ASPJ
Air & Space Power Journal

July–August 2012
Volume 26, No. 4
AFRP 10-1

International Feature

Features

Departments

Embracing the Moon in the Sky or Fishing the Moon in the Water?

Some Thoughts on Military Deterrence: Its Effectiveness and Limitations

Sr Col Xu Weidi, Research Fellow, Institute for Strategic Studies, National Defense University, People's Liberation Army, China*

Deterrence as a military strategic concept came along after the debut of nuclear weapons. For more than 60 years, it has evolved into one of the most frequently used—and abused—concepts in the games of international politics and military services. In the meantime, numerous related theories, ideas, and notions have branched out.[1] Exactly what is deterrence—its nature, effectiveness,

*This article is based on the author's notes for a series of lectures given to officers at the Tanzanian National Defense College. A slightly different Chinese version appeared in the November 2010 issue of 中国战略观察 (*China Strategic Review*). The author wishes to thank Mr. Jiang Guocheng, editor of *Air and Space Power Journal–Chinese*, for his skillful draft English translation.

and limitations? How and why is the concept often miscomprehended and misinterpreted, and why has it evolved to become something mythical? What effects has it had on the global security environment? And how should the militaries of developing nations view and employ deterrence? This article tries to answer these questions.

Three Components of Deterrence

In international strategy studies, the general view on deterrence holds that it is a country's threat to use force to prevent an adversary from taking damaging actions against it. Back in 1957, in his book *Nuclear Weapons and Foreign Policy*, Henry Kissinger identified three components of deterrence: "Deterrence requires a combination of power, the will to use it, and the assessment of these by the potential aggressor. Moreover, deterrence is the product of those factors and not the sum. If any one of them is zero, deterrence fails."[2] In the following decades, Kissinger's formula of deterrence has remained true and broadly appreciated. As such, this article adopts his formula. After exploring this line of thinking and focusing on the three components that Kissinger identified, one may arrive at three inferences.[3]

First, *deterrence is not unilateral military actions; rather, it is a complicated process of interactions between the opposing parties*. Furthermore, unlike ordinary military actions, the success of deterrence—the production of desired effects—does not depend on the superiority of the deterrer over the deterred.

Second, deterrence inherently and tightly links to military threats. The deterring state implements deterrence via a threat to use force in an attempt to compel the adversary to give up conspired or construed hostile plans or actions. In this sense, *so-called military deterrence is no less and no more than threatening the opponent with force*. However, in an international society made up of sovereign states, the deterred nations often counter such military threats in kind, turning deterrence from unilateral to mutual, unequal as they may be. From what has happened

to date, to deem the deterrence concept a theoretical source of most of the international crises in the Cold War years is not an overstatement.

Third, deterrence as a strategic concept is inherent in the gene of failure. In the face of military threats, if the state being deterred does not take the damaging actions presumed by the deterring state, the latter may assume that its deterrence strategy has worked. However, how can the deterring state be so sure that what has not happened is a positive result of its deterrence? Honest evidence won't come from the deterred state; the deterring state may use some human intelligence or technical means to collect evidence, which is usually insufficient for the deterring state to measure the effectiveness of its deterrence strategy. In contrast, it is fairly easy to determine the failure of this same strategy: all one needs to know is that the deterred state ignores the military threats and keeps following its course of action. Thus, *for a deterrence strategy, success is always hard to prove while failure is easily visible*.

Notwithstanding the complexities and uncertainties of the concept of deterrence, after World War II, the nations of the Western world enthusiastically embraced this theory to formulate their military strategies. Politicians and security scholars were particularly fond of two troublesome "strategic gums": containment and deterrence, which they kept chewing for decades.[4] After the end of the Cold War, the "containment gum" seemed marginalized, but, as for the "deterrence gum," they are still reluctant to spit it out.[5]

Deterrence as a fundamental theory underlying Western military teachings has produced many derivatives: nuclear deterrence, conventional deterrence, escalated deterrence, extended deterrence, and maximum or minimum deterrence, to name just a few. Within them, one finds many "woolly concepts"; more importantly, they collectively reflect the tendency of evolving towards a "deterrence generalization." Ironically, when everything can be interpreted as deterrence, deterrence becomes nothing.

Why are Western military analysts so fond of deterrence theory? The answer lies in reality rather than theory. First and foremost, deterrence is

the favorite of the strong. We recall that the first component of deterrence is "power" or military strength. Usually people would think that only the stronger is qualified to deter, though military history repeatedly proves that the reality is not so simple. Since the end of World War II, the members of the Western world in many circumstances have held a strategic advantage—indeed, superiority—over their adversaries, compared with the majority of developing nations.[6] So it is natural that they tend to "subdue the enemy without fighting"—that is, to win by deterrence.[7]

Next, after the birth of the atomic bomb and its huge impact on military doctrine, advocacy of deterrence is a logical development. Fortunately or unfortunately, the atomic bomb, because of its nuclear overkill effects, was by no means a convenient weapon on the battlefield. This was particularly true as the Soviet Union also successfully developed its own nuclear arsenal. The United States found itself in a dilemma where, on the one hand, it had to highlight the strategic role of nuclear weapons and, on the other, strictly restrict itself in the use of those weapons. As such, deterrence theory both reflects the new international strategic reality of nuclear competition between the United States and Soviet Union after World War II and meets the new strategic demand to place one's (and one's allies') national security on top of the nuclear arsenal.

Finally, designed to prevent potential enemies from launching preemptive attacks, deterrence in theory is of a defensive nature. When a nation frames its military strategy on deterrence and then launches military actions under the flag of defense at the time of its choosing, it "kills two birds with one stone." Politically and morally, that country seizes the commanding point and at the same time harvests strategic gains for its national security.

Deterrence after World War II: Its Success and Failure

A brief review of how the concept of deterrence was developed and employed, and how it succeeded or failed, may help the current discussion approach the core nature of this concept. As mentioned be-

fore, the birth of nuclear weapons prompted the concept of deterrence. Deterrence was nuclear in the first place. At the very beginning, the United States did not distinguish between a nuclear bomb and its conventional kin except that the former was much more powerful, as demonstrated by the destruction of Hiroshima and Nagasaki.[8] That said, as early as 1946, Bernard Brodie, an initial architect of US nuclear deterrence strategy, remarked, "Thus far the chief purpose of our military establishment has been to win wars. From now on its chief purpose must be to avert them. It can have almost no other useful purpose."[9] In reality, however, the US military was actively preparing to win the next war by means of the massive use of nuclear weapons.[10] In July 1953, right after the truce that ended the Korean War, some US strategic analysts criticized the way the war was fought. They bluntly questioned why the United States, with such huge nuclear superiority, did not make the best of its nuclear weapons. Soon after, the world's first nuclear-based military strategy—the massive retaliatory strategy—was born. According to some US strategists of the time, if a single Soviet soldier steps across the Iron Curtain, the United States will launch retaliatory nuclear attacks "at times and places of our choosing."[11] In this context, one could consider the so-called massive retaliatory strategy equivalent to the nuclear deterrence strategy.

However, the global situation that developed disappointed US strategic decision makers somewhat; they acknowledged that a massive retaliatory strategy was, after all, something not easily applicable. True, Soviet forces did not cross the Iron Curtain, yet regional conflicts with various complexities kept evolving. Moreover, Uncle Sam, with plenty of nuclear bombs in his arms, simply felt strong restraints that kept him from dropping them. Against this background, a group of strategists represented by Kissinger put forward another concept different from, but closely related to, that of deterrence—limited warfare.[12] This addition lent substance to the concept of deterrence as the core of US military strategy. On top of this, Herman Kahn developed escalation theory, which in essence called for gradually increasing the level of deterrence.[13]

As many people have pointed out, the strategic employment of deterrence theory successfully prevented a nuclear conflict. Initially, the nuclear-based military strategy of the United States upset the Soviet Union, which then rolled full speed ahead to develop and build its own nuclear arsenal for exactly the same objective of dissuading its rival from launching a preemptive nuclear attack. Mutual nuclear deterrence between these two superpowers soon took shape and lasted for decades. A series of strategic crises that occurred during the next two decades more clearly defined and strengthened the US-Soviet strategic relationship of mutual nuclear deterrence. The Cuban missile crisis in October 1962 served as a timely wake-up call to the two superpowers, making them keenly aware of the existence of mutual nuclear deterrence and the possible eruption of nuclear war.[14] Although elbowing each other in the unavoidable nuclear arms race, both countries came to recognize that they must avoid the head-on conflict and that they must regulate the race with rules of engagement. Wading through an approximately 10-year-long negotiation, the two superpowers finally reached strategic stability on the basis of mutual assured destruction (MAD).

MAD stopped both sides from pulling the nuclear trigger first. Indeed, it also prevented conventional wars between the United States and Soviet Union. During the Cold War, the world witnessed a number of regional conflicts; seldom or never did any of them feature face-to-face confrontations of any size between the two superpowers (table 1).

Table 1. Superpower involvement in Cold War regional conflicts

Regional Conflict	*Time Frame*	*US Involvement*	*USSR Involvement*
Korean War	1950–53	Direct	Indirect
Vietnam War	1964–74	Direct	Indirect
Afghan War	1979–89	Indirect	Direct

In the Korean War, knowing that the Soviet air force physically participated in the fighting, the United States refrained from acknowledging that fact openly, all for the purpose of avoiding large-scale direct

conflict with the Soviet forces. On 12 February 1988, on the Black Sea, two US warships sailed into waters only eight nautical miles from the Soviet coast. To repel the intruders, Soviet navy ships reacted by issuing warnings, sending clear signals ("We are going to bump you!"), and then nudging the US ships in the side.[15] Ironically, both sides were equipped with antiship cruise missiles, navy guns, torpedoes, and all kinds of sophisticated weapons, yet neither dared to use them. In this reality show, we saw two muscled men confronting each other, both armed to the teeth, but choosing to use brooms for the duel—they have to fight against each other, but neither must kill the other. Underneath this amusing scene lies mutual nuclear deterrence.

Although nuclear deterrence strategy successfully prevented an all-out war between the superpowers, it drove them into a frenzied nuclear race that put the whole world under the shadow of nuclear catastrophe. According to US nuclear deterrence doctrine, to ensure credible nuclear deterrence sufficient to dissuade the Soviets from launching any preemptive strike, the United States had to hold "assured destruction" capabilities, be able to kill 20–25 percent of the Soviet Union's population, and destroy 50 percent of its industry.[16] To counter, the USSR adopted the same or a similar strategic calculation. Both sides refused to be on the nuclear weak side, leading to the "Matthew effect" whereby each side's nuclear "capital" accumulated to the point that it could destroy the entire world dozens of time over.[17] In this sense, the perceived success of nuclear deterrence rested on unacceptable consequences: people forced to live in a world endangered by protracted "nuclear winter." Following the same doctrine of nuclear deterrence, both superpowers kept their nuclear forces on high alert and many times approached the red line of pressing the nuclear buttons.[18] According to the US nuclear war plan in place at the time (the Single Integrated Operational Plan), in case nuclear conflict erupted between the United States and USSR, the United States would destroy not only the Soviet Union but also China. Indeed, in January 1972, just before President Nixon's visit to Beijing, 600 US nuclear warheads were aimed at China.[19]

In stark contrast to its success in preventing nuclear conflicts, the post–World War II deterrence strategy has failed time and again in averting conventional regional conflicts, which took place for many different reasons. To label them indiscriminately as "Soviet proxy wars," as some American strategists did, was sheer generalization and oversimplification.[20] Nuclear deterrence simply would not work with people who fight for their national independence, liberation, and unification. Besides, having possessed nuclear weapons, neither the United States nor the Soviet Union had the guts to punch each other face-to-face. Regional or local clashes became their logical venues to weaken one another indirectly for strategic advantage. In other words, these two superpowers were themselves part of the causes that led to numerous local clashes. Under these circumstances, how could nuclear weapons deter those regional conflicts? The US government used the Vietnam War as a test ground for "graduated deterrence escalation." However, going hand in glove with it, failure also escalated gradually.

To further illustrate the limited effectiveness of deterrence, let's take a look at strategic interactions between China and the United States during the Korean War and Vietnam War. In early October 1950, Zhou Enlai, China's premier and foreign minister at the time, asked K. M. Panikkar, then the Indian ambassador to China, to pass China's clear warning to the United States: If US military forces advance across the 38th parallel, "we will take the matter into our hands."[21] The US decision circle received but ignored this warning, figuring that China was merely bluffing. First, China had already missed a good chance for a military intervention; second, it was still recovering from the civil war and faced many daunting domestic challenges; and third, the United States possessed the world's most powerful military, and China was simply no match.[22] On 25 October, China sent its People's Volunteer Army across the Yalu River heading into North Korea, and in July 1953, the Korean War ended where it broke out. Eleven years later, in 1964, when the United States expanded its invasion into Vietnam, China again delivered a clear-cut warning: If US forces cross the 17th parallel into North Vietnam, China will intervene. This time, US deci-

sion makers took China's warning seriously and ordered their ground forces not to enter the North. During the war, China sent air defense, engineering, and logistics forces into North Vietnam, but the Americans pretended that they did not know.

From these two wars, should one draw the conclusion that China's deterrence against the United States failed in 1950 but succeeded in 1964? The answer is no. Whether in 1950 or 1964, Chinese leaders never expected to stop the US military intervention with only a few words. The Korean War experience indicates that having strength and the will to use it, as well as sending unmistakable signals, is not necessarily enough to ensure successful deterrence. In the Vietnam War, US ground troops stopped at the 17th parallel, not because China demonstrated deterrence but because the US government had now learned that the Chinese leaders were not bluffing. Further, Washington was not willing to collide head-on with the Chinese one more time.

The discussion above indicates that so-called deterrence is but a derivative effect produced from the employment of military power. This leads one to question whether something called "deterrence capabilities" really exists. Capability, an attribute of the subject of action, can enable some action and produce certain effects. In other words, a capability can be measured by sizes and degrees based on the effects it achieves. Deterrence, however, only evolves into two opposite endings: effective (i.e., it succeeds) or ineffective (i.e., it fails). Deterrence cannot be measured in terms of big or small, high or low. *Actual military capabilities generate the effects of deterrence, which one can describe as big, small, high, or low. But no direct connection exists between these military capabilities and the success or failure of deterrence. Indeed, so-called deterrence capabilities are but a fallacy*.[23] For many years, Western military strategists have invested an enormous amount of time and effort trying to prove the existence of deterrence capability. They try to change deterrence from what it should be (a process of mutual, dynamic interactions between the opposing parties) to what they want it to be—unilateral military actions designed to establish a direct con-

nection between military capabilities and deterrence capabilities.[24] By doing so, these strategists succeed in confusing themselves.[25] Furthermore, they peddle this notion everywhere, hoping to mislead all the others into the same confusion.

The Nature of Deterrence and Its Alienation

One can further understand deterrence as a transaction of strategic gains and losses between two opposing parties. By threatening to use its superior military power, the deterring side (often the strong side) compels the deterred side or sides (often the weak side or sides) to back down or compromise in a way that benefits the strong and supposedly allows the weak to avert yet bigger losses. Obviously, such transactions are never fair, insofar as the deterring side turns deterrence into a sort of strategic kidnapping, holding the other side's larger interests under imminent risk and forcing it to pick the "smaller loss" solution and give in. Now we may define the nature of deterrence as *holding hostage the critical security interests of the deterred side and demanding that it accept an unequal strategic transaction*. Back in the 1960s, China's strategic research community gave US nuclear deterrence another name: nuclear blackmail. The term, though bearing the political ingredients of the time, was appropriate as regards the nature of deterrence. Anyway, for policy makers, whether on the strong side or the weak, a strategic decision is no more than making a choice based on calculations of interests and strengths, gains and losses.

History shows that deterrence may fail. Why so? Unlike observations by some Western strategists, in many cases, it is not because the deterring side does not possess enough strength or because it has not delivered a sufficiently clear message about its resolve to use that strength. Often, the answer lies not so much with the deterrer as with the deterred. One major reason is that what the deterring side perceives as the deterred side's crucial interests is in fact not as crucial as it deems. Here one should pay attention to the difference between Western and other civilizations. For example, when it comes to considerations of

value, in Western culture, life is the most valuable thing of all; therefore, the deterring side logically places it under threat. In Eastern culture, however, there is something more valuable than life. Lao Tzu, founder of China's ancient Daoism, expressed this fact most thoroughly: "When people do not fear to die, what's the use of threatening them with death?"[26] Five basic scenarios illustrate the success and failure of military deterrence (summarized in table 2, following the discussion of the scenarios).

Scenario 1: Side B, the deterrer, holds hostage the critical interests (A1) of Side A, the one being deterred, asking Side A to compromise in A2, which is not as valuable as A1, whereas Side B's cost (B2) would be very small and ignorable. After comparing A1 and A2, Side A gives up. The deterrence of Side B succeeds.

Scenario 2: Side B holds hostage Side A's critical interests A1, asking for A2, which is not as valuable as A1. In response, Side A takes Side B's interests (B1) hostage, which is as important to Side B as A1 is to Side A and bigger than A2. The situation is complicated, and the deterrence of Side B transforms into mutual deterrence. This in some sense means the failure of Side B. One often sees such a "boomerang effect" in the practice of military deterrence.

Scenario 3: Side B holds hostage Side A's critical interests A1, asking for A2, which is less important than A1. But Side A thinks that it can effectively defend its A1 and force Side B to yield B2, which would be bigger than A2. The deterrence of Side B fails.

Scenario 4: Side B holds hostage Side A's critical interests A1, asking for A2, thought to be smaller than A1. But Side A thinks A2 is much more important and prefers to fight for A2 at the cost of A1. The deterrence of Side B fails.

Scenario 5: Side A is extremely weak and possesses almost nothing. Thus, Side B can take hostage nothing valuable from Side A. In this situation, no matter how strong it may be, Side B cannot effectively deter Side A.[27] That's why the United States stresses attacking al-Qaeda.

Table 2. Scenarios illustrating the success or failure of military deterrence

Scenario	*Property of the Deterred (Side A)*	*Strategic Interests Transaction*	*Result*
1	Sovereign state	A1>A2 B2 ignorable	Succeed
2	Sovereign state	A1>A2 B1≥A1>A2	Fail and transform into mutual deterrence
3	Sovereign state or nonstate actor	A1>A2 B2≥A2	Fail
4	Sovereign state or nonstate actor	A2>A1	Fail
5	Nonstate actor	No A1, A2 . . . An	Fail

The above analysis may point to several considerations. First, success or failure is determined more by the deterred side, not vice versa. Primarily, it depends on whether or not the deterred side has real, crucial interests held hostage by the deterring side and on the cost exchange between the two opposing parties.

Second, deterrence strategy works only in proper conditions. In the current international system, composed of sovereign states, deterrence strategy may be one of the options for dealing with national security problems. However, as a military doctrine, deterrence is by no means a one-size-fits-all panacea. Not all adversaries are prone to deterrence. This is particularly true in asymmetric situations where the effects and coverage of military deterrence or subsequent military operations are essentially restricted.

Furthermore, observing what has happened after World War II, one may find that in many cases the military deterrence implemented by Western powers against targeted countries is not deterrence as originally defined. Rather, it has become twisted and alienated from the meaning of deterrence. Here, another related concept comes to mind—military coercion, which is less discussed in the world's military research circles.[28] Like military deterrence, military coercion is buttressed by strength, the will to use this strength, and the adversary's awareness of the former two. But a substantial difference exists between these two con-

cepts. Although deterrence aims to prevent an opponent from taking actions detrimental to one's interests, coercion goes a step further by compelling the opponent to do things desired by the coercer.[29] Joint Doctrine Publication 0-10, *British Maritime Doctrine*, defines "coerce" as "the use or threat of force to persuade an opponent to adopt a certain pattern of behavior against his wishes." It also notes that "coercion involves inducing an action that would otherwise not occur—either forcing an adversary away from one course of action, or compelling him to take another. Coercion will only be successful if a combination of threats and incentives is credible, and their potential is communicated unequivocally to those in a position to assess it."[30] In other words, *during the entire Cold War era, while the Western powers talked about deterrence, they often exercised coercion*. This twisted and alienated "deterrence" is best demonstrated by what they did with forward defense—a defensive posture in which one claims defense by "pointing his bayonet right at the neck of the opponent." With the notion of deterrence warped towards that of coercion, the nominal defensive nature of deterrence also transforms to the actual offensive nature of coercion. The history of the Cold War shows that deterrence imposed by the strong over the weak was often twisted and alienated, whereas counterdeterrence by the weak against the strong maintained its true defensive nature somewhat.

During the Cold War years, the Americans created another derivative concept of "extended deterrence," more commonly known as the "nuclear umbrella." This important notion, for which the author coined the well-comprehended abbreviation "ED" in 2009, serves as doctrinal support to the United States' global system of strategic alliance. According to the logic of ED, the United States provides its allies ED, protecting them from nuclear threats; in return, nations under this umbrella of ED allow the United States to deploy troops on their soil to form its forward defense. In the Cold War era, distressed by the geographic disadvantage of lacking enough strategic depth in Western Europe, the North Atlantic Treaty Organization (NATO), led by the United States, formulated a strategy involving the first use of nuclear weapons to counter the formidable Soviet conventional military threat—particularly the rapidly

maneuvering strike groups of Soviet armor. However, would this nuclear umbrella work? NATO's European members kept asking themselves whether the United States would protect Frankfurt at the cost of Detroit. They had further questions about what might be left in Europe after the launching of nuclear weapons against attacking Soviet forces. The crisis aroused by the deployment of Soviet and US intermediate missiles in Europe during late 1980s further exposed the fallacy of this umbrella. People found that these limited-range nuclear missiles could reach the inland of neither the United States nor the Soviet Union; instead, wouldn't those nuclear warheads shot from either side explode over the heads of Europeans?[31]

Allegations from Eastern Asia held that the United States' nuclear ED had been playing another important nonproliferation role: to discourage Japan and South Korea from developing indigenous nuclear weapons. But, again, this allegation is like the "half-filled bottle" paradox, which depends on whether one pays attention to the full half or the empty half. On the one hand, the United States demands that North Korea give up its nuclear weapon program, and, on the other, it extends the nuclear umbrella to South Korea—by which it highlights the role of nuclear weapons in Korean security challenges and offers a sound reason for Pyongyang to hold on to its own nuclear program. The North may well argue that "I need such an umbrella also, so I commit to making it myself." The current development on the Korean Peninsula makes it quite obvious that the nuclear ED is counterproductive to denuclearization efforts.[32] Whether Washington is aware of such a self-contradiction or just wants to ignore it is a different story.

It will be increasingly clear that nuclear deterrence, no matter how much one may exaggerate its role, works mainly in countering nuclear-capable strategic adversaries. To threaten the use of nuclear weapons in conventional conflicts only pushes the threatening party into the dilemma of never-ending hesitation. In the short term, such a threat might deter opponents. But in the long run, it would usually generate a strong backlash by irritating opponents and causing them to pursue nuclear

weapons as a countermeasure. In this sense, *nuclear deterrence also acts as a theoretical and practical irritation to nuclear proliferation*. Here, one sees an interesting paradox: "positive security assurance" works negatively, while "negative security assurance" plays a truly active role.[33]

One can trace one of the reasons for the appearance of the deterrence concept back to the unwanted overkill capability of nuclear weapons, which reduces them to nothing more than a set of political tools. To enhance nuclear weapons' operational "feasibility," the two superpowers developed various kinds of low-yield nuclear warheads, labeling them "tactical nuclear weapons," an indication that they considered them usable on the battleground. Still, neither side dared to employ them and thereby open Pandora's box. Inspired by these so-called tactical nuclear weapons, some Western strategists later developed a more ambiguous concept: conventional deterrence. The logic is this: thanks to high technology, some advanced conventional weapons can now do the jobs heretofore performed by tactical nuclear weapons. Consequently, these advanced conventional weapons should also play a deterrent role alongside that of tactical nuclear weapons. Truthfully, whether deterrence bears either a nuclear hue or a conventional color, there is no direct link between a weapon's destructive capability and the effectiveness of deterrence.

Post–Cold War Deterrence

During the Cold War, the United States regarded the Soviets and Soviet-led Warsaw Pact as its strategic opponents. In that context, nuclear deterrence as an underlying strategy was understandable. In today's environment, long after the end of the Cold War, to continue allowing deterrence to guide one's military strategy is ludicrous.

Since the conclusion of the Cold War, nuclear deterrence has lost some of its prominence but remains an often-debated topic. The tendency seems to indicate that nuclear deterrence is being reduced to its original role: *to deter one's adversary from launching nuclear attacks*. A renowned Chinese nuclear specialist once remarked that the role that

nuclear weapons can play is tiny, right there to be seen. Any attempt to amplify it—to inflate it to the cornerstone of national security or the fundamental protection against any or all security threats—is to no avail. The US *Nuclear Posture Review Report* of 2010 declares that the United States will reduce the role of nuclear weapons in defending national security. This is a small step in the right direction. Still, this policy document insists on extending nuclear deterrence for maintaining US military alliances, making this small forward step look somewhat reluctant and awkward.[34]

With the end of the Cold War, economic interdependency has developed substantially among nations who share numerous common interests. Relationships between previously hostile states have changed, with shared interests and conflicting interests coexisting. Big powers are now entangled in a complex half-friend-half-enemy or both-friend-and-enemy relationship, wherein they check yet depend on each other, need yet compete against each other, and squeeze yet cooperate with each other. Such complexity will undoubtedly affect the development of military strategies. When designing a deterrence strategy against a potential enemy, how can one deter a half-friend-half-enemy type of state? Will half-deterrence come into being (something beyond the author's imagination)? In the current global landscape, mutual deterrence between nuclear powers still has some reasons to exist. However, it is obviously inappropriate to overstate the importance of mutual deterrence, which will only drag nuclear states back into another cold war.

As nations move forward, deterrence from conventional weapons becomes even more elusive. Although it may have some value and play a limited role in some circumstances, such deterrence is really not worth serious attention.

Employment of Deterrence Strategy by Developing Nations

Western powers have been quite fond of deterrence strategies, but should developing nations, often the militarily weak side, follow suit

and make deterrence the cornerstone of their military strategies? Military leaders in developing nations ought to understand this concept, see it through, and possibly use a deterrence strategy against the right opponent at the appropriate time and under certain conditions. But they should be careful not to go too far down this path. In planning such military deterrence, these leaders should clearly answer the questions against whom, by what means, and will such deterrence work? More importantly, they should be aware that *deterrence not only generates military uncertainties but also imposes an overwhelmingly intimidating presence, which is politically offensive even to third parties*. The question then becomes, In the course of maintaining national security, should a developing nation appear intimidating? More specifically, how, to whom, and under what circumstances should a developing nation demonstrate its deterring might?

Militaries of developing nations may deliver clear messages to potential aggressors or hostile elements trying to subvert their legal governments or break their sovereignty, warning that they will pay a costly price for their conspiracies. Fundamentally, the national security of a developing nation can count only on painstaking and steadfast efforts towards defense modernization. For developing nations, building a highly capable military force is certainly difficult, just as hard as embracing the moon in the sky, whereas deterrence is but a logical or consequential side effect of military power, like the moon's reflection in the water. Eventually, as one successfully embraces the moon in the sky, he or she gets the moon in the water automatically. ✪

Notes

1. For the many theories that sprouted from deterrence theory, see James E. Dougherty and Robert L. Pfaltzgraff Jr., *Contending Theories of International Relations: A Comprehensive Survey*, 5th ed. (Beijing: Peking University Press, 2004), chap. 8.

2. See 核武器与对外政策, translated from Henry A. Kissinger, *Nuclear Weapons and Foreign Policy* (New York: Harper & Row, 1957). See also 选择的必要 (商务印书馆, 北京, 1972),

translated from Kissinger, *The Necessity for Choice: Prospects of American Foreign Policy* (New York: Harper & Row, 1961), 12.

3. Kissinger soon after modified the third component, "the assessment of these by the potential aggressor," to "communicate with the potential opponent to ensure that it understands the above two." See Kissinger, *Necessity for Choice*.

4. Strictly speaking, these two concepts were all coined by US strategic experts and broadly accepted by the entire Western world, thanks to the dominating status and influence of the United States over the world after World War II. This is an important indication of the Americanization of Western strategic thinking. See also Stephen M. Millett, "The Moral Dilemma of Nuclear Deterrence," *Parameters* 10, no. 1 (March 1980): 33–38, http://www.carlisle.army.mil/usawc/parameters/Articles/1980/1980%20millett.pdf.

5. "Deterrence strategy" continues to appear in such policy documents as the US Department of Defense's *Nuclear Posture Review Report* (Washington, DC: Department of Defense, April 2010), http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf.

6. Strategic balance existed only briefly between the West and the East in Europe from the 1970s to the mid-1980s.

7. Many military analysts tend to agree that the concept of deterrence can be traced back to Sun Tzu, the famous, ancient Chinese strategist who, among other things, first put forward the enlightening idea of "winning without fighting." One should note here that Sun Tzu's doctrine primarily reflects the military logic of the stronger rather than the weaker, and politically it serves the purpose of a king to pursue hegemony. In admiring Sun Tzu's great contribution to military thinking, one should also be aware of the historical limits in his thought. The author would also argue that Sun Tzu's "winning without fighting" doctrine conveys broader and deeper implications than mere "deterrence."

8. See 美国军事战略与政策史 (解放军出版社, 北京, 1986), 440–41, trans. 彭光谦 et al., from Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington: Indiana University Press, 1977).

