Constant, “Reliable Knowledge and Unreliable Stuff: On the Practical Role of Rational Beliefs,” *Technology and Culture* 40, no. 2 (April 1, 1999): 324–57; John Law and Vicky Singleton, “Performing Technology’s Stories: On Social Constructivism, Performance, and Performativity,” *Technology and Culture* 41, no. 4 (October 1, 2000): 765–75; Philip Scranton, “Missing the Target? A Comment on Edward Constant’s ‘Reliable Knowledge and Unreliable Stuff,’” *Technology and Culture* 41, no. 4 (October 1, 2000): 752–64; Edward W. Constant, “Performance Is a Moving Target, Reliably,” *Technology and Culture* 41, no. 4 (October 1, 2000): 776–82.

<sup>90</sup> In regards to faith that is necessary when, in times of flux there is less empirical evidence, Gray notes that, “Air power’s advocates acquired a belief system that approximated a faith in a revolutionary change in warfare. This faith served their personal career designs, it must be said, as well as the interests of their nation(s) as they believed sincerely. They feared, again sincerely, that airpower was advancing on a broad, invincible front – at least it was advancing on behalf of those polities that properly anticipated modernity” (Gray, *Airpower for Strategic Effect*, 19). Regarding the playful process by which technologists explore combinations of diverse ideas, materials, people, organizations, note Edwards’s description of the process as *bricolage*, or tinkering: instead of “well-codified methods to well-defined problems,” science and engineering “normally proceed” by collage of historically contextual, contingent, heterogeneous materials (practices, symbols, metaphors, research, conventions of discourse), making it similar to “politics, commerce – or war” (Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: The MIT Press, 1997), 40-1).

metaphors and stories. As those stories evolve from useful fictions into accepted fact, the cycle starts anew: verisimilitude is taken for veracity, socio-cultural influences become hidden, system builders try to “design out *metis*,” and the entire system develops what Thomas Hughes calls “momentum.”<sup>91</sup>

While this change represents a fundamental shift *within* a field of technological knowledge, the overarching process remains the same. That is, the nature of the change remains intact and therefore radically different theories still, at their core, abide by this cyclical process. This is where Morgan’s clarification of Kuhn’s terminology is particularly useful. In Kuhn’s usage, a paradigm can be defined as a specific constellation of beliefs that belong to a particular school of thought. Thus, the process described in the last paragraph is often called a paradigm shift. In Morgan’s typology, however, a paradigm is the cognitive worldview that encompasses all the subordinate changes at the level of theory (and each theory has its own set of constituent “puzzle-solving” techniques). For clarity, discussions of airmen’s “paradigm,” such as the thesis that their paradigm is a *technological logos*, will reference the overall mindset while the term “theory” is used for the middle, more explicit level.

The sketch of air power theories in the WWII era demonstrates these same qualities. Ideas about “strategic” (meaning long-range) and “tactical” (meaning direct or indirect support of land power) were developed in isolation from their parent

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<sup>91</sup> Thomas Parke Hughes, “Technological Momentum in History: Hydrogenation in Germany 1898–1933,” *Past & Present* 44, no. 1 (August 1, 1969): 106–32. Scott writes that certain management practices, such as Taylorization and the CNC manufacturing David Noble analyzes, all hoped for a system that “had designed out *metis*” (Scott, *Seeing like a State*, 337).

organization, the US Army.<sup>92</sup> Airmen's ideas, developed away from Army headquarters, were built more on faith than empirical evidence. According to General "Jimmy" Doolittle, "the trouble was that we had to talk about air power in terms of promise and prophecy instead of in terms of demonstration and experience." By the war's end, the consensus view accepted a synergistic effect in the confluence of all air power missions.<sup>93</sup> In the aftermath of that conflict, however, the air power narrative narrowed. The US Air Force culture neglected theories about these other missions in order to focus their admiration and attention upon a single dominant story, forcing out anomalies and ignoring complexity. In other words, "normal" strategies offer a rationalistic approach in the mold of the Platonic paradigm.<sup>94</sup>

The same cyclical path as other forms of technological knowledge – from normal and evolutionary to novel and revolutionary and back again – happened again later in the century in the next important theory: Strategic Paralysis. This seems like a large historiographical leap. It is validated, however, by the fact that Industrial Web Theory

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<sup>92</sup> Starting in 1920, ACTS permitted a formalized mechanism for embedding airmindedness. Similar to the high percentages of senior Airmen who passed through the Chief's office, 261 of the 320 Army Air Force (AAF) general officers in WWII were graduates of ACTS (Clodfelter, *Beneficial Bombing*, 52). The school was located at Langley Field but eventually moved to Maxwell AFB in Montgomery, Alabama. The move was symbolic of the growing distance between its teachings and the official positions of the War Department.

<sup>93</sup> According to the Strategic Bombing Surveys in 1945 and 1946, "control of the air permitted close air support to ground forces...effective interdiction...[and] destruction by long – range bombing of such of [Japan's] industries and cities as we chose to attack" (*The United States Strategic Bombing Surveys*, reprint (Maxwell Air Force Base, AL: Air University Press, October 1987), 109.

<sup>94</sup> "Rationalistic models are widely held conceptions about how decisions are and ought to be made. An actor becomes aware of a problem, posits a goal, carefully weighs alternative means, and chooses among them according to his estimates of their respective merit" (Amitai Etzioni, "Mixed-Scanning: A 'Third' Approach to Decision-Making," *Public Administration Review* 27, no. 5 (December 1, 1967): 385-6. Alternatives to this approach are discussed in the Conclusion.

and Strategic Paralysis are arguably the only two theories crafted by users of American air power technology. They were also the only two with significant impact on USAF organizational culture.<sup>95</sup> Other voices came from outside the nation or outside the service, or were visionaries and promoters as opposed to theorists.<sup>96</sup> What did exist within the service between World War II and Desert Storm, in terms of theory, was not impressive.<sup>97</sup>

For many, the end of the frontier period in American military aviation was also the end of any degree of *metis* in the paradigm of professional airmen. In 1990, when another group of mid-level staff officers proactively offered an air-centric strategic plan to senior leaders, many saw a revival of the ideas and methods of the interwar Air War Plans Division. Few saw a deeper commonality: both were technological in their content,

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<sup>95</sup> Gray writes “Warden’s conceptual demarche on behalf of conventional airpower in the late 1980s was the first of its kind with logical merit to appear *for more than 40 years* [emphasis added]” (Gray, *Airpower for Strategic Effect*, 209). This was partially as a result of the Cold War dichotomy between Strategic Air Command and Tactical Air Command. An obvious exception is John Boyd but his theoretical writings, though based in the mechanics of air combat tactics, were applied to grand strategy and the nature of warfare, mostly skipping over operational theory (see Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, Strategy and History 18 (New York, NY: Routledge, 2007).

<sup>96</sup> MacIsaac, in assessing the period of 1945 to 1986, notes the lack of Airmen theorists but that air power theory “become almost an industry unto itself, one heavily populated with game theorists, statistically oriented behavioral scientists, economists, and other social scientists” – and few of them focused on conventional air warfare (MacIsaac, “Voices from the Central Blue,” 639, 643). I. B. Holley notes that Mitchell was more of a visionary than theorist (I. B. Holley, “Reflections on the Search for Airpower Theory” in *The Paths to Heaven: The Evolution of Air Power Theory*, ed. Phillip S. Meilinger (Maxwell Air Force Base, AL: Air University Press, 1997), 582).

<sup>97</sup> “Not only was airpower theory neglected, the people who were now running the Air Force had no roots in the theory” (Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force* (New Brunswick, NJ: Transaction Publishers, 2002), 179-80).

their style, and in the way the organization held the idea in creative tension with other theories before eventually accepting it as gospel.

### The Theory of Strategic Paralysis

There are a handful of names associated with air power theory in the WWII period.<sup>98</sup> In contrast, there is a single individual that is intimately tied to the theory of Strategic Paralysis: retired US Air Force Colonel John Warden. While this is not a biographical approach, he is easily the central character in this story (which is, again, about airmen telling theoretical stories about the use of air power technology).<sup>99</sup>

A relatively successful career brought Warden to prestigious Pentagon staff positions for two separate tours. During his first tour on the Air Staff, he served as an action officer in the Directorate of Plans. According to one biographer, Warden was not able to get the more coveted division with oversight into Europe or into the Pacific Division. Instead, when he arrived in August 1975, he went into the division with responsibility for the Middle East region.<sup>100</sup> Then, after a series of operational

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<sup>98</sup> Whereas the WWII era was clearly “air power” (two words), by Warden’s time it was becoming more appropriate to include space and cyberspace and the USAF convention changed to “aerospace power” and then “airpower” (one word). Still, the two word construct is used herein for consistency, because his theory was largely based on air assets, and because the use of a singular construct with three parts was not in common usage until after Operation Desert Storm.

<sup>99</sup> Others have already written biographical works about Warden (e.g. Olsen’s *John Warden and the Renaissance of American Air Power*). What has not been done and what this analysis suggests, however, is the utility of examining Warden in terms familiar to historians of technology, whether in the concept of “heroic inventors” or the notion of the “system builder” or “heterogeneous engineer” (John Law, “Technology and Heterogeneous Engineering” in Wiebe E. Bijker, Thomas Parke Hughes, and T. J. Pinch, eds., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, MA: The MIT Press, 2012).

<sup>100</sup> John Andreas Olsen, *Strategic Air Power in Desert Storm* (Portland, OR: Routledge, 2003), 71; John Andreas Olsen, *John Warden and the Renaissance of American Air Power* (Washington, D.C.: Potomac Books, 2007), 33.

assignments and a year at National War College, Warden arrived for his second Pentagon tour in 1988. His contributions to Exercise Constant Demo, the scenario that tested the defense of a NATO air base, revealed the sophistication and energy he brought to the ideas of operational air power. Impressed, his superiors gave him a position in which he could continue to think deeply about air power theory. Warden became the Deputy Director for Warfighting Concepts Development, later shortened to Warfighting Concepts. By July 1988, the Concepts Division, the Doctrine Division, the Long-Range Planning Division, and the Strategy Division had all become part of Warfighting Concepts. Sometime in late 1989, this deputation acquired the Checkmate Division, further diversifying Warden's staff. In this group, charged with innovative analysis of strategic issues, all career fields were represented except for a dearth of intelligence officers. He accepted this with the logic that security restrictions on classified materials would inhibit his team's creativity.<sup>101</sup>

Creativity was paramount in Warden's philosophy. He tolerated dissent and promoted disruptive thinking about air power. It helped that his superiors sheltered him from the USAF's establishment and encouraged his organization's work. His team began to examine some of the service's basic doctrines using theories Warden had developed in a series of published and unpublished writings.<sup>102</sup> His official mandate became the

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<sup>101</sup> Richard G. Davis, *On Target: Organizing and Executing the Strategic Air Campaign Against Iraq* (Washington, D.C.: Air Force History and Museums Program, 2002), 59-61. Senior USAF leaders decided to disband Checkmate, but Warden convinced them to keep the division as a "think tank" (John A. Warden, III, transcript of interview with Lt Col Suzanne B. Gehri, Lt Col Richard T. Reynolds, and Lt Col Edward C. Mann, III, 22 October 1991, 18, *Desert Story Collection*, US Air Force Historical Research Agency, Maxwell Air Force Base, AL).

<sup>102</sup> Warden's ideas, at that point, were captured in *The Air Campaign* (1988) and "Global Strategy Outline" essay (May 1988, quoted in Olsen, *John Warden and the Renaissance*



development of a new air power theory, a new story of how to best use the USAF domain.<sup>103</sup> Notably, his position had no official authority for crafting a US military response to the Iraqi invasion of Kuwait in August 1990. Still, in the marketplace of ideas, his story ended up “winning” in the way Industrial Web Theory did a half-century earlier. The reasons why his version prevailed go back to the Air Force’s *technological logos* – a paradigm that, first and foremost, is about state of the art technology.

Airmen’s theories on air warfare have always centered on how to employ emergent air power technologies. Before Warden, the last theory constructed by airmen was the Industrial Web Theory. It was built around what were then leading-edge capabilities: long-range, high-altitude, heavy bombers outfitted with cutting edge bombsights, electronic navigational equipment, and multiple machine guns for self-defense against enemy fighters. Theories guiding use of atomic weapons, first on aircraft and then later atop intercontinental missiles, evolved from Industrial Web Theory. But nuclear deterrence theory, which would guide the Air Force’s prestigious Strategic Air Command and their single integrated operational plan (SIOP), was constructed by political scientists and not Airmen. The theory of “graduated and reciprocated initiatives in tension,” which animated air operations during the war over Vietnam, originated with political psychologist Charles Osgood in 1962, and was further developed by political

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*of American Air Power*). Later, he expanded on his ideas in “The Enemy as a System,” *Airpower Journal* 9, no. 1 (1995), 40-55; “Employing Airpower in the Twenty-first century” in *The Future of Airpower in the Aftermath of the Gulf War*, eds., R. H. Shultz, Jr. and R. L. Pfaltzgraff, (Maxwell Air Force Base, AL: Air University Press 1992); and the interestingly titled *Winning in FastTime: Harness the Competitive Advantage of Prometheus in Business and Life*, 5th Edition (Montgomery, AL: Venturist Inc, 2001).

<sup>103</sup> David R. Tretler, quoted in Davis, *On Target*, 60-1.

scientist Thomas C. Schelling.<sup>104</sup> Likewise, after the US-Vietnam War, tactical aviation was guided by a concept developed by the US Army. In their vision of AirLand Battle, air power was one of many tools for deep-battle operations meant to slow down Soviet forces if they mounted a land offensive in Europe. Whereas for SAC the relevant technical advances included precision navigation and stealth technology, AirLand Battle capitalized on precision-guided munitions, advanced air superiority fighters (such as the F-15Cs flown by the 27th FS), and improved capabilities to “Find, Fix, Track, Target, Engage, Assess.”<sup>105</sup> Both took advantage of aerial refueling, sophisticated communication networks, and a global mobility system to shuttle weapons and other materiel.

By the 1980s, the two operative theories, neither crafted by Airmen, were seen as the only options for how to employ air power technology. Furthermore, no one truly integrated SIOP and AirLand Battle. Theater conventional warfare was largely a defensive option. Although USAF doctrine still retained a role for independent conventional missions, most assumed CAS and Air Interdiction would constitute the majority of kinetic air power in any counteroffensive. Most expected these counter-tactics would merely delay the inevitable escalation into total nuclear war.<sup>106</sup> Warden, however,

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<sup>104</sup> Charles E. Osgood, *An Alternative to War or Surrender* (Urbana, IL: University of Illinois Press, 1962); Thomas C. Schelling, *Arms and Influence* reprint (New Haven, CT: Yale University Press, 1966).

<sup>105</sup> John A. Tirpak, “Find, Fix, Track, Target, Engage, Assess,” *Air Force Magazine* 83, no. 7 (July 2000), 24-9.

<sup>106</sup> Mann, *Thunder and Lightning*, 27-8. The dominant narrative of many Airmen today presumes the USAF simply acquiesced to the US Army’s doctrine. Air Force Manual (AFM) 1-1, Basic Aerospace Doctrine of the United States Air Force, 5 January 1984 (2-11 through 2-15, 3-2 through 3-8) shows the USAF’s more expansive sense of conventional air power. Furthermore, AirLand Battle also made all air power missions and assets “newly important” to the ground commanders (Creech quoted in James C.

viewed the same panoply of modern air power technologies and constructed a new story by connecting his tactical experience with strategic objectives.

Warden's Strategic Paralysis theory views any enemy as a system of thinking opponents. Within the complexity of a state system, however, there are some material interventions with foreseeable effects. Indeed, there would be targets, places of leverage, where actions would have disproportionate consequences. Warden surmised the most fundamental of these "centers of gravity" is the enemy's leadership, or more precisely, their ability to exercise command and control (C2). He placed this at the center of his five "strategic rings." In descending order of priority, the subsequent ring is essential processes, such as communications and energy production. Next is physical infrastructure, such as industrial connections or transportation, followed by the population, which should only be targeted via psychological operations.<sup>107</sup> The last and least efficient use of air power is the enemy's military forces deployed in the field.

Warden argued that air power was uniquely suited to affect the center of the enemy system, its leadership, which he likened to the nation's brain. Air warfare can threaten this once inaccessible component without first defeating an intervening force. Not only does this invalidate the traditional presumption that battlefield destruction – with its high costs in blood and treasure – must be the first priority, but it means airmen can bypass noncombatants. What made this use of air power different from strategic bombing in WWII was technology. The same strategic effect that had required thousands

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Slife, *Creech Blue: Gen Bill Creech and the Reformation of the Tactical Air Forces, 1978-1984* (Maxwell Air Force Base, AL: Air University Press, 2004), 38-9).

<sup>107</sup> Warden, *The Air Campaign*, 7, 44; Warden, 30 May 1991, 86, *Desert Story Collection*.

of aircrew members flying hundreds of aircraft and dropping tons of munitions could now be achieved with as little as a single pilot dropping a single precision guided bomb.

Modern air power technology confers an operational flexibility to attack critical vulnerabilities in any of the rings (targeting the outer rings only insofar as to expose the center), in any pattern (sequential or parallel), and with varying degrees of damage (from permanent destruction to temporary disruption). Warden's theory predicted that striking the right targets across multiple rings simultaneously could induce Strategic Paralysis and catastrophic failure of the system.<sup>108</sup>

The *metis* of Strategic Paralysis is evident in how Warden and his division formulated the model, and also in the model itself. First, the theory melded multiple themes, including contemporary theories on nuclear warfare and tactical operations, as well as classical air power ideas. This sense of artistic recombination, or *bricolage*, is specifically associated with strategic intelligence.<sup>109</sup> Also, like all metic approaches, it fit the context. This is true in a technological sense, given emergent air power capabilities, and in a geopolitical sense, as in international legitimacy and the Cold War balance of power.<sup>110</sup> Furthermore, it accounted for Americans' growing intolerance of casualties,

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<sup>108</sup> Olsen, *Strategic Air Power in Desert Storm*, 82-6; Richard T. Reynolds, *Heart of the Storm: The Genesis of the Air Campaign Against Iraq* (Maxwell Air Force Base, AL: Air University Press, 1995), 18; Mann, *Thunder and Lightning*, 73-4; James Blackburn, 21 April 1993, 9-13, *Desert Story Collection*; Deptula, 12 December 1991, 20-22, *Desert Story Collection*; Edward Mann, "One Target, One Bomb: Is the Principle of Mass Dead?" *Airpower Journal* 7, no. 1 (Spring 1993): 35-43; David R. Mets, *The Air Campaign: John Warden and the Classical Airpower Theorists*, Revised (Maxwell Air Force Base, AL: Air University Press, 1999); Warden, *Winning in FastTime*, 112-21; Davis, *On Target*, 62-3.

<sup>109</sup> Scott, *Seeing like a State*, 324.

<sup>110</sup> "Warden in many ways presented a concept that most likely would not have been politically acceptable during the Cold War. While TAC's thinking maintained a Cold War mentality, Warden managed to take advantage of the grand strategic changes that

whether friendly or enemy, since the Vietnam War. Most significantly, however, is how Strategic Paralysis handled violence. Warden prioritized economy of force and believed air power could achieve political effects more efficiently than land power, which is designed to directly confront the most resilient of the enemy's five rings, their field forces. In contrast, parallel warfare destroyed only what was deemed necessary to influence the opposing C2. In fact, destruction was not even required. Sometimes, in order to generate system-wide effects, target sets could be merely suppressed (temporarily degrading performance through active application of firepower). Since this required fewer assets, air power could be used in more places simultaneously. This focus on exponential effects challenged the USAF's established mission planning, which used complicated weaponeering formulas to achieve the desired level of damage to individual targets.<sup>111</sup> Another novelty was that these effects were not associated with a particular aircraft. Previously, no Airman thought "strategic" bombers were suited for attacking fielded forces or "tactical" fighters to strike a center of gravity well behind the front line. Warden also advocated for an "air reserve" force, ready to exploit the changing circumstances that he expected in any war.<sup>112</sup> Lastly, he was willing to assert what there was no empirical evidence for: the decisiveness of an independent air campaign.

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were about to manifest themselves. Thus, the 'man and the moment met and jumped as one' also in geo-political terms" (Olsen, *Strategic Air Power in Desert Storm*, 163).

<sup>111</sup> Lt Col Dave Deptula, 11 December 1991, 15–22, *Desert Story Collection*; Davis, *On Target*, 63-4; Blackburn, 21 April 1993, 9–13. For a sense of the complexity of weaponeering, see Joint Munitions Effectiveness Manual: Methodology Report, TH 61A1-3-6 (USAF), 5 November 1974, 2-1 through 3-9. According to Mann, suppression was not a new idea but it was never imagined on the scale Warden did, instead aiming for tactical paralysis instead of strategic collapse (Mann, *Thunder and Lightning*, 45).

<sup>112</sup> Warden, *The Air Campaign*, 115-27. Mets states that airmen had already arrived at this innovation in the interwar period, or what this chapter argues is the first cycle of *metis* (Mets, *The Air Campaign*, 61).

None of this is to say that SIOP or AirLand Battle lacked *metis*. Nor is this meant to portray Strategic Paralysis as an exemplar of strategic wisdom. There has been no dearth of criticism over Warden's theory. His biographer and fellow airman, Andres Olsen, describes Warden's theoretical writings as manifestos that err towards oversimplification.<sup>113</sup> *Metis* eschews prescription and here, too, Warden's model appears less dynamic. While the model points to the presence of critical vulnerabilities without presumptively identifying them, he still asserted national political leadership was always the center of the strategic rings.<sup>114</sup> He could have, more generally, advocated finding whatever the center of gravity happened to be for a specific enemy. These issues, which have been vigorously debated, are not the focus of this chapter, however.

The *metis* within any given air power theory is not the focal point of this argument. The crucial level of analysis is the paradigm that operates above and beyond these individual theories. In periods of change, such as the first few decades of military aviation, the *technological logos* of airmen contained an admirable degree of strategic wisdom. After WWII, however, a sense of "normal strategy" drove the intellectual climate of the US Air Force. The organization got better at doing what it already did, which was a bifurcation of air power into tactical and strategic domains. Even after the trauma of Vietnam, conditions were not ripe for *metis*: the paradigm was biased to a

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<sup>113</sup> Olsen, *John Warden and the Renaissance of American Air Power*, 77-9; Olsen, *Strategic Air Power in Desert Storm*, 270-1. Gray's evaluation of Warden corroborates Olsen's (Gray, *Airpower for Strategic Effect*, 208).

