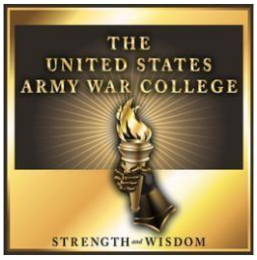
2017 Award Winner
USAWC Student Awards Program

The Field of Human Conflict: Developing HAPDB and Cyber Doctrine

by

Lieutenant Colonel Mark C. Dmytryszyn
United States Air Force

Under the Direction of:
Colonel Edward A. Kaplan



United States Army War College
Class of 2017

REPORT DOCUMENTATION PAGE

Form Approved--OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
01-04-2017	STRATEGY RESEARCH PROJECT	

4. TITLE AND SUBTITLE
The Field of Human Conflict: Developing HAPDB and Cyber Doctrine

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Lieutenant Colonel Mark C. Dmytryszyn
United States Air Force

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Colonel Edward A. Kaplan

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army War College, 122 Forbes Avenue, Carlisle, PA 17013

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Distribution A: Approved for Public Release. Distribution is Unlimited.
I understand this document will be included in a research database and available to the public. Author: ☒

13. SUPPLEMENTARY NOTES
Word Count: 6578

14. ABSTRACT

Interwar years' airpower and modern-day cyber promised to change the character of war through the application of technology. Both are contemporarily the same age and at roughly the same point on the warfighting maturation curve, a point ripe for growth in developing and codifying doctrine. This paper examines the development of airpower's High Altitude Daylight Precision Bombing and industrial targeting doctrines through the evaluation of four decision-making models— Rational Actor, Bureaucratic Politics, Organizational Behavior, and Individual Psychological —to warn of their generic application to doctrine development in the cyber domain. The analysis' review of decision-making found a collection of like-minded innovators falling into common traps; specifically, advancing the shared beliefs of a dominant few, groupthink, exclusion of dissent, and selecting "good enough" solutions. Today's doctrine developers are destined to be tomorrow's commanders, and cyber's application will compel leaders to make guesses about its use before war's outbreak. These guesses will be complicated by doctrine preceding capability, and a reliance on faith-based theories over experience-backed principles. However, shrewd application of these lessons learned may cyber decision-makers from falling into the same traps, promises, and pitfalls.

15. SUBJECT TERMS
ACTS, AWPD, Billy Mitchell, Domain, Groupthink, Hal George, Industrial Web, Strategic Bombardment

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(w/ area code)*
UU	UU	UU	UU	42	

The Field of Human Conflict: Developing HAPDB and Cyber Doctrine

(6578 words)

Abstract

Interwar years' airpower and modern-day cyber promised to change the character of war through the application of technology. Both are contemporarily the same age and at roughly the same point on the warfighting maturation curve, a point ripe for growth in developing and codifying doctrine. This paper examines the development of airpower's High Altitude Daylight Precision Bombing and industrial targeting doctrines through the evaluation of four decision-making models— Rational Actor, Bureaucratic Politics, Organizational Behavior, and Individual Psychological —to warn of their generic application to doctrine development in the cyber domain. The analysis' review of decision-making found a collection of like-minded innovators falling into common traps; specifically, advancing the shared beliefs of a dominant few, groupthink, exclusion of dissent, and selecting "good enough" solutions. Today's doctrine developers are destined to be tomorrow's commanders, and cyber's application will compel leaders to make guesses about its use before war's outbreak. These guesses will be complicated by doctrine preceding capability, and a reliance on faith-based theories over experience-backed principles. However, shrewd application of these lessons learned may cyber decision-makers from falling into the same traps, promises, and pitfalls.

The Field of Human Conflict: Developing HAPDB and Cyber Doctrine

> The airplane's most important effects were promises and theories… promises were that aerial bombardment would make conventional war obsolete. It followed, therefore, that airplanes were the ultimate weapon.
>
> —George and Meredith Friedman[1]

Billy Mitchell is the senior prophet of American airpower, and the "Bomber Mafia" his disciples. Developed during World War I —from both experience and discussion— Mitchell's strategy of "strategic bombardment" offered a "new kind of war in which the airplane would… destroy the [adversary's] means of making war."[2] Mitchell's strategy (*i.e.,* hypothesis) was translated by the U.S. Army's Air Corps Tactical School (ACTS) into the doctrine of High Altitude Precision Daylight Bombing (HAPDB). This doctrine became the cornerstone of the Air War Plans Division's submission for the "organization of the American air effort" in preparation for World War II.[3] The plan, prepared by a subset of the Bomber Mafia, advanced radical and insurgent concepts of preeminent strategic bombing.

The history presented highlights how the Mitchell strategic bombardment paradigm matured into the HAPDB doctrine.[4] This paper examines the decision-making used in the doctrine's development through the application of four models: Rational Actor, Bureaucratic Politics, Organizational Behavior, and Individual Psychological. As explored through these analytical tools, the decisions to apply HAPDB to an adversary's industrial base and economic structure, termed the "industrial web," evolved from an idea sparked by Billy Mitchell. Additionally, HAPDB's doctrine hinged on the belief that there was no need for escorts to protect the bombers, a choice in stark contrast to ideas proffered by Mitchell and by contemporary dissenting voices. Furthermore, the development and subsequent advancement, arguably indoctrination, of the

preeminence of strategic bombing was performed primarily via “groupthink” methods exercised by the ACTS instructors.

Just as airpower was entering adolescence after World War I, cyber is today. Parallels between airpower’s and cyber power’s maturity include:

- Using the domain for more than collecting and transporting information, and for more than reconnaissance; it will be used for warfighting.
- Piggybacking on a strong commercial sector.
- Making quantum advances in military capability attributed partially to radically and rapidly changing technology.
- Pursing recognition as an independent service.

The goal of this treatment is to historically analyze decision-making methods used in developing HAPDB and warn of their generic application to doctrinal development in the cyber domain. After World War I, some thought was that the airplane “had fundamentally changed war.”[5] Some today say the same about cyber.

Background

The seeds of industrial (strategic) bombardment were sown in World War I, owing much to conversations between the American Billy Mitchell and the Englishman Hugh Trenchard, with both informed by the Italian Giulio Douhet.[6] Upon Mitchell’s return from war and ascent through the ranks, he championed increased investment and experimentation in airpower. He was particularly devoted to bomber employment against maritime targets, centered on displaying the bomber’s contribution to national (coastal) defense. Later, ACTS incubated his ideas on strategic bombardment’s application against an adversary’s industrial and economic base.[7] In the roughly twenty

years between wars, through ACTS' farsightedness and conviction, these became the dominant views on airpower employment. The culmination of efforts by a large cast "convinced that the advent of the military airplane had revolutionized the art of war" cemented Mitchell's ideas on strategic bombardment into U.S. industrial warfighting doctrine.[8]

The Personalities[9]

The paradigm of strategic bombardment, later the doctrine of HAPDB, was arguably a theoretical success with many fathers. The list of early aviation heavyweights (fathers) includes Arnold, Eaker, Foulois, Kenney, and Spaatz, along with the lesser known but no less influential Gorrell, Milling, and Sherman.[10] However, most credit is bestowed to Billy Mitchell as the prime mover with the Bomber Mafia responsible for the lion's share of its refinement.[11]

The Influence of Billy Mitchell

Mitchell's ideas permeated airpower development during both his time in uniformed service and after his resignation.[12] He drew attention to two key tenets: the use of the airplane for "strategic bombing," and the often-forgotten necessity for pursuit aviation to protect bombers.[13] In fact, Mitchell emphasized the interdependent and long-lasting relationship between bomber and protector (interchangeably termed pursuit or fighter aircraft).[14] The influence and staying power of Mitchell's ideas are due to his maverick nature, their promotion by his immediate entourage (Mitchell's intellectual descendants), and the ascension of his concepts to a level of regard that obtained unanimous support from his fellow officers.[15] Mitchell had aims to make "air men," to be an iconoclast challenging long-standing warfighting tenets and doctrine, by introducing

the airplane as a specialized weapon used for more than direct support to frontline soldiers.[16]

Political scientist Barry Posen posits that civilians alone do not possess the necessary expertise to change military doctrine and "must rely upon mavericks within military organizations for the details of doctrinal and operational innovation."[17] Mitchell was that maverick, inflaming an insurgency within the post-war Army that radicalized air-minded officers.[18] The outcome of his struggle was a War Department promise that military aviation, in the form of strategic bombardment, would have a decisive role in World War II.[19] Additionally, Mitchell attracted and pursued those air-minded officers, fellow insurgents and mavericks, whom he knew would advance the cause.[20] His insurgents laboriously developed doctrine while initially being considered lesser members of the combat arms. However, the rapid advancement of the airplane for warfighting purposes generated changes in the Army's structure, and elevated those in aviation to higher ranks and greater responsibilities, the most evident being Hap Arnold.[21]

The Influence of Giulio Douhet

Many attribute the first significant development of airpower theory to Giulio Douhet.[22] His book, *The Command of the Air*, emphasizes first defeating the adversary's air force and then attacking their industry.[23] This theory is predicated on the belief, shared by the Douhet-Mitchell-Trenchard trio, that the bomber had and would continue to fundamentally change warfare.[24] What remains unresolved is the *direct* influence Douhet had on American airpower doctrine development.[25] Evidence indicates that it was Mitchell's ideas, most likely developed from Douhet's, that were known and advanced by the cadre at ACTS.[26] It also appears that when ACTS cadre did discover

Douhet's writings, they found that his claims and predictions supported Mitchell's – confirming their bias towards the Mitchell "school" of strategic bombardment.[27]

The Bomber Mafia

The mafia's *de facto* lead was Harold L. "Hal" George, Director of ACTS' Department of Air Tactics and Strategy (including serving as Chief of the Bombardment Section) and later the Chief of the Air War Plans Division (AWPD).[28] George's compatriots included: Muir Fairchild, Haywood Hansel, Lawrence Kuter, Odas Moon, Robert Olds, Kenneth Walker, Robert M. Webster, and Donald Wilson.[29] While all significantly contributed to the development of the HAPDB doctrine (and later the complimentary industrial targeting doctrine), it was Hansell, Kuter, and Walker who rejoined George in forming the primary team that developed AWPD-1.[30]

