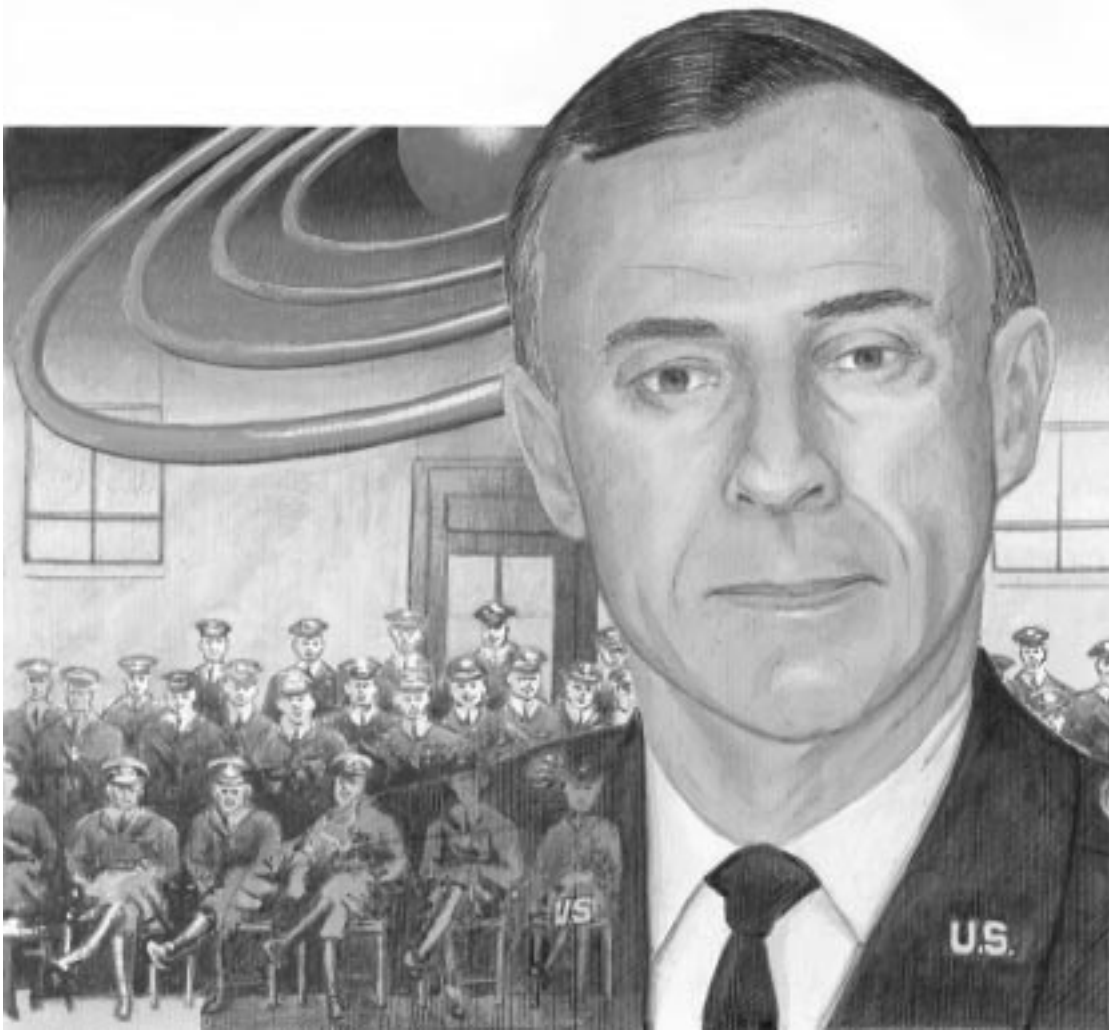

Warden and the Air Corps Tactical School

What Goes Around Comes Around

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What has been will be again, what has been done will be done again; there is nothing new under the sun.

—Ecclesiastes 1:9

BETWEEN 1926 AND 1940, officers at the Air Corps Tactical School (ACTS) created the theory and doctrine which would undergird the air strategies practiced in World War II. The "Bomber Mafia," which included Robert Olds, Kenneth Walker, Donald Wilson,

*The author would like to thank Dr. David R. Mets, professor of technology and innovation at the School of Advanced Airpower Studies, Maxwell AFB, Alabama, for his editorial advice and encouragement.