<sup>114</sup> John A. Warden, III: "Employing Airpower in the 21st Century" in *The Future of Air Power in the Aftermath of the Gulf War*, eds., Richard H. Shultz and Robert L. Pfaltzgraff (Maxwell Air Force Base, AL: Air University Press, 1992). Note the purported universality of his model when he writes, "Every state and military organization will have centers of gravity – or vulnerabilities. Nevertheless, it is possible create a general model as a starting place for analysis." Also note, in the same essay, a sense of hubris: "what the next revolution [in air warfare] will look like is up to us" (Warden, 64, 81).

single image of war. The worst case, total nuclear war between the world's superpowers, seemed to be the only case, and the one approach to prevailing in that scenario was sequential and formulaic. Warden challenged this mentality. But the wisdom of Warden's theory was matched by *metis* at the institutional level as the USAF gave him the opportunity to think deeply, and then wisely melded his ideas into other theories when it came time to put air power ideas into action.

#### Instant Thunder Air Campaign Plan

The historical narrative below continues to identify *metis* elements in Warden's theory as it was transformed into an operational plan. It also shows him as a technologist, but not in the sense of manufacturing a material artifact (although the diversity of his team also mimics the heterogeneity found in the invention, innovation, and development phases of successful technological systems). Instead, Warden embodies the Homeric *techne* in his creative use of material resources, his intuitions, how he crafts physical and psychological interventions for strategic effects, and his rhetorical skills – all aspects that clarify the sense in which airmen's paradigm is “technological.” The story also highlights the role of chance, which, once again, is the domain of *metis*. For example, both tours at the Pentagon forced Warden to grapple with the Middle East, a region many at the time viewed as ancillary to any future hostilities between NATO and the Warsaw Pact.<sup>115</sup>

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<sup>115</sup> Warden's first Pentagon tour expanded his perspective of geopolitics, and he soon disagreed with the focus on Europe as the likely focal point of a NATO-Warsaw Pact clash. His unconventional view was that a confrontation in the Persian Gulf was more likely because the Soviets would assess less risk and greater rewards. He had an opportunity to suggest appropriate force structure changes to the National Security Council based on this assessment while also injecting some of his predictions into the recently created Checkmate unit (which he would eventually have authority over) (Olsen *John Warden and the Renaissance of American Air Power*, 34, 36).

Becoming familiar with the area where war would later erupt was not his only good fortune.

When Saddam Hussein's forces invaded Kuwait on August 2, 1990, Colonel Warden was confident the US would respond militarily. He was also convinced that current approaches were inadequate to guide that response. Operational war plans (OPLANS) only addressed deployment schedules. Furthermore, these plans assumed there would be sufficient time to mobilize Reserve forces.<sup>116</sup> More worrisome, Warden believed, was the lack of any doctrine for offensive warfare in a non-nuclear setting. SAC was not likely to produce a conventional strategic air campaign and the US Air Force's Tactical Air Command (TAC) was unlikely to produce any strategic air campaign.<sup>117</sup> Indeed, the Air Tasking Order (ATO) software, which organized daily missions for each flying unit, only had options for CAS and Air Interdiction.<sup>118</sup> Given these circumstances, Warden initiated a planning effort in his own division. He had the right team for the task.

The climate within Warden's Warfighting Division was uniquely suited for creative strategic thought. The Checkmate Division, in particular, had a reputation for intellectual independence. Warden valued these qualities and pushed them to develop unorthodox ideas for a wide variety of air power scenarios.<sup>119</sup> That August, he even

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<sup>116</sup> Reynolds, *Heart of the Storm*, 15, 20.

<sup>117</sup> Warden, 22 October 1991, 78, *Desert Story Collection*; Jim Brogan quoted in Mann, *Thunder and Lightning*, 45. Others with first hand knowledge of the events reported similar assessments in interviews (James Crigger, 2–4 December 1991, 16-7, *Desert Story Collection*; James V. Adams, 3 February 1991, 1, 29, *Desert Story Collection*; Robert M. Alexander, 3 June 1992, 1-3, *Desert Story Collection*; John M. Loh, 26 September 1991, 1-6, *Desert Story Collection*; Jack Chain, 12 August 1991, 2, *Desert Story Collection*).

<sup>118</sup> Mann, 43.

<sup>119</sup> Reynolds, *Heart of the Storm*, 18. Those around Warden expected as much and were familiar with his penchant for applying chaos theory to his management style, often



brought in others to make the group even more dynamic, and charged them with producing an air campaign plan. The theoretical basis for the plan was the five-ring model they were familiar with and had already practiced. His directions were broad and emphasized the need for creative, agile, and decentralized thinking as well as the importance of interpersonal networks. One military historian describes them in terms reminiscent of *metis*: “[They] seemed to possess a rare combination of uncluttered elegance, economy, and rationality. One could explain them quickly and in simple terms, yet when applied to past or current situations, they cut to the heart of matters and seemed to solve complex problems. As with most intellectually based activities, group members never attained absolute consensus on the exact method of conducting an air campaign, but, as their thinking matured, much coalesced around a set of conceptions at once theoretical and practical.”<sup>120</sup> In addition to the clarity they brought to the situation, speed was also essential – the general consensus was that Saddam Hussein would soon continue his offensive into Saudi Arabia.<sup>121</sup> Their distance from the immediate, practical dilemma of organizing and deploying forces also provided them with the same sort of intellectual

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referencing Tom Peters’s *Thriving on Chaos: Handbook for a Management Revolution* (1987). In that work, Peters argues that crafting adequate and timely solutions to complex, “real-world” problems required a decentralized approach amongst a manageably sized team (Reynolds, 18). Those in Warden’s division described his application of this philosophy as “mentally stimulating” (Wayne Thompson quoted in Olsen, *Strategic Air Power in Desert Storm*, 81).

<sup>120</sup> Davis, *On Target*, 61.

<sup>121</sup> Bernard Harvey, 7, *Desert Story Collection*; Olsen, *Strategic Air Power in Desert Storm*, 103-4. As a core member of Warden’s planning team, Harvey took copious notes throughout the period until discussion. Those writings are part of the same *Desert Story Collection*, held at the US Air Force Historical Research Agency, as the personal interviews cited throughout this chapter. Though the overall document is Secret, information extracted from Harvey’s records for this project is unclassified.

space that range afforded WWI airmen. In that space, they also had the advantage of an air-minded perspective: systemic, playful, and ready to embrace radical changes.

Two factors kept Checkmate's work from being a purely academic exercise. The first came from the particular circumstances of the situation in the Middle East. The US military officer in charge of Central Command (CENTCOM), which included the Saudi Arabian peninsula and the surrounding nations, was Army General Norman Schwarzkopf. On August 3, he called Major General Charles Horner, his senior USAF officer. Horner, the commander of Central Command Air Forces (CENTAF), offered initial suggestions based on a recent CENTCOM staff exercise about how to respond to the invasion of Saudi Arabia. In accordance with AirLand Battle theory, the air strategy focused first on defense and then a counteroffensive in a combined air-ground campaign. All of these, however, required an influx of US and coalition forces since CENTCOM did not have any assets in the theater. The longer it took to get forces in, the longer Saudi Arabia was vulnerable to attack and the longer the highly proficient Iraqi engineer corps could fortify defenses in Kuwait. Furthermore, the Iraqi army was large and had previously demonstrated the ability to withstand high casualties in its war with Iran.<sup>122</sup>

On August 4, both men met with senior military and political officials at Camp David. Horner reiterated the principles of his suggested air campaign, which focused on Air Interdiction and CAS.<sup>123</sup> Afterwards, President Bush expressed concern over the total

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<sup>122</sup> OPLAN 1002 Air Operations, April 1990, file 19, Gulf War Air Power Survey Collection, US Air Force Historical Research Agency, Maxwell Air Force Base, Ala. (Secret) Information extracted is unclassified.; Lt Gen Charles A. Horner, 2 December 1991, 8, *Desert Story Collection*; *Heart of the Storm* 4, 54; *Thunder and Lightning* 28

<sup>123</sup> Horner, 2 December 1991, 12-14, *Desert Story Collection*.

cost of victory, including the possible death toll on both sides of the fighting.<sup>124</sup> A few days later, Secretary of Defense Richard “Dick” Cheney, through the Chairman of the Joint Chiefs of Staff General Colin Powell, directed the military to craft an offensive military option.<sup>125</sup> Based on these interactions, Schwarzkopf made three key decisions. First, the current plan for air power did not fulfill Cheney’s order. Second, air power was the only available resource – whether for an offensive or a defensive response – until land forces could travel from afar. Lastly, CENTAF lacked the resources and time to produce the type of air power option Schwarzkopf needed.<sup>126</sup> His next move is the second element that saved Checkmate’s efforts from becoming merely a staff exercise.

The Goldwater-Nichols Department of Defense Reorganization Act established areas of responsibility (AORs) around the world. Commanders, such as Schwarzkopf, had sole authority to plan and conduct operations within their AOR. The other commands and each service assist the commandant commander, but only when support is formally requested. This is precisely what Schwarzkopf did when he called the Air Staff at the Pentagon.

On August 8, Schwarzkopf, as the Commander-in-Chief Central Command (CINCCENT), called the Chief of Staff of the Air Force (CSAF), General Michael Dugan. Since Dugan was away on temporary duty, General John M. Loh, Vice Chief of Staff of the Air Force, answered the phone call. On the other end of the line came a

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<sup>124</sup> Horner, 15. “According to the best statistical simulation models, slugging it out with Hussein’s army would produce 17,000 to 30,000 US casualties (Diane T. Putney, “From Instant Thunder to Desert Storm: Developing the Gulf War Air Campaign’s Phases,” *Air Power History* 41, no. 3 (1994): 45).

<sup>125</sup> Department of Defense, *Conduct of the Persian Gulf War: Final Report to Congress* (Washington, D.C.: United States Government Printing Office, 1992), 65.

<sup>126</sup> Norman Schwarzkopf, *It Doesn’t Take a Hero: The Autobiography of General H. Norman Schwarzkopf* (New York, NY: Bantam, 1993), 313; Davis, *On Target*, 58.

request that seemed tailor made for Warden. Schwarzkopf wanted an air campaign, separate from any existing OPLAN, that could be executed quickly, and would include a set of strategic targets “broader” than what Horner had outlined.<sup>127</sup> Loh knew Checkmate had been working on something like this, and had this in mind when he offered to give Schwarzkopf a plan within a week.<sup>128</sup>

The same afternoon that Schwarzkopf called the Air Staff, Loh met with Warden and Warden’s supervisor, Major General Robert Alexander, the Director of Air Force Plans. In Warden’s words, Schwarzkopf requested “a strategic air campaign.”<sup>129</sup>

Checkmate now had a mandate. When Warden updated them he announced the name for the operation that would come out of his Strategic Paralysis theory: Instant Thunder.<sup>130</sup>

Over the next few days they applied the five rings model to Iraq, identifying centers of gravity and how to influence them through air power. After briefing his Air Force chain of command, Warden was ready to brief Schwarzkopf himself.<sup>131</sup>

On 10 August, Warden briefed CINCCENT at his headquarters in Tampa, Florida, a mere nine days from the time Warden began unofficial planning – the same

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<sup>127</sup> Loh, 19 September 1991, 4–6, 9, *Desert Story Collection*. It is important to note that this dialogue is Loh’s recollection of the conversation, not Schwarzkopf’s.

<sup>128</sup> Loh, 6.

<sup>129</sup> Warden, 22 October 1991, 49. Note the similarity with the intent of AWPD-1’s authors and Warden in this quote from Olsen’s biography: “There is still uncertainty as to whether Schwarzkopf used the term ‘strategic air campaign,’ but to Warden it did not matter: he was going to present what he believed was the only way forward, whatever the CINC had actually asked for” (Olsen, *Strategic Air Power in Desert Storm*, 113).

<sup>130</sup> “This is not your Rolling Thunder. This is real war, and one of the things we want to emphasize right from the beginning is that this is not Vietnam! This is doing it right! This is using air power!” (Warden, 22 October 1991, 50-3, *Desert Story Collection*).

<sup>131</sup> Warden, 51. The presumption in this chapter is that this version is the best representation of Warden’s air power theory, since his team crafted it before outside influence (either in the form of feedback from those being briefed or sister-service planners sent to assist Checkmate). Still, evidence from later briefs that are in the spirit of the first are still used to explain the theory.

amount of time it took to produce AWPDP-1, incidentally. The philosophy behind the Instant Thunder campaign was pure *metis*: positioning one's strengths against the opponent's weaknesses. In an effort to produce strategic paralysis, it completely ignored the Iraqi forces in Kuwait (unless they moved towards Saudi Arabia). Instead, the indirect approach identified target categories in accordance with Warden's theory.<sup>132</sup> Naturally, Saddam Hussein's personal leadership was the crucial variable. Removing his C2 abilities would not only incapacitate his forces, but Warden's intuition was that it could also foment revolt among Iraqis.<sup>133</sup> It was thus important to include as one of the objectives, "Minimize damage to enhance rebuilding (minimize civilian casualties and collateral damage)." The planners foresaw, for example, the use of oil revenue to repay war debts.<sup>134</sup> Clearly, Warden and his team were thinking not just about victory, but about a continuing advantage. The emphases on destroying Iraqi nuclear, biological, and chemical capabilities and leaving Iraq able to defend itself against potential regional competitors also reveal their broad, long-term focus.<sup>135</sup>

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<sup>132</sup> Warden, 22 October 1991, 52, 56–58, *Desert Story Collection*; Deptula, 12 December 1991, 20–25, *Desert Story Collection*; Lt Gen Buster C. Glosson, 4 June 1992, 14, 54–55, 110, 115–16, *Desert Story Collection*.

<sup>133</sup> Warden, 22 October 1991, 11, 55-8, *Desert Story Collection*; Ronnie Stanfill, 3 June 1991, 29, *Desert Story Collection*; Deptula, 1 November 1990, 2, *Desert Story Collection*; Eliot A. Cohen, and Thomas Keaney A., *Gulf War Air Power Survey: Summary Report* (Air Force History and Museums Program, 2015), 68; Eliot A. Cohen, and Thomas Keaney A., *Gulf War Air Power Survey: Effects and Effectiveness* (Air Force History and Museums Program, 2015), 240-7, 284-5; Anthony H. Cordesman and Abraham Wagner, *The Lessons of Modern War: The Gulf War*, Vol. IV (Boulder, CO: Routledge, 1996), 499-500; Karl Mueller, "Strategies of Coercion: Denial, Punishment, and the Future of Air Power," *Security Studies* 7, no. 3 (March 1, 1998): 187; Harvey, 16, *Desert Story Collection*.

<sup>134</sup> Briefing Slides 1-5, Instant Thunder Brief, 24 August 1990 [File No. CK/Deptula Box II Theater Campaign Slide/Brief] This document is marked "as presented to CSAF-14 Aug; CINC-17 Aug; CENTAF/CC-20 Aug."

<sup>135</sup> John A. Warden III, "Desert Storm Air Campaign," presentation to the USAF Air and

Two other points are noteworthy for the *metis* they reveal. The first is reliance upon psychological operations, including those aimed at the Iraqi populace and another set intended as a deception plan to hide the offensive air campaign. The other point is a matter of influencing internal audiences through the *techne* of rhetoric. Warden's oratory skills were well known from his first Pentagon tour, but influencing an entire US military response would require another level of skill.<sup>136</sup>

Warden always knew one of his challenges would be the acceptance of an unorthodox strategy. His attempts to convince others often involved, as metic storytellers are apt to do, persuasive metaphors and historical analogies.<sup>137</sup> For example, he described

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Space Doctrine Symposium, Maxwell Air Force Base, AL, 6–8 April 1993 (copy in *Desert Story Collection*); Deptula, 11 December 1991, 5, *Desert Story Collection*; *Conduct of the Persian Gulf War*, 129. The last source contains discussions of the US commitment to security and stability in the entire region

<sup>136</sup> Warden's "articulate briefings" and "impressive presentations" were already noted by his supervisors during his first Pentagon tour (Major General Richard B. Goetze Jr. (ret.), Warden's division chief, and Col William Constantine, Executive Officer to CSAF, both quoted in Olsen, *John Warden and the Renaissance of American Air Power*, 38). One of Warden's goals for the Warfighting Concepts, published in August 1988, was to "Develop a coherent theory for employment of air forces...[and] explain the theory simply and succinctly to policy makers and public alike" (Warden, "XOXW Goals," memo, August 3, 1988, quoted in Olsen, 106). There is also a hint of Warden as storyteller in Gray: "Warden's book, briefings, and articles not only presented a genuinely operational-level view of airpower's contribution to strategic success, they also offered a grand narrative for kinetic airpower that carried the promise to deliver all of the effect for strategic success that the country would need" (Gray, *Airpower for Strategic Effect*, 209).

<sup>137</sup> Olsen, *Strategic Air Power in Desert Storm*, 91. Warden's ability to get convince others is even more impressive considering his outsider status within the TAC community that made up the majority of CENTAF's staff and the extreme prejudice against planning outside the theater (see Adams, 3 February 1992, 6-8, 22, *Desert Story Collection*; Robert D. Russ, 9 December 1991, 19-20, 49, *Desert Story Collection*; Warden, 30 May 1991, 110 *Desert Story Collection*; Stanfill, 3 June 1991, 70, *Desert Story Collection*; Alexander, 30 May 1991, 8, *Desert Story Collection*; David Halberstam, *War in a Time of Peace: Bush, Clinton, and the Generals* (New York, NY: Simon and Schuster, 2002), 47-9; Russ, Adams, Charles A. May, Jr., Creech quoted in Olsen, *John Warden and the Renaissance of American Air Power*, 270-2, 280.

the plan as an aerial Schlieffen Plan “rotated into the third dimension.” Unlike the fatal modification that weakened the German design for invading France in WWI, the crushing blow – from air power, this time – would not be weakened.<sup>138</sup> He was also fond of the metaphor likening the enemy state to a body with the leader as its brain; cut the link between head and hands, and the enemy was just as incapacitated as destroying the hands. Lastly, he also seemed to excite Schwarzkopf with the idea that Instant Thunder could be for Schwarzkopf what the Inchon invasion had been for General MacArthur in the Korean War – a surprise counteroffensive well behind the front lines.<sup>139</sup> Olsen asserts that, for all of its faults, Warden’s model had utility because it effectively did what all stories aim to do: make sense of – and suggest strategies to prevail in – a complex and complicated world.<sup>140</sup>

Even before Warden’s complimentary comparison, Schwarzkopf signaled his “100 percent” approval of the colonel’s approach. It gave CENTCOM new options and, moreover, ones that fit the context. While it would take months to assemble sufficient ground power for a land offensive, CENTAF could execute Warden’s air campaign plan in a matter of weeks and with less risk to US forces or civilians.<sup>141</sup> The timeframe to

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<sup>138</sup> Warden, 22 October 1991, 97, *Desert Story Collection*; Harvey, 92, *Desert Story Collection*.

<sup>139</sup> Alexander, 30 May 1991, 16, *Desert Story Collection*. Warden was also fond of using the example of the Allied invasion of Europe in WWII. Prior to D-Day, General Dwight D. Eisenhower, the Supreme Allied Commander, reallocated a sizable amount of air power from strategic bombing to air interdiction. In Warden’s assessment, this dispersal of effort delayed Allied victory. Applying that lesson to Desert Storm, he argued that Instant Thunder should be executed as a separate, distinct opening phase in order to not dilute the ability to induce strategic paralysis (Davis, *On Target*, 70-1).

<sup>140</sup> Olsen, *Strategic Air Power in Desert Storm*, 270-1.

<sup>141</sup> Alexander, 30 May 1991, 16, 28-30, *Desert Story Collection*. Putney confirms CINCCENT’s sentiment (Diane T. Putney, “From Instant Thunder to Desert Storm,” 42).

execute the campaign also fit well within Schwarzkopf's geopolitical concerns.

According to one eyewitness, the general exclaimed: "By the end of the first week we'll have all kinds of pressure to get out! The [United Nations] Security Council will scream. If we can be done in six days, we can say we're sorry and get out."<sup>142</sup> An air campaign directed at Baghdad also had the advantage of preserving Kuwait. Schwarzkopf concluded, "You have restored my confidence in the United States Air Force...You are the first guys that have been leaning forward. I'm glad to see it. This is exactly what I want!"<sup>143</sup>

In many narratives, what happens next is clear. Warden's team continued to develop the plan until CENTAF was ready to accept planning responsibility. When they did so, it was with the help of Checkmate personnel and another dynamic individual, Brigadier General Buster C. Glosson.<sup>144</sup> Back at the Pentagon, Warden and the rest of his

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Warden told CINCCENT and CJCS it would only take one-two weeks to execute Instant Thunder, if the deployment flow was altered. With no changes, Warden thought it could be done around 7 or 8 September 1990 (Warden, 22 October 1991, 86, 102, *Desert Story Collection*). The fact that air combat power arrived rapidly seems to support their assumption. According to DOD's report to Congress, over 200 USAF combat aircraft were in-theater by 14 August, as well as two aircraft carrier groups on station (not counting the aircraft of our coalition partners) (*Conduct of the Persian Gulf War*, Vol. 2, E-23 through E-24). On 17 August 1990, at his second brief to CINCENT, Warden's offered the end of September as an execution date, while CSAF thought a mid-month launch was possible (Harvey, 90-92, *Desert Story Collection*; Alexander, 30 May 1991, 18, *Desert Story Collection*).

<sup>142</sup> Reported by Deptula in Reynolds, *Heart of the Storm*, 109; Davis, *On Target*, 77.

Warden estimated the duration of Instant Thunder to be between six and nine days. Schwarzkopf estimated that after just two days of the operation, debate would erupt in the United Nations, which would take another two days to pass a resolution imposing a cease-fire within two days for a total of six days (Harvey, 98, *Desert Story Collection*).

<sup>143</sup> According to Alexander, Schwarzkopf figured, "If we invade Kuwait, they will destroy it. This might leave Kuwait intact" (Alexander, 30 May 1991, 17, 28-29, *Desert Story Collection*).

<sup>144</sup> These men are also portrayed as metic in Davis's description: "This chapter will show that at crucial times, singularly strong-minded, properly placed individuals – such as Col.



ad hoc planning team continued to provide support to the Airmen in theater. With Saddam Hussein content to wait in a defensive posture, more coalition forces amassed in the region over the course of five months. When the counteroffensive launched in January 1991, the Instant Thunder Air Campaign Plan was the first phase of Operation Desert Storm. Despite the vast quantitative changes in air power in the intervening period, the air campaign was, in essence, still based on a theory of Strategic Paralysis, just as when Warden first briefed Schwarzkopf. Thus, the lopsided victory that followed was not only a vindication of air power, but a validation of the five rings model as well.<sup>145</sup>

In the view of Olsen, historian of military aviation and professional airman, “airpower finally came of age.”<sup>146</sup> According to another historian, Richard Davis, “air power was the decisive factor in the Coalition’s quick and almost bloodless victory.”<sup>147</sup>

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John A. Warden III, USAF, Lt. Col. David A. Deptula, USAF, and Brig. Gen. Buster C. Glosson, USAF – can grasp the flow of events, if for an instant, and permanently redirect them, only to merge back into the crowd when the predestined moment has passed” (Davis, *On Target*, 57).