9. See also Bernard Brodie, ed., *The Absolute Weapon: Atomic Power and World Order* (New York: Harcourt, Brace and Company, 1946).

10. See 为第三次世界大战选择战略 (军事战略), 360–434.

11. See 美国军事战略与政策史, 481, translated from Weigley, *American Way of War*.

12. See 核武器与对外政策 (世界知识出版社, 北京, 1959), translated from Kissinger, *Nuclear Weapons and Foreign Policy*.

13. For details, please refer to 论逐步升级 — 比喻和假想情景 (世界知识出版社, 北京, 1965), translated from Herman Kahn, *On Escalation: Metaphors and Scenarios* (New York: Praeger, 1965).

14. During the Cuban missile crisis, the blocking US Navy forces dropped depth charges to force Soviet submarines to surface. Fearing that a Soviet-US war had broken out, a Soviet submarine almost fired nuclear torpedoes at the US fleet. In retrospect, Robert McNamara, then the US secretary of defense, recalled, "We came within a hair's breadth of war with the Soviet Union. . . . We were 'this' close to nuclear war, and luck prevented it." See 王新森, "被迫浮起" (舰船知识), vol. 364, 58–63.

15. John H. Cushman Jr., "2 Soviet Warships Reportedly Bump U.S. Navy Vessels," *New York Times*, 13 February 1988, http://www.nytimes.com/1988/02/13/2-soviet-warships-reportedly-bump-us-navy-vessels.html.

16. See "道义上左右为难的核威慑战略" (军事战略), 357, translated from Millett, "Moral Dilemma of Nuclear Deterrence," 33–38.

17. In sociology the Matthew effect, or accumulated advantage, refers to the phenomenon of "the rich get richer, and the poor get poorer." The term takes its name from a biblical verse: "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath" (Matthew 25:29).

18. Both the United States and the Soviet Union insisted on a defensive policy but prepared to launch a nuclear attack first.

19. Hans M. Kristensen, Robert S. Norris, and Matthew G. McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning* (Washington, DC: Federation of American Scientists and the Natural Resources Defense Council, November 2006), 133, http://www.fas.org/nuke/guide/china/Book2006.pdf.

20. For example, some of the US strategists considered the Korean War a strategic feint attack by Joseph Stalin. They fell into the mud of conspiracy theory.

21. 周恩来 [Zhou Enlai], "美军如越过三八线，我们要管," 周恩来外交文选 [*Zhou Enlai's Works on Foreign Affairs*] (中央文献出版社, May 1990), 25–27.

22. See *1900* 年以来的美国史 *(*中*)* (中国社会科学出版社, 1983), 464–65, trans. 刘绪贻, from Arthur Stanley Link, with the collaboration of William Bruce Catton, *American Epoch: A History of the United States since the 1890s*, 2nd ed., rev. and rewritten (New York: Alfred. A. Knopf, 1963).

23. Accordingly, the concepts of maximum and minimum deterrence and of limited deterrence, all of which base themselves on the measurement of deterrence capabilities, are also fallacies.

24. We may recall that the United States unilaterally specified its desired level of deterrence capability: to be able to destroy 50 percent of Soviet industries. Why set the figure at 50 percent and not, for example, at 60 percent? This is another indication that such measurements were sheer speculation and groundless subjective judgment.

25. One can find the tendency of shifting the concept of deterrence towards unilateralism in the changes to Kissinger's different descriptions of the three components of deterrence. His definition of 1957 was generally reasonable, but the one he offered in 1960 reflects the attempt to transform deterrence into unilateral actions.

26. Lao Tzu, *Tao Te Ching*, chap. 74. Various English versions are available online. For example, see *Tao Te Ching*, Sacred Books of the East, vol. 39, trans. J. Legge, [1891], http://www.sacred-texts.com/tao/taote.htm.

27. In the eyes of a military dialectician, the relationship is actually starting to reverse; that is, the otherwise stronger Side B is now prone to be threatened by Side A.

28. Some Chinese scholars translated the term *coercion* as 威逼 or 强迫 instead of 胁迫. See 李彬, 军备控制理论分析 (国防工业出版社, 2006), 67.

29. Another important difference exists between the two concepts: Although success through deterrence is invisible and immeasurable, that through coercion is visible.

30. Joint Doctrine Publication (JDP) 0-10, *British Maritime Doctrine*, August 2011, 2-15n, 2-24, http://www.mod.uk/NR/rdonlyres/C39999AB-E1E3-4A0F-843E-FE82CEC6726E/0/20110816JDP0_10_BMD.pdf. See also JDP 0-01, *British Defence Doctrine*, 4th ed., November 2011, 1-16, "Utility of Force," http://www.mod.uk/NR/rdonlyres/FDB67DF9-5835-47FD-897D-CA82C17EC7A5/0/20111130jdp001_bdd_Ed4.pdf.

31. See 美国军事战略与政策史, 517–18, translated from Weigley, *American Way of War*. Extended deterrence strategy fell into the dilemma of "surrender or face mutual destruction," as perceived by many people at the time. Largely due to this dilemma, the US military later developed the AirLand Battle concept, with the intention of using nuclear weapons only as a last resort.

32. On 16 June 2009, the presidents of the United States and South Korea signed the Joint Vision for the Alliance of the United States of America and the Republic of Korea. For the first time, the US commitment to provide extended deterrence to South Korea was written unequivocally in an official declaration. See "Joint Vision for the Alliance of the United States of America and the Republic of Korea," White House, Office of the Press Secretary, 16 June 2009, http://www.whitehouse.gov/the_press_office/Joint-vision-for-the-alliance-of-the-United-States-of-America-and-the-Republic-of-Korea.

33. Right after its first success with a nuclear bomb, China announced its unconditional "no first use" negative security assurance to the whole world.

34. Department of Defense, *Nuclear Posture Review Report*, 15–17.

Sr Col Xu Weidi, Research Fellow, Institute for Strategic Studies, National Defense University, People's Liberation Army, China

Sr Col Xu Weidi (BA, University of Dr. Sun Yat-sen; MA, Huazhong University of Science and Technology) is a founding member of and senior research fellow with the Institute for Strategic Studies, National Defense University. He joined the People's Liberation Army of China in 1976, serving as a military observer and team site leader in a United Nations peacekeeping mission in the Western Sahara from 1992 to 1993. He completed a number of academic tours at several military research institutions overseas, including the Royal United Services Institute (visiting fellow, London, 1999), the Royal College of Defence Studies (course member, London, 2006), the Centre for Defence and Strategic Studies (visiting scholar and/or course instructor, Australia, 2004–7), the National Institute of Defense Studies (Japan), and the Institute for Strategy and Security Policy under Australia's National Defence Academy. He has published dozens of papers, mostly in Chinese and a few in English. His research covers Asia-Pacific security, international arms control and disarmament, and China's military diplomacy studies.

Toward a Superior Promotion System

Maj Kyle Byard, USAF, Retired
Ben Malisow
Col Martin E. B. France, USAF

No management action carries the impact of promotion. Whatever an organization's stated goals and performance criteria, employees note and emulate behaviors that lead to advancement. According to the *Officer Evaluation System: Training Guide*, "Throughout the history of the Air Force, there have been more than 8 different evaluation systems with 14 major variations, at a rate of a new version about every eight years."[1] The cycle of these changes follows a pattern: (1) a new system arises in response to dissatisfaction with the old one; (2) substantial flaws in the reformed system come to light; (3) attempts to correct these problems through formal and informal modifications make the functional process significantly different from the official one; and (4) failing to meet the needs of the service

and officer corps, the system undergoes reform yet again. This article seeks to assess the current cycle of promotion procedures and propose an evaluation/promotion process for Air Force officers marked by stability, predictability, and transparency—one controlled by the actions of the officers it evaluates. Toward that end, it reviews the history and purpose of the current system, explores some of the latter's inherent challenges, and then proposes a series of recommendations that might enhance the promotions process by ameliorating some of these issues.

History of the Current Promotion System

Evaluating military officers has never been an exact science. The British defeated Napoleon nearly two centuries ago and built an empire by allowing the aristocracy to buy its commissions and promotions. The purchase system ensured a homogeneous corps of commanders drawn from a common background and secured the army's loyalty because its officers had "a stake in the country."[2] However, the system failed to systematically reward ability, punish incompetence, or head off disastrous occurrences of "groupthink."

The American Continental Army "was initially led by men who had served in the British Army or colonial militias and who brought much of British military heritage with them."[3] Of the 18 major and brigadier generals in that army, 16 had served as officers in the British Army or in the colonial militia attached to the British Army during the French and Indian Wars. In creating the Continental Army, the precursor to the US Army, the Continental Congress deferred the determination of promotions to General Washington: "That General Washington be requested to fix upon that system of promotion in the continental army, which, in his opinion, and that of the general officers with him, will produce most general satisfaction; that it be suggested to him, whether a promotion of field officers in the colonial line, and of captains and subalterns in the regimental line, would not be the most proper."[4]

Subsequent systems were based upon seniority, giving officers in the upper echelons little incentive to retire and thus creating promotion stagnation due to the limited number of officer slots. Army officers remained in the junior ranks for as long as 20 years.[5] Between the Civil War and the end of World War II, systems underwent modification to include retirement incentives, selection boards, and time limits for each grade; nevertheless, they remained seniority-driven.[6]

These oscillations reveal a basic conflict of officer evaluation: Americans embrace the egalitarian notion that officers not born to titled families can be effective leaders, but the entrenched belief remains that the qualities of a good officer lie beyond the quantitative testing and measuring used to evaluate noncommissioned officers. Officers receive promotions based upon the judgment of other officers within a set of guidelines.[7] The fundamental struggle of officer evaluation entails finding a quantitative measure to compare the subjective judgments made about a large number of officers with many supervisors over a wide range of jobs.[8]

After World War II, the nation committed to more uniformity among the services and the development of a "young and vigorous officer corps."[9] Attempts at reaching these goals included establishing percentage quotas for each grade and "up or out" promotion opportunities. In September 1974, the Air Force instituted the officer effectiveness report (OER) and divided the service into about 300 review groups, in each of which raters could award officers numerical designations of 1, 2, or 3. However, only 22 percent of them could receive a 1, the highest promotion recommendation; 28 percent, a 2; and the remaining half received a 3.[10]

By May 1977, there were indications of improper manipulation of the controlled OER system. A year later, Air Force personnel overseeing the promotion board process concluded that the system was distorting evaluation and promotion. Test scorings of records revealed that hundreds of officers who should have received promotions did not because of the structure of the OER process. Congressional inquiries and internal Air Force investigations followed, culminating in the removal of the rating controls by order of Gen Lew Allen, the Air Force chief of staff, in October 1978.[11]

Over the next 10 years, the uncontrolled OERs developed their own rating scale. Since all officers could now be awarded the top rating of 1, most of them were. Soon, a rating of 2 or 3 became a clear signal to the promotion board that the officer should not advance. Rating all officers at the top created a "Lake Wobegon effect": according to their OERs, "all of the children are above average." To compensate for this nullification of the numerical system, raters sought higher-ranking additional raters to set their officers apart. Commands soon developed guidelines regarding what officers could expect for endorsement levels, given their rank and position.[12]

On 12 December 1980, Congress enacted the Defense Officer Personnel Management Act, which standardized regulations governing promotion, with the intent to "maintain a high-quality, numerically sufficient officer corps [that] provided career opportunity that would attract and retain the numbers of high-caliber officers needed [and] provide reasonably consistent career opportunity among the services."[13] In 1988 the Air Force initiated the Officer Evaluation System (OES), replacing the OER with three separate documents: Air Force (AF) Form 707A, Officer Performance Report (OPR), which evaluates the officer's current job performance; AF Form 707B, Promotion Recommendation Form (PRF), which rates his or her potential for higher rank; and AF Form 724A, Field Grade Officer Performance Feedback Worksheet, which provides confidential feedback between the officer and rater.[14] In its design, the OES acknowledged that doing one's current job well doesn't always indicate suitability for increased responsibility. It also created a parallel feedback system to the OPR that allowed raters to assess their officers' performance candidly while the official record of OPRs remained exemplary. That is, the OES system formalized the common practice of separating the extravagant praise of the OPR from the officer's actual performance.

Recent problems with the OES concern the system's constrained portion, the PRF, which evaluates the officer's suitability for advancement by awarding one of three ratings: definitely promote (DP), promote (P), or do not promote (DNP). The DP recommendation is constrained to 75 percent of officers under consideration for promotion to major, and 55

percent of officers under consideration for promotion to lieutenant colonel.[15] In December 1994, the Air Force announced it had confirmed problems at 22 bases involving improper procedures for awarding the controlled DP rating and for informally using a "top promote" rating, understood by raters and review board members to fall between DP and P. (Also known as the "Super P," the top-promote rating was often accompanied by comments such as, "If I had one more DP to give. . . .") This unofficial rating effectively devalued the P by inserting a superior, unofficial rating above it without burdening the rater with the attendant quota of DPs. System modifications designed to correct some of these inconsistencies limited the information that evaluators could see and the way they could gather opinions from fellow senior officers.[16]

Four Problems with the Officer Evaluation System and Possible Solutions

The OES represents a significant attempt to address issues in the OER, a recognizable step in the historical cycle of promotion schema. Nevertheless, the OES is not necessarily the optimal promotion system—one free of flaws. In fact, it suffers from several significant weaknesses.

Problems

First, as occurred with the OER, the numerical ratings on the OPR are nullified since almost all officers receive the rating "meets standards." This fact makes the rating useless as a point of comparison or a feedback tool, a fact acknowledged by the separate, confidential feedback and PRFs. In the absence of meaningful numerical ratings and the elimination of the OER's endorsement scale, the OES relies heavily upon the writing abilities of the rater. Official guidelines for writing performance reports create a separate and distinct language for these reports, using "stratification" phrases (discussed later in this article) and "push" statements. Although published OPR guidance states unequivocally that "promotion recommendations are prohibited in the OPR," guidance

from major commands endorses the use of push statements—recommendations for assignments that communicate a recommendation for promotion (e.g., "Air Command and Staff College now and then a tough joint job!").[17] Furthermore, according to the Headquarters Air Reserve Personnel Center's *EPR/OPR/PRF Writing Guide*, "While promotion statements are prohibited, an evaluator may make recommendations to select officers for a particular assignment, developmental education, or continuation (IAW [Air Force Instruction (AFI) 36-2406, *Officer and Enlisted Evaluation Systems*, 15 April 2005]). There is a fine line between an assignment recommendation and an implied promotion statement."[18]

Second, the OES postpones the actual evaluation of the officer until the process is nearly over. The scoring and ordering of officers take place at the promotion board, when the officer can no longer influence the outcome.

Third, the inflated ratings of the OES system not only devalue positive reports but also emphasize negative—or insufficiently laudatory—comments. The system assumes that no officer, at any time over the course of his or her career, will experience even a short period of less than stellar performance or conflict with a supervisor. If the latter does not wish to write effusively enough on the OPR, future promotion boards will note this lack of enthusiasm. In such cases, the rated officer has little recourse. One cannot appeal a favorable performance report simply because it wasn't sufficiently laudatory. Gen David C. Jones, Air Force chief of staff from 1974 to 1978, described the rating problem this way: "The effectiveness report system has become so inflated that far more people get perfect effectiveness reports than can be promoted. The promotion board is faced not so much in finding out who should be promoted, but who shouldn't be promoted. It's very difficult if somebody has a bad knock on his record to promote that person and not to promote somebody who doesn't have a bad knock on his record."[19]

Fourth, the OES system is not predictable. Since almost all officers present the promotion board with highly favorable evaluations, they have little basis for assessing their chances for advancement. This con-

cern is echoed in the debrief of recent promotion board results by Headquarters United States Air Forces in Europe: "Every board has seemingly inexplicable results. . . . The process is not well understood. We believe that the source of confusion is not only a lack of education on the promotion system, but a lack of realistic expectations as well."[20] Such unrealistic expectations and inexplicable results might emerge from language that one could construe as deliberately misleading—a possibility examined in more detail later in this article.

Possible Solutions

To make the promotion system honest and understandable, we must recognize four significant truths.

All jobs are not the same. The mission of the US Air Force involves delivering sovereign options for the defense of the United States of America and its global interests—to fly and fight in air, space, and cyberspace.[21] One may reasonably assume that every function within the Air Force contributes to the support of that mission. One may not reasonably assume that all jobs contribute to the mission equally—or that the officers holding those jobs should receive promotions at similar rates. During the recent attempts at budget reduction, service leadership eliminated numerous facilities and positions by applying exactly this criterion: given limited resources, which functions are most critical to the mission?

The Air Force considers an officer who flies a combat aircraft more critical to the mission than an equally skilled (comparatively) budget officer. Granted, the budget officer is important, and the mission will suffer without his or her position, but the service can still carry out its core functions by retaining the pilot and eliminating the budget officer. The reverse is not true. Similarly, the budget officer's job is more critical to the mission than that of an officer supervising a section in Morale, Welfare, and Recreation (MWR services). Again, the service would miss the MWR officer and the mission would suffer—but not to the extent that it would without the budget officer.

Although the current system avoids such comparisons during individual evaluations, when the promotion board meets, it quickly and methodically reduces the job descriptions to scores. All other factors being equal, the board will promote a pilot in preference to a budget officer, who will advance over an MWR officer, because of their relative effect on the mission.

All officers are not equal. Some people do better work than others. Although the current system includes the DP, P, and DNP ratings, the promotion decision actually depends upon the process of stratification, which "can be a statement of opinion, a ranking among peers, or can be reflected in a recommendation for an assignment, command, or [developmental education] opportunity."[22] Stratification uses structured statements to communicate the "relative strength of an officer" without the use of a numerical grade.[23] Ambiguity in the meaning and content of these statements led the Air Force to publish and revise the content and significance of the stratification statements, providing a Rosetta stone to decode the actual meaning of the rater's statements.

According to the *Officer Evaluation System: Training Guide*, the accompanying sample statements describe four strata of officer strength:

> Top:
> "My #1 of 12 . . . finest officer I've ever known"
> "Top 3% of my 35 Majors"
> "My #1 choice for [senior developmental education] now . . . big [group commander] next!"
>
> 2nd level:
> "Top 10% in wing"
> "Top 10% I've known in my career"
>
> 3rd level:
> "One of my best"
>
> Lowest:
> "Outstanding Officer"
> "Superior Officer"[24]

It is possible that a formal rating system which equates the meanings of "superior" and "lowest" and interprets the description "one of my best" as "3rd level" may not provide optimal clarity of meaning to either the promotion board or the ratee. Even in the favorable levels, significant ambiguity exists between "top 3% of my 35 majors" (mathematically "first") and "top 10% in wing." This deliberately created, somewhat Orwellian alternative language ("superior officer" equals "the lowest performing officer I know") exists in official guidance although not in the system's establishing regulations (e.g., AFI 36-2501, *Officer Promotions and Selective Continuation*). Though evidently created for a reason and a definable purpose, the nature of that purpose is not readily apparent.

Possible reasons for creating this language might include preserving the morale of the officer who receives a poor rating by describing his or her performance as "superior" or "outstanding"; hindering the ratee's ability to challenge or appeal the rating (the individual would have little basis for protesting the English meaning of "outstanding officer"); or relieving the rater of the possibly uncomfortable task of directly informing subordinates that their performance is deficient. However, the availability of the translation guide undermines all of these reasons. Moreover, this language might have arisen to remedy a problem in this or previous evaluation systems and has continued to exist as a vestigial feature. The unique language of performance reports may have an origin but not a purpose. Eliminating coded language and reclaiming meaningful numerical ratings would greatly clarify the rater's actual judgment and intent.

At some point, everybody has a bad day. No evaluation system can possibly maintain its integrity when the slightest hint of less-than-stellar performance—let alone failure—could mean the end of one's career. All officers, from those in the Punic Wars to participants in Operation Enduring Freedom, have made significant, costly blunders at some time during their careers: "When initiative is used there is often an element of risk involved, and often mistakes are made when risks are taken. The Air Force wants officers who will take risks."[25] The OES system actively discourages risk taking by making

the penalty for failure prohibitively high. Officers should be expected to make mistakes as they learn. The current evaluation system's almost 100 percent promotion opportunity to first lieutenant and captain acknowledges this expectation. Assuming a lieutenant's lack of experience, raters make the appropriate allowances in writing their performance reports. Unfortunately, many careers end when the young officer, having little maturity and perspective, antagonizes the rater and receives a less-than-effusive OPR. History has shown that some of the greatest American military leaders went against the conventional career paths at certain points in their careers, seeking unconventional opportunities that expanded their experience and made them more useful to the military profession.

Not every officer wants to be a general. The personal price of reaching the highest ranks is considerable. Competent, dedicated officers may decide that they are more motivated by family concerns, engaging duties, and desirable locations than by promotion to the highest ranks. This truth is the antithesis of the experience of many senior officers. No one becomes a general without trying very hard, for a very long time, to become one. Those who survive this competition may neither understand nor respect colleagues who choose a different path. The current promotion system—designed and enforced by officers who have reached the highest ranks—assumes that every officer strives for constant advancement. It does not value a competent, dedicated, productive major who does not actively attempt to climb much higher.

To empower subordinates, one must respect their choices. A transparent and predictable promotion system should make clear the path to higher rank and the relative costs of career (and life) decisions. A system that empowers the lowest affected echelon gives subordinates the opportunity, authority, and resources to do the job. If we trust our officers with so much that is vital to the nation, why do we hesitate to let them manage their own careers?

An Alternative System of Evaluation

The Air Force should adopt a simpler, more predictable, and more transparent system of evaluation and promotion that retains the current stated values and criteria. As a starting point, such a system would review each officer position and assign it a score for its value toward promotion. This will do nothing more or less than move this calculation from the opaque, subjective judgment of the promotion board to a standardized, systematic, and transparent process that makes these position ratings known to the officers filling them.

By means of a simplistic methodology, each position would carry a numerical rating (0 to 2) based upon its attributes in the stated criteria of supervisory responsibility, policy-making responsibility, specialized expertise, operational duty, and mission essentiality. Scoring each category from 0 to 2 produces a 10-point rating scale for the position (see table below). Headquarters Air Force will assign position scores; otherwise, major commands would maneuver for favor among their own personnel and fields.

Table. Example of possible position ratings for junior officers

Position	Supervisory Responsibility	Policy-Making Responsibility	Specialized Expertise	Operational Duty	Mission Essentiality	Total Position Score
Pilot	0	0	2	2	2	6
Budget Analyst	1	1	1	0	1	4
Maintenance Officer	2	0	1	1	2	6
Security Forces Officer	2	1	1	1	1	6
Public Affairs Officer	1	1	0	0	1	3
Civil Engineer	1	1	2	1	1	6

Such a scaling system likely will increase the value of operational jobs, slightly decrease staff positions, and generally assign lower ratings to base-level support positions. This quantitative rating will align well with the current position-description guidance, which assesses

the value of positions on their "level of responsibility, number of people supervised, dollar value of resources or projects . . . [and the] uniqueness of the job."[26] One may assume that officers are aware of the published guidance and the status of their positions compared to others filled by officers of similar grade. Further, daily interactions with both the formal and informal Air Force culture undoubtedly have made base-level support officers acutely aware that their career field positions are promoted at a lower percentage than operational and staff positions. Additional weighting factors, such as the ability to replace the officer with a civilian contractor or the location of the duty (in-theater and overseas versus the continental United States), may affect the determination of the position's operational value and essentiality to the mission.

This scale might value some positions so lowly that filling them with competent personnel becomes difficult. Such a situation raises the question of whether or not such positions properly require an officer or whether a noncommissioned officer or civilian contractor might prove more appropriate. Most importantly, members of the officer corps will know the value of their jobs in terms of promotion and be able to make rational, well-informed decisions about their future. Once again, some of these truths may seem harsh and adversely affect performance and morale. However, after applying for operational and staff positions, an officer assigned to administrative duties—possibly at an undesirable location—probably has already experienced such effects and a realization that he or she might be an "outstanding officer." Having more precise, quantified information will let these officers know what practical steps they may take to improve their position (such as performing their current duties in a manner worthy of a higher score and volunteering for an undesirable position assigned a higher score as an incentive).

The scale favors supervisory jobs directly related to operations. The same position may be rated differently in various locations, based on required levels of readiness, geographical demands of the position, pri-

vation, availability requirements, and so forth, as determined by Air Force needs at the service level. A maintenance officer in a forward location such as Korea may rate higher in mission essentiality than someone with the same position in Texas. The scale also rewards officers for assuming greater supervisory and policy-making responsibilities. As in the past, this is the preferred path to higher ranks.

Although the position itself carries its own weighted value, performance also will factor into the determination of promotion potential. Raters will score the officer's performance on a 1 to 3 scale, 2 representing competent performance of all duties. Establishing a requirement for significant justification of higher or lower ratings should give the performance score a strong central tendency. As the recent OPR analysis at US Air Forces in Europe observes,

> Fact: few officers' achievements truly stand out.
>
> Exceptions:
> —Combat . . . significant contingency participation
> —Functional or unit awards and recognition
> —Distinguished graduate distinction
> —Competitive selection for [command] opportunity
>
> INSIGHT: most often, the best that can be said about impact: "good, but not distinctive."[27]

To award a high grade of 3 for performance, the rater must specify examples justifying this rating for reviewers and board members. Similarly, scoring an officer as a poor performer demands the recording of specific failures. Administrative reviews of such a system should be geared to encouraging ratings of 2, save significant documented evidence of exceptional performance. Raters then multiply this performance value by the position score, yielding the total points—a score that will reward both increased job value and superior performance. Thus, a 3 performance in a job with a value of 4 will score the same as a 2 performer in a job rated 6. Officers can either accept highly valued jobs or perform well to contribute to their own advancement; doing both, of course, optimizes the possibility.

The armed services do have some experience in objective rating systems. At the conclusion of World War II, the services faced a crisis in managing a vast force whose primary goal was to get out of the service and go home. The Navy and Marines encountered isolated but disturbing incidents of rebellion when they forced veteran combat troops overseas to remain in service but released new recruits, still located stateside.[28] The Army solved this dilemma by hastily devising a point system. Troops received points for months in the service, months in combat zones, battle ribbons awarded, and various personal citations. This system clarified soldiers' situations, allowing them to quickly calculate the points they had earned and the number of months required to accumulate enough to leave the service. Furthermore, it was equitable, permitting those who had served the longest and in the most hazardous conditions to leave first.

Although not perfect, the point system was well received and quickly adopted by the other services, and demobilization proceeded to completion in an orderly manner. This discussion, however, proposes a system that optimizes the possibility of producing a stable, predictable evaluation process manageable over the long term, as opposed to one that makes dramatic changes to satisfy short-term budget and manning requirements. For example, what could be done if the Air Force projects a need to promote 300 captains to major in a given year, but 350 officers attain the required score for promotion? Management of the force over an appropriately long horizon should allow anticipation of this problem several years in advance. If the service deems the problem critical, then it might raise the required score for promotion in small, annual increments over several years and make the problem known early enough to captains who might be affected so they could take meaningful actions. If the potential for overage persists, the Air Force might adjust its assignment rotations and needs to accommodate the extra officers. If the problem still occurs, then the service should promote the high-scoring officers. Undermining the integrity of the system is far more damaging to the service than the marginal cost of the extra promotions. According to a basic tenet of management, one

should not incur long-term liabilities to satisfy short-term needs. After educating and training people for a decade, the Air Force should not sacrifice that investment, its potential future, and the faith of the officer corps in the system to meet the relatively small demands of the immediate circumstance.

Officers would undergo a performance rating at six-month intervals, thereby producing more reports than under the current system and diminishing the impact of each. Consequently, an officer could receive a poor rating during one period but improve it in the next, and his or her specific performance would not carry over. Raters must justify each rating with the performance only from the period of that report. The reports, much simpler than the current OPR, should reduce the administrative burden, even when produced more frequently. When this time period is divided between positions, administrative procedures will address the consultation between supervisors and the precedence of position scores. These anomalies will generally not prove significant since the system primarily seeks to dampen the effect of any single performance report.

Periods of training and education (Air Command and Staff College, technical school specific to a career field / position, Squadron Officer School, etc.) would be rated on the same criteria, but officers would acquire additional points for successful completion of the training. To prevent the continued addition of degrees for the purpose of inflating one's score, the system limits the number of times raters can award these points.

The officer would have time windows for promotion (one and a half to three years for first lieutenant, three to five for captain, and eight to 12 years for major). As officers reach specified longevity windows, their cumulative scores will be evaluated against an Air Force standard for promotion. The service reserves the right (though a limited one) to alter this standard to respond to its changing needs. Promotion is a long-term process, incorporating years of effort by the officer and investment by the Air Force. Standards for promotion should not re-

spond to volatility in short-term force-management concerns. Given the highly statistical nature of this system, the service should be able to control the rate of officer promotions to a high degree of precision while leaving the responsibility for realizing that standard squarely in the hands of the officers.

Promotion boards will remain to ensure quality control. An officer who has amassed a very high score does not, simply by virtue of having accumulated numbers, earn promotion while facing disciplinary actions. These boards will also offer a defense against raters who "game" this system, as has occurred in the past, requiring substantiation of sudden jumps in an officer's score just prior to a promotion deadline.