Table 1. AWPD-1's Primary Authors[31]

Member	Abbreviated Curriculum Vitae
Colonel George	Chief of the Air War Plans Division, ex-Director of the Department of Air Tactics and Strategy of ACTS
Lieutenant Colonel Walker	Chief of the War Plans Group of the Air War Plans Division, ex-Instructor in Bombardment at ACTS
Major Hansell	Chief of the European Branch of the War Plans Group, ex-Instructor at ACTS
Major Kuter	General Staff G3 (on loan), ex-Instructor in Bombardment at ACTS

How HAPDB Was Developed and Made Its Way Into AWPD-1

There are volumes cataloging and analyzing the interwar history of the United States air arm. While many of them discuss who, or when, or where, there is very little on the *how* HAPDB came to be and even less on its incorporation into AWPD-1. David

MacIssac's abbreviated history in the *Makers of Modern Strategy* anthology provides a representative example:

> In the United States, the translation of Douhet's and Mitchell's broad concepts into an elaborate doctrine of employment for operations against the enemy industrial web was the work of the U.S. Army's Air Corps Tactical School.[32]

What MacIssac and many others fail to provide is a thread sown through the "who" and the "what." The collective history offers that Mitchell's ideas were pondered and refined by his disciples, the Bomber Mafia, who then championed their inclusion into AWPD-1. However, history shows two things: an identifiable chain of custody regarding Mitchell's thoughts on aerial bombardment, and that a subset of the Bomber Mafia is "responsible for the origin and crystallization" of the HAPDB concept, later theory, and finally doctrine.[33]

As discussed, Mitchell's ideas on strategic bombardment were likely developed from a combination of experience and discussion. Moreover, that discussion clearly involved extended conversations with Trenchard, likely debating Douhet's ideas. In close proximity to Mitchell during these formative years was American Air Service Lieutenant Colonel E. S. Gorrell.[34] Gorrell's initial contribution to strategic bombardment was recommending attacks on German "commercial centers," specifically war-making industries such as weapons factories.[35] Aided by Gorrell's suggestions, Mitchell solidified his views on strategic bombardment and "stressed the enemy industrial base and economic structure as the preferred target for bombardment operations."[36]

Upon his return from the war, Mitchell took command of Army aviation. In July 1920, he appointed Major Thomas DeW. Milling to organize the Army's first air tactics school (later ACTS).[37] Milling then recruited Major William C. Sherman, and the two,

both having served under Mitchell during the war, set about defining the future of what would become the Air Corps.

Milling and Sherman carried Mitchell's ideas to ACTS. There, Air Corps historical heavyweights debated their merits along with the ideas of Douhet and Trenchard in classroom discussions, faculty meetings, and off-the-clock coffee-shop seminars.[38] Strategic bombardment ideas began to distill, with HAPDB initially formed around Douhet's elements of decisiveness of airpower and the invincibility of the bomber.[39] Appended to Douhet's elements were Mitchell's identification of singular targets that might halt an entire industry, and striking vital nodes of an enemy's "industrial web" might halt their ability to prosecute the war.[40] From these ideas, coupled with a faith in the long-range self-protecting bomber, emerged the concept of unescorted HAPDB, simultaneously championed by Olds, Walker, and Wilson operating under George's tutelage.[41]

However, ACTS' work was not complete; the targeting schema at the foundation of the American strategic bombardment required refinement. Enhancements made in the late 1930's by Webster, Kuter, Hansell, Fairchild, and Moon first formalized the doctrine and then, by their placement at ACTS, propagated it.[42] The two-decade maturation of Mitchell's ideas into unescorted HAPDB and the industrial targeting doctrines were the results of thinkers—men who developed theory and elevated it to doctrine.[43]

Conspicuously absent from the doctrine development is airpower-great Hap Arnold. Arnold spent the interwar years with industry and acquisition.[44] While he did not attend ACTS, he did independently develop views of strategic bombardment similar to

Douhet's.[45] Likewise, he was not a stranger to Mitchell or his ideas, having served with the American Expeditionary Force.[46] One of Arnold's biographers attests that "Mitchell contributed the most to Arnold's personal development and understanding of the politics of national military airpower."[47]

In summer 1941, Arnold served as the Chief of the Army Air Forces and hired Bomber Mafia leader Harold George to head the AWPD.[48] When President Roosevelt directed the drafting of a war plan against the Axis, George "saw in FDR's request an opportunity to sneak ACTS doctrine [unescorted HAPDB and industrial targeting] into a major War Department planning document via the back door."[49] George initiated the effort with his immediate staff: Orvil Anderson, Kenneth Walker, and Haywood Hansell (Walker and Hansell being former ACTS instructors, Anderson a graduate of the 1936-37 class). To expedite the process, George recruited former ACTS colleagues including Kuter, Max Schneider, Arthur Vanaman, and Hoyt Vandenberg, along with Samuel Anderson.[50]

George's team completed the comprehensive war plan (AWPD-1) in nine days.[51] "The plan they prepared reflected the essence of the radical air power doctrine that focused on the preeminence of the long-range strategic bomber."[52] Planners frequently briefed AWPD-1 throughout the Army Air Forces and the War Department. While it often received favorable comments, there was some dissent including arguments for escort (pursuit) fighters advanced by former ACTS instructor Clayton Bissel's.[53]

Arnold held views on strategic bombardment similar to those advanced by ACTS, and by allowing George's inclusion of HAPDB and industrial targeting doctrine into AWPD-1, tactically approved of the work performed and promulgated by the tactics

school.[54] Additionally, the accomplishment of George's team —in one week drafting a significant component of a war plan— could only be accomplished by a group imbued with the ACTS doctrine.[55]

However, that time-developed groupthink is one of several areas of ACTS and AWPD decision-making that deserves examination. Therefore, the remainder of this treatment reviews the decisions made in development of AWPD-1 through the four lenses listed in the introduction. Application of these models will show how a collection of like-minded innovators fell into common decision-making traps. The intent of this analysis is to appreciate these shortcomings and consider their application to other doctrine development enterprises, specifically those in the maturing cyber domain.

Decision-Making Models Applied to AWPD-1's Development

This treatment employs four decision-making models to examine how the unescorted HAPDB and industrial targeting doctrines were agreed upon by ACTS and later incorporated into AWPD-1. The four models are a combination of ideas from Allison and Zelikow's *Essence of Decision: Explaining the Cuban Missile Crisis*, and Houghton's *The Decision Point: Six Cases in U.S. Foreign Policy Decision Making*.[56] The treatment also examines how contradictions and convictions counter to the bombardment doctrine developed by ACTS were eliminated, less through the advancement of technology or rational argument and more by social pressures and psychological shortcuts.[57]

Table 2. Decision-Making Models[58]

Model	Brief Description
Rational Actor	Unitary decision-maker(s) assumed to possess all ("perfect") information from which to generate cost-benefit calculations and select outcomes that provide the greatest benefit.
Bureaucratic Politics	Multiple competing actors conduct bargaining games intended to drive the decision in their favor; many decisions bias towards the views of the dominate actors in the model who exercise recurring or standard operating procedures.
Organizational Behavior	Social pressures and self-censorship drive inharmonious views from the group; rapid alignment leaves the group closed to alternative ideas or new, influential information.
Individual Psychological	Due to limited human information processing, rely on aids or templates to make decisions; prone to force new information to fit existing beliefs, expectations, and paradigms; may select less than optimum "good enough" solutions; subject to emotional influence.

Rational Actor Model Analysis of HAPDB Development

The Rational Actor model is the theoretical ideal for ordered and orderly emotion- and influence-free decision-making. It relies on complete, consistent rationality. It also assumes the decision-maker possess all information, with the condition that said information is "perfect." Another condition is that newly available information is incorporated into the model.[59] Using perfect information, the decision-maker generates a list of cost-benefit calculated alternatives and selects the utility-maximizing or value-maximizing solution.[60] When applied to a group, the decision-maker is the theoretical unification of all group members who are "centrally coordinated, purposive individuals."[61]

A Rational Actor analysis of HAPDB's development starts with the early interwar years' debates over the roles of airpower and the near parallel advancement of bombardment and pursuit (later fighter) concepts. Doctrine development held to the model's requirement for re-calculation when new information became available.

Technological advances in aircraft production in 1926-1935 biased airpower theory development towards bombardment, specifically the advantages possessed by the high-speed bomber (*i.e.,* the B-17's speed, range, and payload accompanied by a Norden or Sperry bombsight).[62] Mitchell, who always emphasized the interdependence of bombardment and pursuit, began to drift towards accentuating the bomber as "the key element in airpower."[63] Rationally, the bomber's demonstrated capabilities, both offensive and defensive, support HAPDB and the ability to conduct operations unescorted.

However, support for this decision-making model breaks down in several ways. The first is the absence of perfect information. As mentioned in the above history, the emergence and stabilization of airpower employment concepts came about more from discussion and less from rigorous experimentation.[64] The second breakdown is ACTS' rejection of the Mitchell-Douhet theory as an alternative to the development of precision bombing of the industrial web.[65] This breakdown is focused not on the rejection of an alternative choice, but on the matter that those making the decision (Walker, George, Webster, and Wilson) were ignorant of contrary and dissenting views (*e.g.,* Chennault's insistence on the need for integration with pursuit doctrine).[66] The third breakdown also involves information, this time with respect to the industrial targeting doctrine. The targeting theory (later doctrine) "assumed too much and… was incomplete."[67]

An exemplary assumption: that the economic industrial system would collapse when the right target was destroyed.[68] An illustrative incompleteness:

> As the Allies were to learn, the Germans proved adept at relocating and redistributing manufacturing sites, at stocking up on supplies so that production flows would not be interrupted, at working extra shifts, at corralling slave and foreign workers, and at substituting one raw material for another.[69]

The decision-making approaches employed by ACTS in the development of HAPDB and the industrial targeting doctrines did not conform to the Rational Actor model. The lack of perfect information influenced the calculation of alternatives, generating non-value-maximized solutions. Had the planners possessed all information, had been more inclusive in their group composition and unification, or had installed re-calculation "tripwires" (*e.g.,* early bombing results, early bomber loss rates), the War Department leadership would have found AWPD-1 to be closer to a faith-based theory than a plan supported by experience-backed principles.