<sup>145</sup> For example, see Reynolds and the RAND’s report (Reynolds, *Heart of the Storm*, 132; J. A. Winnefeld, *A League of Airmen: U.S. Air Power in the Gulf War* (Santa Monica, CA: Rand Publishing, 1996), 259-60. Likewise, Davis writes, “In most important respects, Phase I of the conflict equates with Colonel Warden’s original Instant Thunder concepts,” and this theory – plus the way others turned operationalized it – is “the singularly important criterion in assessing the USAF’s performance” (Davis, *On Target*, 110). This is corroborated by Deptula, a man intimately tied to Checkmate and the final operational plan (Deptula, 22 May 1991, 36–37, *Desert Story Collection*).

<sup>146</sup> John Andreas Olsen, ed., *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd* (Annapolis, MD: Naval Institute Press, 2015), 1.

<sup>147</sup> Davis, *On Target*, 320. Sixty-three Coalition members were killed during the Operation Desert Storm land campaign (Stephen T. Hosmer, *Psychological Effects of U.S. Air Operations in Four Wars, 1941-1991: Lessons for U.S. Commanders* (Santa Monica, CA: RAND Corporation, 1996), 155). Contrast this with estimates of ten to twelve thousand Iraqis killed during the air campaign and as many as ten thousand during the ground war (John G. Heidenrich, “The Gulf War: How Many Iraqis Died?” *Foreign Policy* 90 (Spring 1993): 123; Cohen, and Keaney, *Gulf War Air Power Survey*, 2015,

These sentiments are found throughout contemporaneous reports and historical analyses.<sup>148</sup> One active duty USAF officer, writing a few years after the conflict, called it “the most impressive collection of sound tactics and advanced technologies ever seen on any battlefield.”<sup>149</sup> Another Airman argued, “Operation Desert Storm symbolized a fundamental shift in the traditional method of waging mechanized warfare. The stunning performance of coalition airpower symbolized both the maturity of airpower and its dominant position in late twentieth-century warfare.” Furthermore, he stated, “Most important, however, victory in the Gulf War symbolized...the maturity of airpower, the domination of airpower, and the need for a new paradigm of warfare...fulfilling the promises made by the early prophets of airpower.”<sup>150</sup> And it was not just air power, but strategic air power in the mold of John Warden.

Edward N. Luttwak, a political scientist noted for his writings on strategy, captures the impression of many who observed Operation Desert Storm and who have studied it since: Warden rescued “the USAF from its tactical mentality.”<sup>151</sup> In doing so, it seemed as if Warden and his theory of Strategic Paralysis became *the* way to organize

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239fn19). Total losses of Iraqi aircraft from all causes was 259, compared to 75 from Coalition air forces (“Air-to-Air Victories in Desert Storm,” June 4, 2009, <https://web.archive.org/web/20090604224140/http://128.121.102.226/aakill.html>, accessed 25 January 2018; “Fast Facts about Operation Desert Shield/Desert Storm,” accessed January 25, 2018, [https://gulflink.health.mil/timeline/fast\\_facts.htm](https://gulflink.health.mil/timeline/fast_facts.htm), accessed 25 January 2018.

<sup>148</sup> RAND’s report contains copious examples (Winnefeld, *A League of Airmen*, 276-9). As for Warden himself, after the conflict, he wrote, “in the Gulf war, ...a revolution took place that we ignore at our peril” (Warden, “Employing Air Power in the 21st Century,” 81).

<sup>149</sup> Mann, *Thunder and Lightning*, 18.

<sup>150</sup> Dennis M. Drew, *Recapitalizing the Air Force Intellect: Essays on War, Airpower, and Military Education* (Maxwell Air Force Base, AL: Air University Press, 2008), 159-60.

<sup>151</sup> Quoted in Olsen, *Strategic Air Power in Desert Storm*, 270.

modern air power for strategic effect. The foreword to one bestselling work, published by Air University Press and written by an USAF officer, contained this note from a general officer: “Airmen, long uneasy about the lingering inconclusiveness of past applications of their form of military power, now had what they believed to be an example of air power decisiveness so indisputably successful as to close the case forever.”<sup>152</sup> The Chief of Staff of the Air Force at the time, General Ronald Fogleman, placed that book on his annual professional reading list.

This story is concise. It is coherent. It is also, on multiple counts, incomplete. First, not everyone interpreted the Gulf War as an abject victory for strategic air power. The Iraqi regime was never fully paralyzed and the degree of disruption is debatable. Iraqi nuclear, chemical, and biological weapons programs were less vulnerable than assumed. Targeting “organic essentials,” the second ring, proved to be an inefficient use of air power.<sup>153</sup> Even the official USAF assessment of Operation Desert Storm, the Gulf War Air Power Survey, qualifies its evaluation of the strategic campaign. More directly, military analyst Norman Friedman concluded in 1991 that the “strategic air war very largely failed to achieve any of its goals.”<sup>154</sup> Olsen’s in-depth analysis acknowledges how strategic air power was diverted into other missions, but concludes these distractions “do not suggest that a greater operational commitment would have altered the impact on the

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<sup>152</sup> General Charles G. Boyd in Reynolds, *Heart of the Storm*, xi.

<sup>153</sup> Department of Defense, *Conduct of the Persian Gulf War*, 168; Davis, *On Target*, 288, 293, 299, 310. Olsen writes that, “the subsequent ability to put down two internal revolts illustrate the fact that the regime’s domestic control was far from shattered” (Olsen, *Strategic Air Power in Desert Storm*, 288).

<sup>154</sup> Norman Friedman, *Desert Victory: The War for Kuwait* (Annapolis, MD: Naval Institute Press, 1991), 441; Cohen and Keaney, *Gulf War Air Power Survey*, 99.

Iraqi leadership's decision-making." There was simply too little intelligence about precisely how to achieve the paralysis Warden's theory suggested was possible.<sup>155</sup>

Others admit victory but note the circumstances did not truly test Warden's theory, much less US military capabilities. First, CENTAF removed many elements of the Instant Thunder Air Campaign plan before execution day: there was no psychological operations to encourage rebellion, no more emphasis on targeting individual leaders, and no sense that air power would be decisive.<sup>156</sup> Also, while some see a revolution in warfare and "the most successful campaign in US military history," even the Gulf War Air Power Survey noted: "at a distance of two years and after careful scrutiny of the evidence, some aspects of the war that seemed most dramatic at the time appear less so than they did in the immediate afterglow of one of the most lopsided campaigns in military history." The outcome is less surprising in retrospect because "despite the talk of Iraq possessing the fourth largest army in the world, the fact remains that in this war minor military power found itself confronted by the full weight of the world's sole superpower."<sup>157</sup> In a war that, according to Colin Gray, the US "could lose only as a result of extraordinarily bad luck or incompetence," the real contribution of air power

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<sup>155</sup> Davis, *On Target*, 288; Olsen, *Strategic Air Power in Desert Storm*, 292. See Olsen's in-depth assessment on this issue of analyzing the enemy system in chapters four and five. Davis concurs with this weakness in Warden's planning: "Given the original target list and resources, Instant Thunder would probably not have been as decisive as it claimed" (Davis, *On Target*, 80). For example, some suggest the Republican Guard – part of Warden's least profitable target category – were actually a center of gravity (Winnefeld, *A League of Airmen*, 67, 85-6).

<sup>156</sup> Davis, *On Target*, 105,109; Olsen, 166; *Conduct of the Persian Gulf War*, Vol 1, 126-30.

<sup>157</sup> Robert M. Citino, *Blitzkrieg to Desert Storm: The Evolution of Operational Warfare* (Lawrence, KS: University Press of Kansas, 2004), 288; Cohen, and Keaney, *Gulf War Air Power Survey*, 308-9. For more, see Keith L. Shimko's *The Iraq Wars and America's Military Revolution* (2010) or Winnefeld's *A League of Airmen: U.S. Air Power in the Gulf War* (1996).

may not have even been kinetic. A RAND study suggests the most valuable uses of air power were mobility, logistics, and information superiority.<sup>158</sup> Of course, it is hard to evaluate a single concept that is just one piece of a complex, multidimensional, and ever-shifting experience. But this is itself an important point.

Those who interpret Operation Desert Storm as vindication for Warden's ideas commonly exaggerate the independence of Instant Thunder. Schwarzkopf never asked for a decisive air campaign. Just because Warden delivered, what was in his mind, a "war-winning" strategy, did not mean CINCENT viewed it as anything more than a "war-fighting" operation.<sup>159</sup> It may be a reflection of airminded thinking to present something so global, so interconnected and far-reaching, but Schwarzkopf needed a viable retaliation option while land power moved into place. Thus, from the earliest stages of planning, he and Powell accepted the Instant Thunder air campaign plan while remaining intent on a multi-phased approach.<sup>160</sup> As early as August 17 CINCENT indicated that Phase I, a strategic air campaign, would not be initiated proactively until sufficient land power was in place to defend Saudi Arabia. With enough assets, Phase II, in which air

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<sup>158</sup> Gray, *Airpower for Strategic Effect*, 210; Winnefeld, *A League of Airmen*, 261-2.

<sup>159</sup> Stanfill, 3 June 1991, 33, *Desert Story Collection*; Rick Atkinson, *Crusade: The Untold Story of the Persian Gulf War* (Boston, MA: Mariner Books, 1994), 60; Alexander, 30 May 1991, 36, *Desert Story Collection*; Horner, 2 December 1991, 34-5, *Desert Story Collection*; Buster C. Glosson, 29 May 1991, 11, *Desert Story Collection*. At one point, Warden explained, "This plan may win the war. You may not need a ground attack...I think the Iraqis will withdraw from Kuwait as a result of the strategic air campaign" (quoted in Olsen, *Strategic Air Power in Desert Storm*, 101-2). Commenting on his interview with Horner, Olsen noted: "In essence, Schwarzkopf asked for one thing, was presented with something else, and fully appreciated what he received" (Olsen, 113).

<sup>160</sup> Warden, 30 May 1991, 99, *Desert Story Collection*; Col James Sutherland, 22 October 1991, 112, *Desert Story Collection*; Reynolds, *Heart of the Storm*, 73; Olsen, *Strategic Air Power in Desert Storm*, 113; Davis, *On Target*, 74. At the 11 August brief, the CJCS exclaimed: "Good plan! Very fine piece of work!" (reported by Alexander, 30 May 1991, 33-4, *Desert Story Collection*)

power would concentrate on fielded forces, could even start concurrent with Phase I. Phase III would be the assault into Kuwait to liberate it from Iraqi occupation.<sup>161</sup> As these phases suggest, Strategic Paralysis was not the only air power theory employed in Desert Storm.

The narrative that perceives Operation Desert Storm as a victory by and for air power – Warden’s theory of air power, in particular – exaggerates the success of SP, overlooks the flaws in Instant Thunder, and fails to fully appreciate the interdependence of the strategic air campaign. The most fundamental error, however, is ignoring how Warden’s was not the only air power theory operative in the war. This is crucial to the argument that airmen select from a menu of air power means, and their choices, regardless of whether or not the individual options reflect metic intelligence, reflect the *metis* inherent in their *technological logos*.

#### A Menu of Air Power Means

After Schwarzkopf called the Air Staff, General Loh notified Alexander, who then notified Warden, that Checkmate had an opportunity to brief a strategic air plan to CENTCOM. Before that call, however, Loh made two other calls. One was to the commander of SAC, who agreed to send planners to support Warden’s team. He also called Langley AFB, Virginia, to speak with General Robert D. Russ.<sup>162</sup>

Russ was the commander of TAC, the descendent of Arnold’s Fighter Command School (cited earlier to demonstrate the variety of air power missions in the WWII era). Russ offered his own planners to produce what CINCCENT requested. He appreciated, as

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<sup>161</sup> Davis, *On Target*, 94-5.

<sup>162</sup> Loh, 26 September 1991, 9-11, 13, *Desert Story Collection*; Russ, 9 December 1991, 9, 36-37, *Desert Story Collection*.

much as those on the Air Staff did, that CENTAF was too overwhelmed with immediate issues to think deeply and creatively. Indeed, until Schwarzkopf departed CENTCOM's stateside headquarters, Horner served not only as commander for all Central Command air forces but also as the acting forward commander for all forces in the theater. Host-nation coordination, deployment planning, and the threat of a large armored force just hours from his location all competed with his responsibilities as the senior airman.<sup>163</sup>

The plan TAC produced is often contrasted unfavorably with Warden's, but this historiographical bias is unwarranted.<sup>164</sup> First, their plan to conduct limited coercive strikes against high value military targets had clear signs of *metis*. The planners at Langley AFB were sensitive to wider contextual issues beyond achieving tactical effects. For example, they discussed geopolitical ramifications, domestic opinion, protocol towards the theater commander, and the cultural and regulatory parameters regarding joint operations. Specifically, their assessment of Instant Thunder was that it involved too much violence, too much *bia* for either the American public or the international community to accept. Not only was there too much risk of igniting a regional or global

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<sup>163</sup> Steve Wilson, who went into theater before Warden, noted that the combat operations staff in Saudi Arabia was unable to focus on anything but the question of "what if the Iraqis cross the line with tanks" (quoted in Reynolds, *Heart of the Storm*, 120). According to Alexander, those left at CENTAF headquarters in South Carolina were overwhelmed with determining munitions requirements, deployment logistics, aircraft scheduling, and a constant stream of questions from various units (Alexander, 30 May 1991, 9, *Desert Story Collection*) Reynolds also notes this focus (Reynolds, 21, 33, 79, 121).

<sup>164</sup> For examples of the bias against TAC, see Halberstam (Halberstam, *War in a Time of Peace*, 47-9). For more moderate examples, see the works cited herein by Reynolds, Mann, and Davis. For a significant reply to the "myths" of the Gulf War and Warden's role in it, see the statements by former TAC commander, General Wilber L. Creech in Slife and Olsen (Slife, *Creech Blue*; Olsen, *John Warden and the Renaissance of American Air Power*, 280).

firestorm, but Warden's plan did not integrate any other services.<sup>165</sup> It also failed to account for Powell's objective to curb Iraq's offensive capabilities by attriting its forces in the field. Plus, there are indications the plan they were developing could have been as equally novel.<sup>166</sup> It took advantage of the same air power technologies Warden counted on in order to achieve target suppression and operational paralysis, albeit in a way more associated with Iraqi army movements. The TAC plan also had more built-in flexibility. In contrast, once Instant Thunder launched, the intent was to let it run its course, even if Saddam Hussein offered to surrender.<sup>167</sup>

If anything, *metis* was most lacking in TAC's reactive stance, hesitant as they were to meddle with CENTAF's AOR, and in the battle for the best story. Warden offered a more coherent solution to a complex dilemma, and backed up his model with powerful examples that resonated with the right people. Of course, the very reason he had the opportunity to present his story was somewhat a matter of good fortune. Alexander's direct superior, General James Adams, was away from the Pentagon in early August,

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<sup>165</sup> Bristow, 9 November 1992, 10; Tom Griffith and Alex Bettinger, 26 September 1991, 2-4, *Desert Story Collection*; Cohen, and Keaney, *Gulf War Air Power Survey*, 2015, 23; Stanfill, 3 June 1991, 29, *Desert Story Collection*; Bristow, 9 November 1992, 15, 58, *Desert Story Collection*. For a more detailed look at Russ's view, see the transcript of interview (Russ, 9 December 1991, 8-23, *Desert Story Collection*). Regarding the legitimacy of Warden's planning efforts, Checkmate's efforts had to be legalized by deputizing General Adams as an interim member of the Joint Staff (Davis, *On Target*, 72; *Conduct of the Persian Gulf War*, P-65).

<sup>166</sup> Interestingly, when Loh called TAC, Russ immediately mentioned the use of long-range bombers for something other than the nuclear role they had come to be associated with during the era of AirLand Battle (Loh, 26 September 1991, 9).

<sup>167</sup> Horner, 2 December 1991, 12-14, *Desert Story Collection*; Russ, 9 December 1991, 13, *Desert Story Collection*. CINCCENT asked how Warden would respond if Iraq surrendered before the completion of Instant Thunder's six to nine days. The Airman used the legendary story of Captain Nelson's order to continue his attack because, having put his blind eye up to the telescope, he could claim he never saw the order to do otherwise (Warden, quoted in Olsen, *Strategic Air Power in Desert Storm*, 101).



allowing Warden easy access to the CSAF's office. Given Adams's well-documented annoyance with Warden's previous initiatives, his presence would have likely impeded the initial promotion of Checkmate's plan.<sup>168</sup> Such serendipity can never be discounted in a wicked world.

The second reason for a more balanced assessment of TAC's alternative to Instant Thunder is the composition of the air campaign the USAF actually executed over the area in 1991. Aerial warfare in the Gulf War was nothing if not an amalgamation of the two air power theories by Checkmate and TAC (not to mention all the other uses of aviation technology). While some, quoted above, saw Strategic Paralysis as the theme woven throughout the Desert Storm air war, others involved with the operation saw only traces of the original plan.<sup>169</sup> Public intellectual and author Max Boot viewed the air war over Iraq as classic AirLand Battle doctrine. Historian Stephen Biddle applied the same doctrinal framework in his *Military Power*.<sup>170</sup> In truth, despite sometimes being portrayed as "almost theologically" opposed, these air power theories were not mutually

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<sup>168</sup> For example, see reports of Adam's extreme displeasure with Alexander for not reigning in Warden (Alexander, 30 May 1991, 10-14, *Desert Story Collection*; Wilson, 11 December 1991, 6-7, 14-15, *Desert Story Collection*; Harvey, 31-32, *Desert Story Collection*).

<sup>169</sup> Larry Henry, 2 June 1992, 120, *Desert Story Collection*.

<sup>170</sup> Max Boot, *War Made New: Weapons, Warriors, and the Making of the Modern World* (New York, NY: Gotham, 2007), 333; Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2006), 140. Others who support this view include Summers, Paquin, and the co-authors, Toffler and Toffler (Harry G. Summers, *On Strategy II: A Critical Analysis of the Gulf War* (New York, NY: Dell, 1992), 157-9; Robert J. Paquin, "Desert Storm: Doctrinal Airland Battle Success or 'The American Way of War?'" (School of Advanced Military Studies, 1999); Alvin Toffler and Heidi Adelaide Toffler, *War and Anti-War: Making Sense of Today's Global Chaos* (New York, NY: Grand Central Publishing, 1995), 86.

exclusive.<sup>171</sup> They were different in many important ways, but this only becomes more fodder for *metis*.

Much evidence points to air power strategy in Operation Desert Storm as an exercise in *bricolage*. Even during the planning stages, TAC planners sent to Checkmate at the Pentagon were able to interject their opinions.<sup>172</sup> When Warden briefed Horner's staff in Riyadh, Saudi Arabia, the director of operations recalled that Instant Thunder was welcomed as another option for CENTAF planners.<sup>173</sup> As soon as Checkmate handed off planning to Glosson, he began to meld the two plans together. His approach aimed for Strategic Paralysis, but did not presume other air power missions would be unnecessary to exploit their advantage.<sup>174</sup> By the time operations began, an enormous fleet of assets made it unnecessary to make hard choices about the allocation of air power.

Approximately one-third of the sorties were all that were required to execute what was left of Warden's strategic air campaign.<sup>175</sup> The overall use of air power mirrored the six

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<sup>171</sup> Olsen, *Strategic Air Power in Desert Storm*, 72; Reynolds, *Heart of the Storm*, 98; Dag Henriksen, "Airpower: The Need for More Analytical Warriors," in *Conceptualising Modern War*, eds., Karl Erik Haug and Ole Jorgen Maa (London: C. Hurst and Co Publishers Ltd, 2011), 207. As one example of the animosity, Alexander called TAC representatives "spies" (Alexander, 3 June 1992, 20, *Desert Story Collection*) and TAC Director of Operations, Major General Michael Ryan (future CSAF), gave the Air Staff his opinion of Instant Thunder by saying "I like everything after the last slide" (reported by Alexander, 30 May 1991, 10, *Desert Story Collection*).

<sup>172</sup> Bristow, 9 November 1992, 43, 46-8, *Desert Story Collection*.

<sup>173</sup> Reynolds, *Heart of the Storm*, 115-7.

<sup>174</sup> Glosson, 4 June 1992, 5-6, *Desert Story Collection*; Glosson, 29 May 1991, 2-3, *Desert Story Collection*.

<sup>175</sup> *Conduct of the Persian Gulf War*, 159; James P. Coyne, *Airpower in the Gulf* (Arlington, VA: Aerospace Education Foundation, 1992), 89; Davis, *On Target*, 319. This surfeit of resources significantly downgraded the importance of *metis*, given that it is most valuable in times of power disparity.

tasks laid out for it in WWII doctrine, and all three combat phases started almost simultaneously.<sup>176</sup>

Air power accumulated effects across the battlefield and beyond, due to what one Airman calls the “air power compromise.”<sup>177</sup> This is an oft-overlooked point in the simplified narratives that hold up Warden as the “heroic inventor” of modern air strategy. What is missing, however, is recovered by applying ideas from the history of technology, specifically by treating air power theory as a form of technological knowledge.

### Conclusion

The overarching paradigm that guided Airmen allowed them to select elements from multiple theories. The *metis* within a theory is not the central issue, although it is interesting to note that violence (*bia*) was the dominant criteria by which TAC and Checkmate contrasted themselves. For this argument, however, the main point is that the option to choose a combination of approaches is an opportunity for *metis*. Furthermore, Airmen’s strategic wisdom was technological because it was informed by their familiarity with their technical craft of air warfare and cultivated by the very attributes of that technology: range, perspective, and flexibility. The result was a plan appropriate for the context, seeking non-linear effects in both psychological and physical domains, and employing subterfuge and selective violence to create cumulative effects. Airmen writ large did not expect any one theory to mechanically prescribe all aspects of an air strategy, but instead remained open to improvisation and strategic playfulness. Those who deny this are those who see a single theory running through the air power story of

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<sup>176</sup> FM 100-20, *Command and Employment of Air Power*, 2; Mann, *Thunder and Lightning*, 61.

<sup>177</sup> Mann, 66.

Desert Storm – a theory validated by their assessment of that conflict. This has, in fact, become the dominant narrative of air power among Airmen. The result could be called, with apologies to Thomas Kuhn, “normal strategy.”

The cycle of technological knowledge shows that periods of destabilizing advancements are followed by periods in which the new model is honed, but rarely questioned. Given the sense of stability, provided by the rhetoric of one dominant meta-narrative, *metis* is deemphasized. Changes thus occur in an evolutionary progression. This happened to air power theory after WWII. It also happened following the Gulf War. Strategic Paralysis became doctrine and doctrine hardened into dogma. One book, published by Air University Press, contained a foreword from the current CSAF who lamented the kind of air power debates that occurred in Operation Desert Storm. According to General Fogleman, such deliberation “often hinders us from moving on to more current – and, possibly, more important – issues...interval divisions and resultant debate proved inefficient...[this book] challenges airmen as well as other strategic thinkers to consider how aerospace power *works best* so as to preclude, or at least minimize, these 75-year-old debates when we face the next challenge [emphasis added].”<sup>178</sup> Warden’s reputation as air power expert and his position as Commandant of the Air Command and Staff College (ACSC) at Maxwell AFB from 1992 to 1995 only furthered his influence.<sup>179</sup>

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<sup>178</sup> Mann, x. Mann immodestly describes the book’s purpose in a way that denies the wicked nature of all human endeavors: to “project the trend line of airpower theory into the future” (Mann, xvi). Henriksen affirms this lack of debate (Henriksen, “Airpower,” 210).