Although this process may seem too simple and objective for the complexities of evaluating leaders, it does—in a visible and systematic way—only what the promotion board does when it scores officer records. At that board, senior officers evaluate the candidate's job history and performance and score them. Air Force Pamphlet 36-2506, *You and Your Promotions*, specified the use of a nine-point scale to attain this quantification:[29]

Absolutely Superior	10
Outstanding Record	9.5
Few Could Be Better	9
Strong Record	8.5
Slightly Higher Than Average	8
Average	7.5
Slightly Below Average	7
Well Below Average	6.5
Lowest in Potential	6

The current OES training guide implements the alternative four-tiered stratification scale for quantifying OES language and offers seven separate strategies for creating word descriptions that help quantify performance.[30] This raises the question of why the rater does not quantify performance, assigning it a numeric value instead. This approach might remove ambiguity and provide transparency, with all parties knowing the rules and having an opportunity to influence the outcome.

Moreover, numerical grading by the direct supervisor most effectively captures the subjective aspect of the promotion process implied in AFI 36-2501: "A promotion is not a reward for past service; it is an advancement to a higher grade based on past performance and future potential."[31] The supervisor is the closest participant in the process with personal knowledge of the officer under evaluation and has directly observed his or her ongoing performance. A quantitative grade that captures each rater's subjective assessment of the officer's performance and potential over the course of his or her career would provide a more accurate, balanced, and ongoing judgment than a single, subjective assessment by officers many degrees removed, interpreting ambiguous language authored by raters of varying writing skills.

Transition

Converting the entire system once again, as in past transitions, involves some effort. However, the rescoring of past OPRs to the new format should prove relatively simple. If implemented, the promotion board process will remain essentially the same with very minor adjustments. A central board will rate officer positions for scores, after which a second series of boards will review the officer's OER/OPR records and assign a rating of 1, 2, or 3 to each six-month performance period. Statistical sampling of past records would also allow the service to establish promotion-score standards that will accurately mirror past promotion rates.

Conclusion

On the one hand, this system clearly offers a number of benefits, especially that of showing all officers where they stand at every point in their careers. Moreover, the service would set scores for promotion according to its needs (similar to the percentages now associated with promotion potential). An F-15 pilot would know the consequences of refusing to leave the cockpit for a supervisory position. The value of

military education and advanced degrees would be clear. Less-than-perfect ratings on any single report would not prove fatal. Superior performance in a single position, though certainly beneficial to promotion, would not guarantee higher ratings in future positions. The system would vastly reduce the influence of the rater's writing skills. The promotion board would still exist as a quality check, but officers would finally feel that they are driving their careers, answering only to themselves with regard to reaching or not reaching their goals. The sometimes "paternalistic" role of the Air Force Personnel Center in guiding officers' careers would diminish, and speculation about what the promotion board actually wants would finally end. Officers sitting on the boards would benefit from the simplified and less ambiguous language of the raters' comments and from the clearer meaning of the promotion language at the time reports were written (stratification language today might mean something completely different than it would a decade from now).

On the other hand, in this system, some jobs will not facilitate promotion, and the officers in them likely will move. Certainly, we already know this, but admitting it will take an unaccustomed degree of candor. Measured objectively against other positions, jobs formerly on the fast track may be downgraded. Thus, in terms of their positions, officers will have a much clearer picture of their chances of promotion. The current system allows 18 months from the first notification of promotion denial to final discharge from the service—a great difficulty to overcome.

Additionally, the present system can adversely affect morale because officers cannot control, much less predict, a process that offers them little to no information with which to make informed choices. Provided with a clear, simple system, officers may respond favorably and maturely. Altering established ways of doing business calls for some adjustment, but many of these practices are the source of disaffection among some members of the officer corps now. The nation trusts Air Force officers to control nuclear weapons, manage billions of

dollars, and guard our security. Perhaps it's time to trust them to guide their own careers as well. ✪

Notes

1. Air Force Personnel Center, *Officer Evaluation System: Training Guide* (Randolph AFB, TX: Headquarters Air Force Personnel Center / DPSIDE, 29 June 2009), 4, http://www.jber.af.mil/shared/media/document/AFD-120105-080.pdf.
2. Richard Holmes, "The Soldier's Trade in a Changing World," BBC, 28 February 2005, http://www.bbc.co.uk/history/trail/wars_conflict/soldiers/soldier_trade_in_world_05.shtml.
3. Richard Mullins, "History of the Infantry," Combat Infantrymen's Association, 2010, http://cibassoc.com/history/history-of-the-infantry/.
4. "Journals of the Continental Congress, 1774–1789: Friday, December 27, 1776," Library of Congress, accessed 5 February 2012, http://memory.loc.gov/cgi-bin/query/r?ammem/hlaw:@field%28DOCID+@lit%28jc00661%29%29.
5. Bernard Rostker et al., *The Defense Officer Personnel Management Act of 1980: A Retrospective Assessment* (Santa Monica, CA: RAND, 1993), 75, http://www.rand.org/content/dam/rand/pubs/reports/1993/R4246.pdf.
6. Ibid., 75–93.
7. See Air Force Instruction (AFI) 36-2501, *Officer Promotions and Selective Continuation* (incorporating changes 1–3, 17 August 2009), 16 July 2004, http://www.e-publishing.af.mil/shared/media/epubs/AFI36-2501.pdf.
8. Ibid.
9. Rostker et al., *Defense Officer Personnel Management Act*, 90.
10. Neff Hudson, "Ruined Careers," *Air Force Times*, 13 June 1994, 12–14.
11. Ibid.
12. Air Force Pamphlet 36-2404, *Guide to the USAF Officer Evaluation System (OES)*, 1 December 1996 [now obsolete].
13. Rostker et al., *Defense Officer Personnel Management Act*, 1.
14. LCDR Jay S. Lewis, USN, "Military Officer Appraisal: An Examination," research report (Maxwell AFB, AL: Air Command and Staff College, April 1999), 15–16, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA395121&Location=U2&doc=GetTRDoc.pdf.
15. AFI 36-2501, *Officer Promotions and Selective Continuation*, 18, 21.
16. AFI 36-2406, *Officer and Enlisted Evaluation Systems*, 15 April 2005 (incorporating through change 3, 11 October 2011), 15, http://www.e-publishing.af.mil/shared/media/epubs/AFI36-2406.pdf.
17. United States Air Forces in Europe (USAFE), "Performance Reports," GoogleDocs folder, AFMentor.com, 2011, accessed 3 February 2012, https://docs.google.com/viewer?a=v&q=cache:mONlV99oGJMJ:afmentor.com/multi-media/slides/eproprUSAFEBoardSecretaria.ppt+performance+report+push&hl=en&gl=us&pid=bl&srcid=ADGEEShFcgQL9ri1amL-M6rDi4L5m7ipnZDxl4Ax6ffj09Ieowr2kM3iYwZajf2HBq64vrYDoQeo3XqtuexhmLTkUHQ4L7Y

CVsFVdKHSD_n-diccor7sfh4Jf24-HtTmtDr1jzP2zgCH&sig=AHIEtbTulBT3eVZPTT1KkJgAaf68BlvZcQ.

18. Headquarters Air Reserve Personnel Center, *EPR/OPR/PRF Writing Guide* (Buckley AFB, CO: Headquarters Air Reserve Personnel Center, 1 June 2008), 14, http://www.arpc.afrc.af.mil/shared/media/document/AFD-070607-086.pdf.

19. Edgar F. Puryear Jr., "Is This a One-Mistake Air Force?," in AU-24, *Concepts for Air Force Leadership*, ed. Richard I. Lester (Maxwell AFB, AL: Air University Press, 2008), 359.

20. USAFE, "Performance Reports."

21. MSgt Mitch Gettle, "Air Force Releases New Mission Statement," Air Force Print News, 14 December 2005, http://www.af.mil/news/story.asp?id=123013440.

22. Air Force Personnel Center, *Officer Evaluation System*, 11.

23. Ibid., 12.

24. Ibid.

25. Puryear, "One-Mistake Air Force," 357.

26. Air Force Personnel Center, *Officer Evaluation System*, 8.

27. USAFE, "Performance Reports."

28. William Manchester, *The Glory and the Dream: A Narrative History of America, 1932–1972* (Boston: Little, Brown, 1974), 406–9.

29. Air Force Pamphlet 36-2506, *You and Your Promotions: The Air Force Officer Promotion Program*, 1 September 1997, 11, http://www.e-publishing.af.mil/shared/media/epubs/AFPAM36-2506.pdf.

30. Air Force Personnel Center, *Officer Evaluation System*.

31. AFI 36-2501, *Officer Promotions and Selective Continuation*, 12.

Maj Kyle Byard, USAF, Retired

Major Byard (USAFA; BS, University of North Dakota; MBA, Western New England College; MS [Cost Analysis], Air Force Institute of Technology; MS [Environmental Engineering], Air Force Institute of Technology) is a vice president for Tetra Tech, a multinational, publicly traded corporation that offers professional engineering and consulting services. He retired from the Air Force after a career that included security forces, missile treaty inspection, and environmental engineering. Major Byard is coauthor of *McClellan Air Force Base*, Images of America Series (Arcadia Publishing, 2007).

Ben Malisow

Mr. Malisow (USAFA; MBA, University of Phoenix) is a project manager and an information technology security consultant. He is the author of *Terrorism* (Chelsea House, 2008); *1,001 Things to Do If You Dare* (Adams Media, 2012); and many articles and columns.

Col Martin E. B. France, USAF

Colonel France (USAFA; MS, Stanford University; MS, National Defense University; PhD, Virginia Polytechnic and State University) is permanent professor and head of the Department of Astronautics, United States Air Force Academy. His professional experience includes research and development assignments with the Air Force Research Laboratory. He also served as a program manager at the Defense Advanced Research Projects Agency and as a staff officer at Air Force Space Command, the Air Staff, and on the Joint Chiefs of Staff. Colonel France has published technical, policy, and strategy papers in numerous journals. He is a graduate of Squadron Officer School, Air Command and Staff College, and the National War College (distinguished graduate).

Let us know what you think! Leave a comment!

KWar

Cyber and Epistemological Warfare—Winning the Knowledge War by Rethinking Command and Control

Mark Ashley*

In the movie *Patton*, George C. Scott, who plays Gen George S. Patton, outmaneuvers German field marshal Erwin Rommel, proclaiming, "Rommel, you magnificent bastard; I read your book!" That book, *Infanterie Greift An* (*Infantry Attacks*) (1937), gave Patton insight into how Rommel would behave in battle, and he used that knowledge to his ad-

*I would like to thank Robert Bivins and Richard Szafranski for their contributions to this article.

versary's disadvantage. This article takes that thinking a little further, asserting not only that we must understand our adversaries but also that we should become more agile than they by rethinking our whole approach to command and control (C2). To be more agile, we need to build synchronized and centralized situational awareness as well as decentralized C2 (DC2) and execution systems and concepts of operations.

Specifically, this article aims to give greater meaning to and provoke additional thought about a more recent war-fighting concept—knowledge-centric warfare (KCW), also known as "KWar"—which can produce strategic effects.[1] Ultimately, it seeks to convince the reader that in today's network-centric battlespace, the victor must not simply attack and exploit the enemy's cyber and communication systems at the tactical level but completely understand the information environment. The winner will use the knowledge gained from understanding that environment in a highly adaptive and responsive manner to attain a strategic advantage, doing so by means of synchronized and shared situational awareness together with a DC2 structure. These conditions occur when decision makers and war fighters fully understand and coordinate the commander's intent over a greater volume of space and time within an operating environment. After realizing this shared situational awareness, we can enable and accelerate DC2 and execution to stay inside the adversary's decision-and-action loop.

With Knowledge Comes Awareness

Today's military leaders continue to look for and advance new ways of making warfare highly adaptive to the forces of knowledge—of training soldiers to use their minds (brain force) to fight innovatively with novel (although still brute-force) weapons without a centralized, rigid C2 structure to get in the way. As the revolutionary driving force of the Third Wave "knowledge age," technology (more specifically, information technology) is changing the face of combat in the twenty-first century. This endless quest for information and knowledge stands to fundamentally change how we wage warfare. In conflict, victory will

belong to the side that acquires knowledge faster, understands its true value, and applies it more adaptively.

To make sense of the drastic technological progression occurring in today's "information age," we must have an appreciation for information and know its origins and value. For our purposes, we define information as a collection of facts or data that, when placed in context, provides meaning derived from the full range of sensory perceptions. In many cases, we use information as an asset that can improve the quality of life by connecting us to other people and events. We should also recognize, however, that people can use information today, even more so than in the past, to gain a strategic advantage: " 'In war information . . . is the single most significant military factor . . . for controlling the battlespace. . . . Information is the organizing principle of war and postmodernity."[2] Additionally, we must note that "even if one has perfect information it is of no value if it is not coupled to a penetrating understanding of its meaning. . . . Judgment is key. . . . It is not necessarily the one with more information who will come out victorious, it is the one with better judgment, the one who is better at discerning patterns."[3] Only when we can discern these informational patterns and associate them with other patterns can we create knowledge. When centralized, easily accessible, and consumable, this knowledge can generate shared situational awareness.

All of these dimensions of knowledge are changing simultaneously, at speeds never before encountered and thus "demand much faster, smarter decision-making under more and more complex, if not chaotic, conditions" (fig. 1).[4] Given the importance of information and its use in creating knowledge, we should more closely look at the origins of knowledge itself—the epistemological elements based on our observations and beliefs that allow us to interpret information, rightly or wrongly. Epistemology is just this, the study of the nature and origin of knowledge and its validity. According to Richard Szafranski, epistemology is, quite simply, "everything a human organism—an individual or a group—holds to be true or real, no matter whether . . . [it] was ac-

quired as knowledge or as a belief."[5] Based on whether we find something true or real, our knowledge foreshadows our behavior, and in order to understand human behavior, we must take into account what the environment does and how organisms react. To understand an adversary's systems and environment, we can take epistemology—the origins and evolution of our knowledge that include proven theories and observations—and then apply it to cybernetics, which focuses on how systems function, regardless of whether that system is living, mechanical, or social.[6]

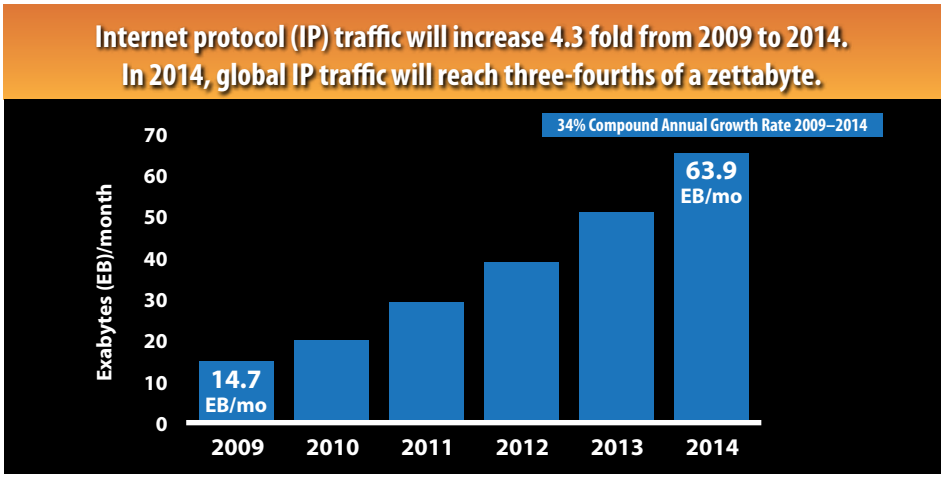

Figure 1. Global growth of Internet protocol traffic. (Adapted from Stacey Higginbotham, "The Zettabyte Era Is Getting Closer," GigaOM, 2 June 2010, http://gigaom.com/video/the-zettabyte-era-is-getting-closer. "A bit is a single binary digit, zero or one. A byte is eight bits. . . . An exabyte is 1024 petabytes which is about 1.15 * 10^18 [10^{18}] bytes. A zettabyte is 1024 exabytes which is about 1.18 * 10^21 bytes." Answerbag, 10 January 2005, http://www.answerbag.com/q_view/13291.)

The Concept of Knowledge-Centric Warfare

The final development of Third Wave war may well be the conscious design of something the world has not yet seen: competitive knowledge strategies.

—Alvin and Heidi Toffler

As it concerns the military's operating in today's information domain, "at the strategic level, the aim of a 'perfect' information warfare campaign is to influence adversary choices, and hence adversary behavior, without the adversary's awareness that choices and behavior are being influenced."[7] Thus, in any discussion of plans that emphasize manipulating adversary choices and behavior, we have the benefit of briefly revisiting John Boyd's observe, orient, decide, act (OODA) loop (fig. 2) and his supporting strategy, which "ties cognition to action designed to infiltrate the opponent's decision cycle."[8] Boyd posits that human behavior can be understood in terms of the mental processing of information, but he rejects the notion that we can see the brain as an information-processing device, "for the human mind thinks with ideas, not with information."[9] A closer examination of the cycle reveals

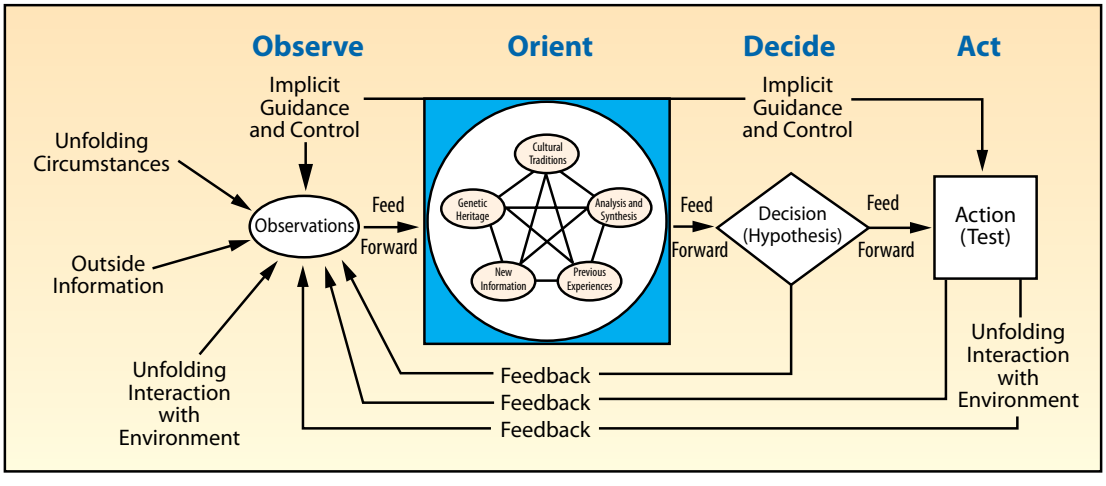

Figure 2. John Boyd's OODA loop. (Adapted from Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* [London: Routledge, 2007], 231.)

that Boyd's strategic theory points to observation as the method used to reveal events and identify change, or the lack thereof, within other people's environments and the world around them. Orientation represents our perceptions of reality and observations—"the images, views and impressions of the world shaped by *genetic heritage*, *cultural traditions*, *previous experiences*, and *unfolding circumstances*" (emphasis in original)—which shape the way we interact with the environment.[10] Orientation, in other words, frames the way we observe, the way we decide, and the way we act.[11] Based on observations, we must then make appropriate decisions that correspond with our objective, ideally improving the capacity for action.

Ultimately, the strategic goal calls for constantly changing the enemy's perception of reality so much that he becomes mired in uncertainty and disorder due to the overwhelming contradictions of inconsistent ideas and interactions, thus causing him to make erroneous decisions. The aim of penetrating the enemy's OODA loop closely reflects military deception operations conducted at the strategic, operational, and tactical levels, defined in Joint Publication 3-14, *Space Operations*, as "those measures designed to mislead the enemy by manipulation, distortion, or falsification of evidence to induce the enemy to react in a manner prejudicial to the enemy's interests."[12] In essence we attack the adversary's ability to create knowledge from information, otherwise known as KCW.

Why is this critical, and what does all this have to do with cyber warfare? Focused primarily at the tactical level, cyber operations try to infiltrate and disrupt an adversary's computers and networks. However, although we continue to make great strides in improving both offensive and defensive cyber capabilities, we must now lift our sights from the tactical to the strategic level. We can do this by recognizing the full potential and strategic implications of utilizing our knowledge to suppress and reduce the enemy's knowledge and channels for information by penetrating his decision cycle and influencing his observations and perceptions. To do so, KCW needs to target and successfully distort

what Alvin and Heidi Toffler call "truth filters," used to validate one's observations and beliefs.[13]

A shift from information-centric warfare to KCW is now well under way, due in large part to the amazing new technologies appearing on and above the battlefield—a fact that we need to realize and embrace. Such technologies, though, have accelerated the decision cycle because, as massive amounts of data come in faster, we must make decisions more quickly. This dynamic change is not limited to the battlefield but transcends the chain of command to the highest levels, underlining the growing requirements for increased synchronization. Obtaining this shared and synchronized situational awareness requires greater trust from leadership and more empowerment of subordinate leaders as well as introductions of new, emerging technologies (fig. 3).[14]

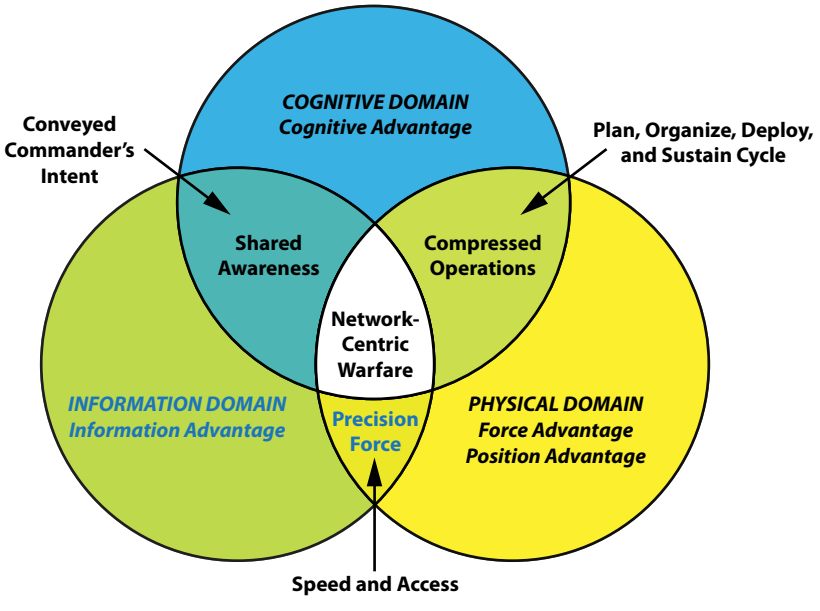

Figure 3. Information age warfare: Domains of conflict. (From Dr. Paul W. Phister Jr. and Mr. Igor G. Plonisch, *Information and Knowledge Centric Warfare: The Next Steps in the Evolution of Warfare* [Rome, NY: Air Force Research Laboratory, Information Directorate, n.d.], 7, http://www.dodccrp.org/events/2004_CCRTS/CD/papers/188.pdf.)

Because decisions increasingly depend upon the constant barrage of data and information, we must know what is real and what is not. Consequently, the Tofflers contend that individuals in certain cultures and societies use any of six accepted criteria, or filters, to validate their beliefs:

1. Consensus: something deemed true through conventional wisdom.
2. Consistency: something that assures truth if the supporting facts harmonize with other facts.
3. Authority: something authenticated by a leadership figure.
4. Revelation: something assumed true and not subject to debate.
5. Durability: something that confirms inherited facts which have stood the test of time.
6. Science: something that ascertains truth through rigid tests and experiments.[15]

The utility of certain truth filters lends to the unique orientation of different cultures. We should note here that increases in the distance between two distinct cultures make the orientation of those cultures more difficult to understand. For instance, American citizens of European descent would find it easier to grasp how the British orient themselves, as opposed to the Arabs, Iranians, or Chinese.[16] In fact, with regard to cyberspace, the Chinese provide a clear example of how our orientations differ in that they approach "information security" as a broad concept that involves regulating content, whereas we narrowly concentrate on "cyber security" to protect our communications and critical networks.[17] Thus, to fully prepare ourselves against present and future threats projected from an ever-growing array of asymmetric capabilities, we must truly understand not only which criteria our adversaries use but also (and more importantly) how the selection of such truth filters validates certain beliefs on which their cultures are built and oriented.

If senior officers wish to have a better understanding of the enemy's orientation, they must improve their grasp of local conditions on the

ground. As P. W. Singer explains, "new technologies may give them an unprecedented view of the battlefield and the ability to reach into it as never before, but this view remains limited," creating danger because "you get too focused on what you can see, and neglect what you can't see. . . . And a lot of the time, what's happening elsewhere is more important."[18] Additionally, given the higher operational tempo demanded on today's battlefield, the enemy no longer affords the general several hours to watch video and analyze information prior to making a decision.[19] Commanders now need to make decisions in real time, as fast as the situation arises.

Acquiring a better understanding of our adversaries' orientation, which shapes the local context on the periphery of the battlefield, demands that we give stronger consideration to creating a more agile DC2 structure, allowing generals to give field officers greater initiative to supply a more comprehensive picture of the battlespace. This image, in turn, enables the desired synchronized and shared situational awareness that generals must have to make more effective strategic decisions. The current austere environment of US defense investment, caused by budget constraints, means that we must do more with less. For that reason, we have to think beyond cyber-based maneuvers at the tactical level and focus on adapting and perfecting our KCW capabilities at the strategic level in order to compete effectively. In KCW, the victor will strategically target and successfully affect the opponent's truth filters, which the latter uses to validate beliefs and knowledge that guide his decisions. We can produce this effect only by means of synchronized and shared situational awareness as well as DC2 and execution.

Social media can greatly aid in the development of in-depth understanding of adversarial truth filters. Social media tools for using "science" to affect the other truth filters—consensus, consistency, authority, revelation, and durability—abound, and few are "military." One social media information organization lists more than two dozen such tools, which include (1) online profiles and online connections; (2) people,

online groups, and new media; (3) e-mail; (4) websites; (5) e-commerce; (6) web conferencing; (7) online video; (8) instant messaging; (9) online communities; (10) podcasts; (11) mobile phones; (12) wikis; and (13) blogs.

Yet each of these tools, to one degree or another, can have a "military" instantiation to create arsenals of superior knowledge and affect an adversary's truth filters. To what degree was nascent KWar evident during the Arab Spring? According to Kate Taylor,

> After analyzing more than three million tweets, gigabytes of YouTube content and thousands of blog posts, a new study has concluded that the Arab Spring truly was fueled by social media. "Our evidence suggests that social media carried a cascade of messages about freedom and democracy across North Africa and the Middle East, and helped raise expectations for the success of political uprising," says Philip Howard, an associate professor in communication at the University of Washington.[20]

Knowledge-Centric Warfare Applied

Successful application of KCW depends upon its organization. Adm Arthur Cebrowski and John Gartska, who introduced the notion of network-centric warfare (NCW) in 1998, observe that synchronization is the "operating of entities in the absence of traditional hierarchical mechanisms for command and control," serving as the "link between shared situational awareness and mission effectiveness." Synchronization "is the ability of a well-informed force to organize and synchronize complex warfare activities from the bottom up."[21] Their creation of NCW has certainly had strong theoretical merit over the years; nevertheless, we continue to have difficulty operationalizing the concept of synchronization, perhaps because the traditional hierarchical, top-down structure among the strategic, operational, and tactical levels still remains.

Rather than the NCW bottom-up approach, KCW seeks to obtain and expand synchronized situational awareness across a wider landscape of the battlefield, offering a more detailed picture of the operating en-

vironment. The use of new operating concepts and technology facilitates a shared understanding of that environment across a DC2 structure that enables delivery of more relevant and timely information to the participants anywhere and at any time, yielding the desired effect of synchronized situational awareness (fig. 4). In decentralized systems, "there is no one central executive or leader directing every aspect of the battlefield, but rather responsibilities are distributed, culminating in an emergent coordination structure based on input from many different perspectives of global terrain. This functionality comprises a general organizational strategy applicable over a wide range of complex tasks."[22] The concept of DC2 envisions a learning organization, shifting from the traditional top-down hierarchy towards a more cylindrical framework that permits greater agility in the face of constantly changing circumstances. In this new arrangement, generals trust their subordinates to adapt to new concepts and technologies, thereby establishing a fully synchronized situational awareness.

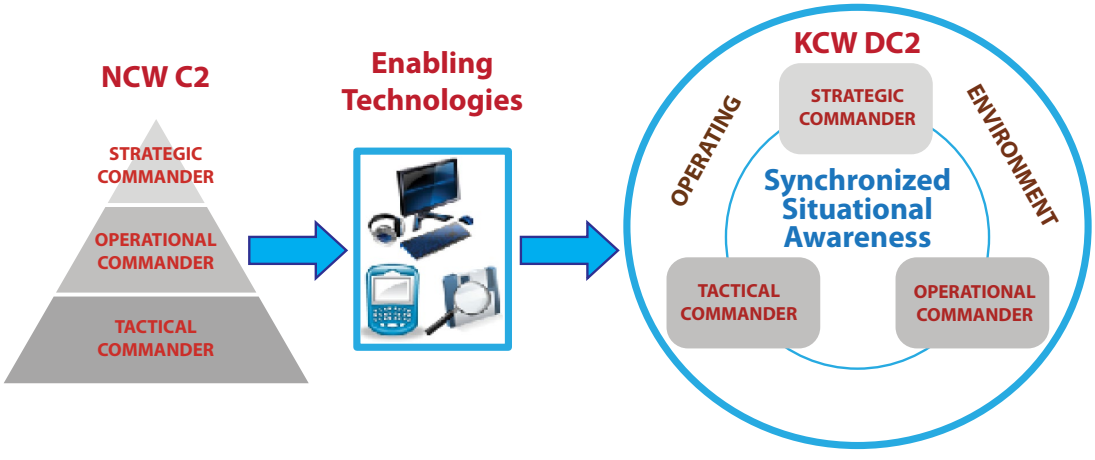

Figure 4. Decentralized command and control

Building on the thesis of Phillip Kao's article "Operationalizing Knowledge," we see that the utility of DC2 resides in the concept of a closer, more coordinated fusion of the strategic and operational levels that support the tactical level in an effort to execute strategic, high-level

functions in a flexible and adaptive manner.[23] The success of military operations depends on assured, reliable, and effective synchronized situational awareness facilitated through DC2 at every military echelon, from the continental United States to the forward-deployed war fighter.