Harold Lee George, Odas Moon, Robert Webster, Haywood Hansell, Laurence Kuter, and Muir S. Fairchild, sought to answer two basic questions of airpower theory. In the words of Lt Col Peter Faber, they asked, "What are the vital elements of an enemy nation's power and how can airpower sufficiently endanger them to change an opponent's behavior?"[1] To answer those questions, ACTS theorists portrayed nation-states as interconnected economic systems containing "critical points whose destruction will break down these systems" and posited that high-altitude precision bombing could effect destruction sufficient to achieve strategic objectives.[2]

As examples of war-tested, uniquely American airpower theory, ACTS and Warden merit special examination. Interestingly, despite the 50 years separating their development, the theories have much in common in context and content.

Similarly, in the late 1980s, Col John A. Warden III developed the theoretical basis for the successful air strategy used in the Gulf War. Before the war, he wrote *The Air Campaign: Planning for Combat*, a balanced study of why and how to achieve air superiority. After becoming director of Checkmate, a Pentagon air strategy think tank, Warden focused on the strategic use of airpower. He created his "five rings" model and based Instant Thunder, Desert Storm's air operations plan, on it. Warden subsequently promulgated his ideas in essays such as "Air Theory for the Twenty-first Century" and "The Enemy as a System,"[3] which, like ACTS theory, depict strategic entities as definable systems with centers of gravity whose destruction can influence the system as a whole.

As examples of war-tested, uniquely American airpower theory, ACTS and Warden merit special examination. Interestingly, despite the 50 years separating their development, the theories have much in common in context and content. To demonstrate these similarities, this article compares and contrasts the history, central ideas, and assumptions of the theories. It then highlights their common strengths and weaknesses. Finally, those parallels are used to suggest lessons for twenty-first-century airpower thought.

Background of the Theories

Historically, the two theories developed in similar contexts. As Faber notes, the ACTS theorists wrote to create a central role and mission for the fledgling Air Corps. Rapid demobilization after World War I had left the Air Service "chaotic, disorganized, [and] tangled," lacking both the equipment needed for training and "coherent theory, strategy, and doctrine upon which airmen could base the future development of American airpower."[4] Without such a working theory, airpower was likely to remain subordinate to Army traditionalists, who considered airplanes as a tool of the corps commander. Under Army control, airpower would be used primarily for observation and artillery spotting—certainly not for the strategic bombing concepts promoted by radicals like Billy Mitchell. Facing that threat, ACTS theorists posited a decisive strategic role for the precision bomber.

Similarly, John Warden wrote to fill a void in airpower discourse and to counter a trend of increasing subordination to the Army. Following the development of the atomic bomb, airmen left theory to civilians like Thomas Schelling and Bernard Brodie and tended to concentrate on technological issues. The airmen appeared content with Brodie's observation that nuclear weapons made Giulio Douhet relevant, and they sought new and better ways of delivering atomic devastation to the enemy. However, when war experience in Korea and Vietnam proved that strategic bombing was insufficient, the focus gradually shifted from strategic to tactical airpower.

Faced by the Soviet threat during the 1970s and 1980s, American air leaders let the

ACTS *bomber advocates included Harold L. George* (left), *Haywood "Possum" Hansell* (above), *and Laurence Kuter* (below).

Army take the lead in developing doctrine. The result was the doctrine of AirLand Battle, and the Air Force accepted a supporting role. In *The Generals' War: The Inside Story of the Conflict in the Gulf,* Michael R. Gordon and Bernard E. Trainor note that in 1990 the commander of Tactical Air Command, Gen Robert D. Russ, and Lt Gen Jimmie Adams, Air Force deputy chief of staff for plans and operations, "believed that the Air Force's main role was to support the Army."[5] Warden, however, found both the old nuclear doctrine and the new supporting, attrition-based scheme "too limiting" and set out to prove that airpower, precisely directed against centers of gravity, could coerce political concessions from an enemy. In suggesting that airpower could dominate a conflict, Warden received the same cold shoulder the ACTS theorists had gotten 60 years earlier. His boss, General Adams, let Warden know that "his theorizing was radical."[6]

ACTS theory put to practice: a B-17 formation over Schweinfurt, Germany, 17 August 1943.

Interestingly, these contextual similarities—filling a theoretical gap while trying to avoid subordination to ground forces—gave rise to similar theories. Both ACTS and Warden used metaphors to describe, in Faber's words, "the vital elements of an enemy nation's power." Both theories focused on the enemy's will and capability to fight and portrayed states as closed systems that can be disrupted or paralyzed by destroying key targets. Finally, both theories prescribed courses of action based on similar assumptions. Examination of the central propositions of these theories will show that, despite some differences, the "industrial web" and the "five rings" are kindred spirits.