Bureaucratic Politics Model Analysis of HAPDB Development

The Bureaucratic Politics model represents decision-making made not by a unitary actor or by group consensus, but by multiple competing actors pursuing differing objectives and priorities who achieve decision-making outcomes through bargaining, compromise, and organizational routine. This model accounts for the impact on decision-making made by each player's interests and actions, perceptions and equities, relative or absolute power held or projected, and their relative performance throughout the bargaining session.[70]

The model can trigger groupthink, not in support of group consensus-seeking dynamics, but forced by political alignment and power-based persuasion.[71] It presumes that the participants are likely to select not only a suboptimal outcome (vis-à-vis the

Rational Actor model), but one that none of the participants favor. This is attributed to infighting, bargaining, concession, and compromise. Additionally, the participants may select an outcome resulting from “mindless organizational routines or standard operating procedures (SOPs)” reflected by the dominant organization.[72] Furthermore, actions in accordance with the Bureaucratic Politics model are prone to irrationality because the participants do not pursue or acquire perfect information and lack an altruistic approach to achieving the value-maximizing solution.

Due to the group-dynamic basis of this model’s decision-making, its outcome is vulnerable to “Principal-Agent problems” in which a senior decision-maker (Principal) engages “lesser” participants (Agents) for advice or action, while Agents take action on behalf of the Principal or take actions that have direct impact on the Principal.[73] Principal-Agent impacts are amplified by the various types of participants-actors: the decision-makers, their immediate staffs, those who are appointed to their position or hold permanent office, and those wider-audience members who engage on an as-needed basis.[74] Risk in these engagements comes in many forms, including: misaligned interests between Principal and Agent (interest asymmetry), Agents pursuing their own interests over those delegated by the Principal, Agents accepting unnecessarily high risk while the Principal remains responsible for the consequences (moral hazard), and incentives offered to the Agent failing to lead to behaviors benefiting the Principal.[75] While not always resulting in a negative outcome, Principal-Agent problems often arise in relationships ripe for conflict of interest.

In June 1917, Mitchell sent two memos to the AEF’s chief of staff asserting that American strategic aviation ideas should emulate Trenchard’s.[76] Regarding the

advancement of strategic bombardment, Mitchell's ideas were propagated by his political maneuvering within the interwar-years' Army and by his senior position within the organization. However Mitchell, along with Douhet and Trenchard, was relegated to history as airpower doctrine became corporate.[77] In his stead, five organizations drove the development of American interwar-years airpower doctrine with ACTS being the most influential.[78] The Bureaucratic Politics model explains why ACTS' promotion of unescorted HAPDB doctrine was dominated by the Bomber Mafia, and why Harold George's senior position at ACTS (as the Director of Air Tactics and Strategy) provided superior power relative to the dissenters of the Pursuit Section (*e.g.,* Chennault). The model also supports that ACTS member's thinking relied on SOPs; specifically, viewing "modern" warfare through the lens of engineering by using systematic and scientific approaches in the development of the industrial targeting.[79] Furthermore, Bureaucratic Politics shows that the inclusion of ACTS doctrine in AWPD-1 must have come from a combination of interests, equities, and fervent lobbying.

Additionally, unescorted HAPDB and the industrial targeting doctrines' inclusion in AWPD-1 risked Principal-Agent problems, specifically two nested Principal-Agent relationships. The first was General Marshall as Principal (Army Chief of Staff) and General Arnold as Agent (Chief of the Army Air Corps). Marshall's understanding and advocacy for airpower was supported by, and yet susceptible to, Arnold's actions and leadership.[80] The second relationship was Arnold as Principal and Harold George as Agent.[81] In Arnold's choice in George to head the AWPD, he selected "an imaginative thinker who also had the advantage that came from broad practical experience…[H]is background spanned the entire spectrum of air power experience to date."[82] In this

case, the Principal bargained to allow the Agent (AWPD, under George's leadership) to write the air portion of war plan requisitioned by President Roosevelt. This was Arnold's advancement of Mitchell's ideas:

> [Arnold] saw an opportunity for which "Billy" Mitchell and the believers in his philosophy had been struggling since the conclusion of World War I—the privilege of drafting the specifications around which to create American air power. He definitely did not want that privilege and responsibility to be given to a group of ground-oriented Army officers—no matter how dedicated they might be to their country's security.[83]

General Gerow, head of the War Plans Division, acquiesced, thanks in part to Arnold's bargaining to take responsibility for all air requirements, allowing Gerow to focus on the ground force.[84] Additionally, Arnold's actions required compliance with a requirement levied by Gerow in that the plan must remain "within the guidelines of RAINBOW 5 [a war plan] and the provisions of the recently completed ABC-1 [American-British Conference-1] conversations", compromises intended to synchronize planning with sister-services and allies (British).[85] Arnold agreed, George seized the opportunity, and in short-order the plan was completed.[86] At risk to Arnold was the potential for George to create a moral hazard or to pursue his own interests over those directed (delegated) by Arnold. This risk was intensified considering Arnold was absent at the Argentia (Atlantic) Conference during the nine-days of plan development.[87]

George and Arnold's bureaucratic maneuvering was responsible in some measure for AWPD-1 including unescorted HAPDB and the industrial targeting doctrines. George's contributions were made through his dominance in doctrine development at ACTS, Arnold's through his bargaining and compromising within the Army Staff. Additionally, Arnold and Marshall's senior positions, combined with their advocacy for airpower, shaped the final plan at least as much as any formal and

rigorous development process. Furthermore, none of the Principal-Agent risks occurred in emplacing the doctrines into AWPD-1. However, George's intent of sneaking untested, theoretical ideas (codified as doctrine) into a major war plan could have led to misaligned interests or, possible worse, Arnold as Principal finding himself responsible for risks assumed by George.

In contrast to the predictions of the Bureaucratic Politics model, it appears that the airpower's interwar years' development failed to supply decision-makers with SOPs, leaving them to conduct personal interactions in incorporating AWPD-1 into the larger war plan. This contrast is likely due to the incommensurable nature of the airpower doctrines and the unprecedented impact airplane technology (speed, range, and scale of destruction) had on the deep-seated Army and War Department decision-makers. The interpersonal collaborations heavily biased AWPD-1's content towards the views of George (via Arnold), leading to the hindsight conclusion that a sub-optimal option was incorporated into this major war plan.

Organizational Behavior Model Analysis of HAPDB Development

The Organizational Behavior model emphasizes decision-making made by group conformity, most often via agreement and consensus. At times, consensus is achieved through social pressures and self-censorship.[88] While the Bureaucratic Politics model embraces the application of SOPs, Organizational Behavior accounts for decision-making methods that include groups functioning by standard patterns of behavior developed from the organization's distinctive logic, culture, and base procedures.[89] These behaviors are characteristic of the group writ large and not individual members. They are inherited from previous generations and emphasize congruence to the group's purpose and capabilities.[90] As a result of this cohesion, Organizational Behavior

decision-makers are susceptible to groupthink, illusions of invulnerability, and arrogance born of moral superiority regarding their ideas.[91]

As stated earlier, the establishment of ACTS transitioned the development of airpower doctrine from individual brilliance to a corporate affair. ACTS' culture was instilled by its founders Milling and Sherman. They established the organization's beliefs in promoting the future of airpower, a vision inherited from father-figure Mitchell. Their likeminded thinking emphasized the special nature of airpower and America's opinions regarding its employment.[92] Furthermore, Milling and Sherman, along with most early ACTS instructors, were veterans of the previous war, and inculcated course materials and instruction with their views and experiences.[93]

Arguably these early doyens of doctrine taught "the Mitchell school" of thought, emphatically driving American airpower towards unescorted HAPDB and industrial targeting.[94] ACTS's curriculum and cadre continued this reinforcing spiral.[95] With instructors assigned for four-year tours, they remained under the organization's cultural sway long enough to not only be influenced by its ideas, but to reciprocally exert influence.[96] Even the most ardent members in opposition and dissention succumbed to group conformity, exercised degrees of self-censorship, or were pariahs to be later vindicated.[97]

ACTS' susceptibility to social pressures was not its only downfall. The groupthink-driven unity exercised by the Bomber Mafia drove George's team to ignore warnings from fellow faculty members and from the parallel British efforts. Several of the Bomber Mafia "more or less simultaneously during the 1933-34 school year" formalized the idea of the industrial targeting schema.[98] This was not the only time when their

cohesiveness acted collectively, energetically focused on their vision of unescorted HAPDB coupled to the industrial targeting schema.[99] ACTS' history shows that this doctrine's "logic" was developed until roughly 1934, and subsequently only formalized and propagated.[100]

Additional susceptibility to groupthink occurred within the AWPD, including views held by George's team that "precision bombardment offered a new, revolutionary means of warfare" and that there was "the total acceptance by the AWPD-1 planning team of the Douhetan [*sic*] notion of aerial strategy as targeting."[101] Arguably groupthink was not new to the AWPD. George's initial staff was comprised of himself, Walker, and Hansell – all friends, all participants in the HAPDB and industrial targeting doctrines' development, and all believers in "the strategic air mission based on bombardment."[102] The trio expanded to include Kuter, an ACTS instructor under George's oversight and a fellow believer in "straight American air power doctrine, as evolved primarily at the Air Corps Tactical School under Harold George."[103] And while much negative criticism is levied on groupthink by the likes of Irving Janis, if it were not for AWPD's consensus views, it is unlikely their portion of the war plan would have been completed in seven days.[104] Notwithstanding, one confession does not make a saint of a sinner. The ACTS cadre zealously carried forward the perceived superior ideas of Mitchell, insisting on the necessity of and subjugation by strategic bombardment.