War today goes well beyond the kinetic campaign maneuvers of the battlefield and has a much broader scope that includes postconflict objectives, joint training exercises, economic development, and nation building, all of which require military commanders to serve as both advisers and consultants with supporting subject-matter experts and ad hoc entities. In terms of shaping KCW and related efforts to create DC2 that fosters improved intelligence analysis and effective situational awareness, numerous consulting engagements that run advanced analytics across the commercial and public sectors have enjoyed great success. Given that intelligence analysis concerns itself with knowledge competition, efforts such as these have directly contributed to creating the shared and synchronized situational awareness of the environment. They do so by utilizing methodologies that not only focus on identifying the adversary's unknown biases and values but also aim to answer the key intelligence question in an effort to provide critical insights in a compressed time frame.

With regard to cyber warfare, the fact that commercial and military systems are not impervious to viruses and data corruption by way of sabotage makes the thrust towards developing KCW capabilities all the more pertinent. Some of the key technology areas of KCW include advances in (1) cognitive reasoning, which deals with understanding human-technology interactions and strives to grasp the cognitive skills underlying behavior, such as problem solving, decision making, and assessment; (2) behavioral modeling, which involves the study of how the human brain functions, reasons, and assesses data, information, and knowledge—a process that machines can mimic, offering more human-like alternatives for a decision maker to consider; and (3) self-learning knowledge extraction, which attempts to develop an automated capability to reason, infer, and discover knowledge implicit in extracted information.[24]

As these capabilities become more integrated, we might foresee something similar to IBM's Watson computer put to use in military cyber, network, and knowledge domain operations. Watson could search and process a tremendous amount of data in less than six seconds per question, outthinking even the smartest contestants on the trivia game show *Jeopardy!* Imagine how this computer's advances in deep analytics and its ability to process unstructured data as well as interpret natural language could be tailored to fit the requirements of new solutions in obtaining knowledge dominance in the cyber battlespace.[25]

Here, we envision a scenario in which a remotely piloted vehicle photographs insurgent activity and then forwards the image to Watson for what one might call an "übersource" assessment—a fusion of all-source intelligence (e.g., human, signals, electronic, geospatial, etc.) augmented by predictive analysis on related environmental, political, economic, and cultural conditions—thus providing the precise, shared situational awareness needed for commanders to make more efficient and better-informed decisions. Lt Gen Michael Flynn, nominated by President Obama to become director of the Defense Intelligence Agency, advocates looking beyond the collection of battlefield intelligence and insurgent activity. Specifically, he urges that we investigate the possibility of successfully attaining the desired full-spectrum intelligence and situational awareness that accounts for all relative environmental conditions in a decentralized command structure.[26]

How Do We Implement Knowledge-Centric Warfare?

Herein lies a working theory and construct that offers an approach to a new strategic command framework that will better accommodate and accelerate the acquisition and distribution of information and knowledge across the battle sphere. The fact that conflicts are becoming more globally interconnected demands new conceptual thinking from military leadership and subject-matter experts, presenting a unique opportunity to embrace a new C2 structure for greater success across future complex conflicts.

The Department of Defense's fiscal circumstances have changed our strategic priorities and made our joint force smaller and leaner. To maintain our military superiority in a world where complex conflicts occur across a greater expanse of the globe, we will need new operating concepts, one of which calls for a more dispersed and decentralized command structure across all domains. This creates the agility necessary to respond to a myriad of contingencies at any given time. A flatter command framework that demonstrates agility with an emphasis on human behavior will gain the competitive advantage in knowledge in a rapidly changing, complex environment.

This emphasis on human behavior remains central to KCW, attained by creating knowledge derived from a comprehension of what people value and why they value it within their environment. By completely understanding the adversary's truth filters—what shapes their perceptions, observations, biases, and beliefs—and by using this knowledge adaptively, we gain the desired situational awareness demanded at all levels of command. We will dominate the knowledge sphere once we have a genuine understanding of what our adversaries value and how those values drive their intentions and motivations within their environment.

In the networked-connected wars of the twenty-first century, new operating concepts and advanced war-fighting technologies are shaping "an environment 'where the strategic, operational, and tactical levels of war can at times be so compressed as to appear virtually as a single function.' "[27] Winning in this environment necessitates the speed of execution based on a shared knowledge that enables the commander to contest the enemy in each of these levels in near-simultaneous fashion.

The very essence of this article concerns the need to know what and why. A new, decentralized command structure that delivers accurate and timely intelligence will give modern commanders a fuller awareness of their environment. When we attain such awareness and always know the answers to what and why, we will have achieved the knowledge dominance that we seek. ✪

Notes

1. For the idea of KWar, see Alvin Toffler and Heidi Toffler, *War and AntiWar: Survival at the Dawn of the 21st Century* (Boston: Little, Brown and Company, 1993), 8, 9.
2. Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (London: Routledge, 2007), 244. I am grateful to Dr. Frans Osinga for his profound understanding and eloquent articulation of John Boyd's thinking.
3. Ibid., 36.
4. Alvin Toffler and Heidi Toffler, *Revolutionary Wealth* (New York: Knopf, 2006), 104, 105.
5. Col Richard Szafranski, "A Theory of Information Warfare: Preparing for 2020," *Airpower Journal* 9, no. 1 (Spring 1995): 60.
6. Osinga, *Science, Strategy and War*, 57, 72.
7. Szafranski, "Theory of Information Warfare," 60.
8. Osinga, *Science, Strategy and War*, 8.
9. Ibid., 77.
10. Ibid., 84.
11. Ibid., 193, 230.
12. Joint Publication 3-14, *Space Operations*, 6 January 2009, GL-6, http://www.dtic.mil/doctrine/new_pubs/jp3_14.pdf.
13. Toffler, *Revolutionary Wealth*, 123.
14. Dr. P. W. Singer, "Tactical Generals: Leaders, Technology, and the Perils of Battlefield Micromanagement," *Air and Space Power Journal* 23, no. 2 (Summer 2009): 78–87.
15. Toffler, *Revolutionary Wealth*, 123–28.
16. Szafranski, "Theory of Information Warfare," 59.
17. Adam Segal, "Chinese Computer Games: Keeping Safe in Cyberspace," *Foreign Affairs* 91, no. 2 (March/April 2012): 14–20.
18. Singer, "Tactical Generals," 81.
19. Ibid.
20. Kate Taylor, "Arab Spring Really Was Social Media Revolution," *TG Daily*, 13 September 2011, http://www.tgdaily.com/software-features/58426-arab-spring-really-was-social-media-revolution.
21. B. J. A. van Bezooijen, P. J. M. D. Essens, and A. L. W. Vogelaar, *Military Self-Synchronization: An Exploration of the Concept* (Netherlands: Tilburg University, n.d.), 2, 4, http://www.dodccrp.org/events/11th_ICCRTS/html/papers/065.pdf.
22. Jamie Gorman, Nancy Cooke, and Jennifer Winner, "Measuring Team Situation Awareness in Decentralized Command and Control Environments," *Ergonomics* 49, nos. 12–13 (October 2006): 1312–25.
23. Philip Kao, "Operationalizing Knowledge: A New Chapter in the Saga of US War Fighting and Cognition," *Air and Space Power Journal* 26, no. 3 (May–June 2012): 31–44, http://www.airpower.au.af.mil/digital/pdf/issues/2012/ASPJ-May-Jun-2012.pdf; and Gorman, Cooke and Winner, "Measuring Team Situation Awareness."
24. Dr. Paul W. Phister Jr. and Mr. Igor G. Plonisch, *Information and Knowledge Centric Warfare: The Next Steps in the Evolution of Warfare* (Rome, NY: Air Force Research Laboratory, Information Directorate, n.d.), 14, 16, http://www.dodccrp.org/events/2004_CCRTS/CD/papers/188.pdf.

25. "Watson—A System Designed for Answers: The Future of Workload Optimized Systems Design," IBM, accessed 19 May 2012, https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=stg-600BE30W.

26. Maj Gen Michael T. Flynn, USA; Capt Matt Pottinger, USMC; and Paul D. Batchelor, DIA, *Fixing Intel: A Blueprint for Making Intelligence Relevant in Afghanistan* (Washington, DC: Center for a New American Security, January 2010), http://www.cnas.org/files/documents/publications/AfghanIntel_Flynn_Jan2010_code507_voices.pdf.

27. Singer, "Tactical Generals," 83.

Mark Ashley

Mr. Ashley (BA, George Washington University; Graduate Certificates, Texas A&M University) is a consultant with Toffler Associates. He originally worked as a cameraman in the film industry shooting high-profile movies such as *The Perfect Storm* and television shows such as *The X Files*. After the terrorist attacks of 11 September 2001, he earned a degree and certificates in international affairs and advanced international affairs with concentrations in counterterrorism and intelligence studies. He has studied at the Middle East Institute and the US Foreign Policy Institute in Washington, DC, and attended the Arabic Language Institute and Al-Akhawayn University in Ifrane, Morocco. Prior to joining Toffler Associates, Mr. Ashley worked as an artificial intelligence engineer with the MITRE Corporation in the Center for Integrated Intelligence Systems and with the MASY Group, supporting the US intelligence community by conducting surveillance training and practical exercise assistance related to antiterrorism and countersurveillance. His present focus area is military and business competitive strategies, especially as they relate to China. Mr. Ashley resides in Arlington, Virginia.

Let us know what you think! Leave a comment!

From the Air

Rediscovering Our Raison D'être

Dr. Adam B. Lowther
Dr. John F. Farrell

After 10 years of witnessing a US focus on land-centric conflicts, commanded mostly by Army and Marine generals, the American public and even a number of Airmen understandably are beginning to believe that the primary purpose of the Air Force is to support land forces. Indeed, the Army began promoting this concept vigorously more than a decade ago by expounding a vision of war involving decisive land forces and a supporting airpower force.[1] Ten years of continuous land-centric conflict appear only to have solidified this view in the minds of both ground commanders and some Airmen. Stephen Budiansky comments that "the Air Force's own seriousness about making the battlefield the focus of its application of precision air power had produced a cadre of officers vastly more knowledgeable about land-warfare strategy and joint operations than their narrowly

air-minded predecessors."[2] Although the Air Force certainly had to support the Army and Marine Corps during Operation Enduring Freedom and Operation Iraqi Freedom, these joint efforts might cause a large cadre of Airmen to identify more with supporting ground operations than with fighting and winning the nation's wars through the strategic application of air, space, and cyberspace power. Hence, these Air Force officers could lose that aspect of "air-mindedness" described as "a global, strategic mind-set providing perspective through which the battlespace is not constrained by geography, distance, location, or time."[3] Such a loss could have negative consequences as land operations in the Middle East and Southwest Asia wind down and the international emphasis shifts toward East Asia, where air and sea operations would predominate.

This problem is exacerbated by the fiscal challenges facing the Department of Defense (DOD). During a time of declining military budgets, forgetting that the Air Force represents (as an independent service) the nation's principal strategic military arm creates problems in determining which of its core functions are most critical to the national interests. In a recent off-the-record conversation, one senior Airman suggested that "the Air Force is a budget in search of a strategy," indicating that years of supporting ground forces may have produced insufficient understanding, within the service at large, of how airpower and the Air Force can perform their main core functions, which are often independent from those that undergird land forces.

Given the daunting issues confronting the Air Force, Airmen would do well to look back at the service's reason for being and remember why the nation established an independent air arm. Admittedly, the Air Force will and should continue to support ground forces when appropriate, but Airmen should concentrate on those core functions that the service was created to perform. Current doctrine lists 12 such functions, but the Air Force could leverage its most fundamental purpose—attaining national security objectives—by prioritizing seven of them: (1) air superiority; (2) space superiority; (3) cyberspace superiority;

power projection through (4) global precision attack and (5) rapid global mobility (including airlift and aerial refueling); (6) global integrated intelligence, surveillance, and reconnaissance (ISR); and (7) nuclear deterrence operations.[4] The remainder of this article seeks to remind Airmen of what constitutes the Air Force's raison d'être (at least in the minds of the authors).

The Air Force's Roles and Core Functions

The Air Force came into being as the nation moved from an isolationist to an internationalist perspective. The experience of World War II, coupled with the advent of nuclear weapons, placed the Air Force in a unique position as the service that could most readily react to future conflicts and strike distant adversaries. The National Security Act of 1947 described the organizing principle of the Air Force:

> In general the United States Air Force shall include aviation forces both combat and service not otherwise assigned. It shall be organized, trained, and equipped primarily for prompt and sustained offensive and defensive operations. The Air Force shall be responsible for the preparation of the air forces necessary for the effective prosecution of war except as otherwise assigned and, in accordance with integrated joint mobilization plans, for the expansion of the peacetime components of the Air Force to meet the needs of war.[5]

The Key West Agreement among the chiefs of staff (1948) further defined the functions of each service. Specifically, the newly established Air Force would "gain and maintain general air supremacy" and "be responsible for strategic air warfare." In terms of supporting ground forces, the agreement noted that the service would specifically furnish the Army with "close combat and logistical air support."[6]

Although Army, Navy, and Marine Corps air assets are designed to tactically support land and naval forces, the Air Force has responsibility for supplying air and space assets that offer a strategic advantage. Title 10, *United States Code*, clearly describes the purpose of the Air Force as follows:

- preserving the peace and security, and providing for the defense, of the United States, the Commonwealths and possessions, and any areas occupied by the United States;
- supporting national policies;
- implementing the national objectives; and
- overcoming any nations responsible for aggressive acts that imperil the peace and security of the United States.[7]

Most recently, Department of Defense Directive (DODD) 5100.01, *Functions of the Department of Defense and Its Major Components*, unambiguously requires the Air Force to "gain and maintain air superiority, and air supremacy" as well as to "gain and maintain space superiority" and "conduct nuclear operations in support of strategic deterrence."[8] The Air Force continues to support ground forces, but, without a doubt, it was not and is not relegated to close air support (CAS), ISR, and airlift. To the contrary, the service has unique responsibilities that differ distinctly from those of the other services.

Gen Norton Schwartz, the Air Force chief of staff, apparently having the foresight to see past current conflicts, has begun to lay the groundwork for prioritizing Air Force functions for the future. Core functions listed in current Air Force doctrine include the following:

- Nuclear Deterrence Operations
- Air Superiority
- Space Superiority
- Cyberspace Superiority
- Command and Control
- Global Integrated ISR
- Global Precision Attack
- Special Operations
- Rapid Global Mobility
- Personnel Recovery
- Agile Combat Support
- Building Partnerships[9]

In a speech to the Air Force Association in 2011, General Schwartz identified certain "core contributions" that must be protected from budget cuts if the Air Force is to provide the nation's leaders strategic

options. These core elements include control and exploitation of the air and space domains, as well as mission assurance in cyberspace; global strike; rapid global mobility; and worldwide ISR.[10] His referral to air, space, and cyberspace deals with these three core functions' gaining and maintaining superiority. Undoubtedly the Air Force has experienced the greatest success with air superiority because no American ground troops have come under aerial attack for more than 50 years. By necessity, his global strike core contribution includes global precision attack (conventional)—one of the newer core functions since relatively recent technological developments have allowed the service to apply accurate and discriminating force anywhere on the face of the earth. The rapid global mobility mentioned by General Schwartz, provided by the nation's intertheater airlift and aerial refueling assets, is perhaps the most ubiquitous core function insofar as virtually every military operation demands it. The core contribution of worldwide ISR is an obvious reference to the core function of global integrated ISR, the oldest of the Air Force's core functions, provided during the Civil War by aerial balloons but now offered by the nation's modern airborne and spaceborne assets. Although General Schwartz did not mention nuclear deterrence in the context of these contributions, he alluded to its importance by emphasizing the progress the Air Force has made in reinvigorating the nuclear enterprise. Since the Air Force must determine where to spend its decreasing fiscal resources to prepare for the future security environment, it should consider nuclear weapons as one of the core functions worth preserving, and it may be time for the service to pause and contemplate its nuclear past as it develops a consistent, forward-looking, long-range strategy.[11]

In the years ahead, these core functions will prove most applicable within the context of three scenarios, used here as the organizing framework for much of this discussion: homeland defense, peer competition, and irregular warfare. Certain reforms in these core functions could also enhance the service's role as the country's air, space, and cyber combat arm. With the exception of cyberspace, statutory requirements are clear. Relatively new, cyberspace is a domain of military op-

erations whose implications for warfare are not fully understood. Undoubtedly, however, integrating the three domains remains critical.

Air, Space, and Cyberspace Superiority

Air superiority has long been a central concern of American airpower.[12] According to War Department Field Manual 100-20 (1943), *Command and Employment of Air Power*, "Air superiority is the requirement for the success of any major land operation."[13] The need for air superiority among the services is undisputed. Note one poignant historical example: Two weeks after the invasion of Normandy, Gen Dwight Eisenhower's son, recently arrived in the theater, criticized the disorder and lack of air defense. Eisenhower responded, "If I didn't have air supremacy, I wouldn't be here." After the war, Eisenhower testified before Congress:

> The Normandy invasion was based on a deep-seated faith in the power of the Air Forces in overwhelming numbers to intervene in the land battle . . . making it possible for a small force of land troops to invade a continent. . . . Without that Air Force, without its independent power, entirely aside from its ability to sweep the enemy air forces out of the sky, without its power to intervene in the ground battle, that invasion would have been fantastic, it would have been more than fantastic, it would have been criminal.[14]

Air Superiority

The need for air superiority is no less important today than it was in 1944. Although the doctrinal definition of air superiority leaves room for varying interpretations, it is best understood as local control of the air, which enables air, land, and naval forces to operate without interference from the enemy.[15] Today, air superiority enables the Air Force to deliver strategic effects through the air—a critical and overlooked point—and to act as a force multiplier, enabling ground forces to operate with greater success. Consequently, enemy ground forces must defend against attack from both the air and land—a distinct advantage for the United States.

Air superiority is a central core function in each of the three scenarios mentioned above. For example, air sovereignty alert serves as the primary Air Force / Air National Guard contribution to *homeland defense*.[16] Air patrols helped ensure that the country maintained air superiority following the terrorist attacks of 11 September 2001 (9/11). In the future, remotely piloted aircraft (RPA) and ballistic missile technology—available to adversaries—may increase the threat to the United States, making air superiority an even more critical component of homeland defense.[17]

When it comes to *peer competition*, gaining air superiority over contested airspace plays a vital role in defeating antiaccess / area denial (A2/AD) strategies "focused on preventing U.S. forces and other legitimate users from transiting international waters, skies, or space."[18] Allegedly, the Chinese are deploying A2/AD systems in the form of missiles and other advanced weapons.[19] Air superiority also enables land as well as naval forces and clears airspace for ISR, airlift, strategic bombing, and CAS operations. An Air Force unable to establish air superiority in a conflict with a capable adversary risks the lives of Americans in the air, on land, and at sea.

Finally, air superiority is becoming an increasingly important component of *irregular warfare*. One should note that during the First Indochina War, the Vietminh gained local air superiority over the French air force during the Battle of Dien Bien Phu (1954) without possessing a single aircraft.[20] Today, irregular adversaries could compromise local air superiority by defeating defenseless ISR assets. In the absence of a permissive air environment, many of the nation's RPAs could not perform critical missions that have a direct impact on the success of American operations.[21] The largely defenseless RPAs of all four services need air superiority to operate safely and effectively over an extended period of time. Air superiority threats to ISR aircraft, however, can come through the cyber realm, as demonstrated in 2009 when Iraqi insurgents successfully hacked into the video feed of a Predator using $26 software available for sale on the Internet.[22] In 2011 an RQ-170

Sentinel RPA crashed in Iran, the victim of an electronic attack, according to Iranian officials.[23]

CAS—particularly important in irregular conflicts, whether provided by an AC-130 gunship, an A-10, or rotary-wing aircraft—also requires airspace free of enemy aircraft. In this instance, the Army, Navy, Marine Corps, and Air Force can all contribute to establishing a passive air environment for their aircraft with minimal risk.

Recommendations for Air Superiority

One must not undervalue the significance of air superiority to joint operations and to the Air Force's ability to deliver strategic effects independently. Control of the air, which enables victory on the land and at sea, may become even more influential in the future. Hence, ceasing production of the F-22 Raptor may be a mistake if the nation continues to demand that the Air Force maintain broad air superiority. Accusing the service's leadership of suffering from "next-war-itis" and failing to concentrate on the ground campaigns of Iraqi Freedom and Enduring Freedom, Secretary of Defense Robert Gates relieved both Air Force Secretary Michael Wynne and Chief of Staff T. Michael Moseley in 2008—ostensibly for failure to maintain proper stewardship of the nuclear arsenal.[24] According to conventional wisdom, however, Gates was unhappy with the senior Air Force leaders' persistent advocacy of the F-22 because they maintained that penetrating defended airspace prior to the establishment of air superiority will require stealthy aircraft with defensive capabilities.[25]

A recent study by the American Enterprise Institute found that the Air Force possesses an insufficient number of stealth F-22 and B-2 aircraft to conduct effective air operations—defined as hitting 30,000 separate targets—against China and North Korea.[26] Although some individuals have speculated that advances in radar detection and tracking will soon compromise the stealth capability of current aircraft, senior DOD decision makers appear confident that weapon systems such as the F-35 can continue to leverage technological advantages in defeating

enemy detection systems. Indeed, General Schwartz asserts that "as our Nation's only active fifth-generation fighter procurement program, there is no alternative to the F-35, so we are committed to this program."[27] However, with the F-35 program falling further behind schedule and experiencing spiraling cost overruns, the problem of relying on this single program to replace a shrinking fighter force becomes particularly acute. One estimate suggests that the final production cost of approximately 180 F-22s will average $158.8 million per aircraft.[28] Estimates of F-35 production costs indicate that the 43 Joint Strike Fighters authorized in the 2011 defense appropriation averaged $201 million per aircraft—an artificially high figure because of the small number of platforms.[29] Original projections called for $114 million per aircraft (for the purchase of 2,443), but cost overruns have driven the price much higher, leaving the United States with fewer *less capable* aircraft at a much higher cost. Spiraling expenses will almost certainly lead the DOD to dramatically reduce the final order for Joint Strike Fighters—perhaps by as much as half.

Maintaining air superiority with fewer less capable aircraft will prove difficult. With the appearance of the MiG-15 during the Korean War, the Air Force nearly lost air superiority with its less capable F-80 Shooting Stars. Fortunately Gen Hoyt Vandenberg, the Air Force chief of staff, released more of the advanced F-86 Sabres to the theater of operations, regaining dominance of the skies over the peninsula. If the Air Force cannot match an adversary with sufficiently capable aircraft, it may be forced to move away from more than 60 years of theater air superiority as a fundamental tenet/ability of American airpower, and Soldiers and Marines may no longer be able to take the friendly skies for granted.

Space Superiority

DODD 5100.01 requires the Air Force to "conduct offensive and defensive operations to gain and maintain space superiority," but significant disagreement exists as to whether the United States can or should dominate space.[30] Resolving this debate, which lies beyond the scope

of this analysis, will likely be driven by future technological developments; however, over the next two decades, the nation undoubtedly will become increasingly dependent upon space-based assets as critical enablers of national power. The prospect of America's losing its edge in space poses an unacceptable risk to national security.

The United States began research and development of space platforms in the early 1950s for two primary reasons: reconnaissance of the Soviet Union and development of an early warning system for the detection of Soviet nuclear missile launches.[31] Although the USSR no longer exists, *homeland defense* still needs an effective early warning system—increasingly important in an age of nuclear and ballistic missile proliferation among rogue states and, possibly, nonstate actors. More recently, space has taken on a more utilitarian role in the daily lives of Americans as the nation finds itself more dependent on commercial and military satellites for the transmission of data (e.g., economic transactions) and other communications. Equally important to the nation and the military is the Air Force's constellation of satellites in the Global Positioning System, which supplies the necessary timing signals for everything from private automobile trips to precision-guided munitions.[32]

Space is no less important as a strategic asset in a potential *peer competition*. America's technologically advanced systems in command and control, communications, targeting, and battlespace awareness provide an unrivalled advantage that depends heavily on space assets.[33] These capabilities also serve as an important conventional and nuclear deterrent against those who would challenge the international status quo. Past and present reliance on satellites for the conduct of war leaves little doubt about their growing importance and the need to protect America's vital interests in space during the coming decades.

What began over half a century ago as a need to conduct imagery intelligence of the Soviet Union has developed into an impressive array of space-based communications and intelligence satellites that have played a major part in assisting commanders during *irregular warfare* in Afghanistan and Iraq.[34] In Enduring Freedom, for instance, the mili-

tary either directly or indirectly used more than 100 satellites to conduct military operations.[35] Satellites also enabled air support of ground forces despite sandstorms during Iraqi Freedom.[36] If predictions are accurate and the most *frequent* form of conflict the United States encounters over the coming decades is irregular warfare, then space will prove significant in providing the situational awareness needed to target the nation's elusive adversaries.

Recommendations for Space Superiority

Maintaining preeminence in space is likely to be especially difficult as the number of nations with advanced technology and access to space increases. What was, and is, a strategic asset may also become a strategic vulnerability. Electromagnetic pulse, directed energy, ballistic missiles, and cyberspace present a threat to the space-dependent and net-enabled American way of war, which will grow over time and has the potential to deliver a debilitating attack.[37] On 20 January 2007, the Chinese government destroyed one of its own derelict weather satellites with a kinetic-kill vehicle, clearly indicating that China is developing significant capabilities to counter American power in space and signaling the value that one potential adversary places on this domain.[38]

The United States must accept the challenge of developing the Global Positioning System's independence as well as nanosatellites, hardened satellites, and the ability to replace lost or damaged space assets quickly if it intends to remain a leader in space.[39] This task becomes more daunting since the United States finds itself temporarily without a manned space capability. Completion of the STS-135 mission on 21 July 2011 represented the final space shuttle flight after 30 years of operation.[40] Just as colonial powers in the seventeenth century eventually ceased sponsoring costly maritime expeditions in favor of private holding companies, President Barack Obama's new space policy, outlined in a speech delivered at the Kennedy Space Center on 15 April 2010, directed the National Aeronautics and Space Administration to rely on commercial space platforms for low-Earth orbit missions in the near term and to

concentrate on more long-term exploration projects such as manned missions to Mars and space asteroids.[41] The lack of a government-controlled manned launch capability offers further indication of the fragility of American preeminence in space and the likelihood that it may end unless the United States invests heavily in developing and fielding resilient and readily replicable space assets. At a time when space is becoming ever more important to all aspects of life (civil and military), the country faces a threat that it can deter or overcome only by clearly demonstrating a capability to sustain its satellites and to rapidly replace those that have been disabled or destroyed. Operationally responsive space becomes possible through further development of nanosatellites, electromagnetic pulse, and directed energy defenses, as well as a clearly demonstrated ability to respond offensively and quickly.[42] By allowing its space assets to appear vulnerable, the United States invites attack and creates an asymmetric advantage for adversaries.[43]

Cyberspace Superiority

Soon after taking office, President Obama commissioned the 60-day *Cyberspace Policy Review*, which noted that "the globally-interconnected digital information and communications infrastructure known as 'cyberspace' underpins almost every facet of modern society and provides critical support for the U.S. economy, civil infrastructure, public safety, and national security."[44] Even a decade ago, cyberspace security was not considered a vital national interest, but recent technological developments leave the nation reliant on the rapid transfer of information through cyberspace. Because the information superhighway is integrated into almost every aspect of American life, the trustworthiness of data is critical to the nation and the Air Force.[45] Thus in August 2009, the Air Force stood up Twenty-Fourth Air Force under Air Force Space Command, which will serve as the nexus of cyberspace operations for the service.[46]

In its *homeland defense* mission, the Air Force relies on cyberspace in two critical areas. First, information transmitted between the nation's

early warning systems and their operators travels through cyberspace. Data then moves to analysts for processing, exploitation, and dissemination. Early warning systems compromised by a cyberspace attack could leave the nation vulnerable to a strike. At a time when nuclear and ballistic missile technologies are proliferating, such a compromise is unacceptable. Second, command and control of the air sovereignty mission depends on cyberspace for transmission of critical information. Something as simple as compromising the integrity of data in these networks would suffice to seriously degrade a core homeland defense function.[47] For that reason, securing these assets will remain a high priority.