Core Propositions

Central to the ACTS theory was the notion that economic destruction would lead to social collapse and enemy capitulation. ACTS theorists described enemy systems variously as a "precision instrument," "wispy spider's web," or "tottering house of cards."[7] Haywood S. Hansell fleshed out the argument as follows:

1. Modern great powers rely on major industrial and economic systems for production of weapons and supplies for their armed forces, and for manufacture of products and provision of services to sustain life in a highly industrialized society. Disruption or paralysis of these systems undermines both the enemy's *capability* and *will* to fight [emphasis in original].
2. Such major systems contain critical points whose destruction will break down these systems, and bombs can be delivered with adequate accuracy to do this.
3. Massed air strike forces can penetrate air defenses without unacceptable losses and destroy selected targets.
4. Proper selection of vital targets in the industrial/economic/social structure of a modern industrialized nation, and their subsequent destruction by air attack, can lead to fatal weakening of an industrialized enemy nation and to victory through air power.[8]

The "fatal weakening" resulting from these attacks against enemy capability and will was so important that it precluded using bombers in any other role. Kenneth Walker set forth an "inviolable principle": The bomber must only fly against "vital material targets" deep in the enemy heartland and never in Army support.[9] To do otherwise would be to squander the bomber's power.

To focus the bomber's power appropriately, the ACTS theorists sought to identify those critical points that would bring down the enemy system. Harold Lee George first suggested that by attacking "rail lines, refineries, electric power systems, and (as a last resort) water supply systems . . . an invader would quickly and efficiently destroy the people's will to resist."[10] Robert Webster and Muir Fairchild refined George's list of "will" targets. They focused specifically on "national *organic systems* on which many factories and numerous people depended" [emphasis in original].[11] According to Hansell, organic systems included production and distribution of electricity, fuel, food, and steel; transporta-

tion networks; and certain specialized factories, especially those producing electrical generators, transformers, and motors.[12] Despite a lack of economic intelligence—theorists identified the foregoing systems by studying the United States—ACTS predicted victory for those who followed the "industrial web" prescriptions.

Roughly half a century later, John Warden applied a new metaphor to the ACTS vision of the enemy as a system. Fortified by his knowledge of military theory—specifically, that of J. F. C. Fuller—and modern communications technology, Warden followed a traditional practice and likened the enemy system to the human body. Rather than an amorphous "web" or "house of cards," Warden described an enemy (indeed, every life-based system) as an entity with a brain, a requirement for "organic essentials," a skeletal-muscular infrastructure, a population of cells, and a self-protection mechanism. He arranged these components into the now-familiar model of five concentric rings, with each ring dependent on the ones inside it. Warden's major addition to ACTS theory—the brain, or leadership ring—controlled the entire system. If the center ring could be killed (Fuller's "shot through the head"), or isolated by severing communications links, the entire system would crumble.[13]

Just like the ACTS theorists, Warden focused on the enemy's will and capability to fight. "It is imperative," he argued, "to remember that all actions are aimed against the mind of the enemy command or against the enemy system as a whole." Furthermore, "when the command element cannot be threatened directly, the task becomes one of applying sufficient indirect pressure so that the command element rationally concludes that concessions are appropriate, realizes that further action is impossible, or is physically deprived of the ability to . . . continue combat."[14] If unable, then, to attack the center leadership ring directly, Warden recommended attacks on organic essentials such as power production and petroleum—precisely the targets identified by ACTS. He proposed that damage to organic essentials could lead to "collapse of the system" or "internal political or economic repercussions that are too costly to bear"[15]—in other words, to the "fatal weakening" suggested by ACTS. Finally, just as the ACTS theorists refused to squander bombing on Army support operations, Warden emphasized that "engagement of the enemy military . . . should be avoided under most circumstances." Fighting an enemy's military "*is at best a means to an end and at worst a total waste of time and energy*" [emphasis in original].[16]