Individual Psychological Model Analysis of HAPDB Development

The Individual Psychological model appreciates the limits of human knowledge and computational ability, a condition identified as bounded rationality.[105] It explains how humans perform decision-making through cognitive shortcuts (heuristics) and selecting "good enough" alternatives. It accounts for human failings, such as not updating beliefs

in the face of new information, or letting emotion overwhelm reason.[106] Furthermore, the model highlights decision-making that has reasoned-away non-confirming information to rapidly reach a “good enough” solution.[107]

In developing unescorted HAPDB and the industrial targeting doctrines, the Bomber Mafia relied not only on scientific logic, but also on analogy and metaphor.[108] While they should not be faulted for taking these liberties —they were executing a shift in airpower thinking— they did fall victim to the heuristic of “mirror imaging” the adversary against American-style industrial targets. In doing so, they developed their first “good enough” solution thinking that “the most efficient way to defeat Germany would be to destroy her industrial capacity by aerial bombardment.”[109]

A second “good enough” solution was HAPDB itself. George’s team believed that their bomber, the B-17 (and later the B-24 and B-29), “could operate beyond the reach of defending fighters and antiaircraft artillery (AAA) fire.”[110] The faith that the American bomber could operate in safe sanctuary reinforced beliefs in two foundational tenets of the “good enough” HAPDB doctrine: precision bombing from high altitude was achievable, and operations in daylight conditions were survivable. In reality, George’s team adhered to these tenets as requisite, for their doctrine was designed to reduce damage to the enemy’s civilian population and its application was tied to American aircraft production capabilities, both in volume and technological advancements.[111] George’s team had no choice but to rely on precision because they anticipated never having anywhere near enough aircraft to achieve the desired level of destruction if they relied on mass alone.[112] Additionally, they depended on daylight operations because navigation at night or in bad weather was technologically infeasible.[113] The limits of

government funding and technology led to the tacit acceptance of a “good enough” solution that became cemented in doctrine. In hindsight, the self-imposed compliance with these tenets should have driven George’s team to review their assumptions and reexamine faiths in the efficacy of industrial targeting.

Another psychological shortcoming occurred at the group level. No evidence was discovered to refute that all who had access to and influence on the inclusion of unescorted HAPDB and the industrial targeting doctrines into AWPD-1 updated their beliefs when new information was presented. They ignored others’ thoughts and hard-won experience in employing strategic bombardment in the pre-war and early years of World War II. For example, a German lesson from the Spanish Civil War was that bombers needed fighter protection and that air superiority remained essential, just as it had during World War I.[114] Also illustrative is that U.S. observers of the 1940 Battle of Britain drew the conclusion that this battle “could not duplicate the sort of air battle that the American air planners had in mind. As a result concrete ‘lessons’ simply did not materialize.” To the observers, Germany’s poorly armed medium bombers flying at lower altitudes were unlike the well-armed B-17s executing HAPDB, and therefore the lessons were deemed inconclusive. The American observers dismissed these and other lessons, including British defensive fighters attacking German bombers vice German escort fighters, forcing new information to fit an existing paradigm.[115]

Even within the AWPD, new information regarding force requirements and bomb damage calculations was ignored. In one instance Kuter examined striking canal locks, determining that each required nine hits. His calculations proved the force requirements

so fantastic (120 bombers dropping more than a thousand bombs) that calculations like this should have cast doubt on the potential success of HAPDB.[116]

Similarly, even before the development of AWPD-1, in 1939 General Arnold openly questioned ATCS' doctrinal thesis of "unescorted" bombing.[117] The emotional attachment to the doctrine, and the application of heuristics from Germany's experiences in the Spanish Civil War and the Battle of Britain, allowed both ACTS and AWPD to reason-away the need for fighter protection. Their counter to the enemy fighter threat and the need for air superiority was to double-down on the self-escorting B-17. They demanded a model with increased survivability and expressed their faith that "large formations of heavily armed, high-performance B-17Es" could penetrate enemy air defenses and strike enemy industrial targets.[118] Deaf to dissent or probing, ACTS' theory "tied up all loose ends in one neat bow."[119] The foundation of the "invulnerable" bomber in HAPDB mated to the scientifically-derived industrial targeting bore the theories of Douhet-Mitchell-Trenchard. "[T]hrough the wonders of American know-how," the seduction of technology was there to remedy any intellectual mistakes.[120] HAPDB "had gained the added momentum of technological and institutional enthusiasm, and theory was once again in the vanguard, charging far ahead of technological reality."[121]

Application to the Cyber Domain

Why cyber, and why now, and how is a 21st century domain associated with interwar years' aviation? First, because both HAPDB and offensive cyber coerce an adversary's capitulation.[122] Both also promised to change the character of war through technology that "seemed to make all things possible and, equally, seemed to solve all potential problems."[123] Both are (contemporarily) the same age —thirty— and are at

roughly the same point on the warfighting domain maturation curve. This point, ripe for growth in developing and codifying doctrine, now has enough history to anchor decisions about the future.[124]

In maturing a paradigm into doctrine, the intermediate theory must be better than the competitors, but may not explain all the facts that challenge it.[125] Shrewd doctrine developers must therefore be prepared to make decisions based on new and belief-challenging information. For emerging domains, doctrine may precede capability, and therefore may derive "as much from strategic ideas, bureaucratic interests, and national politics as from technology."[126] Discerning theorists must also have faith that their new paradigm will succeed in spite of the unknown, that is, to accept a "faith-based theory."[127] Until cyber's capabilities and experience-derived hard evidence is available, the paradigm-theory-doctrine evolution can be informed by the interwar years' lessons learned of airpower.

Rational Actor Model

Discussed at the opening of the corresponding Rational Actor model section, perfect information is unobtainable and perpetual reevaluations can be disruptive. Adding to the chaos is the single decision-maker, emerging as a champion or recast as a prophet with accompanying acolytes. Appointing the prophet as the decision-maker may be uncomfortable for Principals who hold ultimate responsibility, but may be necessary when decision-making relies on faith in substitution for absent information. The cultivation or discovery of a Mitchell-like pioneer may be necessary to incite change, so long as that personality acts as a harbinger and is granted the authority to effect change.[128]

However, decision-makers must honestly examine contrarian and dissenting ideas. In the case of AWPD-1, those in dissent with the idea of unescorted bombers (Chennault and to some extent “father” Mitchell) were excluded, resulting in errors not remedied until late in the war.[129]

If decision-makers are mavericks or insurgents, it is likely they are not acting in concert with this decision-making model. A sign of being a maverick is consciously ignoring contrarian or dissenting views. These views are part of the unachievable perfect information used to generate cost-benefit calculations and select optimized outcomes. Identifying decision-making that excludes dissent, and possibly dissenters themselves, should serve as a reminder that reason alone does not drive innovation.

Bureaucratic Politics Model

Power players in the Bureaucratic Politics model can coerce groupthink adherence, but their influence may not be rooted in positional power. It may be relative power that waxes during very brief periods, and so intense that it eclipses the power wielded by those in a more senior position. This transient power imbalance can manifest in Principal-Agent relationships where both actors may not be altruistic. Because of this, cyber decision-makers must be prepared to bargain for inclusion in higher-order ventures such as joint and multinational actions. Further handicapping this young domain, the absence of SOPs may necessitate reliance on individuals as a stop gap. Just like with the Rational Actor model, dissenting views may be excluded when dominant actors bargain, develop SOPs, or execute plans.

Organizational Behavior Model

The Organizational Behavior model increases the amount of interpersonal interaction in decision-making and continues the transition from a single rational

decision-maker to the group's collective influence in decision-making. This model suggests that cyber decision-makers must be prepared to accept that individual brilliance will be subsumed by the corporate collective. Additionally, this model intimates the difficulty of removing those persistent, entrenched advocates who first developed, then propagated, the initial brilliant ideas that serve as the doctrine's foundation. Furthermore, decision-makers should remain aware of dissenters who, through social pressures, dejectedly adopt party-line ideas and positions.

The Organizational Behavior model highlights groupthink and its mostly negative consequences. In concert with the previous two models, when dissenters are subjugated, potential exists for closed-minded doctrine development and missed opportunities for generating optimal solutions. Had ACTS cadre remained open to fighter escorts accompanying the bombers, the school's graduates may have emphasized the requirement for American industry to produce the requisite aircraft (*e.g.,* drop tank-equipped P-51s) earlier in the war. Because of cyber's prevalence in the civil, commercial, and military spheres, decision-makers must remain attuned to ideas generated from alternative and unfamiliar sources.[130]

Individual Psychological Model

Because human beings will be involved in cyber operations, heuristics are inevitable. Operations in the domain occur at tremendous speed, challenging the limits of information processing for decision-makers. Another reason that heuristics will emerge is the lack of history and doctrine available to aid in developing well-vetted SOPs. As with the developers of HAPDB, cyber decision-makers must be prepared to accept "good enough" solutions rooted in incomplete information and an ever-swifter pace of technology adaptation for both friends and adversaries.

Furthermore, leaders must remain aware of emotion's influence on decision-making. Cyber is being billed as a surgically-precise instrument that could replace cluttered terrestrial warfighting, or even as a warfighting panacea. Future wars will be won with the aid of cyber, but it is doubtful they will be won by cyber alone; George and his team thought they could win the war with airpower alone. Cyber leaders must remain wary of how emotional ties to faith-based theories like these can impact and detract from sound decision-making.[131]

Conclusion

AWPD-1's development fell victim to failures understood through Bureaucratic Politics (George's team of former ACTS instructors relying on their academic studies and development), Organizational Behavior (their shared belief in the efficacy of strategic bombardment), and Individual Psychological (their approach was supported by a reliance on their own experiences) models of decision making.[132] The lessons from airpower's shortcomings are relevant to today's cyber domain. Cyber is becoming a warfighting domain developed to the same state as airpower after World War I.

The lessons offered above are germane to developmental decision-making and avoiding the traps of promises and theories that "would make conventional war obsolete."[133] During the interwar years, the airplane's greatest promise was that "aerial bombardment would make conventional war obsolete. It followed, therefore, that airplanes were the ultimate weapon."[134] With history in mind, cyber advocates can avoid this pitfall. The fear generated by its simultaneous ubiquity and mystery can lead some decision-makers to see this as a silver bullet "that literally would disable and disarm the enemy, again by taking direct action that would bypass the enemy's hard military shell of its army and navy."[135] While HAPDB over-promised and under-delivered, strategic

bombing “is likely to persist because of bureaucratic interests and political pressures for cheap solutions to difficult foreign policy problems.”[136] Arguably the same can be said regarding the employment of cyber.