<sup>179</sup> Dennis Drew, “Air Theory, Air Force, and Low Intensity Conflict,” in *The Paths of Heaven*, 344. A member of the ACSC faculty at the time, Professor Richard R. Muller, noted Warden’s “most lasting impact was on Air Force education, with its potential to

USAF officers attend ACSC midway through their career. A direct descendant of ACTS, the prestige of this yearlong course waned throughout the Cold War. Warden arrived with a mission to reinvigorate the school and make it relevant.<sup>180</sup> Students, comfortable with the technical and tactical aspects of their profession, would be challenged with air power theory, military history, and operational planning. The keystone was the newly introduced Air Campaign Course. The influence of Warden's own ideas was obvious and some began to refer to ACSC as the "John Warden school of air power." Reflective of residual *metis* in Airmen's paradigm, however, there was much debate about the soundness of his approach, at least when it was first introduced less than a year after the first air strikes in Desert Storm.<sup>181</sup> Again, that debate faded over time.

In the decade following the Gulf War, airmen sought to "solve the puzzle" of air power using the same general template being taught at ACSC.<sup>182</sup> In this so-called "golden decade" of air power, Instant Thunder remained its "holy grail."<sup>183</sup> In the words of former NATO Supreme Allied Commander Europe, General Wesley K. Clark, Desert Storm was "airpower's persistent reference point" as it conducted operations against Bosnian Serbs (Operation Deliberate Force, 30 August-14 September 1995), against Iraq (Operation Desert Fox, 16-19 December 1998), and against Serbia (Operation Allied Force, 24

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shape the thinking of generations of officers" (quoted in Olsen, *John Warden and the Renaissance of American Air Power*, 267).

<sup>180</sup> *Report of the Task Study Group Alpha* (Maxwell Air Force Base, AL: Air University, 29 June 1974); *Department of Defense Committee on Excellence in Education, The Intermediate Level Staff Colleges: Conclusions and Initiatives* (Washington, D.C.: Government Printing Office, 1 December 1976); House Armed Services Committee, Panel on Military Education, chaired by Representative Ike Skelton (Washington, D.C.: Government Printing Office, 21 April 1989); Builder, *The Icarus Syndrome*. The last example is addressed in Chapter Four.

<sup>181</sup> Olsen, *John Warden and the Renaissance of American Air Power*, 251-7.

<sup>182</sup> Grant T. Hammond quoted in Olsen, 257.

<sup>183</sup> Henriksen, "Airpower," 225, 211.

March-7 June 1999).<sup>184</sup> Just as one US battalion commander warned during Operation Iraqi Freedom, “beware the majors of Desert Storm” (who were then the colonels and generals), some note a similar “Iraq-syndrome” in airmen who apply the wrong lessons from Operation Desert Storm to later conflicts.<sup>185</sup>

When Operation Allied Force began eight years later against Serbia, the influence of the Iraq war was still palpable. Air power was expected to have a similarly decisive impact as it did in 1991. The decisiveness was not predicted on similar contexts – indeed, the two were hardly comparable in terms of enemies, objectives, or geography – but on organizing forces in a similarly rationalistic manner to execute similar doctrinal principles.<sup>186</sup> In accordance with post-Gulf War doctrine, the senior USAF commander, Lieutenant General Michael Short, preferred to strike immediately and overwhelmingly at strategic targets.<sup>187</sup> Again, as in its other wars, the Air Force’s paradigm assumed that this approach could produce an ideal air strategy. However, unlike any of its other wars, the USAF was forced to “muddle through” from the very beginning. Even after air strikes

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<sup>184</sup> Wesley K. Clark, *Waging Modern War: Bosnia, Kosovo, and the Future of Combat* (New York, NY: PublicAffairs, 2002), 430. Indicative of how wide this narrative spread, consider the comment by the US foreign minister, Madeleine Albright that “air power alone – could make a decisive difference” (Madeleine Albright, *Madam Secretary: A Memoir* (New York, NY: Harper Perennial, 2013), 192. Likewise, following Operation Allied Force, military historian John Keegan exclaimed: “a war can be won by airpower alone” (John Keegan, editorial, *The Sunday Telegraph* (6 June 1999) reprinted in “The Conversion of John Keegan,” *Air Force Magazine* 92, no. 12 (Dec 2009), 72).

<sup>185</sup> John Nagl quoted in Greg Jaffe and David Cloud, *The Fourth Star: Four Generals and the Epic Struggle for the Future of the United States Army* (New York, NY: Broadway Books, 2010), 198; Henriksen, “Airpower,” 217. Gray notes how this demonstrates the paradoxical logic of war: “tactical military competence most likely will dig the pit of strategic error ever deeper” (Gray, *Airpower for Strategic Effect*, 204).

<sup>186</sup> Dag Henriksen, *NATO’s Gamble: Combining Diplomacy and Airpower in the Kosovo Crisis, 1998-1999* (Annapolis, MD: Naval Institute Press, 2007), 49-50, 52-3.

<sup>187</sup> Henriksen, 178.

began, strategy and objectives remained unclear. Airmen were clearly dissatisfied with the limited ability to conduct their prescriptive approach to strategy.<sup>188</sup>

Short later expressed his frustration to other airmen, saying, “My hope is that airpower theory has told you that there is a right way to use airpower...That means to me that on the first day or the first night of the war, you attack the enemy with incredible speed and incredible violence. Violence that he could never have imagined. It should be his worst possible nightmare with an incredible level of destruction...[using] every bit of technology that you have to shock him into inaction until he is paralyzed.”<sup>189</sup> Not only does this embrace *bia*, but it ignores the inappropriateness of a predetermined strategy as well as all the contextual differences between Operation Desert Storm – the “perfect example of how airpower should be used,” per Short – and Kosovo. Short’s statements, such as “we weren’t following the classic air campaign that we’d all learned at Maxwell,” reveals how stagnant air power theory had become.<sup>190</sup> Blaming limitations on factors such as political direction also reveals the extent to which airmen like Short were willing to ignore anomalies.

In the words of Gray, Warden “lit a path from which airpower’s practitioners would prove both unable and unwilling to deviate very much” for at least a decade.<sup>191</sup>

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<sup>188</sup> Henriksen, 9, 191.

<sup>189</sup> Michael C. Short, “An Airman’s Lessons from Kosovo,” in *From Manoeuvre Warfare to Kosovo?*, ed. John Andreas Olsen (Norway: The Royal Norwegian Air Force Academy, 2001), 260.

<sup>190</sup> Short, 257. Also see J. A. Tirpak, “Short’s View of the Air Campaign,” in *Air Force Magazine* 82, no. 9 (1999), 43-5. As Henriksen points out, “The challenge in the Kosovo War, however, was not to fight a high-intensity war, but to find a way to incorporate airpower in a politically constrained strategy of coercive diplomacy. In this scenario, for all practical purposes, the use of overwhelming, decisive force – inconceivable violence – from the outset was politically unacceptable (Henriksen, “Airpower,” 218).

<sup>191</sup> Gray, *Airpower for Strategic Effect*, 210.

Even the colonel himself, previously so attuned to “presumptive anomalies,” showed less tolerance for theoretical novelties in the years since Desert Storm.<sup>192</sup> By 2008, with major combat operations complete in Iraq and Afghanistan, and an inadequate air power response by Israel’s test of Effects Based Operations, it seemed that the moment was again ripe for a shift in Airmen’s thinking.<sup>193</sup> Instead, during this same period that witnessed the ossification of Strategic Paralysis (later EBO) into dogma, Airmen began to debate another component of the *technological logos* that had lain dormant since the last period of revolutionary thinking – airmindedness. Their discourse only verified that the more dynamic parts of their paradigm, the interrelated images of Dionysius, Icarus, and Metis, remained unacknowledged and largely unknown.

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<sup>192</sup> This assessment is based on presentations made to ACSC in 2012 and 2013 in which the author was present, personal interactions, Warden’s *Winning in FastTime*, and quotes such as this one by Henriksen: “Asked whether he really believes that his Five Rings Model concept/methodology has universal validity, John A. Warden says he believes it does – adding that when a better methodology comes along, we should use it, but as far as I know, one does not exist now” (Henriksen, “Airpower,” 223).

<sup>193</sup> For more on how EBO grew out of Warden’s theory to become the key air power concept for the two decades after Operation Desert Storm, see Henriksen’s “Airpower.”



## Chapter 4

### Daedalus As Deity: An Imbalanced Force



**Figure 5. Daedalus sculpture at Maxwell AFB.** Dedicated in April 2017, this piece is a recreation of *A Memorial to the Fleet Air Arm* in London by the original artist, James Butler (photo by author).

*Early airmen capitalized on a robust sense of air-mindedness. The technical traits of their flying machines – their revolutionary capacity for range, speed, altitude, and flexibility – fostered a culture of strategic intelligence, playfulness, and passion for disruptive innovation. Such creativity was on display, as described in the last chapter, at the bookends of the Cold War era. Today, however, in this period of “normal technology,” Airmen are content to graft operational templates proven in past contexts onto novel wicked dilemmas. Symptomatic of this indifference to their more playful, boundary-testing periods, descriptions of air-mindedness are largely restricted to the employment of air operations. This discourse, reflected in the professional and personal writings that form the primary sources for this chapter, is further evidence that the*

*institution fails to capitalize on their full cultural heritage. Without the benefit of the full spectrum of their technological logos, the USAF neglects a source of wisdom that speaks directly to perennial issues of morale, corporate identity, and how to secure a continuing advantage in a world that is wicked once over. This chapter offers reasons why rescuing the reputation of Icarus is helpful, and not as radical as it may first appear.*

## Introduction

Interwar airmindedness combined the images of Daedalus and Icarus. Carl Builder later played upon the contrasts between the father and son when, in 1990, Air University asked the longtime RAND Corporation analyst to write a piece to “remind incoming [ACSC] students of the obligations of the profession of arms, their heritage in history, and where those obligations might carry them with the future of the Air Force.”<sup>1</sup> In his final analysis, he concluded that the USAF lacked a shared sense of identity. According to Builder, the abandonment of air power theory – Warden’s “revolution” had not yet gained wide exposure – was the crux of the organization’s problem. This original theory, developed by the first generation of US Army Air Corps pilots, connected the technological means of air power to reach “strategic” targets with the opportunity to destroy those targets for decisive effect. Builder labeled this institutional crisis, and titled his book, *The Icarus Syndrome* (1994).

The perceived effectiveness of aerial warfare allowed the USAF, like Icarus, to escape its institutional servitude. Later, according to Builder, the Air Force subordinated

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<sup>1</sup> Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force* (London: Transaction Publishers, 2002), xix. Builder’s metaphorical logic is very similar to yet another author’s allusion to the myth, Danny Miller’s *The Icarus Paradox* (1992).

the ends of air power – strategic effects – to the means of air power – flying airplanes. In the process, he claimed the organization lost sight of the overarching logic that had previously held it together. Air power theory “was like the wax that held together the feathers in the wings of Icarus.” When Air Force leaders “abandoned the institution’s single unifying theory,” it was just as detrimental as flying too close to the sun.<sup>2</sup> The analysis in the last chapter suggests otherwise. What Builder perceived was not an inclination towards the playfulness of Icarus or a lack of captivating theory, but the stagnation in the organization’s paradigm as its *technological logos* coalesced around a single narrative of air power.<sup>3</sup>

The spirit of Icarus, exemplified in the passion and creativity of Warden and his team, was not a syndrome, but a solution. By the time *The Icarus Syndrome* was published, however, the sense of revolutionary potential was gone again. Just as in the USAF’s first four decades, a theory that was once novel and expressly partial was hardening into dogma. At the same time, that very conviction in a single story of air power conferred a new level of confidence in the institution. Concurrent with the validation taking place in the skies over Iraq, Airmen at Air University were revising the service’s basic doctrine to acknowledge their unique view of warfare.<sup>4</sup> The new doctrine,

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<sup>2</sup> Builder, *The Icarus Syndrome*, 36.

<sup>3</sup> The remainder of this chapter will use the phrase “air power” to mean the ability to wage war in and through the air. It is narrower than “aviation power,” which denotes the capacity of the entire nation (military plus commercial and private flying). This concept, like Mahan’s sea power, captures physical elements (population, aircraft, infrastructure, geography, and resources) and socio-political elements (governmental policies and the “character” – or, in this case “mindedness” – of the nation).

<sup>4</sup> Interestingly, Warden’s division had also offered a new version of the basic doctrine, based on his vision of air power, but the Air Staff deferred to Air University. Olsen offers a succinct description of Warden’s proposed revision. Warden’s assignment to ACSC was also meant to bolster the school after Builder’s scathing critique (John Andreas

published in 1992, grounded the Airman's perspective – airmindedness – in the organization's heritage by citing General Arnold's 1945 report to Congress. The only place that term is used is the line quoted earlier: "Since military Air Power depends for its existence upon the aviation industry and the air-mindedness of the nation, the Air Force must promote the development of American civil Air Power in all of its forms, both commercial and private."<sup>5</sup> The citation is accurate, but the interpretation in doctrine is distorted.

In the new version of AFM 1-1, *Basic Aerospace Doctrine*, in all subsequent doctrine, and in the opinions of most Airmen who write about the subject, airmindedness no longer accounted for the idea symbolized by Icarus. Perhaps unsurprisingly, given the state of technological knowledge, there was no sense of play or *metis*. Instead, the perspective is narrowly defined around the ability to conduct aerial operations. In other words, without a menu of theories to choose from, the only choice remaining is how to operationalize the one dominant image of air power. Subsequent Airmen largely echoed those themes in the internal debate over the meaning and import of airmindedness. To them, the concept identifies the Airman's perspective as strategic, but defined this quality in terms similar to Warden's air campaign instead of the strategic intelligence of Metis. Thus, instead of embracing Icarus or Dionysius, conversations surrounding airmindedness reveal that modern Airmen treat Daedalus as a deity. The worship of technology frames its story – its *logos* – around the idol of archetypical technician.

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Olsen, *John Warden and the Renaissance of American Air Power* (Washington, D.C.: Potomac Books, 2007), 119-21, 251-3).

<sup>5</sup> Henry H. Arnold, *Third Report of the Commanding General of the Army Air Forces to the Secretary of War, 12 November, 1945* (Washington D.C.: Government Printing Office), 70.

In the mythology record, Daedalus's skills are often put to military ends, and statesmen eagerly sought his service. Thus, as a metaphor for airmindedness, Daedalus represents its practical dimension; the rational pursuit of a mechanical instrument and the pragmatic employment of that technology for political purposes. What is missing from this model – and what is missing from Air Force discourse as much as it is missing from the Apollonian image – is the romantic, aspirational energy of his playful son.<sup>6</sup> Gone is the sentiment Leonardo da Vinci expressed when he wrote “When once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return.”<sup>7</sup> Yet, that attitude is necessary for innovation, and it is an inherent, if latent, component of the US Air Force's cultural history. Indeed, the status of airmindedness in popular discourse during the Cold War likely had just as much influence on the military's modern interpretation of the concept as when early airmen appropriated the idea in the first place.

#### The Airmindedness in American Culture

Once human flight became a reality, the mythological possibilities of flight – particularly its capacity to alter one's perspective and inspire creative thinking – began to

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<sup>6</sup> Regarding the use of the word “aspirational,” the term also has a place in the history of technology. Pacey, for example, describes the evolution of his own writings this way: “‘Values’ and ‘ideals’ were almost interchangeable concepts for the early books, in discussion of links between technology practice and individual purpose and experience. However, in this third and final exploration, I prefer to use words such as ‘aspiration’ and ‘meaning,’ believing that a person's ideals and values in relation to technology are an outcome of her or his sense of the purpose and meaning of life” (Arnold Pacey, *Meaning in Technology* (Cambridge, MA: The MIT Press, 1999), 3).

<sup>7</sup> Quoted in Flamini, Roland. “The Da Vinci Codex: Treasured Sketches of Flight on Rare Display at Smithsonian.” *The Washington Post*, 12 Sept. 2013, [www.washingtontimes.com/news/2013/sep/12/the-da-vinci-codex-treasured-sketches-of-flight-on/](http://www.washingtontimes.com/news/2013/sep/12/the-da-vinci-codex-treasured-sketches-of-flight-on/). Accessed on 17 December 2017. For a threaded discussion for research into the authenticity of this quote, see “Talk:Leonardo Da Vinci - Wikiquote,” accessed January 22, 2018, [https://en.wikiquote.org/wiki/Talk:Leonardo\\_da\\_Vinci](https://en.wikiquote.org/wiki/Talk:Leonardo_da_Vinci).

decouple from its technological possibilities.<sup>8</sup> Slowly, the resonance with Dionysius, Icarus, and Metis waned in favor of Apollo, Daedalus, and Bia. The break was palpable by the time Congress authorized the creation of the USAF in 1947.

The employment of air power in World War II was largely responsible for the disenchantment of aviation in the public mind. Prophecies of ending warfare, poverty, and inequality, all of which strengthened the link between aviation and religion, waned with the trauma of another global conflict and the image of aircraft delivering atomic bombs. More prosaically, the dream of aviation for the masses succumbed to realizations that private flying was still dangerous, expensive, and often unrealistic.<sup>9</sup> Instead of “an airplane in every garage,” aviation for the masses came from airlines, which had an incentive to portray it as safe and mundane.

Increasingly militarized, regulated, and routinized, flying eventually lost its cultural cachet as the edge of human aspiration. Aviation’s frontier, so evident among WWI flyers, had closed, and flying became too mundane and safe to elicit popular

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<sup>8</sup> According to Boitani, this trend began with the 1783 Montgolfier brothers successful balloon flights: “it is here we begin to notice in the European imagination a distinction between scientific and technological reality on the one hand and the mythical imaginary on the other” (Piero Boitani, *Winged Words: Flight in Poetry and History* (Chicago, IL: University of Chicago Press, 2007), 44). Others place the divergence later, during the Industrial Revolution or the world wars of the twentieth century. Singer, however, notes the opposite tendency among writers: “Throughout history, the symbolic use of flight is reinforced the physical perception of actual flight. Achievement feeds the dream, and the dream reinforces that drive toward the heavens. Even when flight or space seems to be merely background for the authors’ for the artists’ main points, it is not choosing arbitrarily. The heavens have symbolic resonance which gives weight and substance, and flavor, to the discussion” (Bayla Singer, *Like Sex with Gods: An Unorthodox History of Flying* (College Station, TX: Texas A&M University Press, 2003), 79).

<sup>9</sup> Many authors address the changing relationship between public opinion and aviation, including Corn, Sherry, Wohl, Call, Courtwright, Pisano, Biddle, Clodfelter, and Vick (see References).

excitement.<sup>10</sup> Simultaneously, the threat of airpower-delivered nuclear holocaust made earlier airminded enthusiasm seem naïve. The twentieth-century became the era in which “flight has released us into space and yet may kill not only Icarus but everyone else.”<sup>11</sup>

To the degree airmindedness is relegated to enthusiasm for aviation, then the decline in its usage in the mid-twentieth century is logical. Once celebrated as “knights of the air,” pilots became less like the mythical heroes they were imagined to be during World War I.<sup>12</sup> Instead, they became more like technicians, operating in an environment striving for safety, reliability, and regulation. Flying was no longer, in the words of one author, a “fusion of sensual and spiritual forces, a tension in which each individual takes part, which is almost invincible.”<sup>13</sup>

The ubiquity of aviation meant that the term airmindedness ceased to have purchase around the same time. After WWII, the pervasiveness of air travel, the familiarity with aerial warfare, and the growing aerospace industry made the word superfluous, like “referring to all people as ‘bipeds,’” as one historian points out.<sup>14</sup> Today, aviation is well established as a critical component of transportation systems, national defense structures, and modern economies. In this sense, most people living in the industrialized world today are unconsciously airminded, living in a world of

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<sup>10</sup> Spariosu discusses how rationality and playfulness relate to each other, as well as how both relate to the mentalities associated with frontiers and periods of instability (Mihai I. Spariosu, *Dionysus Reborn: Play and the Aesthetic Dimension in Modern Philosophical and Scientific Discourse* (Ithaca, NY: Cornell University Press, 1989), 9-11).

<sup>11</sup> Michael Aytron quoted in Nyenhuis, “Daedalus and Icarus,” 233.

<sup>12</sup> Ezra Bowen, *Knights of the Air, The Epic of Flight* (Alexandria, VA: Time-Life Books, 1980).

<sup>13</sup> Kessel, *La Ligne*, quoted in Robert Wohl, *The Spectacle of Flight: Aviation and the Western Imagination, 1920-1950* (New Haven, CT: Yale University Press, 2005), 165.

<sup>14</sup> Leigh Edmonds, “How Australians Were Made Airminded,” *Continuum: The Australian Journal of Media & Culture* 7, no. 1 (May 1993), 206.

“aereality.”<sup>15</sup> Any palpable concerns raised are framed in terms of apocalyptic attack, terrorism, environmental degradation, or, more mundanely, the inconveniences of airline travel.<sup>16</sup> As that list implies, the way most Americans interact with aviation in the last few decades is apt to cause only negative emotions such as frustration or fear.

Today we are more familiar with aviation as a field of purposeful activity, defined by poles of constructive or destructive *effects*. We are less likely to perceive it as a sphere of *affects*: the psychological impact, be it positive (bliss, joy, rapture) or negative (frustration, fear, anger).<sup>17</sup> Even for the USAF, which continues to “worship at the altar of [airpower] technology,” there seems to be little acknowledgement of the inspirational

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<sup>15</sup> Peter Adey, *Aerial Life: Spaces, Mobilities, Affects* (Malden, MA: Wiley-Blackwell, 2010), 8. Aereality is also the title of William L. Fox’s book on how aerial views are constructed physically (through flight) or via imagination (William L. Fox, *Aereality: On the World from Above* (Berkeley, CA: Counterpoint, 2009)).

<sup>16</sup> Author and friend Ken Roach highlighted the particularly egregious nature of the attacks of September 11, 2001, which perverted the wondrous human invention into a weapon of mass destruction (personal correspondence with author).