Clear evidence indicates that China and Russia, potential adversaries in a *peer competition*, are investing heavily in cyber warfare capabilities.[48] These developments pose a very real risk to civil and military networks. Not only can they slow or disrupt the flow of information but also a penetration of secured networks calls into question the validity of the very data upon which the Air Force relies. Given the United States' conventional advantage, cyberspace offers an attractive target. In the view of some adversaries, the damage done by a successful cyberspace attack may be enough to preempt American involvement in a crisis, such as a Chinese attack on Taiwan or in the South China Sea.[49] As the Air Force moves toward further network integration of command and control, communications, and weapons platforms, an adversary with an advanced cyberspace warfare capability will pose a formidable threat.[50] Gaining freedom of action in cyberspace will become a strategic necessity during the coming generation.

Irregular warfare is also an area of concern as nonstate actors prove adept at waging cyber warfare from remote locations using less sophisticated methods and equipment. The reported hacking of video feeds from American drones by Iranian-backed insurgents in 2009 represents one example.[51] More recently, a virus infected highly classified computer systems that control such drones.[52] Given the speed with which irregular adversaries can learn and adapt, in the years ahead

the Air Force will undoubtedly face opposed network operations from nonstate actors. Establishing the right balance in cyberspace will constitute a problem that the Air Force must solve with regard to peer and irregular adversaries alike. Moreover, although the Air Force probably will not have exclusive responsibility for cyberspace, the service should expect to ensure its own ability to operate in that domain.

Recommendations for Cyberspace Superiority

Given its ubiquitous nature, cyberspace is the most pressing core function in need of attention. Unlike other functions in which the Air Force historically assumed leadership in innovative technology, cyberspace has become the one area in which the service trails in technological development and has constantly asserted a reactive rather than proactive strategy in dealing with cyber threats. Turning the Air Force into a cyber fortress not only keeps adversaries out but also keeps Airmen in—harming mission accomplishment. If the Air Force wishes to operate in an environment where opposed network operations are the norm, then it must develop an alternative approach to protecting the integrity of information.[53]

The service lacks the manpower (with the requisite skills) to prevent penetration of its networks and to ensure the credibility of information. According to the Air Force's chief cyber scientist, "Currently, the Air Force does not have an adequate cadre of appropriately educated officers performing the cyber mission."[54] Recognizing the need, the *Air Force Cyber Command Strategic Vision* document (2008) observed that "perhaps the most critical mission of Air Force Cyberspace Command is the development of full-spectrum professionals to employ core cyberspace capabilities across the entire range of military operations."[55] Initially, the command identified, reclassified, and reassigned personnel possessing the needed skills from specialties such as electronic warfare, network warfare, and network operations.[56] Building the internal capability is manpower intensive and requires a set of skills not offered in technical school. The service must recruit personnel holding ad-

vanced degrees in computer science and related fields with the specific objective of building a competent cyber force. This objective will likely prove the most daunting of all since it demands a degree of flexibility from a service accustomed to institutionalized manpower development. Cyber Command addresses this challenge in its strategic vision: "Delivering cyberspace career force capabilities will require changes to the personnel system to identify qualified Airmen with critical skills for presentation to combatant commands when required."[57] Should the Air Force fail, the consequences will prove significant. The simple fact is that China, a potential competitor, already possesses a larger pool of skilled cyber personnel than the United States—a pool that the People's Liberation Army is aggressively expanding.[58]

The service must also begin to think differently about cyber. Simply applying the tactics and strategies of the air and space domains to cyber may lead to an incorrect understanding of how effects are produced in cyberspace. When thinking about cyber, Airmen often fall prey to misconceptions analogous to those they once encountered from their brethren on the ground. Computer networks—frequently conceived of in ways similar to lines of maneuver—may not be the best means to deliver information required for mission accomplishment. Cloud computing and other developments may make the current emphasis on network security obsolete, just as the cannon ended the era of walled castles.[59]

Power Projection

In his book *Air Power*, Budiansky notes that "after every war, soldiers curse the generals and politicians who neglected to anticipate and prepare for war. Airmen, more than most, would draw an especially bitter pleasure in this pastime, forever repeating stories that demonstrated the obtuse shortsightedness of the great men who had dismissed the importance of the airplane."[60] As far back as 1926, the Air Corps Tactical School began teaching a course in Employment of Combined Air Force, which advocated the Army Air Corps's ability to achieve "strategical

objectives" through the projection of airpower behind enemy lines.[61] When an independent Air Force came into existence in 1947, it did so in large part because of this capability.[62] The bomber force was the nation's primary means of power projection prior to the development and deployment of intercontinental ballistic missiles (ICBM) in 1959.[63] Half a century later, the ability to project power rapidly through air and space remains as necessary as it was in World War II and throughout the 50-year Soviet-American standoff.[64]

In the aftermath of the Cold War, the United States took advantage of the "peace dividend," shrinking the size of the Air Force by two-thirds and significantly reducing its number of power-projection aircraft.[65] Less than a decade into the era of American hegemony, al-Qaeda struck the United States, beginning the "long war" and ending the "procurement holiday" of the previous decade. As the Air Force prepares for the coming decades, strategic power projection will once again play a key role in defending the nation's vital interests.

Certainly, Afghanistan and, until recently, Iraq remain the most pressing security concerns, but they too will diminish in their significance as the military attains mission objectives and as budget constraints and war weariness take their toll. Ensuring that the Air Force can serve the nation in its capacity as a strategic arm represents a responsibility for which failure is not an option. Lengthy design, development, and deployment times dictate that the Air Force begin planning for a security environment in which peer competition assails the existing order.[66] Just as the nation became fixated on the Soviet Union during the Cold War, so is it currently fixated on al-Qaeda and other terror networks often operating from distant, remote locations. The nation will call upon the Air Force's power projection capability when the service least expects it, as occurred during the opening phase of Enduring Freedom.

Global Precision Attack

The United States has long thought of itself as an island protected by the Atlantic and Pacific oceans. Technology, however, is bridging these

watery expanses. In the future, as in the past, the Air Force's core function of global precision attack, whether conventional or nuclear, will be important to *homeland defense*. Bombers designed for global precision attack, for example, send a clear signal to adversaries that the US Air Force can strike anywhere on the earth with speed and precision. Nuclear-capable bombers and the remaining ICBMs also deter adversaries from attacking the United States. These capabilities (conventional or nuclear) have served the nation well for half a century and will become increasingly important in the years ahead. Developments in ballistic missile and other technologies bring enemies within striking distance.

Fortunately, defending the nation's vital interests against *peer competition* over the next two decades may not require major combat operations. Much more likely is the deterrence of a potential competitor from challenging the status quo with options for global precision attack.[67] In those cases in which the United States must use force, the Air Force's ability to deliver strategic effects from a distance gives the president unparalleled options and places fewer American troops at risk. Additionally, in some instances, penetration of heavily defended airspace will be the *only* option available. In his recent look at the twenty-first century, George Friedman writes that

> the key to warfare in the twenty-first century, then, will be precision. The more precise weapons are, the fewer have to be fired. That means fewer soldiers and fewer defense workers—but more scientists and technicians. What will be needed in the coming decades is a weapon that can be based in the United States, reach the other side of the world in under an hour, maneuver with incredible agility to avoid surface-to-air missiles, strike with absolute precision, and return to carry out another mission almost immediately. If the United States had such a system, it would never again need to deliver a tank eight thousand miles away.[68]

Friedman highlights the fact that occupation of territory is a labor-intensive endeavor, a fact unlikely to change in the future. He also points out that the United States need not defeat a peer/near-peer competitor's army to defend American interests. Rather, preventing an adversary

from altering the status quo through global precision attack is the foundation of effective American strategy. In the decades ahead, the Air Force is best suited to deliver the strategic effects suggested by Friedman.

The nation's potential competitors understand the importance of American power projection, illustrated by China's focus on A2/AD, ballistic missile, and cyberspace capabilities. That country's *expansion* of the People's Liberation Army Air Force and People's Liberation Army Navy, together with its *reduction* of the People's Liberation Army, signals where China considers its strategic interests most vulnerable. Continuing to hold adversaries at risk with formidable options for global precision attack is in the best interest of the United States.

As the opening campaign of Enduring Freedom demonstrated, the Air Force, unlike other services, can generate strategic effects anywhere in the world.[69] Global precision attack becomes particularly useful when one discovers hard-to-find nonstate actors in distant locations (accessible only with airpower) where the United States is engaged in *irregular warfare*. Because irregular adversaries of the future will flock to remote and unstable places in response to America's dominance in conventional conflict, rapid power projection will prove instrumental in realizing US objectives. In many cases, it can attain those objectives with global precision attack and will not have to deploy ground forces. Should those forces need the Air Force, however, both CAS and interdiction are now, interestingly enough, classified in the latest functions document (DODD 5100.01) and in both basic and operational Air Force doctrine under the all-encompassing category of global precision attack.[70] By merging strategic attack with these formerly delineated ground-support subelements, Air Force leadership has perhaps acknowledged the problem of identifying their purpose solely within the context of supporting land forces.

Recommendations for Global Precision Attack

Today, however, global precision attack is in precipitous decline because a much smaller Air Force continues to depend on many of the

same global attack platforms it did when the Berlin Wall fell; indeed, some were in service when East Germany erected the wall. If, as Under Secretary of Defense for Policy Michèle Flournoy suggests, the United States will take a leading role in defending the "global commons," then the nation will need sufficient global precision attack to do so.[71] Thus, the Air Force will have a strong influence on the ability of the United States to reach its strategic objectives.

During the previous generation, global attack platforms experienced a slow, steady decline in both numbers and capability. Only our 19 B-2 bombers are capable of penetrating advanced antiaircraft defenses; fielding a new global precision attack bomber is imperative. Although design and production of the "2018 bomber" are currently delayed, initially five blocks were planned for production between 2018 and 2025—with the initial Block 10 configuration (24 aircraft) serving as the Air Force's last manned bomber. Subsequent blocks would integrate technologies on the leading edge and continue to improve US capabilities.[72]

In addition to the development of a hypersonic bomber able to penetrate advanced antiaircraft defenses, the nation would benefit from conventional long-range ballistic missiles. Capable of "prompt global strike," such weapons would enable the Air Force to hit a fleeting target from home soil, far from an American military presence while reducing or eliminating collateral damage.[73] This force could effectively deter the nation's adversaries by putting any point on the earth within range of a conventional strike. Despite the valid concern that an adversary might mistake the launch of a conventional ICBM for a nuclear attack, the United States can and should resolve such a concern and not allow it to preclude the development of prompt global strike.

Finally, the retirement of air launched cruise missiles from the arsenal and the unsettled fate of the much shorter-range joint air-to-surface standoff missile and its extended-range variant create a decline in the Air Force's critical capability.[74] A long-range (conventional) cruise missile would likely prove important as an enabler, either striking targets deep behind enemy lines or opening heavily defended airspace to

American aircraft. As China, Iran, and other possible adversaries extend the range of their antiaircraft defenses, the Air Force must be able to defeat these systems or face a world of highly contested global commons.

Rapid Global Mobility (Airlift)

Although global precision attack is the kinetic element of power projection, airlift enables the Air Force to deploy personnel and materiel rapidly to any point on the globe when and where needed.[75] Due to the strategic nature of airlift and the fact that land operations will remain necessary in the future, the Air Force must continue to make this core function a priority. Quickly moving large numbers of people and amounts of materiel from the United States to any point on the earth is an Air Force core function that no other service can match. Gen Henry H. "Hap" Arnold correctly declared that "we have learned and must not forget that from now on air transport is an essential element of airpower, in fact of all national power."[76] As is often necessary, the forward deployment of Airmen, aircraft, and the materiel to sustain them buttresses national power. The lack of such an ability undermines the deterrent effect of airpower. Hence, airlift's contribution to national security and the core mission of the Air Force is significant.

At its simplest, airlift swiftly moves people and materiel across great distances. Because the United States has a history of taking war to its enemies rather than waiting for the fighting to reach its shores, the homeland has not seen the ravages of conflict in more than a century. Thus, airlift has an indirect role in *homeland defense*—principally in military support to civil authorities. Mitigating the effects of a large-scale disaster is the primary role of airlift in homeland defense.

Projecting American power to the far reaches of the globe during *peer competition* will remain an important function for airlift. Examples of such Herculean efforts abound. Whether Gen William Tunner's airlifters flying supplies over "the Hump" to Gen Joseph Stilwell in the China-Burma-India theater during World War II, Gen Curtis LeMay's creation of the Berlin airlift in response to a Soviet blockade, or the

transport of military personnel and supplies to the Persian Gulf during Operation Desert Shield, airlift plays a strategic role in the ever-present geostrategic competition against peer/near-peer competitors.[77] This is unlikely to change over the coming decades. In fact, as American interests shift to Asia, airlift will probably become more prominent in the protection of national interests.

Enduring Freedom and Iraqi Freedom, operations involving *irregular warfare*, serve as excellent illustrations of the significance of airlift in this type of conflict. Air Mobility Command reports that by the end of 2009, the Air Force had carried 9.66 million passengers and 3.92 million tons of cargo during 529,981 sorties in support of these two operations.[78] If, according to predictions of the future, irregular conflicts will dominate, then airlift will prove integral to American power projection, allowing the other vital core functions to concentrate on *homeland defense* and *peer competition*.[79]

Recommendations for Rapid Global Mobility (Airlift)

Airlift has become the backbone of American expeditionary warfare, making it a critical component of any strategy. Representing the majority of Air Mobility Command's inventory, the C-130 Hercules first entered service in 1956, and the latest model (C-130J) appeared as recently as 1999. The Air Force, Air Force Reserve, and National Guard fly more than 400 of these durable aircraft—the nation's principal intratheater airlifter.[80] The 111 C-5 Galaxy intertheater airlifters, built between 1970 and 1989, have an estimated 80 percent of service life remaining. That fact, together with an upcoming modernization program, will make these aircraft a viable Air Force asset well into the twenty-first century.[81] The newest and most widely used intertheater cargo aircraft—the 158 C-17 Globemaster IIIs, manufactured between 1993 and 2004—will most likely not need replacement for decades to come.[82] As this brief description of the current state of Air Force airlift suggests, this aspect of power projection is in excellent condition. Consequently, we recommend no substantive changes for the near future. The strate-

gic airlift fleet is scheduled for replacement around 2040, however, so the length of acquisition time (14 years for the C-17) suggests that planning for the follow-on global C-X aircraft is in its initial stages.[83]

Rapid Global Mobility (Aerial Refueling)

With few exceptions, projecting airpower depends on the Air Force's refueling tankers to extend the range of American and allied airpower. As the only country in the world with the aerial refueling capability to carry out global combat operations, the United States boasts tankers that greatly enhance the operational scope of US military aircraft and that of its allies.[84]

As the hours and days immediately following 9/11 illustrate, the need for aerial refueling begins with *homeland defense*. Without Air Force tankers, fighter aircraft tasked to maintain air sovereignty could not have flown in the nation's skies for long. Continuing to provide aerial refueling for air sovereignty alert will remain an important part of the Air Force's contribution to homeland defense. Furthermore, the fact that America's adversaries have found it easier to strike the United States directly will intensify the need for an effective air defense.[85]

For more than a century, the US military has waged expeditionary warfare. Crossing vast oceans to move personnel and materiel to the battlefield is a staple of the "American way of war," and preventing conflict from reaching American shores is an objective of every president. Absent the ability to project power to the far corners of the globe, the United States could not realize its objectives in *peer competition*. By extending the range of fighter, bomber, cargo, and other aircraft, tankers enable the Air Force to take the fight to an adversary. Projecting power anywhere on the earth stands as a unique capability of the United States and a significant concern of adversaries. As mentioned previously, the People's Republic of China is engaged in a military modernization program that emphasizes the development and fielding of systems which counter Air Force power projection.[86] This is prompted by a growing concern that Chinese and American interests

will diverge and that the relationship between the two countries may turn adversarial as they reach parity. Hence, China's military modernization effort seeks to counter the threat it most fears—American air and naval power.[87] Ensuring that the United States does not lose the capacity to defend its interests and influence actors in the Asia-Pacific theater and elsewhere requires that the Air Force maintain aerial refueling sufficient to project power quickly, anywhere in the world.

Irregular warfare against nonstate actors places a high demand on the Air Force. For air-breathing platforms, persistence, which increases mission effectiveness, is a particularly important characteristic because of the often unexpected and brief opportunities that arise for striking fleeting targets. Aerial refueling gives ISR and air-to-ground attack aircraft that persistence by increasing loiter time in places such as Afghanistan and Iraq. Regarding future irregular conflicts in which the United States is unlikely to have a large ground presence, RPAs with a combined ISR and strike mission will need aerial refueling as they undertake long-endurance missions and serve as a key instrument of American power projection.[88]

Recommendations for Rapid Global Mobility (Aerial Refueling)

Despite aerial refueling's importance in supporting many of the other critical core functions in all three scenarios, some people fail to appreciate its ability to enable long-range operations. Currently 400 KC-135 Stratotankers, manufactured during the Eisenhower, Kennedy, and Johnson administrations, serve as the Air Force's primary aerial refuelers.[89] Augmenting the venerable KC-135 are the 59 newer KC-10 Extenders in the Air Force's inventory.[90] The recent granting of the air refueling tanker contract to Boeing for delivery in 2017 is the single most important step that the service has taken to guarantee the long-term viability of aerial refueling.[91] Because purchasing a capable, cost-effective air refueling aircraft is in the best interest of the Air Force and the nation, the platform should be protected against future cost-cutting measures.

The foreseeable security environment and the missions that airpower will likely undertake leave little doubt about the utmost impor-

tance of power projection (i.e., global precision attack, airlift, and aerial refueling) to the Air Force. Moreover, the service will require significant investments to replace the aging platforms that conduct this mission. The Air Force has made significant progress in maintaining existing weapon systems and procuring new ones, but pressure to reduce military spending could jeopardize sustainment and modernization of the fleet.

Global Integrated Intelligence, Surveillance, and Reconnaissance

The history of military aviation is replete with examples of aircraft serving as ISR platforms. During the Civil War, the Army of the Potomac used manned balloons to determine Confederate troop strength and monitor movements of the Army of Northern Virginia.[92] Such platforms first saw use in aerial reconnaissance during World War I; only later did the great air battles of the war take place.[93] World War II and the Cold War offer additional examples of the Army Air Forces and the independent Air Force contributing to victory during war and security during peace by means of the aerial reconnaissance mission.[94] The Air Force's operation of an impressive array of ISR platforms in the air and space domains leaves little doubt that the service will continue to make these capabilities available across the spectrum of operations for decades.

Intelligence, Surveillance, and Reconnaissance

Among the Air Force's oldest and most important surveillance roles is its provision of early warning in the event of an attack against the United States. Initially Air Defense Command, the largest of the Air Force's original major commands, had responsibility for early warning and *homeland defense*.[95] Development of the continental radar system and of reconnaissance and early warning satellites by the early 1960s allowed the Air Force to supply the continental United States with an extensive early warning system.[96] In light of the proliferation of ballis-

tic missile and nuclear weapons technology as well as continued *peer competition*, the North American Aerospace Defense Command and its early warning mission remain an essential part of the nation's defense—an area that benefits from the Air Force's significant contribution to the broader ISR core function.

Major combat operations against a large conventional force present a set of distinct, difficult issues for combatant commanders, including the development of comprehensive battlespace awareness. The substantial global ISR assets of the Air Force can greatly reduce the fog of war by providing a constant presence above the battlespace as they send information to commanders. Conflict with a peer/near-peer adversary would likely necessitate very different assets than those deployed to Afghanistan today. One should also highlight the fact that superior battlespace awareness acts as a force multiplier, permitting fewer ground forces to attain tactical objectives against a larger enemy force. Since ISR stands to play a major role in future peer competition, it merits priority among the Air Force core functions.

Operations in Afghanistan and Iraq often serve as public examples of airborne ISR's part in contemporary *irregular warfare*.[97] Whether supplied by a satellite, an RPA, or a light attack / reconnaissance aircraft like the MC-12, information plays a critical role in target acquisition.[98] Because nonstate adversaries continue to adapt to the tactics, techniques, and procedures employed by the United States, locating them will demand improved awareness of the battlespace. Fortunately, the current conflict has accelerated the development and acquisition of airborne ISR assets, which will serve the Air Force well for years to come and must enjoy protection as part of the service's core functions.

Recommendations for Intelligence, Surveillance, and Reconnaissance

ISR contributes to the joint fight and cannot be replicated by any other service. However, the current focus on RPAs (Reaper, Predator, and Global Hawk) capable of performing ISR and strike missions may not

constitute the best use of a shrinking acquisition budget.[99] The reality of modern conflict—particularly irregular warfare—is that the military always needs additional intelligence.[100] To offer this service, the Air Force must charge recipients for the cost of systems and personnel. One solution entails seeking a second change in the Defense Working Capital Fund, which enables the Air Force to charge beneficiaries for these services—much as it does for airlift.[101] At present, those who benefit from and use many Air Force capabilities bear none of the cost, thereby incentivizing the demand for more of everything. Developing a market mechanism that weighs demands against costs would be a positive step toward solving some of the fiscal issues confronting the Air Force.

The Importance of Nuclear Deterrence

The nuclear arsenal remains the most important capability for defending national sovereignty from an attack by a *peer competitor* or rogue regime. Nothing else gives an adversary more reason for pause than nuclear weapons. Composed of three legs, the nuclear triad—ICBMs, manned bombers, and submarine-launched ballistic missiles—gives the United States a deterrent force that makes direct attack on the nation a costly choice. The Air Force fields two of these platforms.[102] Perhaps more so than the other core functions, nuclear deterrence operations are difficult to place within one of the three general scenarios (homeland defense, peer competition, or irregular warfare) because of the interrelated effects produced by the nuclear arsenal. Although a somewhat arbitrary distinction, one can think of nuclear deterrence operations as serving three clear objectives related to the escalation ladder that gained prominence during the Cold War.

Nuclear Deterrence Operations

After the United States dropped atomic bombs on Hiroshima and Nagasaki in August 1945, the distinctiveness of those weapons soon became

apparent. As the world began to comprehend the power of thermonuclear devices, developed in 1951, preventing nuclear war between the United States and the Soviet Union became the principal, if not the only, purpose of those weapons. Without question, deterrence was the most significant and successful policy of the Cold War—and it has not failed to prevent a nuclear holocaust.[103]

The combination of nuclear-capable bombers, ICBMs, and submarine-launched ballistic missiles is effective in the *homeland defense* mission because redundancy and survivability make the high cost of an attack on the United States unacceptable to conventional adversaries. Although the Cold War ended a generation ago—only to be replaced by the long war—nuclear deterrence remains vital to the defense of the United States. One recent report suggests that, at its most expensive estimate, the nuclear complex costs 9.96 percent of the 2009 defense budget—a reasonable expense, considering the security it offers.[104] In 2009, for example, the United States spent less on the nuclear enterprise than one company—Microsoft—generated in annual revenue.[105] Put another way, the cost of the nuclear arsenal represents less than one-tenth of 1 percent of the gross domestic product.

As nuclear weapons material and technology continue to spread, deterring current and future adversaries (nuclear and conventional) will remain central to American national security. Furthermore, because US policy precludes responding to biological and chemical attacks in kind, nuclear weapons provide an effective deterrent against these threats.[106] The ICBM's responsiveness is accompanied by bombers as the only leg useful in signaling escalation or de-escalation. Clearly, nuclear deterrence operations remain a critical capability.

In today's strategic environment, some national security analysts believe that the most probable use of a nuclear weapon will come from a nonstate actor or, more likely, a rogue regime such as North Korea or Iran seeking to strike a devastating blow against the United States.[107] Thus, America could find itself engaged in *irregular warfare* in which a limited nuclear strike may be an option. The Air Force must maintain

a force capable of performing such a mission. Rogue regimes seldom negotiate in good faith and tend to respond negatively to diplomatic overtures that would limit their nuclear capability, as evidenced by 20 years of fruitless efforts involving carrots and sticks to convince North Korea to halt its development of nuclear weapons. Additionally, cash-strapped nations such as North Korea could possibly sell nuclear weapons to terrorist networks that would have extreme difficulty building a weapon of their own.

Past experience suggests that terror networks and their state supporters are influenced by existential risks and rewards, which offers reason to believe that a visible limited-strike capability may assist in deterring a nuclear attack against the United States.[108] Removing a limited nuclear strike from consideration as a response to a nuclear terrorist attack gives countries little motivation to cease hosting or tolerating terror networks within their geographical borders. Recent history suggests that pariah governments and militant extremists are often unconstrained by liberal Western values. They respect strength, and, as America's withdrawal from Somalia demonstrated, the appearance of weakness can invite attack.[109] As with strategic nuclear war, an actual limited nuclear strike would remain remote and an action of last resort, but the consequences of such an attack dictate that the deterrent value should remain an arrow in the nation's nuclear quiver.

The United States should retain a credible nuclear strike option, but the preferred alternative calls for improved multinational nonproliferation efforts and nuclear forensics that will reduce the risk of nuclear terrorism by making nuclear material more difficult to acquire and anonymity more difficult to achieve. Extending the nuclear umbrella over America's allies such as Germany, Japan, and South Korea, for example, has proven effective in convincing these governments to forgo development of their own nuclear weapons programs.[110] Linking nuclear materials to their source of origin will not only lead to better law enforcement and more effective safeguards but also give pause to nuclear suppliers and state sponsors of terrorism faced with the possi-

bility of nuclear retaliation.[111] The Air Force has a role in supporting broader DOD efforts in this area. To keep nuclear materials from falling into the hands of terrorists or the Iranian regime, for example, in November 1994 two Air Force C-5 Galaxy transports moved 581 kilograms of weapons-grade uranium from Kazakhstan to Oak Ridge National Laboratory in Tennessee.[112] The service's principal role, however, must remain the precision delivery of the weapons themselves.

In the final calculation, deterrence equals capability plus will, leaving the United States little option other than maintaining a limited strike capability and nuclear doctrine to support it. Current Air Force doctrine does provide for the limited use of nuclear weapons to convince the enemy of the United States' commitment to using the necessary degree of force to meet objectives.[113] By giving the president the option to visibly escalate or de-escalate during hostilities (bombers) and strike with speed and precision (ICBMs) from positions within the United States, the Air Force figures prominently in protecting the American people.

Recommendations for Nuclear Deterrence Operations

If the nation's nuclear deterrent is to remain credible, the United States must refocus on the core function of nuclear deterrence by maintaining a nuclear arsenal and delivery platforms of sufficient size and diversity to assure both allies and adversaries that the United States has the capability and will to employ nuclear weapons to terminate large and small conflicts as quickly as possible on favorable terms.[114] By doing so, the nation bolsters the deterrent effect of the nuclear arsenal and, as the Cold War illustrates, reduces the probability of both nuclear and conventional warfare. *Peer competition* between the United States and Soviet Union remained largely peaceful because the United States could clearly withstand a nuclear strike and retaliate with sufficient nuclear force. The United States, therefore, must ensure that it has a nuclear arsenal sufficient to maintain a credible deterrent "that can under any circumstances confront an adversary with the prospect of

unacceptable damage."[115] Moreover, issuing a unilateral no-first-use declaratory policy could undermine the credibility of nuclear deterrence and might encourage adversaries to seek an asymmetric advantage against a United States perceived as weak and unwilling to wage nuclear war.

Although the relationship between the United States and the People's Republic of China differs markedly from that of the United States and Russia, China is actively modernizing and expanding its nuclear arsenal.[116] Russia, though seeking to reduce its strategic nuclear arsenal, is also modernizing while maintaining a large tactical nuclear force.[117] Only the United States has chosen to forgo modernization. For China and Russia, nuclear weapons serve to deter conventional and nuclear aggression against either country. They also deter efforts that might undermine either state's vital interests. By offering political leaders a sense of security that the Chinese and Russian (conventional) militaries cannot, nuclear arsenals stabilize the strategic relationship between the great powers. According to one former commander of United States Strategic Command, eliminating nuclear weapons would "make the world safe for conventional war."[118] Consequently, the Air Force should maintain a credible nuclear capability.

People working in the highest levels of government wish to reduce the nuclear arsenal. The same strategic guidance that reaffirmed commitment to the nuclear deterrent force also stated that "*it is possible that our deterrence goals can be achieved with a smaller nuclear force*, which would reduce the number of nuclear weapons in our inventory as well as their role in U.S. national security strategy" (emphasis in original).[119] Nuclear operations, however, will remain a cornerstone of the service's contribution to national security for the foreseeable future. Further, at less than 10 percent of the defense budget, the nuclear weapons complex is a cost-effective guarantor of national survival. Plans to reduce the number of weapons, however, do not mean that the arsenal can do without significant investment. Warheads, delivery platforms, infrastructure, and human capital are all aging. Reports

from the Defense Science Board and the Secretary of Defense Task Force on DOD Nuclear Weapons Management as well as statements from Gen Kevin Chilton, USAF, retired, the former commander of US Strategic Command, and Secretary of the Air Force Michael Donley advocate reinvigorating the nuclear weapons complex. Specifically, the report on nuclear deterrence skills recommended that civilian leadership "maintain critical weapon design, development, production, integration, and surveillance skills by exploring follow-on nuclear weapon system designs, including prototyping."[120] Hence, if the nation is committed to reducing its nuclear arsenal, then those fewer weapons should have more capability. The United States, therefore, should emphasize restarting development (but not necessarily production) of a new warhead. Continuing to rely on decades-old designs and an untested life-extension program is not a plan for success.