Much like the airpower leaders of the interwar years, today’s doctrine disciples are destined to be tomorrow’s cyber commanders. While new theories and doctrine for the application of cyber power will compel them to make guesses about its use before war’s outbreak, they must be prepared to react to the results of the first cyber shots of the next war. As strategic thinker and author Colin Gray says “After all, only experience could provide evidence that might validate or refute the theory.”[137]

Endnotes

[1] George and Meredith Friedman, *The Future of War* (New York: St. Martin's Griffin, 1996), 207.

[2] Robin Neillands, *The Bomber War: The Allied Air Offensive Against Nazi Germany* (New York: The Overlook Press, 2001), 22; “Air-power might attain a direct end by indirect means--hopping over opposition instead of overthrowing it.” B. H. Liddell Hart, *Strategy* (New York: Penguin, 1991), 345.

[3] David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army 1917-1945* (Ithaca, NY: Cornell University Press, 1998), 168.

[4] The paradigm’s development began with the collection of facts and beliefs garnered through collective experiences during World War I. This was followed by the appearance in the immediate post-war period of a preparadigmatic movement of attacking war-making industries. The paradigm further formulated around the beliefs of the Douhet-Mitchell-Trenchard trio, with this paradigm raising above others regarding the use of airpower for transport, reconnaissance and surveillance, and direct support to battlefield forces. Finally, the paradigm evolved first into a theory and then into the HAPDB doctrine, and was propagated to other airpower enthusiasts by ACTS and later installed into the War Plans Division’s airpower annex.

[5] Phillip S. Meilinger, *Bomber: The Formation and Early Years of Strategic Air Command* (Maxwell Air Force Base, AL: Air University Press, 2012), xiii.

[6] Alfred F. Hurley, a Mitchell biographer, asserts that Mitchell “borrowed his ideas largely from an international community of airmen when he joined during World War I.” David MacIssac, “Voices from the Central Blue: The Air Power Theorists,” in *Makers of Modern Strategy: From Machiavelli to the Nuclear Age,* ed. Peter Paret, Gordon A. Craig and Felix Gilbert (Princeton, NJ: Princeton University Press, 1986), 631; juxtaposed, from interviews with “those in the

know," Thomas Greer comments that "He [Mitchell] was generally regarded as the American counterpart of the RAF's Trenchard and the Italian Douhet." Thomas H. Greer, *The Development of Air Doctrine in the Army Air Arm, 1917-1941* (Maxwell Air Force Base, AL: USAF Historical Division, Research Studies Institute, Air University, 1955), 17; furthermore, "…Mitchell…was impressed by Trenchard's thinking and that of the Italian bomber builder Count Gianni Caproni, who was in turn a voluble spokesman for his countryman Colonel Giulio Douhet." DeWitt S. Copp, *A Few Great Captains: The Men and Events that Shaped the Development of U.S. Air Power* (McLean, VA: EPM Publications, 1980), 20; while the author has no proof to refute Hurley's assertion, it is the author's opinion that due to proximity of players and the experimental nature of the airplane for warfighting purposes, it is likely that Mitchell's ideas are not uniquely his but are formed from extensive interaction with those involved with early airpower.

[7] The Bomber Mafia's disagreement with certain aspects of Douhet's, Trenchard's (and later Harris'), and Mitchell's targeting schema – attacks on population centers either blatantly or by targeting industrial and economic centers – "led the Americans to an obsession that continues to this day: minimizing collateral damage, avoiding hitting populated areas, and maximizing the accuracy of bombardment by all technical means available." Friedman and Friedman, *The Future of War*, 214.

[8] Robert T. Finney, *History of the Air Corps Tactical School 1920 - 1940* (Maxwell AFB, AL: Air University, 1955), 17, http://www.dtic.mil/dtic/tr/fulltext/u2/a432954.pdf (accessed September 28, 2016).

[9] AWPD refers to the planning division, the group of men who worked on the Air Staff; AWPD-1 is the first plan developed by the AWPD's members. Other listings include AWPD/1 and A-WPD/1.

[10] "Air leaders such as Hap Arnold, Ira Eaker, and Carl Spaatz thought that strategic air bombardment…would be the main instrument of Germany's defeat…At the start of the war they supported the industrial web strategy." Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996), 265.

[11] "ACTS's [*sic*] Bomber Mafia" who "developed HAPDB". 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), 216.

[12] Mitchell was court martialed, found guilty on several charges including insubordination and conduct unbecoming an officer, and was subsequently suspended (5 years) for openly accusing senior U.S. military and political leaders of neglecting the Army's air arm, and by association, neglecting national defense. Mitchell opted to resign and went on to be an advocate for American air power using civilian avenues. Neillands, *The Bomber War*, 22.

[13] Mitchell's publications, both books and articles, "foresaw and described a new kind of war in which the airplane would 'strike directly at centers of production, means of transportation, agricultural areas, ports and shipping…they will destroy the means of making war'. This was 'strategic bombing'..." Neillands, *The Bomber War*, 22; Mitchell himself published his strong belief in strategic bombing with "The air forces will strike immediately at the enemy's manufacturing and food centers, railways, bridges, canals and harbors. The saving of lives, man power [*sic*] and expenditures will be tremendous to the winning side." William "Billy" Mitchell,

Winged Defense: The Development and Possibilities of Modern Air Power--Economic and Military (Tuscaloosa, AL: The University of Alabama Press, 2009), xvi; Mitchell writes regarding World War I flight operations that "Bombardment aviation always had to be protected by pursuit aviation." Mitchell, *Winged Defense*, 166; furthermore, in his 1921-published book *Our Air Force: The Keystone of National Defense*, Mitchell "stressed the importance of pursuit aviation (what we today would term 'fighter aircraft') and especially its role in achieving air superiority…All kinds of Bombardment Aviation are completely at the mercy of Pursuit Aviation." Meilinger, *Bomber,* 4-5.

[14] Barry D. Watts, *The Foundations of U.S. Air Doctrine: The Problem of Friction in War* (Maxwell Air Force Base, AL: Air University Press, 1984), 7.

[15] Greer, *The Development of Air Doctrine in the Army Air Arm*, 17; regarding those who graced his immediate presence (Mitchell's intellectual descendants), "Mitchell did not like anyone around him originating good ideas before he came up with them himself." Meilinger, *Bomber,* 3.

[16] "Everything depends primarily on the creation and development of a specialized air personnel, capable of actually handling their duties in an efficient manner, making a class of real air men." Mitchell, *Winged Defense*, 160.

[17] Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, NY: Cornell University Press, 1984), 174-175.

[18] In the 1920s, Mitchell, serving as the Assistant Chief of the Army Air Service, is identified by his commander as "the ringleader of the insurgents." David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army 1917-1945* (Ithaca, NY: Cornell University Press, 1998), 81; the specific use of the word "maverick" is employed by Biddle "In 1925, the army, finally fed up with Mitchell's maverick behavior..." 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), 137.

[19] Johnson, *Fast Tanks and Heavy Bombers*, 153.

[20] "It was a characteristic of Billy Mitchell's that his thinking often outstripped what was possible, his enthusiasm and conviction carrying others along in his wake." Copp, *A Few Great Captains*, 19.

[21] Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, NY: Cornell University Press, 1991), 251; "But Billy Mitchell contributed the most to Arnold's personal development and understanding of the politics of national military airpower. His association with Mitchell became as important as any he had during his life, and their deference was mutual." Dik Alan Daso, *Hap Arnold and the Evolution of American Airpower* (Washington, DC: Smithsonian Institution Press, 2000), 105.

[22] Watts, *The Foundations of U.S. Air Doctrine*, 5.

[23] "…the Independent Air Force must…meet two conditions: 1. It must be capable of winning the struggle for the command of the air. 2. It must be capable of exploiting the command of the air, once it has been conquered, with forces capable of crushing the material and moral resistance of the enemy." Giulio Douhet, *The Command of the Air* (Tuscaloosa, AL:

University of Alabama Press, 2009), 98; Douhet earlier states “To have command of the air means to be in a position to prevent the enemy from flying while retaining the ability to fly oneself.” Douhet, *The Command of the Air*, 24; additionally, “Like the Italian general Giulio Douhet, Mitchell emphasized the importance of winning and maintaining control of the air.” Biddle, *Rhetoric and Reality in Air Warfare*, 136.

[24] Neillands, *The Bomber War*, 26.

[25] Several sources argue Douhet’s ideas were expressed in American (and British) airpower doctrine development documents, with an emphasis in ACTS texts. “General H. H. Arnold…recognized the Douhet theory as an intellectual basis and referred to ‘the United States' modifications of the Douhet theories, which we had been teaching as an abstract science at the Air Corps Tactical School for several years’ (in the nineteen thirties).” J. C. Wiley, *Military Strategy: A General Theory of Power Control* (Annapolis, MD: Naval Institute Press, 1989), 37; for more, see Biddle, *Rhetoric and Reality in Air Warfare*, 107; Conrad C. Crane, *American Airpower Strategy in World War II: Bombs, Cities, Civilians, and Oil* (Lawrence: University Press of Kansas, 2016), 23-24; Copp, *A Few Great Captains*, 106, 151.

[26] Mitchell is known to have corresponded with Count Gianni Caproni, and Caproni echoed the views of air theorists Giulio Douhet and Nino Salvaneschi. Biddle, *Rhetoric and Reality in Air Warfare*, 52; and Meilinger, *Bomber*, 1; both authors support that Caproni’s correspondence with E. S. Gorrell is well documented, as well as Gorrell’s interactions with Mitchell.

[27] Hugh Trenchard’s influence on Mitchell cannot be quantified, but Trenchard’s views on attacking enemy industry to influence the adversary’s population —morale bombing— was not adopted by ACTS. As of 1919, serving as the Chief of the Air Staff, Trenchard advanced the idea that “The ultimate objective of air attack, is largely achieved by influencing the morale of the enemy population and the maximum effect will be achieved by aerial bombardment of legitimate objectives in his great centres [*sic*] of production.” Stephen Budiansky, *Air Power: The Men, Machines, and Ideas That Revolutionized War, from Kitty Hawk to Gulf War II* (New York: Viking Penguin, 2004), 132.

[28] Faber highlights George’s impact by titling him “doyen [a person who has a lot of experience in or knowing about a particular profession, subject, etc.] of the ACTS Bomber Mafia.” 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), 194.