In essence, Warden just updated ACTS theory. The major thematic difference between the theories is the addition of a new "vital center"—the leadership ring—and two new destructive mechanisms to influence that center of gravity: *decapitation* and *parallel war*. Nuclear strategists coined the first term to describe the killing or isolation of enemy leaders; Warden created the second to describe the overwhelming-force strategy to use when the leaders were unreachable. A "death of 1,000 cuts" would suffice to collapse an enemy system whose center ring was protected, just as ACTS proposed to disrupt the industrial web. Technology improved the execution of the strategy, however, allowing airmen to inflict those cuts nearly simultaneously. Warden noted that Desert Storm air forces "struck three times as many targets in Iraq in the first 24 hours as Eighth Air Force hit in Germany in all of 1943."[17]

Underlying Assumptions

Given the similarities in context and content that connect these bodies of airpower thought, it should not be surprising to discover that they rest on similar assumptions. Most importantly, they presuppose a rational actor, or, to use Graham Allison's term, *Model I enemy*. Warden proposed that "enemies, whether they be states, criminal organizations, or individuals all do the same thing; they almost always act or don't act based on some kind of cost-benefit ratio."[18] Faber made the same observation about ACTS, whose theorists overlooked the fact that an

enemy might operate based on "potentially obscure organizational, bureaucratic, or emotional" Model II/III factors.[19] Faber also pointed out that ACTS theory rested on a "mid-Victorian faith in technology" and "wrongly assumed that revolutionary bomber-related technologies would produce almost 'frictionless' wars."[20] Warden echoed this faith, consigning friction to the Napoleonic era. In Warden's combat equation, modern airmen could ignore morale (and friction, a morale-related factor) because physical factors x morale = outcome. When physical factors approach zero due to technologically superior attacks, output of the enemy war machine will be zero, regardless of morale factors—and friction is therefore irrelevant.[21]

Clearly, these assumptions lead to problems. Due to its simplicity, a rational-actor model cannot adequately describe or predict the behavior of many state and nonstate actors. Faber, for example, asks, "Is it not possible . . . that a state might continue to struggle—at higher costs—to demonstrate its resolve in future contingencies?"[22] If a strategist cannot determine how an opponent will react to pressure—if the Model I analysis is faulty—then he cannot effectively target the opponent's will or force him to change his mind à la Warden and ACTS. A belief in frictionless war seems fraught with peril, as well. Gordon and Trainor devote a full chapter to describing numerous instances of friction in the Gulf War; Lt Col Barry D. Watts uses an entire book to show how twentieth-century warfare is characterized by friction. "The very structure of human cognition," he concludes, "argues that friction will continue to be the fundamental atmosphere of war."[23] These flawed underlying assumptions cast doubt on the validity of both theories and suggest additional questions. Do the ACTS and Warden theories share other flaws? If they do, are they relevant to airpower strategists in the coming years?

Holes in the Logic

The theories do, in fact, contain additional related flaws that highlight lessons for future strategists. Faber characterizes these flaws as the "three pathologies" of airpower theory. One of the pathologies is an overreliance on

Photo courtesy of Lt Col Mason Carpenter.

Precision weapons technology catches up with the ACTS theory.

metaphor in place of logical argumentation.[24] ACTS theorists and Warden provided little evidence to support their "web" and "body" analogies. Warden merely rearranged a tabular presentation of system components into rings and claimed—without empirical data—that the diagram proved "several key insights," namely that the rings were interdependent, the center was most important, that the military was merely a shield for the others, and effectiveness lay in working inside-out vice outside-in.[25] Warden also failed to provide proof that a nation-state, like a body, could be killed through decapitation. Similarly, the ACTS theorists described an economic "house of cards" using a sample size of one—the American economy of the 1930s.

Critiquing Warden, Dr. Lewis Ware notes that such unsupported metaphors are inadequate as analytical instruments. Their "arguments rest on principled belief rather than on reason, and principled belief—however powerful or well intended—is by definition not susceptible to rational explanation."[26] Faber points out that, unlike a human body, a society can substitute for lost vital organs; he further notes that metaphor-based theories have led to faulty employment of airpower in war because they fail to see that conflict is nonlinear and interactive.[27] The message for strategists is clear: Examine theoretical metaphors carefully. Ensure that verifiable cause-and-effect relationships exist between the parts of a metaphor that provide its explanatory power, especially if the metaphor is used to plan an air strategy. Finally, remember that enemies react. Decision makers should not expect an Iraqi-style rollover.