Not only does the current approach send a signal to adversaries that the United States no longer views nuclear weapons as a critical aspect of national defense, but also technological innovation stagnates when scientists and engineers spend their days maintaining outdated technology instead of developing the next generation of weapons. The latest Air Force doctrine stresses the need for responsive research and development and industrial infrastructure as a critical leg of the nuclear triad.[121] Furthermore, the National Nuclear Security Administration's stalled Complex 2030 plan calls for significant investment in nuclear weapons complex infrastructure, personnel, and research.[122] Such an investment could facilitate current strategic guidance for responsible reductions in the nuclear arsenal by providing the scientific means to lessen the need for resuming underground nuclear testing; it could also accelerate the dismantling of retired weapons.[123]

Finally, a credible deterrent demands a reliable means to deliver nuclear weapons across the strike capability of the nuclear triad. Each leg of the triad contributes uniquely to both conventional and nuclear deterrence.[124] To maintain a credible strike capability, the United States must develop the next-generation ICBM and continue to modernize

the submarine-based nuclear force. Also, the latest strategic guidance notes that "the U.S. military will invest as required to ensure its ability to operate effectively in anti-access and area denial (A2/AD) environments."[125] Hence, the United States should develop a bomber capable of penetrating advanced A2/AD systems. In many instances, these investments in the nuclear force will also benefit conventional capabilities. The next-generation bomber as a prompt global strike delivery platform for both nuclear and conventional munitions is but one example.

Given the reality of today's fiscal resources, concentrating on the nuclear arsenal makes economic sense. With entitlement spending consuming an ever-increasing percentage of the federal budget, defense spending is declining.[126] The United States may see a day in the near future when it must rely on more economical nuclear weapons to ensure the basic requirements of national defense, a scene strikingly similar to the one in the 1950s when President Eisenhower turned to cheaper nuclear weapons as an alternative to more expensive conventional military capabilities. Because personnel costs constitute the greatest expense in today's military, replacing a conventional force comprised mostly of ground forces with nuclear weapons may lie on the fiscal horizon. Thus, a *credible* nuclear arsenal is necessary. Investing in the nuclear weapons complex will enhance the deterrent effect of nuclear weapons by signaling potential adversaries of American resolve. As historian Phillip Meilinger points out in his biography of Gen Hoyt Vandenberg, when this Air Force chief of staff attempted to build the nuclear force with limited funding in the late 1940s, "a deterrent force that is not credible is not a deterrent; it is an invitation."[127]

Conclusion

Over the past two decades, the Air Force has spent considerable effort and resources meeting the airpower requirements of US Central Command. Beginning with Desert Shield, Air Force major combat operations in the Middle East, the Balkans, and Southwest Asia, as well as contingency and crisis operations in Haiti, Indonesia, Japan, and

elsewhere have continued unabated. The constant demands of major operations such as Desert Storm, Northern Watch, Southern Watch, Enduring Freedom, and Iraqi Freedom require a heavy focus on the tactical and operational aspects of airpower, which has played a role in delaying the recapitalization of some platforms necessary to conduct Air Force core functions at the strategic level of war. While the Air Force is in the midst of acquiring the next generation of multirole fighters, airborne ISR RPAs, tankers, and possibly even remotely piloted long-range penetrating bombers, it still has aging platforms that have long passed their expected service life. Consequently, the Air Force must either engage in costly modifications to maintain combat-ready status or modify the missions of these aircraft to adjust to the changing threat environment (e.g., using the B-52 as a launch platform for nuclear cruise missiles rather than a penetrating bomber).

In many instances, technological innovation and the capabilities of the nation's adversaries make these systems highly vulnerable. Thus, if the United States desires to maintain an Air Force capable of global vigilance, reach, and power, it needs a clear strategic vision that explains the service's objectives over the coming decades. Such a vision may then guide acquisition and planning. The fact that the service suffers from acquisition requirements well in excess of likely funding is certainly reason for concern. However, the Air Force has weathered difficult days throughout its relatively short history and may do so again.

If the myriad of defense experts are correct in suggesting that the economic and military growth of Asia—China particularly—signals a shift in American interests to the Pacific, then the region's geography may lead to a renaissance of airpower.[128] The air-sea battle concept now under development represents one such reaction to this new strategic paradigm. As General Schwartz and Adm Jonathan Greenert, chief of naval operations, point out in an article on air-sea battle, "Autocratic states and groups seeking to subvert the prevailing political and economic order are already leveraging their geographic advantages to employ armed coercion and political action to counter Ameri-

can presence and power projection, as well as to disrupt free access to key areas in the air and maritime commons."[129] Since the distances involved are much greater than those in other theaters of operation and the strategic environment, for the most part, is not conducive to the use of land power, Air Force and Navy airpower will likely prove the best option for defending the nation's interests in the years ahead. To illustrate the challenge posed by these vast distances, consider that a pilot must log only 3,638 miles from New York to Paris but 6,255 miles from Los Angeles to Beijing. If the United States wishes to protect its interests in an environment where distances are greatly extended and A2/AD strategies compound the problem, it will do so in part because the Air Force offers innovative solutions to future problems. The "core" of those solutions should concentrate on functions that contribute to the Air Force's strategic mission. ✪

Notes

1. Benjamin S. Lambeth, *The Transformation of American Air Power* (Ithaca, NY: Cornell University Press, 2000), 287.

2. Stephen Budiansky, *Air Power: The Men, Machines, and Ideas That Revolutionized War, from Kitty Hawk to Gulf War II* (New York: Penguin, 2004), 436.

3. Dr. Dale L. Hayden, "Air-Mindedness," *Air and Space Power Journal* 22, no. 4 (Winter 2008): 44, http://www.airpower.au.af.mil/airchronicles/apj/apj08/win08/hayden.html.

4. For the 12 core functions, see Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine, Organization, and Command*, 14 October 2011, 43–53, http://www.e-publishing.af.mil/shared/media/epubs/AFDD1.pdf.

5. National Security Act of 1947, Public Law 253, 80th Cong., 1st sess., 26 July 1947, sec. 207(f).

6. Department of Defense, *Functions of the Armed Forces and the Joints Chiefs of Staff* (Washington, DC: Office of the Secretary of Defense, 21 April 1948), 11.

7. *United States Code*, vol. 5, *Title 10, Armed Forces* (Washington, DC: US Government Printing Office, 2006), subtitle D, chap. 807, sec. 8062(c), 1905.

8. Department of Defense Directive (DODD) 5100.01, *Functions of the Department of Defense and Its Major Components*, 21 December 2010, 34, http://www.dtic.mil/whs/directives/corres/pdf/510001p.pdf.

9. AFDD 1, *Air Force Basic Doctrine*, 43 (fig. 5.1).

10. Gen Norton Schwartz, chief of staff, US Air Force (address to the Air Force Association Air and Space Conference and Technology Exposition, National Harbor, MD, 20 September

2011), accessed 21 October 2011, https://www.my.af.mil/gcss-af/USAF/search?text=CSAF+Air+Force+Association+Convention+Speech+2011.

11. Katherine V. Schinasi, *DOD Acquisition Outcomes: A Case for Change* (Washington, DC: Government Accountability Office, 2005), 3–4.

12. Stephen L. McFarland and Wesley Phillips Newton, *To Command the Sky: The Battle for Air Superiority over Germany, 1942–1944* (Tuscaloosa, AL: University of Alabama Press, 2006); and William W. Momyer, *Airpower in Three Wars* (Maxwell AFB, AL: Air University Press, 2003).

13. War Department Field Manual 100-20, *Command and Employment of Air Power*, 21 July 1943, [1], http://www.au.af.mil/au/awc/awcgate/documents/fm100-20_jul_1943.pdf.

14. Richard Hallion, *Decisive Air Power prior to 1950* (Bolling AFB, Washington, DC: Air Force Historical Studies Office, n.d.), http://www.airforcehistory.hq.af.mil/EARS/Hallion papers/decisiveairpower1950.htm.

15. AFDD 3-1, *Air Warfare*, 22 January 2000 (incorporating change 1, 28 July 2011), 105, http://www.e-publishing.af.mil/shared/media/epubs/AFDD3-1.pdf.

16. Government Accountability Office, *Homeland Defense: Actions Needed to Improve Management of Air Sovereignty Alert Operations to Protect U.S. Airspace* (Washington, DC: Government Accountability Office, 2009).

17. Anthony H. Cordesman and Martin Kleiber, *Chinese Military Modernization and Force Development* (Washington, DC: Center for Strategic and International Studies, 2006); and Phillip C. Saunders and Erik R. Quam, "China's Air Force," *Joint Force Quarterly* 47, no. 4 (2007): 28–33, http://www.dtic.mil/dtic/tr/fulltext/u2/a519421.pdf.

18. Gen Norton A. Schwartz and Adm Jonathan W. Greenert, "Air-Sea Battle: Promoting Stability in an Era of Uncertainty," *American Interest*, 20 February 2012, http://www.the-american-interest.com/article.cfm?piece=1212.

19. Bill Gertz, "China 'A2/AD' Threat," *Washington Times*, 15 December 2010, http://www.washingtontimes.com/news/2010/dec/15/inside-the-ring-251245374/?page=1.

20. Bernard B. Fall, *Hell in a Very Small Place: The Siege of Dien Bien Phu* (New York: De Capo Press, 1966), 455–59.

21. Anne Broache, "Army Official: UAVs Are 'Unsung Heroes' in Iraq," *CNET News*, 29 February 2008, http://news.cnet.com/8301-10784_3-9883300-7.HTML; and Sgt Jason Dangel, "UAVs Role Key Ingredient to Success in Iraq," United States Army, 15 August 2008, http://www.army.mil/article/11684/.

22. Siobhan Gorman, Yochi J. Dreazen, and August Cole, "Insurgents Hack U.S. Drones: $26 Software Is Used to Breach Key Weapons in Iraq; Iranian Backing Suspected," *Wall Street Journal*, 17 December 2009, http://online.wsj.com/article/SB126102247889095011.html.

23. "Iran 'Hacks Software of US Spy Drone,'" *Telegraph*, 22 April 2012, http://www.telegraph.co.uk/news/worldnews/middleeast/iran/9219459/Iran-hacks-software-of-US-spy-drone.html.

24. Michael C. Sirak, "The Wynne Outbrief," *Air Force Magazine* 91, no. 9 (September 2008): 48–50, http://www.airforce-magazine.com/MagazineArchive/Documents/2008/September%202008/0908wynne.pdf.

25. Joe Pappalardo, "Air Force Acknowledges Secret Stealth UAV," *Popular Mechanics*, 7 December 2009, http://www.popularmechanics.com/technology/military_law/4339138.html.

26. Jeff Schogol, "Study: AF Lacks Stealth Aircraft to Fight China," *Air Force Times*, 28 March 2012, http://www.airforcetimes.com/news/2012/03/air-force-lacks-stealth-aircraft-to-fight-china-study-says-032812w/.

27. Schwartz, address, 11.

28. Barry Watts, *Backgrounder: The F-22 Program in Retrospect* (Washington, DC: Center for Strategic and Budgetary Analysis, December 2009), 3.

29. Winslow Wheeler, "How Much Will Each F-35 Cost?," Center for Defense Information—Straus Military Reform Project, 30 March 2010, http://www.cdi.org/friendlyversion/printversion.cfm?documentID=4596.

30. DODD 5100.01, *Functions of the Department of Defense*, 34.

31. Jeffrey T. Richelson, *America's Space Sentinels: DSP Satellites and National Security* (Lawrence, KS: University Press of Kansas, 1999).

32. Ahmed El-Rabbany, *Introduction to GPS: The Global Positioning System* (Boston: Artech House, 2002).

33. United Nations, *Outer Space and Global Security* (Geneva, Switzerland: United Nations Institute for Disarmament Research, 2003); and Michael E. O'Hanlon, *Neither Star Wars nor Sanctuary: Constraining the Military Uses of Space* (Washington, DC: Brookings Institution Press, 2004).

34. L. Parker Temple, *Shades of Gray: National Security and the Evolution of Space Reconnaissance* (Reston, VA: American Institute of Aeronautics and Astronautics, 2005).

35. Benjamin S. Lambeth, *Air Power against Terror: America's Conduct of Operation Enduring Freedom* (Santa Monica, CA: RAND, 2005), 274.

36. AFDD 3-14, *Space Operations*, 27 November 2006, 33, http://www.e-publishing.af.mil/shared/media/epubs/AFDD3-14.pdf.

37. *Report of the Commission to Assess United States National Security Space Management and Organization* (Washington, DC: The Commission, 2001), http://www.dod.mil/pubs/space20010111.pdf; and Clayton K. S. Chun, *Defending Space: US Anti-Satellite Warfare and Space Weaponry* (Oxford: Osprey, 2006).

38. Lt Col James Mackey, "Recent US and Chinese Antisatellite Activities," *Air and Space Power Journal* 23, no. 3 (Fall 2009): 82–93; and Adam Levine, "In Today's Space Race, Watch Out for China," *CNN*, 18 November 2009, http://www.cnn.com/2009/TECH/space/11/18/china.space/index.html.

39. David Wright, Laura Grego, and Lisbeth Gronlund, *The Physics of Space Security: A Reference Manual* (Cambridge, MA: American Academy of Arts and Sciences, 2005), http://www.amacad.org/publications/Physics_of_Space_Security.pdf; and Guy Gugliotta, "Space Invaders," *Atlantic* 302, no. 2 (September 2008): 30–32.

40. National Aeronautics and Space Administration, "Crew Returns Home after Final Space Shuttle Mission," 22 July 2011, http://www.nasa.gov/externalflash/135_splash/index.html.

41. Mike Wall, "The Future of Human Spaceflight," *Fox News*, 12 April 2011, http://www.foxnews.com/scitech/2011/04/12/future-human-spaceflight/.

42. Guy Ben-Ari et al., *National Security and the Commercial Space Sector* (Washington, DC: Center for Strategic and International Relations, 2010).

43. Bruce W. MacDonald, *China, Space Weapons, and U.S. Security* (New York: Council on Foreign Relations, 2008), 12–26.

44. Executive Office of the President, *Cyberspace Policy Review: Assuring a Trusted and Resilient Information and Communications Infrastructure* (Washington, DC: Executive Office of

the President of the United States, 2009), 1, http://www.whitehouse.gov/assets/documents/Cyberspace_Policy_Review_final.pdf.

45. See General Accounting Office, *Cybersecurity for Critical Infrastructure Protection* (Washington, DC: General Accounting Office, 2004); and Brian Cashell et al., *The Economic Impact of Cyber-Attacks*, CRS Report for Congress RL32331 (Washington, DC: Congressional Research Service, 2004), http://www.cisco.com/warp/public/779/govtaffairs/images/CRS_Cyber_Attacks.pdf.

46. "24th Air Force Activated, 2 Units Realign in Joint Ceremony," United States Air Force, 18 August 2009, http://www.af.mil/news/story.asp?id=123163831.

47. Rebecca Grant, "The Cyber Menace," *Air Force Magazine* 92, no. 3 (March 2009): 24–28, http://www.airforce-magazine.com/MagazineArchive/Documents/2009/March%202009/0309cyber.pdf.

48. Jason Fritz, "How China Will Use Cyber Warfare to Leapfrog in Military Competitiveness," *Culture Mandala* 8, no. 1 (October 2008): 28–80, http://epublications.bond.edu.au/cgi/viewcontent.cgi?article=1110&context=cm; Kim Hart, "Longtime Battle Lines Are Recast in Russia and Georgia's Cyberwar," *Washington Post*, 14 August 2008, D01, http://www.washingtonpost.com/wp-dyn/content/article/2008/08/13/AR2008081303623.html; and John Markoff, "Georgia Takes a Beating in the Cyberwar with Russia," *New York Times*, 11 August 2008, http://bits.blogs.nytimes.com/2008/08/11/georgia-takes-a-beating-in-the-cyberwar-with-russia/.

49. Fritz, "Leapfrog in Military Competitiveness," 55–80; and Ed Pilkington, "China Winning Cyber War, Congress Warned," *Guardian*, 20 November 2008, http://www.guardian.co.uk/technology/2008/nov/20/china-us-military-hacking/print.

50. Alan W. Dowd, "World War 2.0," *American Legion Magazine*, 1 January 2010, 34–37.

51. Declan McCullagh, "U.S. Was Warned of Predator Drone Hacking," *CBS News*, 17 December 2009, http://www.cbsnews.com/blogs/2009/12/17/taking_liberties/entry5988978.shtml; and Gorman, Dreazen, and Cole, "Insurgents Hack U.S. Drones."

52. Jim Miklaszewski, "US Military: Concern but No Panic over Drone Virus," *NBC News*, 8 October 2011, http://www.msnbc.msn.com/id/44830227/ns/us_news-security/t/us-military-concern-no-panic-over-drone-virus/.

53. Thomas P. Ehrhard, *An Air Force Strategy for the Long Haul* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), 23–24.

54. Kamal Jabbour, "Cyber Vision and Cyber Force Development," *Strategic Studies Quarterly* 4, no. 1 (Spring 2010): 69.

55. *Air Force Cyber Command Strategic Vision* (Barksdale AFB, LA: Air Force Cyber Command, February 2008), 14, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA479060.

56. Ibid., 15.

57. Ibid.

58. Bryan Krekel, *Capability of the People's Republic of China to Conduct Cyber Warfare and Computer Network Exploitation* (Washington, DC: US-China Economic Security and Review Commission, 2009), http://www.uscc.gov/researchpapers/2009/NorthropGrumman_PRC_Cyber_Paper_FINAL_Approved%20Report_16Oct2009.pdf.

59. Michael Armbrust et al., "Above the Clouds: A Berkeley View of Cloud Computing" (Berkeley: University of California, Reliable Adaptive Distributed Systems Laboratory, 10 February 2009), 4–6, http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.pdf.

60. Budiansky, *Air Power*, 46.

61. Ibid., 176.

62. David R. Mets, *Reflections of a Middling Cold Warrior: Should the Army Air Corps Be Resurrected?* (Maxwell AFB, AL: Air University Press, 2009).

63. "Table of US ICBM Force," Natural Resources Defense Council, 25 November 2002, http://www.nrdc.org/nuclear/nudb/datab3.asp.

64. David R. Mets, *The Air Campaign: John Warden and the Classical Airpower Theorists*, rev. ed. (Maxwell AFB, AL: Air University Press, 1999).

65. Adam Lowther, "Understanding the Nuclear Triad," *Air and Space Power Journal–Portuguese* 21, no. 4 (Winter 2009): 49–54.

66. Zalmay M. Khalilzad and Ian O. Lesser, *Sources of Conflict in the 21st Century: Regional Futures and U.S. Strategy* (Santa Monica, CA: RAND, 1998).

67. Alastair Iain Johnston, "Is China a Status Quo Power?," *International Security* 27, no. 4 (Spring 2003): 5–56. George Friedman suggests that the United States need only deny China, for example, the ability to achieve its objectives, rather than win a large-scale conflict. Options for global precision attack provide some of the necessary capabilities to realize such an objective. See George Friedman, *The Next 100 Years: A Forecast for the 21st Century* (New York: Doubleday, 2009).

68. Friedman, *Next 100 Years*, 178.

69. Adam B. Lowther, *Americans and Asymmetric Conflict: Lebanon, Somalia, and Afghanistan* (Westport, CT: Praeger, 2007), 126–34.

70. DODD 5100.01, *Functions of the Department of Defense*, 34; and AFDD 1, *Air Force Basic Doctrine*, 48–49.

71. Michèle Flournoy and Shawn Brimley, "The Contested Commons," *U.S. Naval Institute Proceedings* 135, no. 7 (July 2009): 16–21, http://www.usni.org/magazines/proceedings/archive/story.asp?STORY_ID=1950.

72. Ehrhard, *Air Force Strategy*, 70.

73. Col Rick Patenaude, "Prompt Global Strike Update" (presentation, Air Force Space Command, 2005); and Todd C. Shull, *Conventional Prompt Global Strike: Valuable Military Option or Threat to Global Stability?* (Monterey, CA: Naval Postgraduate School, 2005), 43–47.

74. James Kitfield, "The Cruise Missile Question," *Air Force Magazine* 93, no. 2 (February 2010): 46–49, http://www.airforce-magazine.com/MagazineArchive/Documents/2010/February%202010/0210missile.pdf.

75. Lt Col James David Clifton, *Air Mobility Command: Providing Global Reach or Reaching to Be Global?* (Carlisle Barracks, PA: US Army War College, 2002), http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA400772&Location=U2&doc=GetTRDoc.pdf.

76. Quoted in Keith A. Hutcheson, *Air Mobility: The Evolution of Global Reach* (Beltsville, MD: Todd Allen Printing, 1999), 35.

77. Jack Barnard, *The Hump: The Greatest Untold Story of the War* (New York: Souvenir Press, 1960); Warren Kozak, *LeMay: The Life and Wars of General Curtis LeMay* (Washington, DC: Regnery Publishing, 2009), chap. 10; and William T. Y'Blood, "From the Desert to the Mountains," in *Winged Shield, Winged Sword: A History of the United States Air Force*, vol. 2, ed. Bernard C. Nalty (Washington, DC: Air Force History and Museums Program, 1997), 447–52.

78. Bekah A. Clark, Air Mobility Command Public Affairs, interview by the author, 5 January 2010.

79. United States Joint Forces Command, *The Joint Operating Environment: Challenges and Implications for the Future Joint Force* (Suffolk, VA: United States Joint Forces Command, Center for Joint Futures, 2008), http://www.jfcom.mil/newslink/storyarchive/2008/JOE2008.pdf.

80. "C-130 Hercules," fact sheet, United States Air Force, 29 December 2011, http://www.af.mil/information/factsheets/factsheet.asp?fsID=92.

81. "C-5 Galaxy," fact sheet, United States Air Force, 29 December 2011, http://www.af.mil/information/factsheets/factsheet.asp?id=84.

82. "C-17 Globemaster III," fact sheet, United States Air Force, 29 December 2011, http://www.af.mil/information/factsheets/factsheet.asp?id=86.

83. Headquarters Air Mobility Command/A8XPL, *Air Mobility Master Plan* (Scott AFB, IL: Headquarters Air Mobility Command, 2010), 32.

84. Clark, interview.

85. Although a number of developing technologies enhance an adversary's ability to strike the United States from a distance, the proliferation of ballistic missiles serves as one example. The Claremont Institute maintains a detailed description of ballistic missile developments. See "Ballistic Missiles of the World," MissleThreat.com, accessed 31 May 2012, http://www.missilethreat.com/missilesoftheworld/pageID.134/default.asp.

86. Evan S. Medeiros, *Analyzing China's Defense Industries and the Implications for Chinese Military Modernization* (Santa Monica, CA: RAND, 2004), http://www.rand.org/pubs/testimonies/2005/RAND_CT217.pdf; and Roger Cliff, *Advances Underway in China's Defense Industries* (Santa Monica, CA: RAND, 2006), http://www.rand.org/pubs/testimonies/2006/RAND_CT256.pdf.

87. Jayshree Bajoria, "Countering China's Military Modernization," Council on Foreign Relations, 4 February 2009, http://www.cfr.org/publication/9052/countering_chinas_military_modernization.html; and Richard Fisher, *China's Military Modernization: Building for Regional and Global Reach* (Westport, CT: Praeger, 2008), 169–212.

88. "Aerial Refueling for UAVs," strategypage.com, 7 July 2009, http://www.strategypage.com/htmw/htnavai/20090707.aspx.

89. "KC-135 Stratotanker," fact sheet, United States Air Force, 29 December 2011, http://www.af.mil/information/factsheets/factsheet.asp?id=110.

90. "KC-10 Extender," fact sheet, United States Air Force, 29 December 2011, http://www.af.mil/information/factsheets/factsheet.asp?id=109.

91. Dave Majumdar, "Boeing Wins KC-X Tanker Battle," *Air Force Times*, 24 February 2011, https://www.airforcetimes.com/news/2011/02/defense-boeing-win-tanker-contract-022411/.

92. Mary Duprey Hoehling, *Thaddeus Lowe: America's One-Man Air Corps* (New York: Messner, 1958); and L. T. C. Rolt, *The Aeronauts: A History of Ballooning, 1783–1903* (New York: Walker and Company, 1966).

93. Lee Kennett, *The First Air War, 1914–1918* (New York: Free Press, 1991); Eric Lawson and Jane Lawson, *The First Air Campaign, August 1914–November 1918* (Conshohocken, PA: Combined Books, 1996); and John H. Morrow Jr., *The Great War in the Air: Military Aviation from 1909–1921* (Washington, DC: Smithsonian Institution Press, 1993).

94. Francis Gary Powers with Curt Gentry, *Operation Overflight: The U-2 Spy Pilot Tells His Story for the First Time* (New York: Holt, Rinehart and Winston, 1970).

95. Charles J. Gross, *American Military Aviation: The Indispensible Arm* (College Station, TX: Texas A&M University Press, 2002), 222.

96. Richelson, *America's Space Sentinels*.

97. Maj David Kurle, "Predators Provide Eyes in the Sky over Afghanistan," Armed Forces News Service, 9 June 2006, http://www.spacewar.com/reports/Predators_Provide_Eyes_In_The_Sky_Over_Afghanistan.html; and Bill Sweetman, "USAF Predators Come of Age in Iraq and Afghanistan As Reaper Waits in the Wings," *Jane's International Defence Review*, 26 October 2006, http://www.janes.com/defence/news/idr/idr061026_2_n.shtml.

98. Chuck Paone, "A Top AF Official Lays Out 21st Century ISR Challenges," *Air Force Print News Today*, 11 June 2009, http://www.afmc.af.mil/news/story_print.asp?id=123153691.

99. Lolita C. Baldor, "Increased UAV Reliance Evident in 2009 Budget," *Army Times*, 5 February 2008, http://www.armytimes.com/news/2008/02/ap_uavs_080205/.

100. Gene J. Koprowski, "U.S. Air Force Confirms 'Beast of Kandahar' Secret Stealth Drone Plane," *Fox News*, 9 December 2009, http://www.foxnews.com/scitech/2009/12/09/usair-force-confirms-secret-stealth-drone-plane/.

101. United States Air Force, *United States Air Force Working Capital Fund* (Washington, DC: United States Air Force, 2009), http://www.saffm.hq.af.mil/shared/media/document/AFD-090508-032.pdf.

102. Lowther, "Understanding the Nuclear Triad."

103. VADM Robert R. Monroe, USN, Retired, "A Perfect Storm over Nuclear Weapons," *Air and Space Power Journal* 23, no. 3 (Fall 2009): 19–29.

104. Stephen I. Schwartz and Deepti Choubey, "The Cost of Nuclear Security," *Los Angeles Times*, 12 January 2009, http://www.latimes.com/news/opinion/commentary/la-oe-schwartz12-2009jan12,0,5207429.story; and Department of Defense, *National Defense Budget Estimates for FY 2009* (Washington, DC: Department of Defense, Office of the Under Secretary of Defense, 2008), http://comptroller.defense.gov/defbudget/fy2009/fy2009_greenbook.pdf.

105. Gavin Clarke, "Microsoft Doubles Quarterly Revenue Drop," *Register*, 24 July 2009, http://www.theregister.co.uk/2009/07/24/microsoft_fiscal_09_results/.

106. AFDD 3-72, *Nuclear Operations*, 7 May 2009, ii, http://www.e-publishing.af.mil/shared/media/epubs/AFDD3-72.pdf.

107. Graham Allison, *Nuclear Terrorism: The Ultimate Preventable Catastrophe* (New York: Holt, 2004). Allison argues that it is not a matter of if but a matter of when.

108. See Seth G. Jones and Martin C. Libicki, *How Terrorist Groups End: Lessons for Countering al Qa'ida* (Santa Monica, CA: RAND, 2008).

109. Lt Col Kenneth Carrick, *Weakness against Terrorism: Fifteen Years of Failed U.S. Policy*, strategy research project (Carlisle Barracks, PA: US Army War College, 30 March 2007), 5, http://handle.dtic.mil/100.2/ADA467152.

110. Joseph Cirincione, *Bomb Scare: The History and Future of Nuclear Weapons* (New York: Columbia University Press, 2007), 31.

111. Michael Levi, *On Nuclear Terrorism* (Cambridge, MA: Harvard University Press, 2007), 127.

112. Cirincione, *Bomb Scare*, 142.

113. AFDD 3-72, *Nuclear Operations*, 9.

114. Ibid., 11.

115. Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: Office of the Secretary of Defense, January 2012), 5, http://www.defense.gov/news/Defense_Strategic_Guidance.pdf .

116. "China: Overview," Nuclear Threat Initiative, May 2012, http://www.nti.org/db/china/darmpos.htm; and Joseph Cirincione, "China's Nuclear Modernization," *Carnegie*

Proliferation Brief 2, no. 8 (2006), http://www.carnegieendowment.org/1999/04/07/china-s-nuclear-modernization/4gz.

117. Vladimir Isachenkov, "Russia to Modernize Its Nuclear Arsenals," Associated Press, 25 February 2009, http://www.huffingtonpost.com/2009/02/25/russia-to-modernize-its-n_n_169788.html.

118. Adm Richard Mies, "The Nuclear Order—Build or Break" (remarks at the 2009 Carnegie International Nonproliferation Conference, 6 April 2009).