[29] Per Faber, of George and the eight officers listed, all but Odas Moon “became influential generals in World War II and after.” That influence was exercised not only by the development of HAPDB and AWPD-1, but also by attending and then serving as instructors at ACTS. Finney adds “For the most part, graduates of the [Air Corps] Tactical School furnished the leadership of the American air arm during World War II…That the graduates of the Tactical School were rank of the leaders of the AAF [Army Air Forces] during the years when the theories were being hammered into established doctrine is attested to by the fact that of 320 general officers on duty with the AAF at the close of World War II, 261 were Tactical School graduates.” Faber, “Interwar US Army Aviation and the Air Corps Tactical School,” 216; Finney, "History of the Air Corps Tactical School 1920 - 1940," 42.

[30] “…and the four [George, Walker, Hansell, and Kuter] had known each other well for years, ever since the early thirties when they were instructors together at the hotbed of airpower

enthusiasm, the Air Corps Tactical School." James C. Gaston, *Planning the American Air War: Four Men and Nine Days in 1941* (Washington, DC: National Defense University Press, 1982), 2.

[31] Haywood S. Hansell, Jr., "AWPD-1 … The Process (Historical Analysis for the Joint Doctrine Air Campaign Course)," April 30, 1996, http://www.au.af.mil/au/awc/awcgate/readings/awpd-1-jfacc/awpdproc.htm (accessed November 30, 2016).

[32] MacIssac, "Voices from the Central Blue," 633.

[33] Greer, *The Development of Air Doctrine in the Army Air Arm,* 57.

[34] "The United States Army Air Force (USAAF) of the Second World War was born in 1907 as the Aeronautical Division of the US Army Signal Corps. In 1914 this developed into the US Army Signal Corps Aviation Section, and in June 1918 the Aviation Section became the Air Service. The Air Service became the Army Air Corps in 1926." Neillands, *The Bomber War*, 20-22.

[35] Developed from a combination of Finney, "History of the Air Corps Tactical School 1920 - 1940," 6, and Greer, *The Development of Air Doctrine in the Army Air Arm*, 10-11; Gorrell's target selection of "the relatively few factories that built those guns and shells" comes from Maurer, ed., *U.S. Air Service in World War I*, vol. 2, 143, quoted in Meilinger, *Bomber,* 2; the "Gorrell Plan," considered "the 'earliest' and 'clearest' statement of 'the American conception of employment of airpower'," is based heavily on a work by British aerial bomber Maj. Lord Tiverton. Tiverton's 3 September 1917 paper on long-range bombing, known to both Trenchard and Gorrell, discussed the requirements for bombing to be concentrated, to attack the foundations of an adversary's war economy, and to be done at long-distance emphasizing attacks not on the battlefield but deep into an adversary's heartland where their economic centers lay. For more on Gorrell's development of Tiverton's ideas, see Biddle, *Rhetoric and Reality in Air Warfare*, 38-39, 54.

[36] MacIssac, "Voices from the Central Blue," 631; "To Mitchell…Gorrell's thoughts ['The object of the strategic bombing is to drop bombs upon commercial centers and lines of communications in such quantities…'] matched his own," Copp, *A Few Great Captains*, 20-21.

[37] Finney, "History of the Air Corps Tactical School 1920 - 1940," 9; the names and locations for the Army's air tactics and doctrine school had several permutations, including: Air Service Field Officers' School (ASFOS) (1920-1921), which the War Department later rechristened the Air Service Tactical School (ASTS) (1922-1926), and then the Air Corps Tactical School (1926-1940). (From 1920 to 1930, the location of the ASFOS/ASTS/ACTS was Langley Field, Virginia. From 1931-1940, the location of the ACTS was at Maxwell Field, Alabama). Peter R. Faber, "The Development of US Strategic Bombing Doctrine in the Interwar Years: Moral and Legal?" *Journal of Legal Studies*, 1996-1997, http://www.au.af.mil/au/awc/awcgate/interwar/faberdbd.htm (accessed December 8, 2016).

[38] Finney, "History of the Air Corps Tactical School 1920 - 1940," 35.

[39] Friedman and Friedman, *The Future of War*, 214.

[40] MacIssac, "Voices from the Central Blue," 633-634; Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base, AL: Air University Press, 2012), 104; Michael Sherry counters

that Mitchell “never systematically developed the notion of daylight precision bombing.” Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven, CT: Yale University Press, 1987), 52.

[41] The “unescorted” nature of HAPDB was a function of fighter or pursuit/escort range versus bomber range. It also stemmed from a Douhatian belief that the bomber was invincible. The “precision” portion of HAPDB was necessitated by the Americans’ belief that their industry, as mighty as it would prove to be, could not generate a fleet the size prescribed by Douhet, forcing the selection of targets to bring a halt to the enemy’s industrial production. Faber, “Interwar US Army Aviation and the Air Corps Tactical School,” 217; Thomas Greer gives credit to the same list but substitutes Robert M. Webster for Olds. The author found nothing to resolve this discrepancy, but did identify (per Faber) that Webster and Muir Fairchild are involved later in refinement to the targeting schema, specifically the identification of the various industrial and economic targets. Faber, “Interwar US Army Aviation and the Air Corps Tactical School,” 219; furthermore, from peacetime bombing experience, George and Kuter enhanced the schema to account for anticipated war-time bombing inaccuracies. Jurgen Brauer and Hubert Van Tuyll, *Castles, Battles, & Bombs: How Economics Explains Military History* (Chicago: University of Chicago Press, 2008), 214; George, Walker, and Wilson appear on the roll of Staff and Faculty, Air Corps Tactical School, for the 1932-1933 class. Olds served as an instructor through the 1931-1932 class. Finney, *History of the Air Corps Tactical School 1920 - 1940*, 103-104; additionally, Olds and Walker served as aides to Mitchell and “continued, expanded, augmented, and separated [Mitchell’s work] into several components, including tactics and techniques of attack aviation, tactics and techniques of bombardment aviation, and the employment of air forces.” Brig Gen Laurence S. Kuter, interview by Major C. W. Williams, n.p., October 21, 1942, quoted in Finney, *History of the Air Corps Tactical School 1920 - 1940*, 57.

[42] While instructing at ACTS, Fairchild gave three lectures “to most of the Air Corps ‘best and brightest’ officers, which elucidate the core of the [industrial web] theory.” Pape, *Bombing to Win*, 62-63; Pape further references Ronald Shaffer’s *Wings of Judgment: American Bombing in World War II*, Conrad C. Crane’s “Evolution of U.S. Strategic Bombing of Urban Areas” in *The Historian*, and what are likely lecture notes from M.S. Fairchild’s 3-part series in the spring of 1939.

[43] It is unclear how Mitchell’s stressed importance of pursuit aviation, and its role in achieving command of the air, was removed from ACTS’ advancement of his founding ideas. Career fighter pilot ACTS instructors (*e.g.,* Vandenberg, Kenney, Chennault) aided in forming bombardment doctrine “simply because their profound knowledge of pursuit and attack was essential in forcing the ideas of the bomber advocates to be more realistic.” Meilinger, *Bomber,* 15.

[44] Some histories bestow Arnold with considerable credit for the B-17’s development.

[45] “General H. H. Arnold…recognized the Douhet theory as an intellectual basis and referred to "the United States' modifications of the Douhet theories, which we had been teaching as an abstract science at the Air Corps Tactical School for several years" (in the nineteen thirties).” Wylie, J. C. *Military Strategy: A General Theory of Power Control* (Annapolis, MD: Naval Institute Press, 1989), 37.

[46] “It was no secret that General Arnold was a disciple of General "Billy" Mitchell and an ardent advocate of air power.” Hansell, "AWPD-1".

[47] In addition, “His [Arnold’s] association with Mitchell became as important as any he had during his life, and their deference was mutual.” Daso, *Hap Arnold and the Evolution of American Airpower*, 105.

[48] Fellow airpower heavyweight Carl “Tooey” Spaatz served as Arnold’s Chief of Staff during the August 1941 AWPD-1 development. Gaston, *Planning the American Air War*, 2.

[49] Faber, “Interwar US Army Aviation and the Air Corps Tactical School,” 224.

[50] Kuter was a former ACTS instructor intimately familiar with the industrial targeting doctrine; Schneider, Vanaman, and Vandenberg were all mid-1930’s ACTS graduates with Vandenberg also a former ACTS instructor specializing in pursuit curriculum; Anderson had no ACTS affiliation. 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), 109; instructor status confirmed by Finney in "History of the Air Corps Tactical School 1920 – 1940."

[51] Some sources state seven days.

[52] Johnson, *Fast Tanks and Heavy Bombers*, 168.

[53] Futrell, *Ideas, Concepts, Doctrine*, 111.

[54] Extract from Arnold’s Fundamental Principles of Air Power. “1. The main job of the Air Force is bombardment…3. Daylight operations, including daylight bombing, are essential to success, for it is the only way to get precision bombing...5. In order to bring the war home to Germany and Japan…we must carry our strategic precision bombing to key targets, deep in the enemy territory…7. All types of bombing operations must be protected by fighter airplanes.” H. H. Arnold, *Global Mission,* 290-291, quoted in “General Arnold’s Fundamental Principles of Air Power,” http://www.au.af.mil/au/awc/awcgate/ww2/arnold-principles.htm (accessed February 20, 2017).

[55] Haywood S. Hansell, Jr., "Harold L. George: Apostle of Air Power," in *Makers of the U.S. Air Force* ed. John L. Frisbee (Washington, DC: Pergamon-Brassey's International Defense Publishers, Inc., 1989), 94; “Arnold knew them [George, Walker, Hansell, and Kuter] well enough, in fact, to know what to expect of them.” Gaston, *Planning the American Air War,* 3.

[56] “[T]he Rational Actor, Organizational Behavior, and Governmental Politics models [and by extension the Psychological model] can be applied beyond foreign policy to the domestic policy of national governments; state and local governments…and other aggregate actors whom one encounters in normal, everyday life.” Graham Allison and Philip Zelikow, *Essence of Decision: Explaining the Cuban Missile Crisis*, 2nd ed. (New York: Longman, 1999), 7.