<sup>17</sup> Wohl, the contributors to *Seeing From Above: The Aerial View In Visual Culture*, and, to some extent, Corn are all representative of the types of scholars that address the affective side of airmindedness: art historians, cultural geographers, and those who study visual culture. The tone is often critical, ranging from critiquing strategic bombing or “drone” strikes as ineffectual and immoral to the “oppressive gaze” of a powerful state imposing its will. For example, in his introduction to the edited volume, *From Above*, Peter Adey proclaims “This book asks difficult questions of this view, as for all its spectacle in beauty, we must be careful not to celebrate it.” For Adey, and those who contributed to the work, airmindedness is an oppressive imposition of power from above, a forced set of “ideas, beliefs, and behaviors” that define what is acceptable for members of a community (Peter Adey, Mark Whitehead, and Alison Williams, eds., *From Above: War, Violence, and Verticality* (New York, NY: Oxford University Press, 2014), 2). Some counter these ideas by restoring agency to those below (e.g. Jason Weems, *Barnstorming the Prairies: How Aerial Vision Shaped the Midwest* (Minneapolis, MN: University of Minnesota Press, 2015)). Contemporaneously, fiction writers were often the earliest to highlight the affects and effects of flight, with more even attention to its promises and pitfalls (e.g. H. G. Wells, who believed airmen were destined to be part of the ruling elite, foresaw the rise of strategic bombing as early as 1908).



component of flying.<sup>18</sup> Airmindedness is merely an issue of growing, managing, and employing airpower's capabilities. Furthermore, histories about the USAF, and by the USAF, project this emphasis on pragmatism back into time, underemphasizing the playfulness and spiritual nature originally inherent in flying. The enthrallment of Icarus is seen as a fatal distraction and relegated to a cautionary tale. Thus, it is no wonder that some commentators bemoan too much technological enthusiasm in USAF culture, mirroring Hansen's warnings, highlighted in the introduction, regarding the same attitude among aviation historians. It has become cliché to lament Airmen's attentiveness to technology.<sup>19</sup> Airmindedness was thus recast without any sense as a way of thinking about exciting possibilities, as an exhilarating experience of something divine, or as a symbol of humanity's ability to harness technology and re-enchant an industrialized world.<sup>20</sup>

#### Airmindedness in USAF Doctrine

General Arnold published his *Third Report of the Commanding General of the Army Air Forces to the Secretary of War* in 1945. Two years later, the US Air Force earned its organizational autonomy with the National Security Act of 1947. Around this time "airmindedness" began to fall out of common usage for the reasons offered above.

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<sup>18</sup> Carl Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore, MD: Johns Hopkins University Press, 1989), 19.

<sup>19</sup> For example, consider Smith's reproach (Jeffrey J. Smith, *Tomorrow's Air Force: Tracing the Past, Shaping the Future* (Bloomington, IN: Indiana University Press, 2013).

<sup>20</sup> Other air forces also use the term. See the Royal Air Force Joint Doctrine Publication 0-30, UK Air and Space Doctrine, 1-9. For an overview of both the USAF and Royal Air Force definitions from the perspective of a Royal Canadian Air Force officer, see Brigadier-General Christopher J. Coates, "Airmindedness: An Essential Element of Air Power," *The Royal Canadian Air Force Journal* 3, no. 1 (Winter 2014), 70-84. This project does not evaluate the degree to which airmindedness's past is as foreign to these other air forces as it is to the USAF.

The term did not return to official USAF discourse until 1992, with the drastic revision of Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine*.<sup>21</sup> By this time, however, the concept had lost much of its heritage and some of its most important dimensions.

*Basic Aerospace Doctrine* contained two volumes. The first volume defined air-mindedness as a three-dimensional mindset and emphasized its distinctiveness. The second volume contained this extended explanation:

Air-mindedness is much harder to convey than the perspectives of soldiers and sailors for several reasons. The viewpoint of the soldier and sailor – bounded by the apparent horizon – is part of everyday life and instinctive understanding; few have ever operated an aircraft or contemplated the problems of aerial warfare; and few popular sources of information reflect an airman’s perspective. Airmen should understand, honor, and apply the various useful views of war resulting from the different operating environments within the profession of arms...Nevertheless, because air-mindedness distills the understanding and imperatives unique to airmen, it is different from surface perspectives.<sup>22</sup>

Both the ideas and the tone in which they are presented are reminiscent of Mitchell and de Seversky. Furthermore, the doctrine explicitly links the concept to Arnold, almost implying that he created the term: “The study of aerospace warfare leads to a particular expertise and a distinctive point of view that Gen Henry H. (“Hap”) Arnold termed air-mindedness. The perspective of airmen is necessarily different; it reflects the range, speed, and capabilities of aerospace forces, as well as threats and survival imperatives unique to airmen.”<sup>23</sup> The footnote for this line deserves further examination.

The reference is to Colonel Dennis Drew’s article, “Joint Operations: The World Looks Different from 10,000 Feet.” Air University Press, the same organization that

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<sup>21</sup> Coates, “Air-mindedness,” 71.

<sup>22</sup> Air Force Manual (AFM) 1-1, Volume II, *Basic Aerospace Doctrine* (March 1992), 210.

<sup>23</sup> AFM 1-1, 210.

produced the doctrine manual and many of the internal assessments of Desert Storm, published his think piece in 1988.<sup>24</sup> Drew's opening argument is that effective joint warfare requires leaders who understand the "different worldviews held by soldiers, sailors, and airmen...over how warfare should be conducted."<sup>25</sup> He explained how the nature of their operating environments shapes the paradigms of the Army, Navy, and Air Force. No one view is inherently better and all three are needed in different combinations to serve different contexts. The relative youth of the USAF means Airmen are less prepared to articulate its unique mindset, the essence of which is perspective. According to Drew, "all other characteristics (speed, range, flexibility, etc.) are different only in a relative sense." It is altitude that confers a global, strategic perspective upon the Airman, even when air power is used to support limited operational objectives.

The focus on airminded operations is mirrored in AFM 1-1 when air warfare is examined through the lens of the traditional principles of war. Indeed, the discussion of airmindedness was placed in the section on employment and operational art, along with explanations of missions and campaigns.

The next two iterations of AFM 1-1, in 1997 and 2003, did not use airmindedness, seemingly replacing the term with the phrase "the Airman's perspective." Likewise, the doctrine published in 2007, now retitled Air Force Doctrine Document (AFDD) 2,

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<sup>24</sup> In fact, Drew worked on AFM 1-1. In a 2012 interview, however, said he was unable to recall who authored the essay on airmindedness. Drew, however, offered that "perhaps the author of the essay...viewed Arnold's use of 'airmindedness' less literally and much more figuratively as applying broadly to both civil and military aviation" (Coates, "Airmindedness," 72). The full context of Arnold's quote reveals that this "figurative" interpretation was precisely what the Commanding General meant, and not the airmindedness that survives in official discourse today in narrower form.

<sup>25</sup> Dennis M. Drew, "Joint Operations: The World Looks Different From 10,000 Feet," *Air Power Journal* 2, no. 3 (Fall 1988), 5.

*Operations and Organization*, did not mention airmindedness except for an inset from AFM 1-1 Volume II (1992). The placement of the quote, which reiterates the allusion to Arnold's *Third Report*, implied airmindedness and the Airmen's perspective of warfighting are one and the same. Additionally, the description further solidified the narrower conception of the Airmen's airminded perspective as a functional model:

Airmen must understand the intellectual foundation behind air and space power and articulate its proper application at the strategic, operational, and tactical levels of war; translate the benefits of air and space power into meaningful objectives and desired effects...[using] an effects-based approach to operations...But the differences in range, flexibility, and perspective with respect to surface warfare require a different approach to the application of air and space power. This outlook – the Airman's perspective – demands that Airmen understand and apply the distinctive characteristics of air and space power in a complex joint environment that is experiencing profound technological change.<sup>26</sup>

The 2011 version of AFDD 1, *Basic Doctrine, Organization, and Command*, pulled Arnold's quote into the text and further framed the concept around operations – now combined into one word, “airpower,” signal the inclusion of space and cyberspace:

The perspective of Airmen is necessarily different; it reflects a unique appreciation of airpower's potential, as well as the threats and survival imperatives unique to Airmen. The study of airpower leads to a particular expertise and a distinctive point of view that General Henry H. “Hap” Arnold termed “airmindedness.” Airmen normally think of airpower and the application of force from a functional rather than geographical perspective...This approach normally leads to more inclusive and comprehensive perspectives that favor strategic solutions over tactical ones...the flexibility and utility of airpower is best fully exploited by an air-minded Airman.<sup>27</sup>

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<sup>26</sup> Air Force Doctrine Document (AFDD) 2, *Operations and Organization* (3 April 2007), 2-3.

<sup>27</sup> Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine, Organization, and Command* (14 October 2011), 18.

Besides including space and cyberspace, this passage adds little new to the notion of airmindedness. It is still a way of thinking that is unique, oriented to operational effects, and inherently strategic.<sup>28</sup> And it is still a misrepresentation of Arnold's quote.

The following page does expand on the practical application of this perspective to warfare, paralleling the annex discussion in AFM 1-1, Volume II. It is focused on the qualities of airpower and its employment (e.g. the primacy of air superiority, airpower's inherent speed, range, and flexibility, the importance of an Airman in control of airpower). To the degree this is about a different way of thinking, it is only thinking as it relates to warfare – it is not the suggestion of other writers that flying can ignite passionate creativity. Then again, that component of airmindedness has never been explicit within the US Air Force.

Current doctrine offers the same ideas as the 2011 AFDD 1 to describe airmindedness and the Airman's perspective, citing both the 1992 essay in AFM 1-1 Volume II and Col Drew's article. In an example of self-referential logic, airmindedness is explicitly – and unhelpfully – defined as what Airmen do.

A paradigmatic (i.e. what Morgan labels theoretical) approach to aerial warfare has always been a component of airmindedness. Yet, it is not the only dimension.

Aviation's contributions to the nation, much less to the entire world, and the impact of

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<sup>28</sup> This is not perfectly clear, however. Chapter Two on "Airpower," states "Accordingly, the following discussion of airpower is intentionally not Service-specific; aspects of airpower are used across the joint force and by coalition partners. However, Airmen have a special appreciation for airpower's broader potential" (AFDD 1, 2011, 11). Additionally, the section on "Airman's Perspective," which explains operational principles guiding development and employment of airpower, describes these processes as the "practical application of 'airmindedness,'" implying airmindedness is not itself practical (AFDD 1, 2011, 19). What else it could be is not part of the doctrinal definition (though it is part of larger usage, as noted in AFDD 1, Chapter Two).

flying on human imagination are both missing. What remains is a more restricted, and less inspirational, version of airmindedness. There is no resonance with the metaphor of Icarus, and what is left of Daedalus' image is not a project of national import, but only a style of warfare.

#### Airmindedness in Air Force Discourse

Since 1992, every version of USAF basic doctrine reiterated the words, or at least the spirit, of the original AFM 1-1 representation of airmindedness. Unsurprisingly, when Airmen write about the concept they tend to hew to that same connotation. For instance, a 1996 Air War College student paper proposed a new Professional Military Education course to remedy the overspecialization and fragmentation highlighted in *The Icarus Syndrome*. Its purpose would be to develop “airminded officers with a firm foundation in the history and doctrine of airpower and an in-depth understanding of the Air Force's core competencies.”<sup>29</sup> The paper never defined airmindedness, implying the author relied upon its doctrinal definition. Similarly, a research paper from a student at ACSC examined the World War I Battle of Saint Mihiel in September 1918. By simply applying the principles of war described in AFM 1-1 (1992) to “America’s first operational air campaign,” the student further corroborated the more narrow concept of airmindedness as a model of aerial warfare.<sup>30</sup> Finally, retired Lieutenant General Robert J. Elder, Jr., offered his “confessions of an airpower advocate” in the Fall 2009 issue of the *Air & Space Power Journal*. In an article titled, “Air-Mindedness,” he posited, “Airmen look at problems

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<sup>29</sup> John C. Scherer, “It’s Time for the Basic Airpower School” (Student Research Paper, Air War College, 1996), 5, 9.

<sup>30</sup> Michael J. Taschner, “Examples of Airmindedness from America's First Operational Air Campaign: The St. Mihiel Offensive, 1918” (Student Research Paper, Air Command and Staff College, 1997), vi.

differently,” and suggested the USAF use that unique perspective to understand how an independent Air Force contributes to joint warfare.<sup>31</sup>

Even when Airmen extend the concepts, they tend to do so cautiously, returning to airmindedness as an operational model, as if the defining feature of their paradigm is formal air power theory. For example, five years after the paper on St. Mihiel, another ACSC student looked for the origins of an airminded culture in the era before World War I. In professional journals and popular magazines, this first generation of military flyers argued for the unique role aircraft could play on the battlefield. Although the author acknowledged that these airmen “found a sort of spiritual outlet” among their cohort, felt “personal fascination with flight,” and quoted a primary source extolling the need for “imagination” and “prophecy,” the paper instead focused on the operational principles they pioneered. The student noted that “Flying was clearly moving from the realm of fantasy to that of an accepted science, and enthusiasts were likewise becoming true ‘airmen,’ with a corporate sense of their specialized expertise and the particular body of knowledge that it implied.”<sup>32</sup> The author did not consider whether the domains of imagination and science could co-exist.

Going even further back in his analysis, Major Dave E. Bonn’s thesis from Air University’s School of Advanced Air and Space Studies (SAASS) analyzed “Airmindedness and its Antecedents in Union Cavalry.” Titled “Saddled with History,”

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<sup>31</sup> Robert J. Elder, Jr., “Air-Mindedness: Confessions of an Airpower Advocate,” *Air & Space Power Journal* 23, no. 3 (September 2009): 11-12.

<sup>32</sup> Ronald G. Machoian, “Looking Skyward” (Student Research Paper, Air Command and Staff College, 2004), 8, 14, 13, 21.

the author admirably clarified airmindedness as “more than the artifact of technology.”<sup>33</sup> One could be airminded apart from air power. Nevertheless, he still situated that mindset within context of military operations, using parallels to Civil War cavalry.

Just months after Bonn completed his work, the outgoing SAASS Commandant, Colonel Jeffrey J. Smith, published “Beyond the Horizon: Developing Future Airpower Strategy” in Air University’s *Strategic Studies Quarterly*. Smith did not address airmindedness directly, simply defining Airmen as air-minded thinkers.<sup>34</sup> There was, however, an interesting connection to Bonn’s thesis on cavalry. Smith’s article culminated in the claim that the three “fundamental axioms” of air power – access, speed, and “strategic” strike – can exist without aviation. Just as the industrial age applied the term “horsepower” outside an equestrian context, air power could be a meaningful measure of force even without aircraft. Apart from the common equine reference, what is interesting is the extension of air power (in Smith’s article) and airmindedness (in Bonn’s thesis) to contexts outside of aviation. Both, however, still remained firmly within the realm of military operations.

Some Airmen, nevertheless, have offered their own, less doctrinaire, ideas about the meaning and utility of the concept. One example is from a short piece published in *Air and Space Journal* by retired USAF colonel and researcher at Air University’s Air Force Research Institute, Dr. Dale L. Hayden. He began with the conventional assertion

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<sup>33</sup> Dave E. Bonn, “Saddled with History: Airmindedness and its Antecedents in Union Cavalry” (MPhil Thesis, School of Advanced Air and Space Studies, 2014), 5. Bonn’s thesis does highlight the misuse of Arnold’s quote regarding airmindedness, but incorrectly writes: “In a larger sense, however, the history and evolution of airmindedness as a concept suggests AFM 1-1 still used the term appropriately” (Bonn, 27).

<sup>34</sup> Jeffrey J. Smith, “Beyond the Horizon: Developing Future Airpower Strategy” *Strategic Studies Quarterly* 8, no. 2 (Summer 2014): 75.



that what distinguishes Airmen from Soldiers or Sailors is their perspective on the art of warfare, “an attribute we loosely define as airmindedness.” Distinct from doctrine or operational art, airmindedness is characterized by a global, offense-oriented mindset “not constrained by geography, distance, location, or time.” Furthermore, aerial warfare implies “the ability to influence the links between adversary materiel and moral strength” and “the ability to range over the battlespace rapidly and with relative impunity while surface forces often struggle to advance even short distances.”<sup>35</sup> The notions of air power as inherently strategic, offensive, and flexible are standard tenants of the airminded operational model. Hayden, however, also highlighted some of the aspirational and affective qualities of airmindedness. Quoting Mitchell, “‘the ability to do something in the air’...has sparked innovation.” “Like esprit de corps,” Hayden concluded, “it binds airmen together and guides their actions.”<sup>36</sup>

Hayden acknowledged that the term is evolving, and at any one time “the notion of air-mindedness probably will not find consensus among either airmen or their surface partners.”<sup>37</sup> Indeed, the concept has sometimes been the subject of debate. For example, in “Shortchanging the Joint Fight?” Major General Charles J. Dunlap (retired) critiqued Field Manual 3-24, *Counterinsurgency (COIN)*, for restricting its discussion of airpower to a five-page annex. Even when ground forces are the most suitable for such operations, he argued that:

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<sup>35</sup> Dale L. Hayden, “Air-Mindedness,” *Air and Space Journal* 22, no. 4 (Winter 2008): 44.

<sup>36</sup> Hayden, 44-5. In a 2012 interview, Hayden suggested the use of the term airmindedness may serve as a “meta-narrative” that has been accepted, as it served the USAF’s organizational interests (Coates, “Airmindedness,” 12).

<sup>37</sup> Hayden, 45.

The design of even those operations, however, *always* ought to reflect careful consideration of not just the technology and capabilities of the whole joint team but also the unique war-fighting perspective each service and component brings to the analysis...A *complete* COIN analysis for implementation in the joint environment must benefit from an *airminded* perspective. That means taking into account the potential of airpower technologies as well as the Airman's distinct approach to resolving issues across the spectrum of conflict [emphasis in original].<sup>38</sup>

While describing what the USAF can contribute to the COIN fight that was then raging in Afghanistan and Iraq, he characterized airminded Airmen as “inherently strategic,” “fascinated with innovation,” and concerned with the larger geopolitical context.<sup>39</sup> A longer version of this article was later published as a monograph by Air University Press.

Dunlap's writings, which can easily be interpreted as parochial, inspired Lieutenant Colonel Buck Elton to respond in *Small Wars Journal* the following year. In his article, “Shortchanging the Joint Doctrine Fight: One Airman's Assessment of the Airman's Assessment,” Elton retorted that Dunlap's “recommendations only serve to discredit ‘air-mindedness’ as unrealistic.” He went on to opine, “perhaps the most disturbing concept discussed by General Dunlap is the statement that only Airmen think strategically or specifically that ‘Airmen tend to reason in strategic terms and Soldiers are intellectually disposed to favor close combat and tend to think tactically.’”<sup>40</sup> Elton later seemed to imply that the notion of a unique service mindset towards strategy is itself invalid. In other words, Dunlap did not just misrepresent airmindedness, but there really

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<sup>38</sup> Charles J. Dunlap, *Shortchanging the Joint Fight: An Airman's Assessment of FM 3-24 and the Case for Developing Truly Joint COIN Doctrine* (Maxwell Air Force Base, AL: Air University Press, 2007), 7-8.

<sup>39</sup> Dunlap, 11, 15.

<sup>40</sup> Buck Elton, “Shortchanging the Joint Doctrine Fight: One Airman's Assessment of the Airman's Assessment,” *Small Wars Journal*, 12 July 2008, <http://smallwarsjournal.com/blog/journal/docs-temp/74-elton.pdf?q=mag/docs-temp/74-elton.pdf>, accessed 27 July 2016.

is no such thing, at least in terms of strategic approaches. Elton only explicitly acknowledged the unique *operational* acumen of Airmen.

Approximately one year after Elton penned his response, Dunlap's ideas on air-mindedness reappeared in his online essay titled, "Do We Need 'Air-minded' Options for Afghanistan?" Although this was largely an extension of his earlier argument, he did make some further statements about the unique perspective of Airmen. First, he clarified that "an 'air-minded' approach does not equate with 'Air Force,' *per se*, but rather reflects a philosophy that seeks to avoid the bloody close fight. It welcomes the opportunity to create kinetic and nonkinetic effects from afar." Continuing, he declared "air-mindedness' is more of an attitude that focuses not upon any one dimension of military power, but rather aims to holistically leverage America's technological advantages across multiple domains, especially (but certainly not exclusively) in air, space, and cyberspace. At its core, it unapologetically tries to substitute machines for the bodies of young Americans whenever possible." The notion of technological fascination is present, as well as an emphasis on air-mindedness as a style of thinking that can be applied beyond the domain that gives the concept its name. Dunlap's extension of air-mindedness beyond air warfare is rare.

The insinuation that an air-centric perspective should shape the thinking of all services inspired another Air Force officer to suggest abandoning the term altogether. Lieutenant Colonel Mark Jacobsen offered two reasons in a blog post in 2010. The first was that the strategic utility of airpower has already been proven (as has the broad strategic view of warfare in general). This presumed air-mindedness is mainly about advocating Air Force capabilities. It also presumed an air-minded perspective is naturally

a strategic perspective, which is also a common claim among air power theorists. “The second reason we should jettison the phrase,” according to Jacobsen, “is that nobody is listening. It’s a term and concept that only circulates within the ranks of the Air Force...the elitist view of air-mindedness will not close the [inter-service] gap.”<sup>41</sup> Jacobsen, later a student at SAASS, limited the term’s utility based on the premise that airmindedness should resonate with external audiences. Therefore, airmindedness is about promoting airpower operations, and that advocacy is directed outwards to joint partners for whom the term itself has no legitimacy. This sentiment is corroborated in an article by Royal Canadian Air Force Brigadier-General Christopher J. Coates, “Airmindedness: An Essential Element of Air Power,” where Coates notes “A large number of those interviewed found the existing USAF definition pejorative, ‘outdated’ or ‘archaic.’ This negative reaction was not limited to USAF’s joint partners, as several very senior USAF officers indicated that, in their opinion, the USAF definition was unhelpful.”<sup>42</sup>

Apart from the contributions of Dunlap, Elton, and Jacobsen, three other Airmen have made notable critiques of the doctrinal notion of airmindedness. The earliest example is a 2004 Masters of Philosophy thesis from SAASS on “the cognitive origins of airmindedness.” The author, Major Robert Killefer III, presented a continuum of airmindedness, from the practical to the psychological: tactics, operations, strategies, and,

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<sup>41</sup> Mark Jacobsen, “The Problem with Air-Mindedness,” *Building Peace*, 19 February 2010, <http://buildingpeace.net/?s=air-minded>, accessed 3 December 2015.