119. Department of Defense, *Sustaining U.S. Global Leadership*, 5.

120. Defense Science Board, *Report of the Defense Science Board Task Force on Nuclear Deterrence Skills* (Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, 2008), 71. See also James R. Schlesinger, *Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management: Phase I; The Air Force's Nuclear Mission* (Washington, DC: Secretary of Defense Task Force on DOD Nuclear Weapons Management, 2008); Schlesinger, *Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management: Phase II; Review of the DoD Nuclear Mission* (Washington, DC: Secretary of Defense Task Force on DOD Nuclear Weapons Management, 2008); Gen Kevin P. Chilton (remarks to the Strategic Weapons in the 21st Century Conference, Ronald Reagan International Trade Center, Washington, DC, 31 January 2008), http://www.lanl.gov/conferences/sw/docs/chilton-speech-SW21-31Jan08.pdf; and Secretary Michael Donley, "Reinvigorating the Nuclear Enterprise: A Critical Air Force Mission" (address, Center for Strategic and International Studies, Washington, DC, 12 November 2008), http://csis.org/files/media/csis/events/081112_donley_invitation.pdf.

121. AFDD 3-72, *Nuclear Operations*, 6–7.

122. Thomas P. D'Agostino, *Testimony on "Plans for Transforming the Department of Energy's Nuclear Weapons Complex" before the House Armed Services Subcommittee*, 109th Cong., 2nd sess., 5 April 2006; and Edgar M. Vaughan, *Recapitalizing Nuclear Weapons* (Maxwell AFB, AL: Air University Press, 2007), 1–3, 25.

123. Office of the Deputy Assistant to the Secretary for Nuclear Matters, *Nuclear Matters: A Practical Guide* (Washington, DC: Office of the Secretary of Defense, 2008), 46, http://www.lasg.org/Nuclear_Matters_A_Practical_Guide_DoD.pdf.

124. Dr. Adam B. Lowther, "Should the United States Maintain the Nuclear Triad?," *Air and Space Power Journal* 24, no. 2 (Summer 2010): 23–29.

125. Department of Defense, *Sustaining U.S. Global Leadership*, 4.

126. Vaughan, *Recapitalizing Nuclear Weapons*, 20–21.

127. Phillip S. Meilinger, *Hoyt S. Vandenberg: The Life of a General* (Washington, DC: Air Force History and Museums Program, 2000), 107.

128. Associated Press in Beijing, "US Concerned over China's Rapid Development of New Weapons," *Guardian*, 9 January 2011, http://www.guardian.co.uk/world/2011/jan/09/china-us-gates-new-weapons; Dominique Moisi, "Handing the 21st Century to Asia," *New York Times*, 26 May 2005, http://www.nytimes.com/2005/05/25/opinion/25iht-edmoisi.html; and Kishore Mahbubani, *The New Asian Hemisphere: The Irresistible Shift of Global Power to the East* (New York: Public Affairs, 2008).

129. Schwartz and Greenert, "Air-Sea Battle."

Dr. Adam B. Lowther

Dr. Lowther (BA, MA, Arizona State University; PhD, University of Alabama) is a research professor at the Air Force Research Institute (AFRI), Maxwell AFB, Alabama. His principal research interests include deterrence, nuclear weapons policy, and terrorism. Dr. Lowther is the author of *Americans and Asymmetric Conflict: Lebanon, Somalia, and Afghanistan* (Praeger Security International, 2007) and the editor of *Terrorism's Unanswered Questions* (Praeger Security International, 2009). He has published in the *New York Times*, *Boston Globe*, *Joint Force Quarterly*, *Strategic Studies Quarterly*, and elsewhere. Prior to joining AFRI, he was an assistant professor of political science at Arkansas Tech University and Columbus State University, where he taught courses in international relations, political economy, security studies, and comparative politics. Early in his career, Dr. Lowther served in the US Navy aboard the USS *Ramage* (DDG-61). He also spent time at CINCUSNAVEUR–London and with Naval Mobile Construction Battalion 17.

Dr. John F. Farrell

Dr. Farrell (USAFA; MA, University of the Philippines; EdD, University of Southern California) is associate professor and chair for Warfare and Profession of Arms at Air University's Squadron Officer College at Maxwell AFB, Alabama, where he teaches and develops curriculum for Squadron Officer School, Air Command and Staff College, and graduate-level professional military education online courses for Air Force officers. Following his commission from the US Air Force Academy in 1980, Dr. Farrell served 24 years in the Air Force. Prior to his retirement in 2004, he logged over 3,400 hours in the T-37 Tweet, T-38 Talon, C-130 Hercules, and UV-18 Twin Otter, serving on staff positions for Pacific Air Forces and as a liaison officer with the US Army. He taught world, military, area, and American history courses at the Air Force Academy and several colleges in Hawaii, Arkansas, and New Mexico, as well as graduate courses in Korean Security Studies for American Military University. He has published in *Air and Space Power Journal*, *Strategic Studies Quarterly*, and *Air Power History*, and has contributed a chapter for *High Flight: History of the U.S. Air Force Academy* (2009).

Let us know what you think! Leave a comment!

The Importance of Airpower in Supporting Irregular Warfare in Afghanistan

Col Bernie Willi, USAF

There's no doubt that this is the most difficult terrain that I've ever seen in 33 years, to actually walk across, operate in or to fight in, or, for that matter, to actually help the people in. Helicopters are just more than part and parcel of what we do each and every day. They are critical to almost every operation that we execute here in Afghanistan.

—Maj Gen Jeffrey Schloesser
Commander, Combined Joint Task Force 101–Afghanistan, 2009

Recently, the Department of Defense increased its emphasis on irregular warfare (IW), a concept difficult to define although most military professionals know it when they see it. Identifying IW as one of the department's core mission areas, the *Quadrennial Roles and Missions Review Report* of 2009 then defines it as "operations in which the joint force conducts protracted regional and global campaigns against state and non-state adversaries to subvert, coerce, attrite, and exhaust adversaries rather than defeat them through direct conventional military confrontation. Irregular warfare emphasizes winning the support of the relevant populations, promoting friendly political authority, and eroding adversary control, influence, and support."[1] Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, more succinctly characterizes IW as "a violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s)."[2]

In the context of Operation Enduring Freedom, the North Atlantic Treaty Organization (NATO) is helping Afghanistan organize, train, and equip its forces to the benefit of the nascent Afghan military, the Afghan government, and, ultimately, the civilian populace. By conducting successful IW operations, the Afghan military gains self-confidence and encouragement from the NATO community. Moreover, by supporting these missions, the Afghan government demonstrates its legitimacy as the ruling power against the Taliban insurgency. Such operations highlight the insurgents' inability to provide significant benefits on par with those of the Afghan government that would tangibly improve the livelihood, security, and well-being of the predominantly rural Afghan masses.

As part of the Combined Air Power Transition Force and now the NATO Air Training Command–Afghanistan (NATC-A) from December 2009 to November 2010, I served as an air advisor to the Afghan air force (AAF). According to the Air Advisor Academy's charter, air advisors serve to "apply aviation expertise to assess, train, advise, assist, and equip foreign personnel in the development and application of their aviation resources to meet their national needs in support of U.S. interests."[3] Specifically, I helped AAF personnel understand the utility and importance of airpower—in particular, the employment of their Mi-17 helicopter force in support of Afghanistan's national objectives. During that year, I observed and participated in numerous missions with AAF crews that had a direct and beneficial effect on the lives of average Afghans. I also witnessed and engaged in numerous direct-action missions against Taliban forces. (This article does not address those operations, focusing instead on building partnerships and IW aspects of the NATC-A mission.)

The AAF is a highly visible representation of the Government of the Islamic Republic of Afghanistan—an administration that is struggling to establish its legitimacy among a far-flung and fiercely self-reliant population. Airpower in the form of the AAF's Mi-17s lets the government reach the people, no matter how remote their location, and assist them with their basic and humanitarian needs. This use of air-

power demonstrates government responsiveness and commitment that Afghans will not likely forget. More importantly, from a US perspective, facilitating this kind of unmistakable connectivity between the government and its population lies at the very center of NATO's strategy in Afghanistan. According to former secretary of defense Robert Gates, "Where possible, U.S. strategy is to employ indirect approaches—primarily through building the capacity of partner governments and their security forces—to prevent festering problems from turning into crises that require costly and controversial direct military intervention. In this kind of effort, the capabilities of the United States' allies and partners may be as important as its own, and building their capacity is arguably as important as, if not more so than, the fighting the United States does itself."[4]

Although the US Air Force must use its finite financial resources primarily against a high-end, near-peer opponent, it should not consign IW to the history books. Our policy makers and planners must consider that future warfare will require long-term stability operations which include rebuilding the airpower capacity and capability of partner nations, as occurred in Germany, Japan, Korea, and Iraq. Remembering and implementing the IW lessons learned from previous conflicts could produce significant strategic success by eliminating the safe havens of our nation's adversaries and instigators of global conflicts in the future. Consequently, this article highlights the mission of the NATC-A and AAF as an example of how building our partner nation's airpower capacity supported strategic-level objectives defined by the Afghan government and NATO. Toward that end, it briefly examines the geographical nature of Afghanistan and its effect on aviation operations, the supporting organizational structure behind these efforts, and the ways in which the AAF has furthered national objectives by conducting IW operations.

Afghanistan's Geographical Challenges

A geographically unique area of the world, Afghanistan has some of the highest and most treacherous terrain anywhere (fig. 1).[5] Tempera-

tures range from -50°F to 120°F in the most extreme locations. According to the *CIA World Factbook*, the country includes more than 250,000 square miles of desert, mountainous, and forested terrain. The northeastern Wakhan Corridor boasts the highest mountains and the highest peak (Nowshak, at 24,557 feet). Generally in poor condition, the underdeveloped road system lacks high-quality land transportation routes; good airfields are sparse; and most remote locations have a very limited number of large airfields. The air transportation system includes 19 paved runways, 34 unpaved runways, and 11 certified heliports.[6] The lack of infrastructure, a rural population (about half of which lives in areas physically inaccessible much of the year), and the gradually developing civil aviation system make helicopters vital to the transportation of goods and services throughout the country. For these same reasons, rotary-wing aircraft have proven a substantial asset in supporting IW operations in Afghanistan.

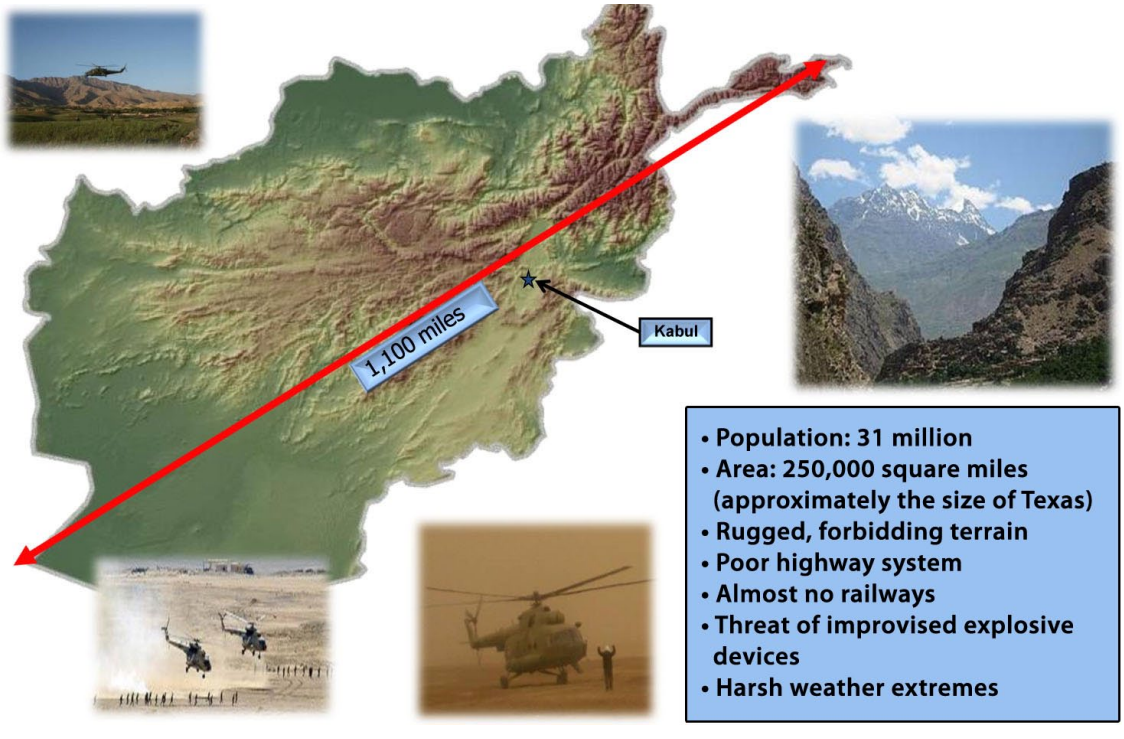

Figure 1. Characteristics of Afghanistan

Organization and Structure of the NATO Air Training Command–Afghanistan / Afghan Air Force

Part of the NATO Training Mission–Afghanistan, the NATC-A plays an important role in the current mission of building a partnership with the Afghan government. Officially, the NATC-A—headquartered at Camp Eggers in Kabul, Afghanistan, and organized similarly to a US Air Force wing as the 438th Air Expeditionary Wing—seeks to "set the conditions for a professional, fully independent and operationally capable Afghan 'air force' that meets the security requirements of Afghanistan today . . . and tomorrow."[7]

Located at the Kabul International Airport, the wing includes three air expeditionary advisory groups at the airport, Kandahar Air Base, and Shindand Air Base, equipped with Alenia C-27, Mil Mi-17, and Mil Mi-35 aircraft. About 700 members strong, the NATC-A is home to members of the US Army, Navy, Marines, and Air Force, as well as personnel from the Belgian, British, Canadian, Croatian, Czech Republic, Greek, Hungarian, Italian, Jordanian, Latvian, Lithuanian, Mongolian, and Portuguese militaries, together with Afghan interpreters, all supporting the NATC-A mission.[8]

According to the Afghan Ministry of Defense's *Guidance for Operational Planning*, insurgent efforts to control the populace by means of intimidation and coercion remain the greatest threat to the authority of the government and the general public's faith in democratic institutions.[9] Given the present political and economic issues and the harsh operational environment of Afghanistan, the unique capabilities of the AAF's rotary-wing aircraft figure prominently in executing IW operations. Efforts of the NATC-A abet the development of a sustainable training, maintenance, and operations program for the AAF and will help facilitate the orderly departure of US and coalition forces in the near future.

The mission of the AAF entails "provid[ing] trained and ready airmen and soldiers to execute critical tasks from the air in support of the Afghan National Army and when directed by the [Ministry of Defense] and General Staff, to support by air the civil authorities of Afghanistan

at all levels."[10] That mission includes transportation of the president and distinguished visitors, casualty evacuation, air mobility, training, and close air attack in support of the Afghan National Security Forces.[11] In reality, the AAF must be ready to assist with a myriad of tasks as directed by the Ministry of Defense.

Organizationally, the AAF functions as a distinct subdivision of the Afghan National Army, currently divided into six geographically assigned infantry corps and one capital division, supported by the single air force.[12] As of January 2011, the AAF had approximately 50 aircraft and 4,000 airmen (fig. 2). The air force remains on track to grow to a planned full strength of 146 aircraft and about 8,000 airmen. Its future inventory will consist of both rotary- and fixed-wing training aircraft as well as cargo and light attack platforms, an appropriate composition considering the fact that the US Department of Defense characterizes most of the AAF's missions as IW. The AAF's developing capabilities give it a significant asymmetrical advantage unmatched by Taliban forces, further bolstering the Afghan government's claim of legitimacy.

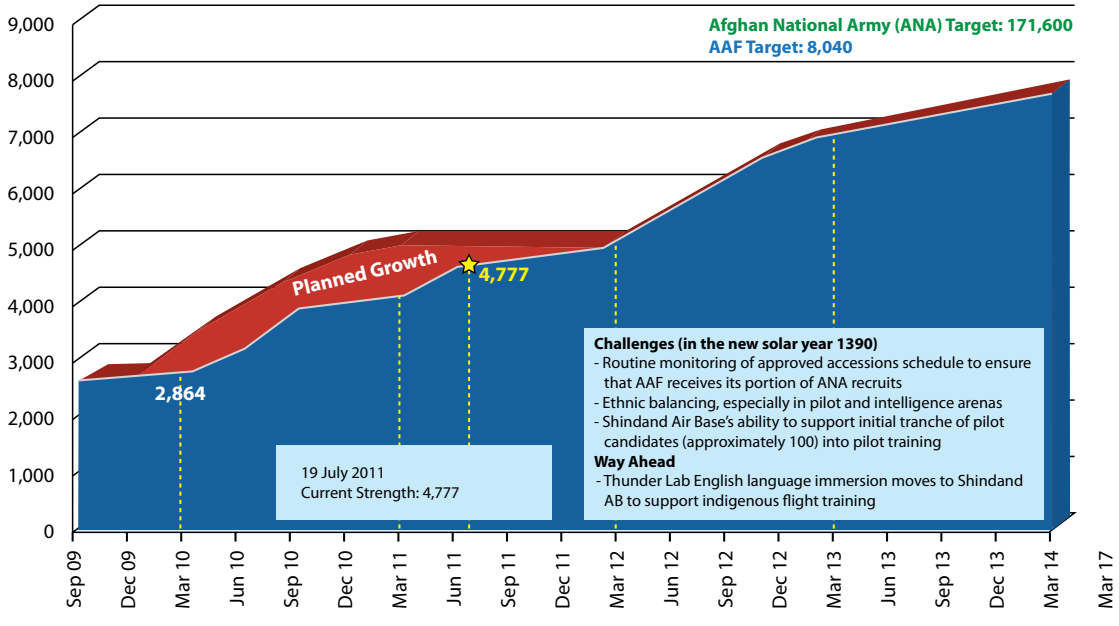

Figure 2. Strength of Afghanistan's air force

Recent Irregular Warfare Operations by the Afghan Air Force

Disaster Relief

The Afghan government's *Guidance for Operational Planning* cites the importance of its successfully responding to natural disasters as a major factor in reducing vulnerability to internal and external threats.[13] The Afghan Ministry of Defense also includes this capability among its strategic priorities. At no other time does the AAF's rotary-wing force shine brighter than when it conducts disaster relief operations.

In February 2010, heavy snows triggered deadly avalanches that killed some 150 people in the Salang Pass in north-central Afghanistan.[14] Once notified of the tragedy, the AAF and NATO air advisors sprang into action using Mi-17s to fly soldiers and recovery equipment to the disaster location (at an elevation of 11,000 feet) (fig. 3). These quick actions rescued scores of Afghan civilians.

Figure 3. Salang rescue

The mission also recovered many people killed in the calamity, a noteworthy achievement in light of Muslims' sensitivity to the quick recovery and burial of their dead. The AAF fulfills a requirement of the Afghan National Security Forces to move soldiers killed in action from the battlefield to their final ancestral burial site within 48 hours of notification. It does so by using a combination of rotary- and fixed-

wing aircraft to ensure timeliness while retaining maximum capability for battlefield support. Further, the AAF has an obligation to recover and evacuate injured Afghan National Security Forces personnel, beginning mission execution within one hour of notification and delivering any wounded Afghan National Army soldier to a level-two (comprehensive trauma care) medical facility within five hours of notification. The AAF's transfer of patients throughout the country elicited an immensely favorable reaction from both those individuals and their families.

On 28 and 29 July 2010, severe flooding hit the northwest corner of Afghanistan and the surrounding area.[15] Again, the AAF and NATC-A offered vital humanitarian assistance, making use of new Mi-17V5 aircraft—part of the US government's assistance to the Afghan military. To the credit of the Afghan leadership, it placed an Afghan public affairs cameraman on board one of the recovery platforms to document the rescue operations. On 28 July, the crews performed rescues in the eastern Laghman and Nangarhar provinces, saving 200 local nationals from the floodwaters. After completing the rescues for that day, the crews intended to return to Kabul, but poor weather forced them to spend the evening at the nearby air base in Jalalabad. At first light of the next day, the crews resumed rescue operations in Nangarhar Province. After recovering 40 more people, they returned to Jalalabad to refuel for the return trip to Kabul.

At that time, the governor of Kunar requested that the AAF rescue more people from the floodwaters in the Kunar Valley, a location notorious for routine attacks from Taliban small arms and rocket propelled grenades against AAF helicopters. Nevertheless, the combined Afghan/US crews began recovering those in need of lifesaving assistance. Notably, during these missions a large Taliban flag could be seen to the east of the recovery zone where the crews off-loaded the recovered personnel. Afghan civilians on scene informed the crews that this flag served as an unambiguous signal that the Taliban was observing the recovery operations in the area. Despite their unmistakably close proximity, Taliban forces opted not to attack the aircraft and crews that

day because of the essential assistance provided by the AAF to them and their families.

Moreover, during these missions Afghan civilians took pictures of the event with their cell phone cameras. Despite the extremely poor weather and high-threat environment, the crews received credit from NATO's International Security Assistance Force for rescuing almost 2,100 Afghan civilians from the flood and minimizing loss of life.[16] The fact that nearby Taliban foot soldiers stood down while AAF helicopters conducted rescue operations reflects the impact of the missions.

These same floods resulted in thousands perishing in nearby Pakistan. Flush with confidence gained by completing the formidable operation in Afghanistan, the AAF deployed to Pakistan the following month to help with the multinational flood-relief efforts there, adding support to the Afghan government's claim of legitimacy with both the Afghan populace and neighboring states (fig. 4).

Figure 4. Humanitarian assistance and disaster relief in Pakistan

Humanitarian Support

With the help of the NATC-A, AAF helicopters also lent extensive support to several humanitarian missions. NATC-A members and AAF leadership developed a working relationship with two humanitarian organizations—Global Roots and the Central Asian Institute (made famous by the book *Three Cups of Tea* by Greg Mortenson).[17] This team began planning helicopter airlift missions to expedite construction of

an orphanage in the remote Badakhshan Province and delivered school supplies, typically donated by US and international civilian groups, to the towns of Bamiyan, Kabul, and Panjshir.

During these missions, members of both the NATC-A and the AAF interacted with local men, women, and children, who saw that the Afghan military could operate freely in most areas of the country (fig 5). Perhaps more importantly, the operations demonstrated that the Afghan government and coalition partners could act as agents of beneficial change. Personal contact with the Afghans offered tangible proof of the altruistic motives of the government and AAF, further discrediting Taliban propaganda describing the government and coalition partners as "monsters" and adding credibility to the central government's claim of legitimacy. Further, these humanitarian missions gave the participating NATC-A mentors and AAF aircrews a sense of personal fulfillment.

Figure 5. Supporting humanitarian missions in Afghanistan

Election Support

AAF helicopters also assisted in ballot distribution and collection for Afghanistan in the Wolesi Jirga (Afghan Parliament) election in September 2010, delivering ballots to select, relatively secure locations throughout Afghanistan (fig. 6).[18] Although a few locations had too much enemy

activity to visit, most areas did receive election ballots. In one instance, in the vicinity of the village of Dawlat Shah, Taliban forces attacked AAF aircraft with small arms and rocket propelled grenades as they attempted to deliver ballots to the village. After the successful delivery, the Taliban warned the AAF not to return to retrieve the ballots.

Figure 6. Election support

Undaunted by the threats, NATC-A mentors formulated a plan to execute the mission and recover the ballots under cover of darkness. (Only a few AAF aircrews had qualified to fly the Mi-17 using night vision goggles, and they were assigned exclusively to the Presidential Airlift Squadron.) After hearing a briefing on the potentially dangerous mission, the AAF crew members eagerly volunteered and became part of the planning cell. Despite poor weather and the Taliban threats, two AAF Mi-17s, escorted by two US Army AH-64s, recovered the ballots successfully.

Lt Col Qudratullah Hotaki, one of the AAF pilots who flew on the mission, remarked that in his 30 years of experience with helicopters (which included flying with the Russians and Northern Alliance), he had neither seen nor participated in anything of this magnitude or complexity. The mission showcased the rapidly escalating operational capabilities of the AAF, thanks to the NATC-A's training, support, and mentorship. Similarly, according to Brig Gen Asadullah Hashimi, commander of the Kabul Wing Operations Group, despite the difficulty of the mission and the presence of national controversy (with respect to the fairness of the elections), it was good for the Afghan people to see the AAF executing such a complicated operation. He also observed

that as Afghanistan gained more experience holding elections, the process would become more transparent and less challenging. Overall, the AAF's support of these elections had a major strategic impact on the Afghan populace insofar as it illustrated the growing competence and proficiency of the Afghan military and government.

Banking

In September 2010, the government of Afghanistan turned to the AAF's helicopter force to assist with a problem affecting the country's economic structure. Nervous Afghan depositors had withdrawn the equivalent of $180 million from the Kabul Bank over the course of two days.[19] Some individuals predicted a collapse of the country's financial system unless the Afghan government and the United States moved quickly to stabilize the bank. Should the depositors continue to withdraw their money at that rate, the Kabul Bank almost certainly would fail, undermining confidence in the basic financial system the Afghans had been trying to build with American help.

The Afghan government determined that cash deliveries to banks throughout Afghanistan would solve the problem. Because security concerns made land transportation untenable, the government tasked the AAF to make the deliveries. Most of the destinations did not have access to a nearby runway; therefore, AAF helicopters were pressed into service. Admittedly, the strategic effect of a Kabul Bank collapse is hard to estimate since most Afghans do not use banks in the same way as the citizens of industrialized nations, but keeping the bank solvent certainly maintained the Afghan government's legitimacy. Its failure would have served as additional propaganda for the Taliban insurgency—a sign of the government's inability to care for its people's basic needs.

Conclusion

The unique environmental, political, and topographical nature of Afghanistan lends itself to extensive use of rotary-wing aircraft in sup-

port of numerous IW missions. Current US strategy depends upon a strong, effective central government (which Afghanistan has never had) that is visible and relevant to a population scattered across a huge area and therefore difficult to reach. Development of Afghan airpower—a rotary-wing capability in particular—provides a direct, uniquely powerful illustration of such a government in Afghanistan. Specifically, as noted in Field Manual 3-24 / Marine Corps Warfighting Publication 3-33.5, *Counterinsurgency*, "the government [must secure] its citizens continuously, [sustain] and [build] legitimacy through effective governance, . . . effectively [isolate] the insurgency, and . . . manage and meet the expectations of the nation's entire population."[20] In the case of NATC-A/AAF rotary-wing operations, successful mission execution helped set the conditions to win popular support of the citizens through security, address the root causes of discontent, and favorably influence the local populace, thereby attaining legitimacy.

The rescue of a few thousand Afghans certainly might incline those individuals less committed to the insurgency to shift their allegiance to the Afghan government. The video taken by the Afghan public affairs officer, the cell phone pictures taken by civilians, and the school supplies delivered by AAF helicopters might also influence a tribal chief to realign his tribe's loyalty.

Clearly, building the Afghan government's airpower capacity lies well within our national security interests. It is equally clear that the AAF represents a requisite component of IW operations in Afghanistan. The NATC-A mentorship program that abetted missions supporting strategic-level goals, described in this article, deserves nurturing and maintaining. As noted by President Obama in 2009, "a campaign against extremism will not succeed with bullets or bombs alone."[21] This partnership capacity holds the key to the ultimate strategic objective—a smooth and peaceful transfer of security duties to the Afghan military as planned for 2014. ✪

Notes

1. Department of Defense, *Quadrennial Roles and Mission Review Report* (Washington, DC: Department of Defense, January 2009), 5, http://www.defense.gov/news/jan2009/qrmfinalreport_v26jan.pdf.
2. Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 8 November 2010 (as amended through 15 February 2012), 170, http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf.
3. Pascual Flores, "Air Advisor Academy Honors Fallen Comrades," Air Mobility Command, 3 February 2012, http://www.amc.af.mil/news/story.asp?id=123288542.
4. Robert M. Gates, "A Balanced Strategy: Reprogramming the Pentagon for a New Age," *Foreign Affairs* 88, no. 1 (January/February 2009): 2, http://www.jmhinternational.com/news/news/selectednews/files/2009/01/20090201_20090101_ForeignAffairs_ABalancedStrategy.pdf.
5. All images and figures in this article come from the following: Briefing, NATO Air Training Command–Afghanistan Embedded Partnership, subject: NATO Training Mission, 23 July 2011.
6. Central Intelligence Agency, "Afghanistan," *The World Factbook*, 14 March 2012, https://www.cia.gov/library/publications/the-world-factbook/geos/af.html.
7. "Our Mission," 438th Air Expeditionary Wing, accessed 10 April 2012, http://www.438aew.afcent.af.mil/main/welcome.asp.
8. Fact sheet, 438th Air Expeditionary Wing, 18 October 2011, http://www.438aew.afcent.af.mil/library/factsheets/factsheet.asp?id=18253.
9. Afghan Ministry of Defense, *Guidance for Operational Planning* (Kabul, Afghanistan: Afghan Ministry of Defense, 11 March 2010), 3.
10. Briefing, NATO Air Training Command–Afghanistan Embedded Partnership.
11. Afghan Ministry of Defense, *ANAAC Concept of Operations (CONOPS)* (Kabul, Afghanistan: Afghan Ministry of Defense, November 2006), 10.
12. Ibid., 6.
13. *Guidance for Operational Planning*, 3.
14. "Afghanistan Avalanches Kill at Least 165 in Salang Pass," *BBC News*, 10 February 2010, http://news.bbc.co.uk/2/hi/south_asia/8506033.stm.
15. David Fox, "Dozens Killed and Stranded by Afghanistan Floods," Reuters, 31 July 2010, http://www.reuters.com/article/2010/07/31/us-afghanistan-floods-idUSTRE66U0PM20100731.
16. Ibid.
17. "Global Roots is a . . . non-profit organization registered in the states of Washington and Oregon. [Its] goal is to support local humanitarians in their efforts to change the lives of children around the world." "About Us," Global Roots, accessed 11 April 2012, http://www.globalroots.org/about/about-us. The Central Asia Institute is an American nonprofit organization based in Bozeman, Montana, that seeks to "empower communities of Central Asia through literacy and education, especially for girls," in remote regions of Pakistan and Afghanistan. "CAI's Mission," Central Asia Institute, accessed 11 April 2012, https://www.ikat.org/about-cai/.
18. "Afghans Brave Taliban to Vote in Parliamentary Election," *BBC News*, 18 September 2010, http://www.bbc.co.uk/news/world-south-asia-11349179.