[57] To reduce risk, 1930s aircraft builders “favored aircraft that were safe, reliable, and cost-effective and that did not push the envelope on technical development.” To develop a heavy bomber drew from technology and experience shared with commercial airlines; to develop a long-range escort (pursuit) fighter was an unattractive high-risk new venture. Moreover, the speed and performance characteristics of the under-development bombers (*e.g.,* B-17) equaled or surpassed those of all contemporary pursuit aircraft, doubling-down on the nonnecessity of a new pursuit fighter. Meilinger, *Bomber,* 16-17.

[58] Developed through a combination of Allison and Zelikow's Model I Rational Actor, Model II Organizational Behavior, and Model III Government Politics, along with Houghton's Homo Bureaucraticus, Homo Sociologicus, Homo Psychologicus, and Homo Economicus. Supplemental information provided by Biddle's introductory discussion on cognitive psychology's analysis of decision-making. Allison and Zelikow, *Essence of Decision*; David Patrick Houghton, *The Decision Point: Six Cases in U.S. Foreign Policy Decision Making* (New York: Oxford University Press, 2013); Biddle, *Rhetoric and Reality in Air Warfare*, 4.

[59] A shortcoming of always incorporating new information into the decision-making model is the turmoil generated when "our basic understandings [are] subject to wholesale revision with every new datum." Biddle, *Rhetoric and Reality in Air Warfare*, 4.

[60] Value-maximizing is used by Allison and Zelikow; utility-maximizing by Houghton.

[61] Allison and Zelikow, *Essence of Decision*, 3.

[62] Greer, *The Development of Air Doctrine in the Army Air Arm*, 44.

[63] Watts, *The Foundations of U.S. Air Doctrine*, 7; Greer, *The Development of Air Doctrine in the Army Air Arm*, 55.

[64] "From the class discussions, coupled with endless disputes and discussion in faculty meetings and coffee-shop seminars, there emerged a stabilized body of concepts concerning the employment of airpower." Finney, "History of the Air Corps Tactical School 1920 - 1940," 35.

[65] "If one person were to be singled out as having had the most decided influence on the school [ACTS], it would probably be Brig. Gen. William Mitchell. After his court-martial in 1925 it would have been decidedly impolitic for airmen at the Air Corps School to indorse openly Mitchell's views or to include reference to his writings in school literature. Thus, when the host of ideas on airpower were being synthesized into a body of fully developed concepts, the influence of "Billy" Mitchell was not as direct as might have been expected." Finney, "History of the Air Corps Tactical School 1920 - 1940," 56-57.

[66] "…Kenneth Walker's deeply held conviction that well-planned, well-flown bomber formations could always get through and, hence, that such formations could be self-defending." Watts, *The Foundations of U.S. Air Doctrine*, 18; ironically, George's AWPD-1 development team admitted that an escort fighter "would be desirable" but that they did not exist and therefore should be developed immediately. Meilinger, *Bomber*, 40-41.

[67] Brauer and Van Tuyll, *Castles, Battles, & Bombs*, 207.

[68] Budiansky, *Air Power*, 175; see Pape's discussion on "critical component" theory in Robert A. Pape, *Bombing to Win*, 71.

[69] Brauer and Van Tuyll, *Castles, Battles, & Bombs*, 208.

[70] "Where you stand depends on where you sit." Allison and Zelikow, *Essence of Decision*, 307; "The view that the policy positions or beliefs of decision-makers are often shaped by their position within the government." Houghton, *The Decision Point*, 9; selected aspects of the Government Politics Model (a.k.a. Model III). Allison and Zelikow, *Essence of Decision*, 6.

[71] Groupthink: “cohesion produces a psychological drive for consensus, which tends to suppress both dissent and the consideration of alternatives.” Allison and Zelikow, *Essence of Decision*, 283.

[72] Houghton, *The Decision Point*, 9; Meilinger, *Bomber*, 22.

[73] Allison and Zelikow, *Essence of Decision*, 272; Principal-Agent engagements are division and specialization of labor cost-saving strategies, where the Principal delegates the desired action to the Agent; Tim Worstall, “Solving The Principal Agent Problem: Apple Insists That Executives Must Hold Company Stock,” *Forbes,* March 1, 2013, https://www.forbes.com/sites/timworstall/2013/03/01/solving-the-principal-agent-problem-apple-insists-that-executives-must-hold-company-stock/#1a1d5e506e01 (accessed March 4, 2017).

[74] Allison and Zelikow, *Essence of Decision*, 296.

[75] Ibid; “Definition of ‘Principle Agent Problem’,” *The Economic Times,* http://economictimes.indiatimes.com/definition/principle-agent-problem (accessed March 4, 2017); Stephen Biddle, Julia Macdonald, and Ryan Baker, “Small Footprint, Small Payoff: The Military Effectiveness of Security Force Assistance,” February 16, 2017, https://dl.dropboxusercontent.com/content_link/IcJ70F3buntNHZrBgTxcscVQ5D5yaosRLZCLxFiiPiORwqCFzegeu4HYSY5WbRTy/file (accessed March 4, 2017).

[76] Mitchell was looking to the long-term, to establish America as an aviation leader with an independent air arm. Johnson, *Fast Tanks and Heavy Bombers*, 46.

[77] MacIssac, “Voices from the Central Blue,” 632.

[78] The five organizations: “the conservative War Department (including the Army General Staff), the moderate Office of the Chief of the Air Corps, the equable GHQ Air Force, the progressive Air Corps Board (particularly in the mid- to late-1930s where its members were virtually all ACTS faculty), and the radical Air Corps Tactical School.” Faber, “Interwar US Army Aviation and the Air Corps Tactical School,” 211; Finney, *History of the Air Corps Tactical School,* 28-32, quoted in Meilinger, *Bomber,* 21.

[79] Watts, *The Foundations of U.S. Air Doctrine*, 23; as an example of the engineering science approach “Malcolm Moss made a particularly valuable suggestion with regard to the electric power system in Germany. He knew that the electric power generating and distribution system of Germany was relatively new, and that it had been built with capital borrowed largely from the United States. He also knew that American banks do not lend large sums of money for capital equipment without making careful investigations of the proposed structures. He suggested that we inquire of the great international banks, particularly in New York, as to the availability of drawings and specifications of German electric plants and systems. Using these sources, together with scientific journals and trade magazines, it was possible to put together a comprehensive target study on the German electric power system and the electric distribution system. It was even possible to prepare target folders, including aiming points and bomb sizes.” Hansell, "AWPD-1 … The Process.”

[80] “[General George] Marshall understood the importance of aviation in a political as well as an operational sense.” Johnson, *Fast Tanks and Heavy Bombers*, 168; this claim in supported in greater detail by Daso, *Hap Arnold and the Evolution of American Airpower*, 165; furthermore, Arnold’s performance at the Argentia Conference earned the trust of American and British

leadership including the two nations' senior leaders who both believed in the importance of an air force-led response to Nazi advances in Europe. Daso, *Hap Arnold and the Evolution of American Airpower*, 169.

[81] In discussing if George was the right person for the job politically, Haywood Hansell remarks that "George was a model of aplomb, a remarkably personable and persuasive speaker, especially in difficult situations. Others saw these qualities in George, too." Gaston, *Planning the American Air War*, 12.

[82] Hansell, "AWPD-1 … The Process."

[83] Ibid.

[84] Sherry supports Hansell's opinion with "Rather than pool its planning effort with that of the Army general staff, Arnold pressed hard for permission for his new Air War Plans Division (AWPD-1) [*sic*] to do its own planning. The general staff, perhaps itself overwhelmed by the magnitude of FDR's request, granted permission, acceding surprising autonomy to the AAF [Army Air Forces]." Sherry, *The Rise of American Air Power*, 99; Gaston's account supports this persuasion by first George, then Spaatz, and finally Arnold. Gaston, *Planning the American Air War*, 14.

[85] Hansell, "AWPD-1 … The Process." This constraint was likewise applied to fellow Army and Navy planners. Gaston, *Planning the American Air War*, 14.

[86] George drove organizational routine within AWPD through the issuing of daily instructions via tasking letters. These letters established planning assumptions, responsibilities, and assignments. Ibid., 14-15.

[87] Daso, *Hap Arnold and the Evolution of American Airpower*, 169.

[88] Houghton, *The Decision Point*, 11-12; Biddle adds "Decision makers with powerful organizational goals or self-interests may discount or minimize incoming information that conflicts with those interests, and highlights information that supports them." Biddle, *Rhetoric and Reality in Air Warfare*, 5.

[89] Allison and Zelikow, *Essence of Decision*, 5.

[90] Ibid., 144, 153, 177.

[91] Groupthink: "a process through which a group reaches a hasty or premature consensus and then becomes closed to outside ideas or alternative thoughts within." Houghton, *The Decision Point*, 13; "Groups that are highly cohesive may come to believe that they are not only invulnerable but morally superior to their adversaries, refusing to countenance outside views or warnings that disaster is imminent." Houghton, *The Decision Point*, 12; "the psychological drive for consensus at any cost that suppresses disagreement and prevents the appraisal of alternatives in cohesive decision-making groups." Irving L. Janis, *Groupthink: Psychological Studies of Policy Decisions and Fiascoes*, 2nd ed. (Boston: Houghton Mifflin, 1982), back cover; these definitions of groupthink align with the one used by Allison and Zelikow (cited earlier), both are offered in context as Allison's and Zelikow's suppression of dissent and alternatives aligns with Bureaucratic Politics decision-making while Houghton's rapid action followed by closure aligns with Organization Behavior decision-making.

[92] “Milling and Sherman…had worked for Billy Mitchel in World War I and in the postwar Air Service Training and Operations Group.” Faber, “Interwar US Army Aviation and the Air Corps Tactical School,” 214.

[93] Finney, *History of the Air Corps Tactical School 1920 - 1940,* 17.

[94] The ACTS leadership took actions to “shield its faculty from the rest of the Army to allow the development of the new doctrine.” While this provided sanctuary for coalescing thought, it also “insulated them from additional dissent that might have reshaped their results.” Conrad C. Crane, e-mail message to author, March 1, 2017.

[95] Biddle offers the example “All bomber advocates [Wilson, George, Walker, Olds, and Herbert Dargue], they reinforced one another’s intuitions and logic, and helped to create loyal and tenacious support at ACTS for their maturing ideas.” Biddle, *Rhetoric and Reality in Air Warfare*, 160.

[96] Finney, *History of the Air Corps Tactical School 1920 - 1940*, 40-41.