ACTS and Warden share Faber's second "pathology" as well: They both "made a fetish of quantification and prediction in war."[28] As Faber notes, the ACTS instructors who wrote Air War Plans Division—Plan 1 calculated precisely how to defeat Germany: 6,860 bombers attacking 154 target sets would produce victory in six months. Likewise, Warden claimed that "with precision weapons, even logistics become simple. . . . [S]ince we know that all countries look about the same at the strategic and operational levels, we can forecast in advance how many precision weapons will be needed to defeat an enemy."[29]

Political scientist Robert Pape has highlighted the problem with such quantification. Strategists who rely on predictions like the forecasts cited above confuse combat effectiveness with strategic effectiveness. Operators should be concerned with the first, which concerns target destruction, while strategists and commanders must focus on the second and ask whether or not said destruction achieves political goals. Strategists cannot allow a quantitative focus to obscure their understanding of the human interaction that constitutes both war and politics. Despite Warden's claims to the contrary, technology has not invalidated Clausewitz; war is still unpredictable.

The unwavering devotion with which ACTS theorists and Warden clung to the aforementioned "pathologies" highlights their susceptibility to Faber's final pathology. Faber notes that "air theorists sought to develop hoary maxims that would apply to all wars, regardless of time and circumstance. The ACTS 'Bomber Mafia,' for example, adopted 'a Jominian, mechanistic view of war—a view of war as a mathematical equation whose variables can be selectively manipulated to achieve success.'"[30] Warden's previously cited "outcome" equation and his claim that the five rings are "general concepts not dependent on a specific enemy" suggest that he also believed in a universally applicable strategic formula. Both theories, however, ignore the role of historical, cultural, and moral context, and that limits their universality.[31] More importantly, their claims of universality have led to widespread skepticism.

Arguably, that skepticism underlies the current battles over airpower's role in joint doctrine. Gen Ronald R. Fogleman has said that, due to the claims of airpower visionaries, "we found ourselves in a position where there were a lot of unfulfilled promises and false expectations relative to what airpower could and could not do." He further admonished airmen not "to let our enthusiasm for our primary mediums of operations blind us to the advantages that can be gained by using air-

power in support of land and naval component objectives."[32] He suggested that airmen are partly to blame for current interservice battles. In other words, the adherence of air theorists to "hoary maxims" has hampered the development of joint doctrine. Future air strategists can alleviate that problem by claiming less universality for airpower ideas.

Both theories lay on questionable assumptions about enemy rationality and technology's ability to overcome friction, and both fell prey to Faber's "pathologies" of airpower theory—overreliance on metaphor and quantification, and a Jominian claim to universality. In the final analysis, however, both worked.

The Bottom Line

Do these pathologies inherent in the ideas of ACTS and Warden invalidate the theories? No. Warden critic Lewis Ware admits that Warden's "reductionism has immense practical value for the successful prosecution of an air action."[33] Col Richard Szafranski is more blunt: "Purism matters less to action-oriented people than the verifiable consequences of action. . . . Try as critics might, they cannot eradicate the objective reality of the Desert Storm air battles. They worked."[34] Similarly, after a long trial and midcourse adjustments, ACTS theory succeeded. By late 1944, attacks on fuel production and transportation nearly prevented German forces from flying or driving at all. Szafranski's critique of Warden applies equally to ACTS: Each "dares to offer us a map for air warfare. Its imperfection does not erase its utility. . . . [If] 'bold ideas, unjustified anticipations, and speculative thought are our only means . . . we must hazard them to win our prize.'"[35] ACTS theorists and John Warden provided frameworks for winning air campaigns.[36] Despite their common flaws, the theories provide valuable understanding of air warfare and starting points for further theoretical development.

In the 1920s and 1930s, ACTS theorists proposed an answer to the "two basic questions of airpower theory": (1) What are the vital elements of an adversary's power? (2) How can airpower influence them? Writing to prevent a subordinate role for airpower, the ACTS instructors suggested that nations could be coerced or destroyed by precision bombing of their "industrial web." In the 1980s and 1990s, John Warden updated ACTS theory. He wrote in a similar context, added a leadership ring to the economic target list, and echoed ACTS's claims about precision. Both theories lay on questionable assumptions about enemy rationality and technology's ability to overcome friction, and both fell prey to Faber's "pathologies" of airpower theory—overreliance on metaphor and quantification, and a Jominian claim to universality. In the final analysis, however, both worked. Air strategists can, therefore, learn much from the shortcomings and strengths of the airpower theories of the Air Corps Tactical School and Col John Warden—and future theorists have therein a ready-made, battle-tested foundation for shaping the aerospace power of the next century. □

Notes

1. Lt Col Peter Faber, "Competing Theories of Airpower: A Language for Analysis," paper presented at the Air and Space Power Doctrine Symposium, Maxwell AFB, Ala., 30 April 1996. Available on-line from http://www.airpower.maxwell.af.mil/airchronicles/presentation/faber.html.