<sup>42</sup> Lieutenant General (Lt Gen) Michael C. Short (Retired), USAF, described it as “chest beating,” and Lt Gen Allen G. Peck (Retired), USAF, indicated that “the term ‘air-mindedness,’ when used in a better-than-thou context by Airmen, can do more harm than good regarding the perception of the Air Force as a coequal partner at the joint force table” (Coates, “Airmindedness,” 74).

finally, a fusion of epistemological and ontological knowledge (i.e. what constitutes a justifiable belief and what constitutes reality). The crux of the argument was how the “worldview” of airmindedness evolved, and continues to evolve, as a result of metaphorical thinking along this spectrum.<sup>43</sup>

Although Killefer’s thesis still exhibits the circular logic that has emerged in doctrine and discourse – Airmen think and act in airminded ways; to be airminded is to think and act as an Airman would – it is the deepest investigation yet into airmindedness as a way of thinking. The theory could presumably extend airmindedness to encapsulate the broader notion of the term as it was used in the Golden Age of Flight. It is telling that no other author has referenced this paper when writing about airmindedness, nor was the paper selected for publication, as some SAASS theses are.

In 2012, another SAASS graduate, Lieutenant Colonel Chris Wachter, published “Air-Mindedness: The Core of Successful Air Enterprise Development” in *Air and Space Power Journal*. A 1925 quote from Mitchell set the tone for his article: “The Air Force is the great developing power in the world today...the greatest civilizing element in the future.” Wachter also claimed “air-minded societies tend to seek progress and freedom.”<sup>44</sup> Thus, in his argument for how to nurture the air enterprise in developing nations, he turns explicitly to the interwar concept of airmindedness as an appreciation of what aviation can do for defense *and* for commerce. In another sentiment that extends airmindedness, he briefly mentioned aviation’s psychological elements as an impetus for

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<sup>43</sup> Robert Killefer III, “A Metaphor Theory Of Airmindedness” (MPhil Thesis, School of Advanced Air and Space Studies, 2004), vi. This links to the discussion of metaphors in the introduction, and further strengthens the association of Airmen with the post-Platonic paradigm.

<sup>44</sup> Chris Wachter, “Air-Mindedness: The Core of Successful Air Enterprise Development,” *Air and Space Power Journal* 26, no. 1 (January-February, 2012), 56.

national development: “the most comprehensive, sustainable approach for our partners involves helping them develop their own attitude of air-mindedness. This enables them to reap the tangible benefits of aviation not only militarily but also in a way that legitimizes their central governments, assures their sovereignty, and encourages improvement in their economy, technology, education, and communications.”<sup>45</sup> Still, as this quote highlights, his suggestions focused on the practical aspects of aviation, such as infrastructure, sustainment, and training. He did not strongly tie airmindedness to a creative perspective for framing and solving problems.

Finally, in 2016, Major Mike Benitez posted “Air-Mindedness 2.0: We Need To Do Better Than Fly, Fight, And Win” on the *War on the Rocks* website.<sup>46</sup> Airmindedness, as defined in current Air Force doctrine, is “a perplexing and somewhat odd term that is not as familiar today as it used to be, but it possesses unrealized potential that has been forgotten.” Although he cited the current doctrinal definition, Benitez interpreted airmindedness as the character of the Air Force, or, alternatively, the strategy for nurturing airpower.<sup>47</sup> Admirably, he not only distinguished airpower operations from the underlying rationale behind its mission, that is, airmindedness; but he also properly situated the mental realization of airpower’s potential in relation to the material realization of that potential. Thus, only with an updated version of the organization’s character, what he called “airmindedness 2.0,” can the USAF properly leverage emerging capabilities. This formulation becomes problematic, however, when he then defined the

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<sup>45</sup> Wachter, 54.

<sup>46</sup> Mike Benitez, “Air-Mindedness 2.0: We Need To Do Better Than “Fly, Fight, And Win” *War on the Rocks*, August 8, 2016, <http://warontherocks.com/2016/08/air-mindedness-2-0-we-need-to-do-better-than-fly-fight-and-win/>, accessed August 10, 2016.

<sup>47</sup> The second phrase was not explicitly stated as such in the article, but was used in personal correspondence with the author.

new version of air-mindedness in terms of those capabilities, which he labeled “high-dimensional operations”: “In the literal sense, air and space domains reside above the traditional land and sea; figuratively, cyber exists on a higher cognitive level.”

Though it is not the same tautology offered in doctrine (wherein the Airman’s perspective is air-minded, because air-mindedness is having the perspective of an Airman), this is still another example of circular logic. Moreover, it is indicative of the general conceptual pitfalls surrounding a term that is supposedly central to the institution. Even on a practical basis, Airmen cannot even agree on a spelling convention (i.e. whether it is air-mindedness or air-mindedness).

This survey demonstrates that, with some exceptions, Airmen write about air-mindedness as a unique interpretation of a military problem first, and secondly as the application of air power to help solve such problems in a joint context. Most are reluctant to apply air-mindedness to warfare outside of the air domain. They are even less likely to advocate an air-minded approach to non-military problems, such as the economy or education. Both notions, however, were common among earlier air-minded officers, as demonstrated by Mitchell and Arnold. Additionally, air-mindedness as a way of thinking was previously considered in a much more robust manner. It was not just how to efficiently apply military force to achieve political objectives. It was an outpouring of imagination and creativity, passion and transformation, on individual, national, and global scales. Even if this boldness was seldom expressed by even the earliest air-minded airmen, it does not follow that it did not influence them then – or Airmen today.

### Rescuing Icarus

In the early twentieth century, Icarian descriptions were not just employed by artists or cultural commentators. The label was also applied to – and by – flyers. For the

historian Robert Wohl, Louis Bleriot was “first to claim the legacy of Icarus” when he crossed the English Channel (the first time an airplane crossed a major body of water). A sculpture of nineteenth century gliding pioneer Otto Lilienthal at the Berlin-Tegel Airport portrays him as Icarus, prostrate after his feathered wings failed him.<sup>48</sup> A mid-century social historian writing about the challenge of reintegrating WWII veterans declared: “The qualities that make the finest combat pilot are qualities that seem to presage his own destruction. Icarus is his prototype and patron.”<sup>49</sup> Thomas Wolfe’s description of “the Right Stuff” sounds the same refrain. Describing the crop of hot shot pilots bound for the high stakes world of early flight testing and space travel, Wolfe noted their “ability to go up in a hurtling piece of machinery and put their hides on the line and then have the moxie, the reflexes, the experience, the coolness, to pull it back at the last yawning moment – and then go up again.”<sup>50</sup>

Aviators themselves reported similar reactions to the “sweetness of perpetual danger.”<sup>51</sup> Lindbergh thought his life was “richer because of its very association with the element of danger...In flying, I tasted a wine of the gods of which [those afraid to fly] could know nothing.”<sup>52</sup> Another embraced Icarus explicitly in his 1916 letter expressing his desire to become a military pilot: “I will fly...If I fall, I shall fall mightily. I shall be with Perseus and Icarus, whom I loved...I would happily die in any adventure against [the

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<sup>48</sup> Lilienthal made significant advancements in glider flight, but died as a result of injuries sustained in a flying accident.

<sup>49</sup> Wexler, Dixon, *When Johnny Comes Marching Home* (Cambridge, MA: Houghton Mifflin Company, 1944), 520.

<sup>50</sup> Tom Wolfe, *The Right Stuff* (New York, NY: Farrar, Straus and Giroux, 1979), 17.

<sup>51</sup> Pierre Weiss, *L’Espace*, quoted in Wohl, *The Spectacle of Flight*, 290.

<sup>52</sup> Charles A. Lindbergh, *Spirit of St. Louis* (New York, NY: Scribner, 1953), 261-2.



enemy].”<sup>53</sup> These airminded descendants of Icarus exhibited a passion that willingly sacrificed safety for the mysticism and majesty of flight. Wohl wrote that flying offered “visual excitement...often combined with a sense of awe that merged on mysticism and a feeling of contact with the divine...aviation attracted people who sought strong emotions and valued intense experience above long life.”<sup>54</sup>

This enthusiasm spilled over into more official policy, as well. In 1940, the Royal Air Force’s criteria for selecting trainees for the “art” of flying sounds like a profile of Icarus: “fearlessness, a love of adventure and sport, dogged determination to overcome difficulties, and, perhaps most important...a love of the air.”<sup>55</sup> In the US, despite a faith in rationalistic procedures, aircrew selection still had an intuitive element. Judgments were based on factors such as athletic skills, familiarity with motorcycles, and interest in fictional stories of adventurous daredevils.<sup>56</sup> Arnold himself, writing in *Winged Warfare* with Eaker, honored Icarus as a pioneer “test pilot.” Another co-authored work, this one with a title revealing ties to play, *This Flying Game*, begins with “Flying – what dreams it inspires! What ideas and thoughts it excites in boy and man alike!” Later they insisted that the inspiration of myths like Daedalus and Icarus “played no small part” in achieving

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<sup>53</sup> Harold Owen and John Bell Owen, *Wilfred Owen: Collected Letters* (London: Oxford University Press, 1967), 408.

<sup>54</sup> Wohl, *The Spectacle of Flight*, 290, 4.

<sup>55</sup> F. Warren Morrison quoted in Adey, *Aerial Life*, 125. For more on the US policies regarding the ideal profile for aircrew, see the words by Mark K. Wells and David Courtwright (Mark K. Wells, *Courage and Air Warfare: The Allied Aircrew Experience in the Second World War* (Portland, OR: Routledge, 1995), 4-22; David T. Courtwright, *Sky as Frontier: Adventure, Aviation, and Empire* (College Station, TX: Texas A&M University Press, 2004), 115-8.

<sup>56</sup> Wells, 6; Courtwright 115.

actual flight.<sup>57</sup>

The official Air Force song, a project initiated by Arnold, also celebrates the dangerous intensity of flight, virtually written as a soundtrack to the myth. The first verse about the “wild blue yonder” exclaims, “we live in fame or go down in flame!” The second verse, referring to aviation pioneers, states, “how they lived, God only knew!” The third verse, a full quarter of the song, is used as a dirge to those who did *not* live. Finally, the fourth verse issues a self-congratulatory warning to others: “if you’d live to be a grey-haired wonder / Keep the nose out of the blue!”<sup>58</sup> Again, these words seem to accept the rehabilitated version of Icarus.

Icarus also happens to be the name of the US Air Force Academy magazine of creative writing. Furthermore, for years, Academy cadets have memorized another positive treatment of the Icarian symbol, the poem *High Flight*. Composed by American pilot John Gillespie Magee, it reiterates the themes of escape, playfulness, exclusivity, heightened consciousness, and divinity: “slipped the surly bonds of Earth,” “danced the skies on laughter-silvered wings,” “done a hundred things / You have not dreamed of,” and finally, “with silent, lifting mind I’ve trod / The high untrespassed sanctity of space, / – Put out my hand, and touched the face of God.” Poignantly, the 19-year-old writer suffered Icarus’s fate in a fatal mid-air collision just months after penning those words.<sup>59</sup>

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<sup>57</sup> Henry H. Arnold, *Winged Warfare* (New York, NY: Harper & Brothers, 1941), 213; Arnold, *This Flying Game*, 3, 22.

<sup>58</sup> David A. Lande, “Saved by the Wild Blue Yonder,” *Air Force Magazine* 93, no. 9 (September 2010), 102-4; Robert Crawford, “The Air Force Song,” Official US Air Force Songs Web Page (January 1997) <http://www.afnoa.org/afsong.html>, accessed 3 October 2016.

<sup>59</sup> Jonathan F. Vance, *High Flight: Aviation and the Canadian Imagination* (Toronto, ON: Penguin Canada, 2002), 268-9. Vance argues the Canadian urge to claim both

Finally, in 1938, the Royal Air Force College composed an anthology of the poetry of flight and titled it *Icarus*. Many were written by flyers, “the successors of Icarus,” and all share the same sentiment: “men, driven by the divine urge in them, want to explore, to go on finding things out; and men want to escape from the terrestrial muddle they have made for themselves.” The title, the author of the preface notes, “is well chosen...[Icarus’s] gallant failure has always been the greatest inspiration.”<sup>60</sup>

The epilogue to *Icarus* is particularly noteworthy to quote at length:

[T]he Air has already begun to endow with inspiration true poets of its own. We may well rejoice that this is so in an age when the terrible and increasing power of aerial armament renders it certain that civilisation will perish if that power be not wielded by men vowed to the service of ideals higher than those which hitherto have moved mankind...the language of poetry alone affords a medium whereby [Air’s ideals] may be discussed and disseminated. Indeed, I have long been convinced that the first need of an Air Force is a poet...We, for whom the Air has opened up a new world of strange experience, seem to come near to a great discovery. Our hands touch, as it were, the very curtain of the shrine, and it seems at times that nothing can prevent us from drawing it aside, so that at last the mystery of life and love will be revealed to mortal eyes. Yet ever there comes unbidden the doubt that perhaps that curtain yields its secret only when we rend it spinning to our final crash. This at the least is clear, that our new world untraversed heretofore gives those who enter it a view transcending far the closed horizon of the two-dimensional race of men. He is dull of soul indeed who does not feel, alone above the clouds, that all the faults, the failures, and the follies of his fellow-men are naught but a faint reflection of his own...Alone in the Air a man can know these matters clearly. For then he can attain true ecstasis, achieving a detachment from the world not otherwise to be experienced.

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Magee, who flew with the Royal Canadian Air Force, and his poem, is another confluence of air-mindedness and nationalism.

<sup>60</sup> Rupert De la Bère, ed., *Icarus: An Anthology of the Poetry of Flight* (London: Macmillan, 1938), viii, xi. Interestingly, pace Singer and this chapter, the preface notes that flying will become normal and nobody will write poetry about a such a common activity (De la Bère, x).

Written by Austin Hopkinson, this quote is replete with themes addressed throughout this project. There are allusions to verticality in language, a palpable reverence for “Air” (capitalized as a proper noun), and aviation portrayed as an impetus to evolution. The author highlights the need for a new breed of leaders, wise by virtue of their experience in the privileged domain of the heavens, who can guide humanity through that historical moment. Furthermore, theirs is an exclusive perspective, since “only those who brave its dangers [can] comprehend its mystery.”<sup>61</sup> Finally, he makes an explicit plea translating an air-minded perspective into words, into the artistic story of a mechanical artifact – and does so with reference to Greek mythology: “it is hard indeed for [airmen], when on the earth again, to give an account of the vision...Prometheus, bringing fire from heaven to mortals, must be a poet. For poetry is the language of mysticism, and the attempts of mystics throughout the ages to put their gnosis into prose have ever been a sorry failure.”<sup>62</sup>

The “past is a foreign country,” to which we are strangers.<sup>63</sup> Without such a poet as called for in this epilogue, it is difficult to recapture the sense of air-mindedness as Icarus and Daedalus in creative tension. Without that awareness it is even more difficult to see the larger paradigm Airmen operate within and how this *technological logos* invokes these terms beyond their materialistic, technical, logical connotations.

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<sup>61</sup> De la Bère, 185-7. Note how this exclusiveness mirrors the points by Mitchell and de Seversky quoted earlier in Chapter Two.

<sup>62</sup> De la Bère, 187.

<sup>63</sup> David Lowenthal, *The Past Is a Foreign Country - Revisited*, 2nd edition (Cambridge: Cambridge University Press, 2015). Lowenthal took the title from a line in Leslie Poles Hartley’s *The Go-Between* (1953): “The past is a foreign country: they do things differently there.”

## The Icarus Solution

Chapter Two explained how air-mindedness is the awareness of aviation's multidimensional possibilities – physical and psychological; positive and negative; individually, nationally, and globally – as well as the degree that aviation's potential is achieved in practice. While this offers a useful corrective for academia, the last clause of the expanded definition is about realizing those potentials in practice. This is not the job of academics. Rather, the duty to achieve aviation's potentials falls onto air-minded professionals in industry, government, public service, education, and, of course, defense. Yet, just because these people may be primarily concerned with aviation's practical benefits at an institutional or national level, they should not neglect the deep-seated power of the aerial view to impact thinking on an individual basis – which should then feed into their primary, pragmatic interests.

Reframing the myth of Icarus and Daedalus into a story of creative tension supplies a model of this dialectic. It is a model that is particularly apt for aviation's military potential. This is precisely what Killefer argued in his thesis on air-mindedness. First, metaphorical images play a natural role in our thinking, even if the match is never perfect. As statistician George Box famously quipped, "All models are wrong, but some are useful."<sup>64</sup> The fallacy in the Icarian myth is that temperature is actually inversely proportional to altitude; the wax would have hardened, not melted. Yet, Icarus' soaring heights still serves as a warning against ambition; it still makes sense *metaphorically*. Far from being inherently pathological – as one Airman wrote – the Air Force's use of

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<sup>64</sup> George E. P. Box and Norman R. Draper, *Empirical Model-Building and Response Surfaces* (New York, NY: Wiley, 1987), 424.

analogies has suffered from an inadequate bank of images.<sup>65</sup> Yes, sometimes it is useful to think of war as mechanical, as an industrial science, or as a contest between rational actors seeking to maximize advantages within a set of market rules.<sup>66</sup> These metaphors must be balanced, however, with images that are less common in Air Force discourse: war as messy politics, as a sport, or as an art. These are the subjective orientations, the ones valuing “creativity, intuition, genius, emotion, passion, shared experience, and the importance of the individual,” that Killefer proscribed to create a more holistic, more effective airmindedness. “If there is a ‘pathology’ in airmindedness,” he wrote, “it is this: collectively, Airmen have an unbalanced view of reality and knowledge.”<sup>67</sup> Remediating this disparity requires new organizational narratives, such as an embrace of Daedalus *and* Icarus.<sup>68</sup>

Still, Icarus seems like an odd model for Airmen. What value is there in thinking like an ill-fated character from an ancient Greek tale? A modern Air Force has no responsibility for cultivating the human spirit or to inspire artists; the loss of romance may be lamentable, but excusable. There is no room for playfulness with deadly technology.<sup>69</sup> There is no time for forays into the sublime when tasked with the awesome responsibility to help the joint, interagency effort to secure the nation.

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<sup>65</sup> Peter R. Faber, “Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower” in *The Paths of Heaven*, ed. Phillip S. Meilinger (Maxwell Air Force Base, AL: Air University Press, 1997), 221.

<sup>66</sup> Killefer, “A Metaphor Theory of Airmindedness,” 34-41.

<sup>67</sup> Killefer, 63, 65, 101.

<sup>68</sup> Artist Michael Ayrton, the subject of Nyenhuis’s *Myth and the Creative Process*, observes the same combination of Daedalus and Icarus in his drawings, poems, and his novel, *The Maze-Maker* (1967).

<sup>69</sup> Note the same judgmental tone in Ovid’s poetry: “Icarus, stood next to him, and, not realising that he was handling things that would endanger him, caught laughingly at the down that blew in the passing breeze, and softened the yellow bees’ wax with his thumb,

Such judgments, however, do not account for a fundamental moral of the myth. Icarus died, yes, and Daedalus survived. But the father became unwilling, unable even, to wield his *techne* any further. Ideally, the two could have continued to use their divergent perspectives to fuel creativity. This confluence of imagination and technology, of playfulness and pragmatism, is part of the Icarian, Dionysian paradigm. Thus, Singer writes about “the intellectual playfulness of mechanically minded people,” and Clive Hart asserts that the greatest impediment to human flight was a lack of imagination as early pioneers held too tightly to the metaphor of flying like a bird.<sup>70</sup>

The role of subjectivity is prevalent in many histories of technology. In *Technology Matters*, Nye quotes a Los Alamos engineer who assisted with the first atomic weapons: “Technology is more closely related to art than to science – not only materially, because art must somehow involve the selection and manipulation of matter, but conceptually as well, because the technologist, like the artist, must work with unanalyzable complexities.”<sup>71</sup> In *Between Reason and Experience: Essays in Technology and Modernity* (2010), Andrew Feenberg discusses the philosopher Miki Kyoshi Zenshu’s *The Logic of the Imagination* (1939) and his notion of “subjective-objective” technology: the material reality intersects with reason, imagination, and “*logos*.”<sup>72</sup>

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and, in his play, hindered his father’s marvellous work [*sic*]” (Ovid, *The Metamorphoses*, trans. A. S. Kline, 2nd edition (CreateSpace Independent Publishing Platform, 2014), VIII:183-235).

<sup>70</sup> Singer, *Like Sex with Gods*, 4; Clive Hart, *The Prehistory of Flight* (Berkeley, CA: University of California Press, 1985), xiii-xiv.

<sup>71</sup> David E. Nye, *Technology Matters: Questions to Live With* (Cambridge, MA: The MIT Press, 2007), 9-10. Note the insinuation of “wicked” conditions.

<sup>72</sup> Andrew Feenberg, *Between Reason and Experience: Essays in Technology and Modernity* (Cambridge, MA: The MIT Press, 2010), 120. For more on how imagination and myth combine to spark creativity, even in the most rationalistic pursuits, see Mary Midgely’s *The Myths We Live By* (1995).

Finally, in “Prometheus And The Muses: On Art and Technology,” Barry Allen asks “What starker opposition than between the artist and the engineer – the irrational dreamer and the rigorous realist, the indulgent devotee of subjectivity and the austere technician?”

He then questions that dualism:

We tend not to think that engineering might be enhanced by the love of beauty, nor that it is impossible to be a really good engineer without understanding art. Yet we depend on essentially artistic skills in engineers, the capacity to feel technically and construct aesthetically. The invention of a seriously new alternative is an aesthetic moment in art and technology alike. No design is ever determined by calculations or technical necessity. Choice pervades technological design and is made, ultimately, on the basis of aesthetic invention (supplemented, of course, by careful testing). Engineering design is the analytical and imaginative synthesis of perception and technique, which is also the ideal, the point, the idea of art.<sup>73</sup>

Earlier airmen recognized this interdependence between technology and imagination. In 1909, Julio Douhet argued that the idea of flight required fantasy in order to rise to its potential. The following year a US Army officer writing about aviation in a professional journal wrote “one must be prepared to use his imagination largely and even touch on the borders of prophecy.”<sup>74</sup> Alexander de Seversky argued that industrial capacity was “the lesser half of the job for a machine-age nation like the United States.” Instead, “We must outthink and outplan them, in a spirit of creative audacity...All those gifts of mechanical ingenuity, industrial efficiency, and, above all, imaginative daring which have made America the first nation of the industrial era must be given full play in

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<sup>73</sup> Barry Allen, “Prometheus and the Muses: On Art and Technology,” *Common Knowledge* 12, no. 3 (September 19, 2006): 354.

<sup>74</sup> Azar Gat, *A History of Military Thought: From the Enlightenment to the Cold War* (New York, NY: Oxford University Press, 2002), 572; G. L. Townsend, “The Use and Effect of Flying Machines on Military Operations,” *Infantry Journal* 8 (September 1910): 245.



American airpower.”<sup>75</sup> Finally, retired Major General and professor emeritus at Duke University, Irving B. Holley, Jr., notes the key role of imagination in many of his seminal essays on the relationship between technology and aerial doctrine.<sup>76</sup> Airmen today still promote disruptive innovation and the aspirational qualities of serving their country by mastering their technological domains. And they do so without the worst element of the “Icarus Syndrome,” the obsession with specific means.