[97] “Chennault, a pursuit instructor from 1931 to 1936, argued just as vehemently that the bomber would *not* [original emphasis] always get through, and a well-organized and capable defense—armed with first-rate interceptor planes and backed by a ground-observer corps…*would* [original emphasis] be able to meet and defeat an enemy air attack…Chennault…was ignored.” Capt Claire Chennault, “Pursuit Aviation,” ACTS lecture, September 1933, AFHRA, file 248.101-8 and Chennault, “Special Support for Bombardment,” *US Air Services*, January 1934, 18-21, quoted in Meilinger, *Bomber,* 19; in their two years of shared instruction at ATCS, Walker and Chennault argued over whether the bomber or the fighter was “the supreme expression of airpower.” Gaston, *Planning the American Air War*, 73; “Similarly, when Hoyt Vandenberg took over the Pursuit section at ACTS…he was given a written directive to teach pursuit [escort]…not for protection of the bomber force.” Gaston, *Planning the American Air War*, 41-42.

[98] Budiansky, *Air Power*, 177; “But the new concept seems in the main to have been one of those rare creative ideas that generate in several minds at about the same time.” Greer, *The Development of Air Doctrine in the Army Air Arm*, 57.

[99] “The airmen [doctrine developers] rarely recognized such flaws in their assumptions…the fliers were not challenged to explore weaknesses in strategic theory.” Sherry, *The Rise of American Air Power*, 56.

[100] Faber, “Interwar US Army Aviation and the Air Corps Tactical School,” 217, 211.

[101] Watts, *The Foundations of U.S. Air Doctrine*, 22-23.

[102] Martha Byrd, *Kenneth N. Walker Airpower's Untempered Crusader* (Maxwell Air Force Base, AL: Air University Press, 1997), 67.

[103] Hansell, "Harold L. George," 86; “Ken Walker remarked that…General Twaddle… assign Major L. S. Kuter to the Air War Plans Division until the task was completed…like the rest of us, Larry Kuter was a strong advocate of the doctrines and philosophies of General Mitchell and he was thoroughly familiar with the principles of air warfare as developed at the Air Corps Tactical School.” Hansell, "AWPD-1 … The Process.”

[104] "[AWPD-1] could not have been completed in the short space of seven days save for the fact that all senior participants had been thoroughly imbued at the Air Corps Tactical School with Hal George's ideas on the proper use of air power." Hansell, "Harold L. George," 94; Janis' use of groupthink "takes on an invidious [tending to cause discontent, animosity, or envy] connotation. The invidiousness is intentional: Groupthink refers to a deterioration of mental efficiency, reality testing, and moral judgment that results from in-group pressures." Janis, *Groupthink*, 9.

[105] Allison and Zelikow, *Essence of Decision*, 20.

[106] Houghton, *The Decision Point*, 13-14; Biddle adds "we also prioritize incoming information according to its emotional vividness…first-hand personal experience, especially when [it] is unusually painful, strikingly positive, or uniquely formative." Biddle, *Rhetoric and Reality in Air Warfare,* 5.

[107] For example, the circular reasoning of: "to bomb the [aircraft manufacturing] factories, one needs to get through the air defenses; to get through the air defenses, one bombs the factories." Brauer and Van Tuyll, *Castles, Battles, & Bombs*, 214.

[108] Faber, "Interwar US Army Aviation and the Air Corps Tactical School," 218; additionally, "because the Americans had no direct experience of strategic bombing in World War I, they had no record to explain or protect in the interwar years." Biddle, *Rhetoric and Reality in Air Warfare,* 130.

[109] "Faber charges the American "Bomber Mafia" of the 1930s and early 1940s with the following [9] sins against sound strategy…9. The strategic economic targeting methods formulated at ACTS ran the risk of "mirror imaging," whereby the key nodes of one's own industrial infrastructure became confused with the critical vulnerabilities of an opponent's system." Gray, *Airpower for Strategic Effect*, 136-137.; furthermore, "ACTS instructors began to study American industry in an attempt to locate other such [industrial] bottlenecks." Meilinger, *Bomber,* 20; Watts, *The Foundations of U.S. Air Doctrine*, 19.

[110] Faber, "Interwar US Army Aviation and the Air Corps Tactical School," 218.

[111] A third foundational belief serving as a restraint, more aligned to Organizational Behavior's social pressures, is the American belief that outright targeting of civilians is anathema. The American's HAPDB emphasis on economic and industrial targets was counter to the British (Douhetian) emphasis that "infliction of high costs can shatter civilian morale…so that citizens pressure the government to abandon its territorial ambitions." Giulio Douhet, *Command of the Air* (New York: Coward-McCann, 1942), esp. 28, 47-48, 57-58, 309, quoted in Pape, *Bombing to Win*, 60, 62, 66.

[112] "Why did they emphasize precision? Among other reasons, because government parsimony demanded that they get the biggest "bang for the buck" from the few aircraft they had." Pape, *Bombing to Win*, 218.

[113] "And why did they prefer daylight operations? Because then-current navigation aids and bombsights were to primitive to supplant a reliance on visual, line-of-sight techniques." Ibid.

[114] James S. Corum, *The Luftwaffe: Creating the Operational Air War, 1918-1940* (Lawrence: University Press of Kansas, 1997), 219-223.

[115] Hansell, "AWPD-1"; British Air Chief Marshall Sir Hugh Dowding, in discussing the battle, expounded on how air defense could (and did) defeat air offense: "…Dowding…proved only that air defense *can* [original emphasis] defeat air offense, contrary to the teaching in much previous theory and doctrine." Gray, *Airpower for Strategic Effect*, 107; Dowding's book, *Twelve Legions of Angels*, was suppressed from publication by the British government due to opinion that adversaries could gain advantages from its contents.

[116] "Taking everything into account and using realistic data, Kuter now calculated that getting those required nine hits on the canal locks would require 120 bombers dropping more than a thousand bombs. The entire precision-bombing theory should have been cast into doubt by this unsettling discovery." Budiansky, *Air Power*, 180; another jarring example of astounding calculations involved Haywood Hansell. In figuring the necessary requirements to destroy the AWPD-prescribed forty-five German power stations and accompanying eleven transformer sites, Hansell found that "…if the goal was to put a single power station out of commission for the duration of the war, a raid by two full air wings [one wing composed three combat boxes of 18 bombers each; two full wings totaled 108 bombers] simultaneously dropping 356.4 tons of bombs, carried out in ideal daylight weather conditions, would provide an excellent probability of success--but would not guarantee it." Friedman and Friedman, *The Future of War*, 220.

[117] "On November 14, 1939 [*sic*] he [General Arnold] said the widely held Air Corps belief that large bombardment formations could defend themselves against fighters was open to question. General Arnold blamed acceptance of bomber invulnerability on teachings of the Air Corps Tactical School…" Hansell, "Harold L. George," 82.

[118] B-17 survivability improvements included guns, self-sealing fuel tanks, increased engine power, and increased bomb capacity. The quote regarding "large formations…B-17Es could succeed" is attributed to Tooey Spaatz who was an American observer during the Battle of Britain. What was truncated from the quote was the second phrase "but a serious effort should be made to develop escort fighters." Hansell, "Harold L. George," 82-83. Additionally, and well before the Spanish Civil War, an exercise held in 1931 "seemed to reinforce the idea that fast bombers could fare well on their own." This conclusion was reached by both the exercise's umpires and Hap Arnold. Biddle, *Rhetoric and Reality in Air Warfare,* 168.

[119] Budiansky, *Air Power*, 179.

[120] Ibid.

[121] Ibid., 180.

[122] Pape, *Bombing to Win*, 1.

[123] Biddle, *Rhetoric and Reality in Air Warfare,* 161.

[124] "There was…too great a readiness to focus on the future without rigorously considering the past. This is an endemic problem in air forces." Biddle, *Rhetoric and Reality in Air Warfare,* 291. "Mitchell never articulated a coherent body of doctrine that devolved from consistent theories or logical postulates." Biddle, *Rhetoric and Reality in Air Warfare*, 137.

[125] Kuhn, *The Structure of Scientific Revolutions,* 17-18.

[126] Sherry, *The Rise of American Air Power*, 52.

[127] "Bluntly, the ideas devised at ATCS in the 1930s were a 'faith-based theory,' unsupported by hard evidence." Meilinger cites Dan Kuehl for coining this term. Meilinger, *Bomber*, 43.

[128] Following his resignation, Mitchell simultaneously became more extreme in his views and lost his position as an insider or change-agent. From Crane's e-mail message discussing Alfred F. Hurley's biography "Billy Mitchell: Crusader for Air Power," Crane, e-mail message, March 1, 2017.

[129] Hansell argues that the unescorted nature of HAPDB was attributed to the lack of fighter technology (*i.e.,* range) development. MacIssac, "Voices from the Central Blue," 634; Hansell's message was supported by Walker's "deeply held conviction that well-planned, well-flown bomber formations could always get through and, hence, that such formations could be self-defending." Watts, *The Foundations of U.S. Air Doctrine*, 18; "Looking back over the years, General Hansell frankly admits that the supporters of bombardment at ACTS persisted in their faith in the unescorted bomber, and that the faith was based more on hope than fact." Greer, *The Development of Air Doctrine in the Army Air Arm*, 60; "Most simply, if a military organization has adopted an offensive doctrine [*e.g.,* strategic bombing], or is bent on adopting one, technological lessons on the advantage of defense [*e.g.,* the pursuit or fighter defense aircraft] are likely to be ignored, corrupted, or suppressed." Posen, *The Sources of Military Doctrine*, 56.

[130] Janis, *Groupthink*, 9.

[131] "[George's] heart—like the hearts of Walker, Kuter, and Hansell—was strongly in favor of winning the war with airpower." Gaston, *Planning the American Air War*, 17.

[132] Meilinger, *Bomber*, 38.

[133] Friedman and Friedman, *The Future of War*, 207.

[134] Ibid., 208.

[135] Gray, *Airpower for Strategic Effect*, 104-105.

[136] Biddle, *Rhetoric and Reality in Air Warfare*, 314. For background on Anglo-American long-range bombing success and failure, see Biddle, *Rhetoric and Reality in Air Warfare*.

[137] Gray, *Airpower for Strategic Effect*, 105.