2. Lt Col Peter Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower," in Col Phillip S. Meilinger, ed., *Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AFB, Ala.: Air University Press, 1997), 217.

3. Col John A. Warden III, "Air Theory for the Twenty-first Century," in Karl P. Magyar, ed., *Challenge and Response* (Maxwell AFB, Ala.: Air University Press, 1994), 311–32; and "The Enemy as a System," *Airpower Journal* 9, no. 2 (Spring 1995): 40–55.

4. Faber, "Interwar US Army Aviation," 185.

5. Michael R. Gordon and Bernard E. Trainor, *The Generals' War: The Inside Story of the Conflict in the Gulf* (Boston: Little, Brown and Co., 1995), 79.

6. Ibid.

7. Faber, "Competing Theories," 1–2.
8. Quoted in Faber, "Interwar US Army Aviation," 217.
9. Ibid., 219.
10. Ibid., 194.
11. Hansell, quoted in ibid., 219.
12. Ibid.
13. Warden, "Air Theory," 311–32; and "The Enemy as a System," 40–55. For Fuller's influence on Warden, see Lt Col David S. Fadok, "John Boyd and John Warden: Airpower's Quest for Strategic Paralysis," in Meilinger, 361.
14. Warden, "The Enemy as a System," 49.
15. Ibid.
16. Warden, "Air Theory," 317–18.
17. Ibid., 324. Of course, there are other differences between the theories; for example, ACTS assumed total war with maximum destruction, while Warden foresaw limited war with minimum collateral damage—another update which reflected better technology and, perhaps, the "CNN factor." These differences are peripheral, however.
18. Ibid., 314.
19. Faber, "Interwar US Army Aviation," 221. See also Graham Allison, *Essence of Decision: Explaining the Cuban Missile Crisis* (Boston: Little, Brown and Co., 1971), for discussion of Models I, II, and III (Rational Actor, Organizational Process, and Bureaucratic Politics) analyses.
20. Ibid., 220. ACTS instructors did, in fact, include "fudge factors" in their calculations, but they turned out to be far too small.
21. Warden, "The Enemy as a System," 42–43.
22. Faber, "Interwar US Army Aviation," 221.
23. Lt Col Barry D. Watts, *The Foundations of U.S. Air Doctrine: The Problem of Friction in War* (Maxwell AFB, Ala: Air University Press, 1984), 93.
24. Faber, "Competing Theories," 1–2.
25. Warden, "Air Theory," 315–17.
26. Dr. Lewis Ware, "Ware on Warden: Some Observations of the Enemy as a System," *Airpower Journal* 9, no. 4 (Winter 1995), 92.
27. Faber, "Competing Theories," 2.
28. Ibid., 1.
29. Warden, "Air Theory," 327–28.
30. Faber, "Competing Theories," 1; internal quotes from Col Thomas A. Fabyanic, "War Doctrine and the Air War College—Some Implications for the U.S. Air Force," *Air University Review* 37, no. 2 (January–February 1986).
31. See Faber, "Competing Theories," 1; and Ware, 91, on the lack of contextual understanding of ACTS and Warden, respectively.
32. Gen Ronald R. Fogleman, "Aerospace Doctrine—More Than Just a Theory," keynote address to the Air and Space Power Doctrine Symposium, Maxwell Air Force Base, Alabama, 30 April 1996. Available on-line from http://www.airpower.maxwell.af.mil/airchronicles/presentation/doctrel.html.
33. Ware, 89.
34. Col Richard Szafranski, "The Problem with Bees and Bombs," *Airpower Journal* 9, no. 4 (Winter 1995): 96.
35. Ibid., 97. Szafranski attributes the internal quotation to Karl R. Popper as cited in Timothy Ferris, ed., *The World Treasury of Physics, Astronomy, and Mathematics* (Boston: Little, Brown and Company, 1991), 799.
36. It is true that the Gulf War theater planners in the "Black Hole" made substantial additions to Warden's original scheme; they certainly deserve credit for their contributions to airpower theory and coalition victory.

Nobody is driven into war by ignorance, and no one who thinks that he will gain anything from it is deterred by fear.

—Hermocrates of Syracuse