With Icarus and Daedalus viewed as two interrelated dimensions, and not mutually exclusive options on a single continuum, airmindedness can be technical, practical, and political as well as inspirational, creative, and playful. The former strengthens the latter just as the son inspired the father. No longer a syndrome to avoid, Icarus becomes a solution to embrace.

### Conclusion

Language evolves and words change meanings. Why, then, demand that modern Airmen pay attention to the airmindedness of the interwar period, or to the *techne* and *logos* of two millennia ago? The value is not just for the sake of etymological purity. The older connotations of these concepts highlight elements still present, if inactive. Airmindedness can be playful and pragmatic. *Techne* implies *metis*, and vice versa, and both are linked to storytelling. Technology is both material and mental, a force that is shaped by society as well as a force that shapes society. Technological knowledge

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<sup>75</sup> Alexander P. de Seversky, *Victory Through Air Power* (New York, NY: Simon and Schuster, 1942), 5-6.

<sup>76</sup> I. B. Holley, Jr., “Technology and Doctrine” in *Technology and the Air Force: A Retrospective Assessment*, eds., Jacob Neufeld, George M. Watson, Jr., and David Chenoweth (Washington, D.C.: Air Force History and Museums Program, 1997); I. B. Holley, Jr., “Reflections on the Search for Airpower Theory” in *The Paths to Heaven: The Evolution of Air Power Theory*, ed. Phillip S. Meilinger (Maxwell Air Force Base, AL: Air University Press, 1997).

advances by faith, imagination, and a mosaic of metaphors, but also by rigorous logic and the (generally valid assumption of) predictability. The paradigm of Airmen, their *logos*, is technological because all of these various elements are represented in their overarching story, their technical logic, and their divine inspiration. It is not a weakness to apologize for, but a resource to harness.

Acknowledging the robust definitions of these concepts, highlighted by a history of technology approach, helps advance historical scholarship. It would also have been a better way to fulfill Air University's original request to RAND for a manifesto on professional obligations, heritage, and the future of the Air Force. Most importantly, however, is how this analysis has practical benefits for the USAF's ability to realize the deeper meanings behind their slogans of "aim high" or "above all," and use the full force of their cultural inheritance to prevail in a world that is wicked once over.

## Conclusion

**Epilogue** \ 'epə-lôg\ *n.* - 1. a conclusion summarizing a story's meaning, offering a prescriptive coda, or revealing the fate of characters [ancient Greek: *epi-* (prefix: in addition) + *logos* (story)]

### Reframing the Narrative

In the introduction to the edited work, *Airpower Reborn*, historian, strategist, and airman John Andres Olsen suggests “the basic facts and the main narrative [of air power] are now in place.”<sup>1</sup> Thus, similar to changes in the history of technology field, more scholars are now emphasizing the social, cultural, political, and intellectual dimensions of the story.<sup>2</sup> Still, “no one comes close” to fully capturing the institutional culture of a key air power organization, the United States Air Force.

The conventional narrative offers an intellectual history that is partial and overdue for reframing.<sup>3</sup> This story's *leitmotif* is the inability of Airmen to decouple the technical and tactical from the theoretical and strategic.<sup>4</sup> Instead, they substitute the logic of technology for the language of war, which is more art than science. Colin Gray claims this fusion creates “a persisting conceptual failure” to situate the practice of air power

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<sup>1</sup> John Andreas Olsen, ed., *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd* (Annapolis, MD: Naval Institute Press, 2015). Meilinger writes, “Olsen is one of the dominant voices in airpower history and operations in the world today. His books should be required reading for everyone in uniform” (Phillip S. Meilinger, “Book Essay: Airpower Writings of John Andreas Olsen,” *Strategic Studies Quarterly* 8, no. 1 (Spring 2014): 147).

<sup>2</sup> Sebastian Cox and Peter Gray, *Air Power History: Turning Points from Kitty Hawk to Kosovo* (Portland, OR: Routledge, 2002), xi.

<sup>3</sup> For examples, see footnote 2 in the Introduction and footnote 86 in Chapter Two.

<sup>4</sup> This seems to be a problem among historians, as well. “To make air power comprehensible,” Olsen writes, “many have tended to focus on the scientific aspects rather than to view it in its wider context” (John Andreas Olsen, *Global Air Power* (Washington, D.C: Potomac Books, 2011), xv). This is precisely the criticism levied in Hansen's article (James R. Hansen, “Aviation History in the Wider View,” *Technology and Culture* 30, no. 3 (July 1, 1989): 643-656).

within an overarching political history.<sup>5</sup> Similarly, Dag Henriksen writes that the fundamental dilemma facing Airmen is their inability to “adapt and establish a sufficiently critical and robust analytical tradition.”<sup>6</sup>

Scholars suggest an assortment of reasons for Airmen’s supposed intellectual failings. Some emphasize the inherent difficulty of theorizing about a dynamic technological means, grappling with what Gray labels a history that is short and “necessarily in motion.”<sup>7</sup> Others are less sympathetic, suggesting the faults are internal. For example, the radical revision of Air Force Manual 1-1 that reintroduced Airmen to air-mindedness articulated doctrine in a novel, less superficial, fashion. But, according to one commentator, “Given this strong dose of intellectual rigor, it is not surprising that the experiment was short-lived.” According to a more recent critique by a current USAF officer, “When [military] professionals hear the word theory, their eyes tend to glaze over.” And in *Airmen and Air Theory: A Review of the Sources*, Philip Meilinger states: “Theory and doctrine deal with the realm of ideas, not operations, and partly because of this, fewer people have been inclined to write about this more esoteric subject. As a

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<sup>5</sup> Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base, AL: Air University Press, 2012), 199. The rest of the quote is interesting for its connections to other points made in this dissertation: “One suspects that the sheer wonder of airpower has much for which to answer. So great has been that wonder that many of airpower’s active advocates have had difficulty accepting, if they even comprehended, the titanium logic that requires airpower to be subordinate to strategy as well as to the character of particular conflicts” (Gray, 199).

<sup>6</sup> Dag Henriksen, “Airpower: The Need for More Analytical Warriors,” in *Conceptualising Modern War*, eds., Karl Erik Haug and Ole Jorgen Maa (London: C. Hurst and Co Publishers Ltd, 2011), 206.

<sup>7</sup> Gray, *Airpower for Strategic Effect*, 11-2. One Airman expressed a similar sentiment, writing, the central “obstacle to writing air force doctrine in the past was the rapidity of the development of air power” (Evaluation Division, Air University, staff study, “To Analyze the USAF Publications System for Producing Manuals,” 13 July 1948). A 1951 Air War College study noted the same (Air War College, “Command and Employment of Air Forces, World War II and Korea,” 1951, 43-44).

result, tracing the history of ideas has proven to be a fairly barren field.” “The problem becomes far worse regarding airpower,” he concludes this bleak analysis, “Airmen...have seldom been accused of being thinkers.”<sup>8</sup> Interestingly, all three quotes are from Airmen, who appear to be performing the very act they claim Airmen avoid. These voices internal to the organization are certainly not alone.

Many, inside the USAF and out, cite Carl Builder’s assessment as the reason Airmen fail to produce sufficient theory: the obsession with technology shortcuts any attempt to grapple with the subjective, messy challenge of applying air power to achieve political effects in a wicked world. Dennis Drew, the man associated with the introduction of airmindedness into doctrine, claims that, for many in the USAF, “technology has become virtually the alpha and omega of airpower success – all else seems to be of secondary importance.”<sup>9</sup> In the seminal *Makers of Modern Strategy*

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<sup>8</sup> Harold Winton, “An Imperfect Jewel: Military Theory and the Military Profession,” reprinted in *Strategy: Context and Adaptation from Archidamus to Airpower*, eds., Richard Bailey, James W. Forsyth, Jr., and Mark O. Yeisley (Annapolis, MD: Naval Institute Press, 2016), 54; Rich Ganske, “Theory Properly Constructed,” May 27, 2014, <https://medium.com/@richganske/theory-properly-constructed-c7826e65f6>, accessed September 17, 2017; Phillip S. Meilinger, *Airmen and Air Theory: A Review of the Sources* (Maxwell Air Force Base, AL: Air University Press, 2001), 97. Certainly, the USAF is not the only service that receives such criticism. Another Airman writes, “As an institution, the military largely discourages independent thought and critical inquiry. This is an unfortunate, self-defeating contradiction for a profession whose *raison d’etre* is closely tied to outwitting adversaries and grappling with uncertainty” (Gregory D Foster, “Reading, Writing, and the Mind of the Strategist,” *Joint Force Quarterly* (May 1996): 112). Nor is this a recent indictment: “The Air Force has never boasted a high percentage of scholars...Air activities have most often attracted men of active rather than literary leanings, and the more methodical minds have been needed for technological application” according to another Airman in 1947 (Noel F. Parrish, “New Responsibilities of Air Force Officers,” *Air University Quarterly Review* 1, no. 1 (Spring 1947): 29-41). In contrast to these critiques, many of the ideas throughout this dissertation came from the writings of airmen.

<sup>9</sup> Dennis M. Drew, *Recapitalizing the Air Force Intellect: Essays on War, Airpower, and Military Education* (Maxwell Air Force Base, AL: Air University Press, 2008), 62.

(1986), David MacIsaac writes that air power theorists are few and “have had only limited influence in a field where the effects of technology and the deeds of practitioners have from the beginning played greater roles than have ideas.”<sup>10</sup> “One might conclude, with some distress,” he writes later in that essay, “that technology itself may be today’s primary air power theorist; that invention may, for the moment, be the mother of application.”<sup>11</sup>

Airmen, in this conventional perspective, replace strategy with technology, privileging technical mastery as well as an overly mechanical, sanitized, rational vision of warfare amenable to quick, clean victories through air power.<sup>12</sup> This picture is not only

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<sup>10</sup> David MacIsaac, “Voices from the Central Blue: The Air Power Theorists,” in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton, NJ: Princeton University Press, 1986), 624. Of course, there is a narrative that this apolitical techno-rationalism and a “scientific way of war” define the strategic culture of the entire US defense establishment (Antoine J. Bousquet, *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity* (New York, NY: Columbia University Press, 2009), 2-3; Thomas G. Mahnken, *Technology and the American Way of War Since 1945* (New York, NY: Columbia University Press, 2010), 5; Thomas P. Hughes, *American Genesis: A Century of Invention and Technological Enthusiasm, 1870-1970*, 2nd edition (Chicago, IL: University Of Chicago Press, 2004), 97; Milan Vego, “On Military Theory,” *Joint Forces Quarterly* 62, no. 3 (July 2011): 59; Ralph Sanders, “Technology in Military Strategy: A Realistic Assessment,” *Technology in Society* 5, no. 2 (January 1, 1983): 147). In 1958, an Airmen and former commandant of the Air Command and Staff College stated “We try to make our doctrine and strategy conform to glamorous hardware, instead of studying modern conflict to find acceptable solutions from which to establish the hardware requirements we need” (Lloyd P. Hopwood quoted in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, vol. 1 (Maxwell Air Force Base, AL: Air University Press, 1989), 9).

<sup>11</sup> MacIsaac, 647.

<sup>12</sup> Robin D. S. Higham, *Air Power: A Concise History*, Enl., 2nd ed (Manhattan, KS: Sunflower University Press, 1984), 233; Brice Harris, *America, Technology and Strategic Culture: A Clausewitzian Assessment* (New York, NY: Routledge, 2015), 2. Harris also writes that the most extreme example of strategy replaced by technology is Network-Centric Warfare (NCW)/Effects Based Operations (EBO) and “the fundamental problem with the NCW/EBO – and, indeed, with America’s defence transformation writ large – is that it centres on technology at the expense of other dynamics, most noteworthy the human dynamic” (Harris, 2).

incomplete, conditioned as it is by the same prejudices as Plato; it is seriously flawed. The distortions and omissions can be remedied by reframing the narrative using some of the interrelated, “post-Platonic” shifts occurring throughout academia since the mid-twentieth century. This postmodern movement restores validity to subjectivity, imagination, storytelling, mythology, play, and a chaotic world. All of these changes are evidenced generally in the discipline of history and particularly in the history of technology.

How to craft technological histories that integrate the material and the mental is an ongoing project. This present work, an intellectual history of a technological organization, contributes to that endeavor by applying analytical perspectives already identified by historians of technology to subjects that are currently underrepresented in their field. One example of a new topic viewed from an established approach is the evolution of airmindedness among the last generation of Airmen. Also consider the intuition among members of SHOT to reach back to the poets and philosophers of antiquity to understand the meaning of “technology.” This dissertation does the same, but actually dissects the most commonly cited myth, that of Prometheus, and unpacks the concepts of *techne* and *metis* embodied within his character. Then there are calls for historians to pay attention to users and, separately, to storytelling. There are few works, however, on technological users *as* storytellers. Lastly, historians of technology have addressed the nature of technological knowledge for decades, but none have applied it to the example of air power theory (or, for that matter, any military theory).

In this dissertation, novel investigative approaches illuminate well-worn topics just as often as the reverse examples offered in the last paragraph, which listed instances

in which old methods explain new materials.<sup>13</sup> One instance is the historiography regarding attitudes towards the airplane. The analysis above addresses the same issue, but with the benefit of transdisciplinary concepts from rhetoric, literary theory, and urban planning. It contains stories *about* flyers and stories *from* flyers. It addresses closed, tame worlds as useful fictions within a world that is wicked once over. Finally, it compares master plans based on comprehensive, rationalistic approaches and the presumption of overwhelming power, with muddling through in improvisational, humble ways. This project, using those disparate sources, even commends artful recombinations of the two.<sup>14</sup> Furthermore, the technical characteristics of Airmen’s mechanical artifact are well known, but this dissertation “tasted the forbidden fruit of technological determinism” by linking the way they think with the technical characteristics of range, speed, and

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<sup>13</sup> When, in 1984, Laudan points to the need for an understanding of how technology shapes organizational culture, she stipulates that such an approach requires “unconventional” historical analysis (Rachel Laudan, ed., *The Nature of Technological Knowledge. Are Models of Scientific Change Relevant?* (Boston, MA: Springer, 1984), 12). Likewise, Edwards, Detienne, and Vernant all capture the tacitness and pliability of their subject matter – respectively, closed world metaphors in Airmen’s Cold War discourse and *metis* in Greek culture – by infusing their explanations with the same style as their subjects (Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: The MIT Press, 1997), 27-41; Robert C. H. Chia and Robin Holt, *Strategy without Design: The Silent Efficacy of Indirect Action* (Cambridge: Cambridge University Press, 2011), 194). As explained later in this conclusion, this author attempts the same, to some degree.

<sup>14</sup> According to Charles Lindblom, “muddling through” is the preferred alternative to the rationalistic approach (Charles Lindblom, “The Science of ‘Muddling Through,’” *Public Administration Review* 19, no. 2 (Spring, 1959), 80-1). The short term perspective and incremental nature of “muddling through,” however, make it equally inappropriate as a way to execute military strategy. Instead, strategists should consider Etzioni’s “mixed-scanning” model that, in the words of political scientist Robert Jervis, advances “towards goals indirectly with multiple policies” and should expect surprises along the way (Amitai Etzioni, “Mixed-Scanning: A ‘Third’ Approach to Decision-Making,” *Public Administration Review* 27, no. 5 (December 1, 1967): 385-6; Robert Jervis, “Complexity and the Analysis of Political and Social Life,” *Political Science Quarterly* 112, no. 4 (Winter, 1997-1998): 586-7, 592).



altitude.<sup>15</sup> There are other established topics this project viewed with new approaches. For example, many books address WWI as the birth of airmen, civilian air-mindedness in the period following that conflict, or the general theory of air strategy on display in the next war. Few, however, employ the concepts of play and story, which turn out to be central in each of these narratives. Finally, there is no lack of analysis pointing to the USAF as an organization with a technological paradigm, but the full dimensions of that adjective go unappreciated. Indeed, a broader definition of “technological” expands the implications of that judgment significantly – and contradicts its implicit condemnation.

Unusual perspectives of familiar topics combined with familiar perspectives of unusual topics yields a synthesis that is unique among histories of air power. This new narrative offers insight into how Airmen relate technology to strategy, illustrates how technological knowledge evolves, and – adapting the plea to situate air power in context – offers a broader picture of its human, “internalist” dimensions.<sup>16</sup> That is, the problems and possibilities of military aviation are not just matters of politics or physics; understanding the culture of a technological organization must account for other essential aspects of *homo sapiens*. We are not just the thinking animal, but also *homo faber* (the making animal), *homo ludens* (the playing animal), and *homo narrans* (the storytelling animal). When the intellectual history of the USAF is viewed from these perspectives, the analysis points to a paradigm that is aptly labeled a *technological logos*.

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<sup>15</sup> Rosalind H. Williams, “Opening the Big Box,” *Technology and Culture* 48, no. 1 (February 7, 2007): 104.

<sup>16</sup> Olsen writes, “To think clearly about the future, we need to know where air power came from and how it developed into what it is today,” and, elsewhere, Airmen need “a framework for thinking about air power in a socio-cultural context” (Olsen, *Global Air Power*, xviii; John Andreas Olsen, *Strategic Air Power in Desert Storm* (Portland, OR: Routledge, 2003), 272). Gray expresses the same sentiment (Gray, *Airpower for Strategic Effect*, xv).

## Unpacking “*Technological Logos*”

Any organization’s culture is manifested in official policies, operational procedures, and social practices.<sup>17</sup> These tangible elements, however, are all consequences of a deeper set of shared assumptions. For Airmen, this collective mindset, or paradigm, is a *technological logos*. That such a complex phenomenon as organizational culture could be represented in just two words is only possible because of the multiple meanings embedded within them.

First, consider *logos*. As explained in Chapter One, most modern English speakers associate the word with logic. This is part of Plato’s legacy. Before the philosopher redefined it as reason and logic, *logos* represented all forms of human communication, including stories. Another translation uses the term as an ontological narrative describing the nature of reality. In this sense, *logos* closely aligns with Morgan’s definition of paradigm. Moreover, this worldview often implied a supernatural, divine origin, which is why Christian theologians appropriated the term to represent Christ as the preexistent, immanent “word of God.” In all cases – whether as logic, a story, an overarching

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<sup>17</sup> According to organizational theorist Edger Schein, culture can be defined as “a pattern of shared basic assumptions learned by a group, as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.” It exists on a spectrum from the overt to the covert and Schein divides this into three levels of increasing depth. The first is the “Artifact” level, which contains visible phenomena such as behaviors, products, statements, and symbols. “Espoused Beliefs and Values” are the “ideas, goals, values, aspirations; ideologies; [and] rationalizations,” which are less tangible than superficial artifacts but more explicit than the deepest level, “Basic Underlying Assumptions.” This is the category containing implicit solutions, broad paradigms that cannot be easily confronted, and pervasive cognitive frameworks not subjected to debate. (Edgar H. Schein, *Organizational Culture and Leadership*, 4th edition (San Francisco, CA: Jossey-Bass, 2010), 14-8, 23-8). *Technological logos* describes all three levels in the USAF.

principle that unifies knowledge, or a focus for sacred worship – *logos* makes sense for Airmen.

In addition to substituting *logos* for “paradigm,” metaphorically and literally, it is also fitting to describe Airmen’s worldview as a *logos*. Airmen, by virtue of the tempo of air warfare described in Chapter One and by the airmindedness described in Chapter Two, have a penchant for telling stories about flight. Indeed, the only way to adequately understand and convey the use of technology in a wicked world is through storytelling; to guide a warrior’s *techne*, *metis* is communicated through rhetoric that is itself a unique combination of *techne* and *metis*. Chapter Three illustrated this process through the use of operational theory, which is just another form of story (i.e. “a type of narrative, with implications for the audience, conveying why and how one or more characters struggle in order to prevail in a particular setting”).<sup>18</sup> Of course, *logos* as logic is also appropriate. Airmen undoubtedly appreciate and encourage a system built on rigorous mechanical reasoning. Such an approach shapes the research and development of their artifacts, as well as how they are trained to operate them. Lastly, as often noted, the affinity of Airmen for those flying machines approaches the level of reverence. This “worship” of technology, however, is not necessarily as pathological as some claim.<sup>19</sup>

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<sup>18</sup> Jason M. Trew, “Fiction in Military Education: *Ender’s Game* as a Case for Fiction in PME,” (MPhil Thesis, School of Advanced Air and Space Studies, 2015), 65.

<sup>19</sup> Such critics believe military historian Martin van Crevald’s assessment obtains: “Technology does not just represent an assemblage of hardware but a philosophical system. As such, technology affects not only the way war is conducted and how victory is sought, but the very framework that we use for thinking about it” (Martin Van Crevelde, *Technology and War: From 2000 B.C. to the Present* (New York, NY: Touchstone, 1991), 233).

Technology has multiple dimensions that cannot be fully appreciated without an intellectual history approach that appreciates narrative intelligence, the Greek origins of “technology,” and the nature of technological knowledge.

The most obvious way in which the *logos* of Airmen is technological, and the most superficial sense in which their paradigm is defined by technology, is the fact that the airplane is at the heart of their social practices, their theories of air warfare, and their fight for organizational autonomy. This is as self-evident as it is necessary. It is, after all, the way in which Airmen have traditionally fulfilled their central responsibility to the nation. No wonder then that one of the founders of USAF organizational culture, General “Hap” Arnold, imbued the institution with close connections to the military-industrial-university complex.<sup>20</sup> Being attuned to technological advances was critically important, especially in an age of rapid change.<sup>21</sup> Gray points out that a focus on the technical and tactical aspects of aerial warfare is “inevitable, necessary, and desirable” so long as it does not distract from the larger strategic purpose.<sup>22</sup> Regrettably, this does happen – but not always – and this relates to another connotation of technological.

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<sup>20</sup> Neil Sheehan, *A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon* (New York, NY: Vintage Books, 2010), xv-xviii; Futrell, *Ideas, Concepts, Doctrine*, 205. In a line that resonates with Joseph Corn’s idea of the “winged gospel,” called Arnold “the evangelist of technology” (Sheehan, xvi).

<sup>21</sup> Consider the astounding differences between the Wright Flyer and four-engine, high-altitude bombers with cutting-edge targeting systems, able to navigate visually and electronically over long ranges. Pursuit aircraft were also evolving rapidly, getting faster, more durable, more maneuverable, with more firepower and better ability to communicate within their formations and with ground forces.

<sup>22</sup> Gray, *Airpower for Strategic Effect*, 298. He goes on to write that, “It is not inevitable that air forces must err in this way, but the theory of airpower should alert air persons to the inalienable danger” (Gray, 298). This dissertation is meant to add depth to this warning.

Knowledge that is technological is not just know-how of technical matters. It also describes the way in which such knowledge evolves: from periods of “normal” puzzle-solving activities to phases in which old ideas are challenged. In those periods of flux, the play of imagination and serendipity create an opening for creative minds to reframe the dominant way of thinking before the cycle repeats itself. Air power theory, as a species of technological knowledge, has undergone this process at least twice in its short history, as explained in Chapter Three: the period around WWII and then again around Operation Desert Storm.

Finally, there is a meaning of “technology,” not as it is used in popular culture today to convey technical, artifactual systems, but as revealed by its origins in antiquity. Prometheus, the character who gifted craftsmanship to humanity and who is literally named “pro-*metis*,” best conveys this sophisticated interpretation of the concept.<sup>23</sup> It is technology as it was linked to both *techne* and *metis* before Plato’s biased narrative gained widespread purchase. Yet, it is more than the idea, prevalent in Greek culture, that *metis* guides *techne*. The even bolder claim supported by this dissertation is that characteristics of aviation *techne* can encourage – that is, both cultivate and ennoble – *metis*. This corroborates Gray’s assessment that “it can be claimed that airpower theorists should be all but uniquely able to think strategically, such being a gift from their military

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<sup>23</sup> Janet M. Atwill, *Rhetoric Reclaimed: Aristotle and the Liberal Arts Tradition* (Ithaca, NY: Cornell University Press, 2009), 103-4, 114. The myth of fire and technology he bestowed on humanity highlights a final linkage to the notion of *metis* and the post-Platonic paradigm, as some authors describe *metis*’s polymorphism and power using the metaphor of fire (which earlier provided an image of technology). In the case of Detienne and Vernant, they use the ubiquitous role of fire in Greek myth as an analogy to the ubiquitous role of *metis* (Marcel Detienne and Jean-Pierre Vernant, *Cunning Intelligence in Greek Culture and Society*, trans. Janet Lloyd (Chicago, IL: University of Chicago Press, 1991), 281).

specialty...The mobility, and hence range, reach, and temporal compression, enabled by airpower ought to encourage a somewhat matching width, breadth, and generously contextualized view of the strategic world.”<sup>24</sup> Yet, this metic quality is unacknowledged in analyses of USAF culture, mirroring the absence of *metis* in Airmen’s vocabulary.

In sum, Airmen inhabit what historian Paul Edwards calls a technologically constructed social world.<sup>25</sup> Their organizational culture is *about* technology, its overarching philosophy can be *like* technology in the sense of *techne* as it was understood both before and after Plato, and its theories are a *form* of technological knowledge. When that know-how of air power enters a phase of dogmatic standardization, it becomes all too easy to worship their technological means. In such periods of intellectual stasis, Airmen treat the artifact itself as the defining feature of their trade. They assume their organizational paradigm is defined by formal air power theory, and not the worldview that produces a specific theoretical approach. When Airmen embody “technological” in the pejorative, narrow sense, they conceptualize technology as a technical solution to a closed world problem, without the guidance of an executive supervision supplied by metic intelligence. This was the moral of the Chapter Four “case story” about modern definitions of air-mindedness. If, however, they take the full measure of technology, as recent historians in that field have done, the accusation they substitute technology for strategy becomes nonsensical. The technological can, and should, be just as intertwined with the strategic as society and technology. When it is not, unfortunately, Airmen confirm the standard critique of their intellectual acumen.

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<sup>24</sup> Colin Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base, AL: Air University Press, 2012), 291.

<sup>25</sup> Edwards, *The Closed World*, 34.

## Codas: Narratives for Strategic Effect

This dissertation contains arguments designed to produce two different codas. One is academic. In this vein, it attempts to fulfill various calls made in historical scholarship and encourage others to adopt and adapt such approaches: the focus on the lived experience of technology-in-use, attention to technological tales, analysis of how technology shapes organizational culture, and the use of transdisciplinary approaches. It redefines airmindedness in a way that captures its multiple dimensions. It anchors one of the most modern technical artifacts using metaphors and meanings from antiquity, hoping to make flight “more meaningful in the overall record of human existence,” as James Hansen calls for “Aviation History in the Wider View.”<sup>26</sup> Most ambitiously, perhaps this project will do for “playfulness” in military history what Detienne and Vernant did for *metis* in Greek history: to identify an idea that is as pervasive as it is unacknowledged. The other coda is directed to Airmen, but its explanation also sheds light on the style, logic, and presentation of the dissertation’s argument.

The epilogue to *Icarus*, the 1938 Royal Air Force anthology of poetry, contains an appeal for a poet to capture the majesty, mysticism, and meanings of air power.<sup>27</sup> Perchance, however, Airmen already have one. The person need not have practical experience with flight, as the description of airmindedness in Chapter Two makes clear. It is more helpful, perhaps, for the poet laureate to be more familiar with mythological forms of flight, or simply mythology writ large. Indeed, Bayla Singer notes, “The deep symbolic meanings of flight have been expanded and enriched...[and] still contribute to

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<sup>26</sup> Hansen, “Aviation History in the Wider View,” 644.

<sup>27</sup> Rupert De la Bère, ed., *Icarus: An Anthology of the Poetry of Flight* (London: Macmillan, 1938), 187.

our motivations and experiences. This is true not only of flight, but of our other dreams and drives as well. Those who look for the wellspring of creativity...would do well to give more than superficial lip service to ancient longings. Old dreams do not fade away, they merely adapt to current social realities.”<sup>28</sup> Of course, Plato – who disbanded the poets, denigrated *techne*, redefined *logos*, and denied *metis* – is not a viable candidate, but possibly there is another ancient Greek writer.<sup>29</sup>

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<sup>28</sup> Bayla Singer, *Like Sex with Gods: An Unorthodox History of Flying* (College Station, TX: Texas A&M University Press, 2003), 183. Likewise, aviation historian Richard Hallion observes that “from the dawn of time people around the globe have expressed the dream of flight, emphasizing the incredible and depicting aerial powers as an element of religion, mythology or war” (Richard P. Hallion, *Taking Flight: Inventing the Aerial Age, from Antiquity through the First World War* (New York, NY: Oxford University Press, 2003), 3). Laufer warns against the denigration of aviation’s “mythological and legendary period,” notes “And what, after all, is the difference whether the Daedalus story is true or not? It is not the gray, cold, naked objective truth that counts in the history of mankind and will advance the cause of civilization, but it is the flight of human imagination, the impulses and visions of a genius, very often his errors and miscalculations, which have stimulated inventions and progress. Ever since Daedalus' alleged or real flight men in Europe have tried and died until finally success was insured” (Laufer 8, 63). Another line is interesting given this dissertation’s use of *The Iliad* and *The Odyssey*: “No historian's pen has preserved a record of the Trojan War, but Homer has sung it in the form of epic poetry which has been enjoyed by a hundred generations and which has been more often read than any accurate report of a war published by the competent staff of any war ministry... it is just man's ingrained love for the fabulous and fanciful, for the wondrous and extraordinary to which we are indebted for the preservation of ancient records of flight” (10).

<sup>29</sup> Greeks are obvious place to start, according to political scientist Christopher Coker, (Christopher Coker, *Waging War Without Warriors?: The Changing Culture of Military Conflict* (Boulder, CO: Lynne Rienner Pub, 2002), 16.) References are not just frequent in Western culture, but specific mentioned in USAF history. Some examples include Project Aphrodite, Atlas missile, C-130 Hercules, Gorgon Stare sensor system, Air University Press monograph title *Apollo's Warriors*, and the name of USAF Academy Cadet Squadron 03, Cerberus. Lawrence Freedman identifies ancient Greek culture as the key source for the art of strategy and, in fact, a book by SAASS faculty reflects this in both its subtitle and in James Tucci’s chapter presenting strategic education in terms of Plato’s dialogues (Lawrence Freedman, *Strategy: A History* (New York, NY: Oxford University Press, 2013), 22; Richard Bailey, James W. Jr Forsyth, and Mark O. Yeisley, eds., *Strategy: Context and Adaptation from Archidamus to Airpower* (Annapolis, MD: Naval Institute Press, 2016), 75-96). Of course, throughout world history there are



Perhaps, as hinted throughout these chapters, Airmen can better perceive their *technological logos* through the poetry of Homer. First, he contributes heavily to the corpus of literature that describes the pantheon of characters used herein for their contrasting tendencies. Additionally, his works display exemplars who balance those creative tensions.

Odysseus is *the* “unifying element” for Greek notions of *metis*, and the only character Homer describes as poly-*metis*, “[knowing] all the ways of guile and cunning strategies.”<sup>30</sup> Zeus exclaims that Odysseus is “beyond all other men in mind,” and he is not the only god favoring the sidetracked traveler.<sup>31</sup> On his journey home, Odysseus is aided by Athena, another deity highly associated with both *techne* and *metis*.<sup>32</sup> This is why the goddess of wisdom, craft, and war is fit to serve as Odysseus’s patron throughout his journey home, and could acknowledge he is “far the best of all mortals in thought and

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corollaries to the Greek ideas discussed herein (see Carl Mitcham, *Thinking through Technology: The Path between Engineering and Philosophy* (Chicago, IL: The University of Chicago Press, 1994), 117; Freedman, *Strategy*; Lewis Mumford, *Technics and Civilization* (London: Routledge & Kegan Paul PLC, 1934), 46; Hodgson, *The History of Aeronautics in Great Britain*, 53-8; Laufer, “The Prehistory of Aviation,” 11-4; “Theft of Fire,” *Wikipedia*, August 27, 2017, [https://en.wikipedia.org/w/index.php?title=Theft\\_of\\_fire&oldid=797541994](https://en.wikipedia.org/w/index.php?title=Theft_of_fire&oldid=797541994), accessed 30 January 2018; Lisa Raphals, *Knowing Words: Wisdom and Cunning in the Classical Traditions of China and Greece* (Ithaca, NY: Cornell University Press, 1992)).

<sup>30</sup> Everett Wheeler, *Stratagem and the Vocabulary of Military Trickery* (New York, NY: Brill, 1997), 51; Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 93.

<sup>31</sup> Homer, *The Odyssey*, quoted in Brian Boyd, *On the Origin of Stories: Evolution, Cognition, and Fiction* (Cambridge, MA: Belknap Press, 2010), 277.

<sup>32</sup> Detienne and Vernant, *Cunning Intelligence in Greek Culture and Society*, 177-85. There is abundant literature on Athena’s connections to technology, war, *metis*, and two aforementioned characters, Prometheus and Hephaestus (Detienne and Vernant, 179, 180, 183; Raphals, *Knowing Words*, 217; “Athena - Greek Goddess of Wisdom, War & Crafts,” Theoi Greek Mythology, accessed January 30, 2018, <http://www.theoi.com/Olympios/Athena.html>).

word, and I'm renowned among all the gods for my wisdom and my cunning ways."<sup>33</sup>

And since Homer's sense of *metis* is bound up with *techne*, it is not surprising to find the two melding into the single character of Odysseus.

Not only is Odysseus poly-*metis*; he also displays a variety of technical skills. First, *The Iliad* demonstrates his gift as a battlefield tactician.<sup>34</sup> Next, *The Odyssey* showcases many of his maritime navigational skills, a common metaphor for the way-making nature of both *metis* and *techne*. His abilities as a carpenter are demonstrated when he constructs the Trojan Horse that ends the war and the raft that ends his exile on a remote island.<sup>35</sup> Finally, as he balanced reason and passion, words were often his weapon of choice.<sup>36</sup> Athena states Odysseus is "far the best of all mortal men for counsel and stories."<sup>37</sup> He validates this compliment when he expertly recounts the Cyclops story for others.<sup>38</sup> Great storytelling is, in fact, a manifestation of both *techne* and *metis*.

To reiterate earlier points, *metis* is a *strategic* intelligence: pragmatic, political, and particularly apt for war. The inclination towards organized violence makes the world doubly wicked as it adds danger to the disorder. Warfare is perhaps the most wicked

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<sup>33</sup> Homer, *The Odyssey*, quoted in Freedman, *Strategy*, 24.

<sup>34</sup> Homer and Bernard Knox, *The Iliad*, trans. Robert Fagles (New York, NY: Penguin Classics, 1998), 2.270-3.

<sup>35</sup> Homer, *The Odyssey*, trans. Samuel Butler (MIT Classics, 2014), <http://classics.mit.edu/Homer/odyssey.html>, 8.493-4, 5.234-57. Lisa Raphal points out that the notion of "following straight along a line," is a technical term in navigation and in shipbuilding that also applies to archery, the *techne* Odysseus employs in his final victory over the suitors who invaded his home during his absence (Raphal, *Knowing Words*, 193).

<sup>36</sup> According to Barnouw, Odysseus's *metis* was as much "visceral as intellectual"; not merely an "impassive weighing of alternatives," but a strategic arrangement of ways and means to secure an advantage (Jeffrey Barnouw, *Odysseus, Hero of Practical Intelligence: Deliberation and Signs in Homer* (New York, NY: University Press of America, 2004), 2, 33.)

<sup>37</sup> Homer, *The Odyssey*, quoted in Boyd, *On the Origin of Stories*, 276.

<sup>38</sup> Boyd, 252.

activity humans participate in, and therefore the one in which *metis* matters the most.<sup>39</sup>

As the innate link between strategy and war implies, *metis* is not just about ruses or what Sun Tzu called the acme of strategy: winning without fighting.<sup>40</sup>

Military strategy is fundamentally about the use of violence to secure an advantage. Indeed, Odysseus himself, the paragon of *metis*, uses force deftly when required.<sup>41</sup> He is attuned, however, to the range of potential consequences of his actions, whether those actions are forceful or cunning, and the limits to what can be known.<sup>42</sup> Regardless of which approach he takes, and whether it is even cooperative and

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<sup>39</sup> Many authors corroborate this assertion (James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1999), 315; Wheeler, *Stratagem and the Vocabulary of Military Trickery*, 25; Raphals, *Knowing Words*, xiii; Creveld, *Technology and War*, 77, 310, 316; Jacob W. Kipp and Lester Grau, "Military Theory, Strategy, and Praxis," *Military Review* (March-April, 2011): 20; Trew, "Fiction in Military Education," 28-9; Gray, *Airpower for Strategic Effect*, 37; Freedman, *Strategy*, 43. Bousquet writes, "The most effective forms of warfare have therefore always included recognition of the inherent unpredictability that accompanies the use of military force and built unpredictability that accompanies the use of military force and built into military organization a tolerance to uncertainty and even a capacity to profit from it" (Bousquet, *The Scientific Way for Warfare*, 242).

<sup>40</sup> Sun Tzu, *The Illustrated Art of War: The Definitive English Translation by Samuel B. Griffith* (New York, NY: Oxford University Press, 2005), 9. The author is aware of the extension of *metis* beyond the typical association with duplicity, deceit, and disguise. Such denotations often place *bia* and *metis* as polar opposites, whereas the argument herein is about how wisdom should sit over and direct forces (just as it guides technique, or as subjectivity guides the objective).

<sup>41</sup> Raphals, *Knowing Words*, 192. In *The Iliad*, it is Odysseus, in fact, who pleads for what their forces most need at that moment, which is the violence of Achilles (Gregory Nagy, *The Best of the Achaeans: Concepts of the Hero in Archaic Greek Poetry* (Baltimore, MD: Johns Hopkins University Press, 1998), 48). Furthermore, upon returning home, Odysseus shows his own might as the only one among the suitors who can restring his bow, which he then uses to kill them (Nagy, 317).

<sup>42</sup> Freedman, *Strategy*, 28. In one sense, *The Odyssey* is not just a physical journey but the main character's journey towards greater humility – indeed, his hubris with the Cyclops is what delays his return by a decade but also what gives him time to develop his "character."

constructive instead of competitive and destructive, the goal of this strategic intelligence is always to realize a continuing advantage in a world that is wicked once over.

Odysseus, therefore, exemplifies the following two descriptions of strategy, the first about its environment and the second about its functions therein: “strategy is a process, a constant adaptation to shifting conditions and circumstances in a world where chance, uncertainty, and ambiguity dominate;”<sup>43</sup> and “the realm of strategy is one of bargaining and persuasion as well as threats and pressure, psychological as well as physical effects, and words as well as deeds.”<sup>44</sup> The latter definition highlights an important dimension to *metis*, which is unavailable to the non-human examples offered by Detienne and Vernant (e.g. octopi or ivy).

Odysseus crafts a way out of his predicaments, but he is also deft at doing what proficient strategists do: “putting ideas into words.”<sup>45</sup> This is not the *logos* of Plato, but the rhetorical skill of the Sophist. It is, essentially, the application of metic intelligence into two domains. First, a plan must be crafted. Second, that plan, that “theory of victory,” must be communicated in a coherent, persuasive fashion.<sup>46</sup> While some elements may remain tacit and intuitive – after all, any domain in which universal rules are explicable is, by definition, not a field of metic activity – the strategist is still able to

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<sup>43</sup> Williamson Murray and Mark Grimsley, “Introduction: On Strategy,” in *The Making of Strategy: Rulers, States, and War*, eds., Murray, MacGregor Knox, and Alvin Bernstein (Cambridge, 1994), 1.

<sup>44</sup> Freedman, *Strategy*, xii.

<sup>45</sup> Tadd Sholtis, *Military Strategy as Public Discourse: America’s War in Afghanistan* (New York, NY: Routledge, 2013), 5.

<sup>46</sup> Eliot A. Cohen, *Supreme Command: Soldiers, Statesmen, and Leadership in Wartime* (New York, NY: Free Press, 2002), 33. Although not addressed in this dissertation, this should also include the use of communication externally (see Emile Simpson, *War From the Ground Up: Twenty-First Century Combat as Politics* (New York, NY: Oxford University Press, 2012).

employ words to achieve an advantage. And often stories and metaphors are the most effective type of narrative despite (or perhaps because of) the fact that they are always perishable and partial. Again, consider the definition of stories and how it resonates with the function of strategies: narratives that convey why and how to prevail in a particular context.<sup>47</sup>

Airmen have, at times, been adept at crafting innovative theories of aerial warfare in moments of instability. As Effects Based Operations falls out of favor, low-intensity conflicts not amenable to air power continue to fester around the world, and the USAF's position as preeminent air force is challenged by rising states, many authors perceive another such moment will arise in the next quarter century, if not before. What Airmen need, however, is not merely another theory to guide air power operations. They need a better story of what it could mean to be Airmen.

Organizational theorists have long asserted the need for compelling stories to incite and sustain cultural change. Likewise, modern USAF doctrine itself lists "telling the Air Force story" as one of the organizational competencies required at the highest echelons of command.<sup>48</sup> Finally, the links between strategy and storytelling are at least as

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<sup>47</sup> Everett Dolman's line makes strategists sound like storytellers: "the strategist makes sense of the world in terms of abstract causal relationships and aggregate perceptions" (Everett Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York, NY: Routledge, 2005), 14). Lest the reader forget, there is the underlying *metis* of Homer himself (Raphals, *Knowing Words*, 211).

<sup>48</sup> Air Force Doctrine Document (AFDD) 1-1, *Leadership and Force Development* (8 November 2011), 59. Arnold himself promoted the officer's duty to "tell the story," and retired four-star General William Momyer wrote in 1978 that "an extremely high premium must be placed on the Airman's ability to articulate options thoroughly and clearly" (Arnold quoted in Futrell, *Ideas, Concepts, Doctrine*, 138; William W. Momyer, *Airpower in Three Wars* (Maxwell Air Force Base, AL: Air University Press, 1978), 379).

old as Homer.<sup>49</sup> What is needed, then, is for air-minded strategists to turn their skills inward and craft a compelling organizational narrative, one that will cultivate an environment of continuous innovation.

This task is, at first glance, paradoxical. Culture is the accumulated wisdom of solutions that worked, or have been perceived as a success. Culture is thus based on stability. Unremitting innovation contradicts the continuity organizations naturally crave. The crux is reframing expectations. Enduring resolutions for wicked dilemmas will not come from the level of theory, which is inevitably only a partial, perishable approach. Instead, the ability to continuously “re-solve” complex and complicated problems, which never have a final solution, can only emerge at the level of paradigms. It is not any one design or school of thought, but the process of constantly generating and experimenting with a menu of options. It is a meta-strategy that embraces playfulness, whether as storytelling, exploring metaphorical possibilities, or iterative approaches; that opts for incomplete theories over single unified, universal explanations; that expects experiments to be indecisive; that privileges contingencies and contexts; and that not only accepts, but leverages, the fact that a wicked world often requires synthesis instead of analysis, empathy instead of objectivity, reflection over Platonic rationality, complexity and ambiguity instead of order and convention.

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<sup>49</sup> For a modern example David Culkin states: “A strategist, then, links policy to operational planning. He or she attempts this by effectively merging creative methods from literary theory with conceptual models to formulate meaningful narratives. The story must describe how the ends-ways-means outlined will produce the desired effects in time and space. Linking these conceptual frameworks to realistic application requires developing and personally selling the *strategic narrative* that describes how the ways and means accomplish the ends...Strategists must link policy narratives to strategic narratives by writing fiction where intelligence and guidance fall short” (David Culkin, “Discerning the Role of the Narrative in Strategy Development,” *Military Review* (January-February, 2013): 62-3). This and many other examples are in Trew, “Fiction in Military Education.”

Thankfully, the paradigm of Airmen, their *technological logos*, already responds in this way when the organization perceives a period of flux. Therefore, it is not so much a matter of replacing the institution's culture, as it is a matter of cultivating the creative tension between continuity and change that happens at that point in the cycle of technological knowledge when *metis* is most operative. Maintaining a sense of perpetual flux will not be easy, but strategists can ease the psychological burden by rebalancing Airmen's paradigm back towards the images of Icarus, Dionysius, and Metis. It may be surprising, but they are a natural part of USAF culture, paradoxically, by virtue of the culture's relationship with Apollo, Daedalus, and Bia.

### Epilogue

The research and writing for this project did not start with this conclusion in mind. If anything, the intent was to join the chorus of voices lamenting the lack of rigorous thinking among Airmen. Examples would have revolved around quotes from flyers about how “‘unmanly’ it is to develop one’s intellect” or how a former general officer bluntly stated, “I am a professional fighter pilot, and getting a PhD is a nice thing to do, but it has nothing to do with flying and fighting.”<sup>50</sup> There was no expectation to find periods of anything but exaggerated emphasis on technoscientific rationality, bureaucratic self-interest, and obsession with technological artifacts. Likewise, Greek mythological metaphors were initially meant as literary flourish, not the principles to organize the argument. Storytelling was meant to be an example of fallacious logic, not a central mode of human cognition.

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<sup>50</sup> Edward C. Mann, *Thunder and Lightning: Desert Storm and the Airpower Debates* (Maxwell Air Force Base: Air University Press, 1995), 194; Olsen, *John Warden and the Renaissance of American Air Power*, 118.

As it turned out, playfulness, storytelling, and unconventional connections guided the style of this dissertation as much as its substance. It became a narrative about technological stories and those who tell them, whether ancients or Airmen, as well as a story itself. It is, after all, written by an Airman with three decades of experience in air-minded organizations, acculturated to the *technological logos*, doing what Airmen naturally aspire to do: break barriers, tell stories, challenge conventions, tinker with metaphors, and all the while trying to improve mastery with their machines. Perhaps, if we get closer to understanding this as our cultural heritage, maybe no one really will ever “come close” to matching the performance and prestige of the USAF.



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