19. Dexter Filkins, "Depositors Panic over Bank Crisis in Afghanistan," *New York Times,* 2 September 2010, http://www.nytimes.com/2010/09/03/world/asia/03kabul.html.

20. Field Manual 3-24 / Marine Corps Warfighting Publication 3-33.5, *Counterinsurgency*, December 2006, 5-2, http://www.fas.org/irp/doddir/army/fm3-24.pdf.

21. "Remarks by the President on a New Strategy for Afghanistan and Pakistan," White House, Office of the Press Secretary, 27 March 2009, http://www.whitehouse.gov/the_press_office/Remarks-by-the-President-on-a-New-Strategy-for-Afghanistan-and-Pakistan.

Col Bernie Willi, USAF

Colonel Willi (USAFA; MS, Embry-Riddle Aeronautical University) is chief of the Personnel Recovery Core Function Team, Headquarters Air Combat Command, Langley AFB, Virginia. He represents the commander of Air Combat Command on all matters related to personnel recovery (PR) and directs all Air Force–level PR planning, programming, budgeting, requirements, acquisition, and test priorities spanning a $1 billion portfolio across 18 major commands and agencies. An HH-60G and Mi-17 evaluator pilot who has flown combat missions in Operation Southern Watch and Operation Enduring Freedom, he previously served as commander of the HH-60 Combined Test Force, Nellis AFB, Nevada, and deputy commander of the 438th Air Expeditionary Advisory Group, Kabul, Afghanistan. Colonel Willi is a graduate of Squadron Officer School, US Naval Weapons School, Air Command and Staff College, and Air War College.

Let us know what you think! Leave a comment!

Whither the Leading Expeditionary Western Air Powers in the Twenty-First Century?*

Group Capt Tim D. Q. Below, Royal Air Force

Since Winston Churchill delivered his famous "Iron Curtain" speech in Fulton, Missouri, in 1946, the phrase "special relationship" has been synonymous with the political relationship between the United Kingdom and the United States.[1] Whether in nuclear weapons cooperation or intelligence sharing, this relationship has weathered numerous variations of the ruling political parties' ideologies on either side of the Atlantic and has surmounted the vagaries of cooler and warmer Anglo-American interpersonal relationships over the intervening six-and-a-half decades. Today the relationship between the US president and the United Kingdom's prime minister is as strong as ever, President Barack Obama describing it as "truly special" during a joint press conference shortly after Prime Minister David Cameron's election to office in 2010.[2] In 2011 the two leaders jointly described it as "not just a special relationship . . . [but] an essential relationship—for us and for the world," a position further cemented during Prime Minister Cameron's near-state-level visit to the United States in March of this year.[3] Fundamental to the very bedrock of the North Atlantic Treaty Organization (NATO), the American presence in Europe underpinned the continent's security throughout the Cold War and indeed has continued to underwrite its security since the collapse of the Soviet Union.

*The editorial boards of *Air and Space Power Journal*, *Air Power Review* (Royal Air Force), and *Penser les ailes française* (French Air Force) have agreed to simultaneous publication of Group Captain Below's article.

However, the US presence and the special relationship with the United Kingdom has formed only part of the European defense equation. Although President Charles de Gaulle withdrew French forces from NATO's integrated military command structure in 1966, France remained a member of NATO and a deeply responsible part of the European community. France and the United Kingdom have been close partners for decades, but developments in the early years of the twenty-first century have brought them even closer together. Without doubt, President Nicolas Sarkozy's decision in 2009 to rejoin the integrated command structure of NATO is a significant factor, raising France's military power within British consciousness. The signing of the Anglo-French treaty on defense and security cooperation in November 2010 is just as much a factor, drawing the nations inextricably nearer and inculcating a burden-sharing culture between them.[4] Of course the present era of global austerity includes a third inescapable element: the relentless financial pressure on European nations to deliver their commitments with fewer resources. At their Paris summit in February 2012, Prime Minister Cameron and President Sarkozy reaffirmed that they could envisage no situation in which threats to the vital interests of one nation would not also threaten those of the other. In all, the combination of these three factors in the current security environment makes the case for increased security cooperation and defense interaction irrefutably compelling.[5]

Must the United Kingdom's modern, evolving security relationships with the United States and France necessarily compete, or can they coexist in harmony? At first look, an observer would certainly hope for the latter; the reality is yet more favorable. Despite its relative might and the enormity of its military power, the United States faces its own challenges. On the one hand, the rise of Asian powers in the global hierarchy is inexorably drawing America's focus from the Atlantic to the Pacific. On the other hand, the United States cannot avoid confronting the same fiscal issues that beset Europe, and it too must reduce military expenditures in light of diminishing budget allocations. Against this backdrop, we see a Europe better able to assure its own se-

curity, one in which increasing numbers of nations have become net providers rather than net absorbers of security, and one that has both the capacity to assure its own security and the capability to lead those operations necessary to do so. Given this state of affairs, the United States can feel comfortable making force reductions in Europe to fund force enhancements in the Pacific Rim.

Preventive air operations over Libya in 2011 highlighted the significance of the Armée de l'air (French air force) as a European expeditionary air power. Yet the apparent arrival of the French on the European and international scene is nothing new: the Armée de l'air had engaged in coalition operations over Bosnia, Kosovo, and Iraq, and remains active in the skies over Afghanistan today. Indeed, the rich history of contemporary combined air operations between the Royal Air Force and the Armée de l'air enabled Anglo-French forces to act effectively and rapidly after the United Nations' endorsement of UN Security Council Resolution 1973, authorizing the protection of Libyan citizens and the enforcement of a no-fly zone over Libyan territory. With the US Air Force "leading from behind," operations over Libya were perhaps indicative of a new paradigm in European expeditionary air operations.[6]

The chiefs of the Royal Air Force, Armée de l'air, and US Air Force share a vision to increase their operational effectiveness through closer collaboration among their services.[7] Despite continuing force reductions and their dependence upon the United States for augmentation of enabling capabilities such as air refuelling and surveillance, the air forces of NATO; Europe; contributing non-NATO nations such as Sweden; and non-NATO, non-European nations such as Qatar and the United Arab Emirates are already capable of the highly effective application of airpower, as demonstrated so vividly over Libya. But the United Kingdom and France are now stepping up to the mark with regard to the leadership of such coalition forces, taking on the European mace wielded so effectively by the Americans since the Second World War. It is in this context of open coalitions that we should consider the emerging

relationship among the air forces of the United Kingdom, France, and the United States. By no means a final dawning of a Gaullist "directorate," their collaboration initiative is coherent with NATO's principles of "smart defense," wringing more operational effectiveness from extant capabilities as well as informing future capability and capacity decisions in concert with major expeditionary allies.

Within this relationship is an emerging line of unified exploration steered by collaborative activity among strategy teams representing each of the air forces through the United Kingdom's Air Staff, the French Centre d'études stratégiques aérospatiales, and the US Strategic Studies Group. Coined the Trilateral Strategy Steering Group, this tripartite team draws strength from its constituent members' diverse, collective means of airpower advocacy, which range to various degrees among the teams from the respective air force leadership across defense, internal service, academia, and both the private and public sectors. Leveraging off each air force's investment in strategic thinking, the Trilateral Strategy Steering Group seeks to contribute to establishing a resilient steady state of collaborative engagement, aiding adaptation to an uncertain future, and articulating the airpower message of the strength, value, and relevance of our relationship. Doing so will better inform our own joint compatriots; the broader defense community, including political decision makers; and the wider international community of air forces.

Conducting more exercises with each other, as with each of our other allies, has served as the bedrock of contemporary Western coalition air operations. With a common understanding of the roles and employment of airpower, the political will to lead air operations when called upon, and, crucially, senior airmen having the operational expertise to do so, the Royal Air Force and the Armée de l'air are well placed to play a leading role in the assurance of Europe's continuing security while the US Air Force adjusts its force structures and role on the continent. Yet impediments remain, and the optimization of our air forces' European and global effectiveness, synergy, affordability,

and responsiveness will require improved command and control processes and infrastructure. It also demands an increased willingness to share information, constrained neither to the intelligence axis nor in terms of with whom to share (to whatever appropriate degree) that information. Lastly, in an era of global austerity, such optimization requires the confidence to parse sovereign capabilities and increase our mutual interdependence.[8] These are lofty challenges indeed, but the air forces of the United Kingdom, France, and United States must not shy away from them if they truly wish to fulfil their potential as leading coalition air powers in the twenty-first century. ✪

Notes

1. Cambridge Editorial Partnership, *Speeches That Changed the World*, rev. ed. (London: Quercus Publishing, 2010), 98.

2. "Remarks by President Obama and Prime Minister Cameron of the United Kingdom in Joint Press Availability" (Washington, DC: White House, Office of the Press Secretary, 20 July 2010), http://www.whitehouse.gov/the-press-office/remarks-president-obama-and-prime-minister-cameron-united-kingdom-joint-press-avail.

3. "Barack Obama: UK Relationship Is 'Truly Special,' " video clip, http://www.bbc.co.uk/news/uk-politics-10693215; and "UK and US: An Essential Relationship," Foreign and Commonwealth Office, 24 May 2011, http://www.fco.gov.uk/en/news/latest-news/?view=News&id=600145482.

4. Treaty between the United Kingdom of Great Britain and Northern Ireland and the French Republic for Defence and Security Co-operation (London: Stationery Office Limited, 2 November 2010), http://www.official-documents.gov.uk/document/cm79/7976/7976.pdf.

5. "UK-France Declaration on Security and Defence," 10: The Official Site of the British Prime Minister's Office, 17 February 2012, par. 5, http://www.number10.gov.uk/news/uk-france-declaration-security/.

6. The phrase "leading from behind" is generally attributed, incorrectly, to Ryan Lizza, who coined it in a magazine article. See Ryan Lizza, "The Consequentialist: How the Arab Spring Remade Obama's Foreign Policy," *New Yorker*, 2 May 2011, http://www.newyorker.com/reporting/2011/05/02/110502fa_fact_lizza?currentPage=all. For more detail on Lizza's interpretation of this phrase, see Lizza, "News Desk: Leading from Behind," *New Yorker*, 27 April 2011, http://www.newyorker.com/online/blogs/newsdesk/2011/04/leading-from-behind-obama-clinton.html.

7. Gen Norton Schwartz, Air Chief Marshal Sir Stephen Dalton, and Gen Jean-Paul Paloméros, "Libyan Air Ops Showcase French, UK, US Partnership," *Jane's Defence Weekly*, 21 March 2012, 19.

8. Ibid.

Group Capt Tim D. Q. Below, Royal Air Force

Group Captain Below (BSc, University of Durham; MA, King's College London; MAAS, School of Advanced Air and Space Studies, Air University, Maxwell AFB, Alabama) is RAF group captain for strategy at the French Air Force's Centre d'études stratégiques aérospatiales. Commissioned into the Royal Air Force in 1986, he flew in Operations Desert Shield, Desert Storm, and Provide Comfort as an operational C-130 pilot. Fluent in French, he graduated as an experimental test pilot from the Ecole du Personnel Navigant d'Essais et de Réception in 1997. He went on to complete three tours at the Ministry of Defence's (MOD) flight test centre at Boscombe Down, including command of the Heavy Aircraft Test Squadron and culminating as the MOD's chief test pilot within the Air Warfare Centre. He has also served as a procurement desk officer. Group Captain Below has 4,400 flying hours in more than 60 types of aircraft, including 1,500 hours in command.

Let us know what you think! Leave a comment!

Exchanging Business Cards

The Impact of the National Defense Authorization Act of 2012 on Domestic Disaster Response

Col John L. Conway III, USAF, Retired

This year's National Defense Authorization Act amended public law to allow the secretary of defense (upon the direction of the president) to mobilize reserve components involuntarily up to 120 days in response to natural or man-made disasters.[1] This change will add more than 380,000 reserve Soldiers, Sailors, Airmen, and Marines to the pool of potential responders, ensuring for the first time an "all in" military response to these events.

Although governors have long had the authority to mobilize National Guard troops, reserve units have remained unavailable due to the absence of a mechanism to recall them involuntarily for domestic disaster relief. This situation became apparent two weeks after Hurricane Katrina's landfall when the approximately 66,000 military personnel present in the affected area included only about 1,900 reservists (together with 45,871 members of the Army and Air National Guard and 18,276 active duty troops).

This change will act as a force multiplier, but most natural disasters do not rise to the level of federal involvement; consequently, members of the National Guard will remain each state's first "first responders" for most incidents. Moreover, the event must overwhelm state resources, and the governor must ask for declaration of a major disaster before the president can approve federal aid. If support from the Department of Defense (DOD) is necessary, it makes sense to call up local title 10 reserves before summoning active duty assets because of the shorter distances involved (in most cases), their detailed local knowledge, and, obviously, the availability of local support.

In actuality, most reserve forces will augment existing Guard capabilities. For example, adding the nine C-130 squadrons of the Air Force Reserve Command to the Air Guard airlift fleet increases available tactical airlift by 30 percent. The other reserve components also can bring a capable force of fixed- and rotary-wing assets to supplement the Air Guard. The Navy Reserve has 15 fleet logistics support squadrons throughout the country, equipped with C-130T, C-40, C-20, and C-9 aircraft. The C-130Ts are based on both the East Coast and West Coast as well as at Naval Air Station New Orleans, and the C-40s—the military cargo equivalent of the Boeing 737-700—are also located on both coasts and at Naval Air Station Fort Worth Joint Reserve Base, Texas. The Marine Forces Reserve has KC-130Fs/Js at the Fort Worth location as well and KC-130Ts in upstate New York. The Army Reserve's 11th Aviation Command oversees numerous fixed- and rotary-wing assets across the country, including C-12 jet aircraft at Fort Hood, Texas, and at Dobbins Air Reserve Base, Georgia, and its new Medevac Blackhawk helicopters at Fort Knox, Kentucky. All of these platforms, potentially available in a declared emergency, can cover a wide variety of regional disaster scenarios and are present in numbers that allow response to more than one crisis at a time. Beyond airlift, all four title 10 reserve components have medical personnel, engineering and transportation units, and a host of other specialized expertise that they could bring to bear in any major disaster scenario—and that they could bring to the fight via organic transportation. Despite this wealth of new resources, the devil is in the details.

Like their active duty counterparts, title 10 reservists cannot be called up without the same adherence to the procedure outlined in the National Response Plan (now called the National Response Framework), which determines the type of federal assistance necessary to respond to a governor's request. As chronicled in the White House's *Federal Response to Hurricane Katrina: Lessons Learned*, this series of actions is lengthy: "From the time a request is initiated until the military force or capability is delivered to the disaster site requires a 21-step process."[2]

Therefore, day-one disaster support by title 10 reservists is neither bureaucratically practical nor planned for.

When state officials need federal military support, they should ask for exactly what they require rather than repeat the famous "Send me everything!" plea by Louisiana's governor after Hurricane Katrina. The challenge lies in understanding the vast array of reserve units within each state (and those of nearby states) and their capabilities in order to make an informed call for assistance. But this information cannot be cobbled together within two days' landfall of a hurricane. It demands prior planning and commitment. As the saying goes, the day after a disaster is no time to exchange business cards. The following suggestions would enhance the process.

Start locally. Adjutants general should survey all of the title 10 reserve units within their respective states to compile data on equipment, personnel, and assigned missions. Canvassing Army and Air Force Reserve units should be easy because of the similar nature of their National Guard counterparts. Understanding the markedly different Navy Reserve and Marine Forces Reserve force structures, however, may prove a bit more daunting but certainly worth the effort. Next, it's time to meet these units face-to-face; receive mission briefings; and, yes, exchange business cards. Liaison officers from each reserve component should be attached to each joint force headquarters–state to enhance the coordination and situational awareness process as envisioned in DOD Directive (DODD) 5105.83, *National Guard Joint Force Headquarters–State (NG JFHQs–State)*.[3] Armed with a complete picture, state officials can now tailor requests for federal assistance to include specific reserve elements.

Think regionally. Under a congressionally ratified arrangement known as the Emergency Management Assistance Compact, governors can call upon the resources of other states—including the National Guard—during emergencies. This concept proved its worth in the aftermath of Hurricane Katrina when Guard units from all 50 states, three territories, and the District of Columbia mobilized to assist Louisiana and

Mississippi, serving under the command of the adjutant general of the state they assisted. Reserve units from nearby states, subject to call-up under the newly amended law, would come under the title 10 chain of command in each state. Using the tactical airlift model from above, Air Force Reserve Command's C-130 units in Mississippi, Alabama, Georgia, and North Carolina, which are aligned on a map like a string of pearls, could provide close-by emergency airlift support to the entire Southeast coastline from Texas through Virginia and beyond. Calling upon title 10 reservists in neighboring states will pay the same dividends as those found under the Emergency Management Assistance Compact construct, and planning for them should occur in advance.

Plan nationally. US Northern Command, already key to the planning and response process for national disasters, should focus on understanding the disaster-relief capabilities and unique command relationships of the title 10 reserve community. Headquarters Marine Forces Reserve, Headquarters Air Force Reserve Command, Headquarters Army Reserve, and Headquarters Navy Reserve also need to turn their attention to planning for disaster-relief augmentation. Of particular concern to all parties are liaison requirements, warning/notification processes, delineation of chains of command (operational control, administrative control, and tactical control), and funding. Although DODD 5105.83 describes Army and Air Guard linkages to active duty forces, it needs revising to address title 10 reserve forces as well.

Exercise frequently. In the future, all local-, state-, and national-level disaster exercises should include mobilization of title 10 reserve forces, assuring an all-in approach to DOD disaster mitigation.

Dust off your business cards—more help is here. ✪

Notes

1. Title 10, *United States Code*, sec. 12304, as amended by National Defense Authorization Act for Fiscal Year 2012, sec. 515.

2. Executive Office of the President, *The Federal Response to Hurricane Katrina: Lessons Learned* (Washington, DC: White House, February 2006), 54, http://library.stmarytx.edu/acadlib/edocs/katrinawh.pdf.

3. DODD 5105.83, *National Guard Joint Force Headquarters–State (NG JFHQs–State)*, 5 January 2011, http://www.dtic.mil/whs/directives/corres/pdf/510583p.pdf.

Col John L. Conway III, USAF, Retired

Colonel Conway (BA, MA, University of Alabama) is a military defense analyst at the Air Force Research Institute (AFRI), Maxwell AFB, Alabama. During his more than 30 years in the Air Force, he served as an intelligence officer with major assignments at Headquarters Air Intelligence Agency, North American Aerospace Defense Command, and the National Security Agency. He was the senior intelligence officer at Headquarters Air Force Reserve Command (AFRC), Robins AFB, Georgia, and held several wing and squadron intelligence assignments, including a combat tour with the II Direct Air Support Center in Pleiku Province, Republic of Vietnam. For his last active duty assignment, he was the chief, Counterdrug Support Division, Headquarters AFRC. Following active duty and prior to joining AFRI, Colonel Conway was a systems engineering and technical assistance contractor to the U-2 Directorate at the Warner Robins Air Logistics Center, Robins AFB, Georgia, and a civilian adviser to the commander, Gordon Regional Security Operations Center, Fort Gordon, Georgia. He is a frequent contributor to *Air and Space Power Journal*.

Let us know what you think! Leave a comment!

Air Officer's Education*

Captain Robert O'Brien

THERE are three distinct elements in the education of an Air Force officer: military instruction, technical or professional training, and general education.

Air warfare has come upon us so rapidly that the military instruction of Air Force officers has never been thought out and analyzed as a new military problem. The traditional army basic training has consequently served as the model for military instruction in the Air Force. Close-order drill, bivouacs, field exercises and the other common routine ground-training maneuvers are as much an introduction to military life for a young flyer as they are for a foot soldier. This approach overlooks the fact that each occupation has its own peculiar psychology, its own dialectics.

Flying, which has been a dream of mankind throughout history, adds a new dimension to man's existence. There is no experience in a flyer's life prior to his air training that prepares him for this dimension, whereas an infantryman learns to walk and to double-time as a child, and a sailor learns the problems involved in handling a ship through the experience of operating and directing a wheeled vehicle over a definite course. When we subject the flyer to the same basic military instruction as an infantryman, we not only delay his orientation to this new sphere—the air—but we doubly handicap him by forcing him to act two more long years as an infantryman.

As there is no preparation for the flyer in ordinary life, a special emphasis is needed to steep him in his new element *from the*

*Reprinted from *Air University Quarterly Review* 1, no. 2 (Fall 1947): 9–24.

very beginning of his military instruction. And emphasis means that he must be torn away from his habits of thinking of the earth as a place to be walked upon or driven over. The infantryman thinks of assaulting frontiers and breaking the resistance of armies. The sailor envisages the blockading of sea lanes, and victory through attrition and starvation. But total warfare, the new concept which has grown out of the development of the airplane, finds its most effective expression in the destruction of centers of production. The airman must be taught to think about methods which will paralyze the economy of an enemy nation; further on in this article, the study of economics is discussed as the major subject of general education which provides the airman with this knowledge.

The Air Force will never realize its full potentialities from its own element, the air, unless the airman is first allowed to develop his soldierly qualities out of this element. He must learn to look at everything from the air, including his problems of drill, discipline, comradeship, courage, organization, and administration. The preflight inspection, for example, might be the basic act around which all the discipline of the Air Force centers or grows. By learning to look at the world of the air, all misleading symbols, such as close-order drill, would be done away with. If flying is at the center of the military instruction program, other related subjects will fall into place naturally and acquire greater meaning, "care and feeding of troops," "transportation and troop movement," "military history and biography," and "survival"—all these subjects which have become complicated in fast-moving aerial warfare should be approached by airmen who are familiar with the possibilities and limitations of Air Power.

A subject of military instruction that is lightly touched upon in the Air Force is "physical training." All voluntary or ordered hardship, such as training to get along with little or uncomfortable sleep, to survive on short rations, to know something about self sufficiency, should be included in military instruction. In the past, the Air Force has been able to provide its men with more conveniences than were necessary. It is fine if this can be done without interfering with operations, but unless the men have exerted themselves at some time to sacrifice these comforts, constant grumbling will always plague the field commander. The programs of physical training should not lead officers to think that they are passively undergoing this as a training, when in reality they are showing themselves capable of surviving a rugged experience. As long as we call it "physical training," we shall have no lasting results because the exertion must be an attainment of the character and not of the muscles.

The Air Force was founded and developed to full maturity, in only thirty years, under the pressure of two wars. This precocious growth has hindered the establishment of great traditions which mean permanency in any institution, for without a heroic past no really hopeful future is possible. This is a secret of institutional life which must be recognized in the Air Force. Continual neglect of tradition might lead to an argument by the other services that the Air Force is not permanent, but merely a new development which itself is now superseded by guided missiles. Therefore, the Air Force must insist that today it is the heir and the instrument which carries on the great military traditions of this country. In its exploration of new frontiers, in its responsibility as the first line of defense, and in its readiness to dissent from untenable military opin-

ions, the Air Force represents the continuation of the achievements of Lewis and Clark, of Fremont, of Perry, of Byrd. Our present pioneering in the Arctic and our explorations in the ionosphere represent a modern conquest of frontiers. The study of military history and biography should be included as an essential part of the military instruction program in all service schools so that this background could be added to the consciousness of the officers of the present Air Force.

The second element of education—specialist training—is an outgrowth of the union of economics and experimental science. Science has endowed technicism with the possibility of limitless growth, and industry has applied this knowledge in the development of innumerable diverse occupations. Specialization has thus become the means for advancement in modern society, yet we know that a wisely ordered society cannot be wholly controlled by specialists, and this same condition holds true for the Air Force. Modern warfare cannot be fought by the general-duty officer or soldier, but neither can the expert be allowed to determine what chances will be taken, for the expert is a specialist only in materials and techniques. Training a pilot in electronics will not produce a better commander, for it is not the possession of techniques that defines leadership. This situation was evident during the war, when many squadron commanders who had been in the Air Force long enough to have been thoroughly cross-trained were incapable of providing the leadership which the position required.

In politics, in art, in social usages, in the other sciences, the expert is apt to be an ignorant man. Because he knows his own tiny corner of the universe, he is led to believe that he may dominate

fields outside his profession. An examination of the graphic presentation of the "Army Air Force Educational System," depicting the career outlook of an Air Force officer, discloses no evidence which shows the specialist, despite his cross-training, growing into a wise, mature leader. The quality of leadership proceeds from the inner convictions of a man, and no amount of mechanical know-how can substitute for this essential.

Despite the dangers in a system of specialization, no one can dismiss the value and necessity of a division of labor either in modern industrial society or in the modern army. The extent to which technological developments have been applied to military weapons staggers the imagination. Today the Air Force makes more use of these complex weapons than any other arm or service, and therefore it requires technical schools for instructing technicians which are comparable to the shops and laboratories in industry. Gone are the days in which basically qualified soldiers could man the several branches of the army. It has been necessary to diversify labor within the military establishment, and the classification system for Military Occupational Specialties has become similar to that of Civilian Occupational Specialties. Although the positions are broadly defined as possible, the number approaches a thousand, with twelve different specialties for enlisted radar mechanics alone. The training of individual specialties does not involve difficult educational problems, for the science of job analysis and the improvement of training materials have greatly facilitated the specialist training of an unskilled soldier.

Today when real technical progress is achieved in a particular field, it is usually due to a combination of two or more existing specialties. Thus experimental science is science in a constant flux,

and it is anti-specialistic. The intrenched specialists usually fight such integration, declaring it to be unwise, or unnecessary, or impracticable, or of merely transitory value. However, the profusion of cultural and technical possessions is such today that it threatens to engulf mankind. It is urgent, therefore, that we base our specialist training, its methods and instructors, upon the plain, humble principle that the student cannot learn all that we would like him to know. Since all officers and enlisted men have become specialists within the military profession, the most serious task now is the necessity of developing within each specialist a larger view of his contribution to the total social effort. This is possible only if he is given a broad familiarity with the men and ideas which comprise his heritage.

The remainder of this article will deal with general education, its definition, theory, development, content, and necessity in an aggressive, specialized, purposeless society. There is an airy and unspecific connotation to "general," for in uncertain circumstances we are carried through largely by the quality of our nature. In this study the word "general" signifies "universal," and it applies to and is concerned with the recurring and changing roles that we enact in our lifetime.

The universal theme of America is a belief that life holds a promise for all men, that limitations must not be imposed upon their development, and that this life can only continue as long as mutual trust exists among men. Many disintegrating ideas and practices have weakened this faith: in an ever-changing society, its true meaning and power must be constantly rediscovered. Education is not the only means of achieving this, but it is one of the in-

stitutions that men have built to accomplish it. There is another side to general education that emphasizes the recurring roles of father, judge, teacher, soldier, politician, worker, player, lover, and philosopher which each man lives in his lifetime. These actions and occupations are not produced in us mechanically. At each moment it is necessary to make up our minds whether we shall live vitally or whether we shall pass things by. Even when we seem to drift, to make no decision, aimlessness is our decision. The complexities of modern society have striven to split the personality: narrow specialization in the economic field is disorganizing family and community life; bureaucracy threatens to put an end to personal government; and pragmatism as a philosophy has substituted empiricism and expediency for authority and responsibility. Until 1939, life in this country was drifting into anarchy, and the tradition of liberal education which was concerned with the development of the whole man was being lost in departmentalization.

During the last few years, a general re-appraisal of college education has been taking place, and widespread plans for reshaping curricula have been proposed as a response to the need revealed and created by the catastrophe of a World War. Educators began to realize that peace and survival were frail entities, that social responsibility could not be delegated. The isolationism of this country did not belong to any class or section; it existed primarily in the hearts of the people. We know now that individuals must again begin to act energetically and directly in all of their roles, that they must become familiar with their history and with their society. General education is concerned with a people's attitudes and with the spirit in which they face life.

The renewed interest in general education has also been brought about by the contempt with which many college graduates view higher learning. Many have held that the essential benefit of college life resided in the social intercourse and the contacts that were made. As knowledge became investigation, information, and opinion rather than the pursuit of truth and wisdom, real intellectual development was frustrated.

When knowledge becomes cheap, mass production methods must be introduced to support the facade of learning. There has been a noticeable trend in the last thirty years to let students obtain a college degree in the least possible time and in the easiest possible manner. Pseudo-scientific systems of measurement have been devised to determine the amount of learning an individual possessed, and education has been reduced to a quantitative analysis. Here, again, knowledge was separated from purpose and became mere information which was readily forgotten. In professional and technical training the emphasis upon "scientific" testing methods and teaching procedures, optimum classroom size, and student load is well rewarded, but in general education, where there is a spirit to transmit, where great ambitions and the feeling of infinite growth are the conditions of learning, these practices emasculate teaching and degrade education. Any plan of general education must rule out shortcuts whether they be correspondence courses, intelligence tests, or other impersonal agencies which attempt to peddle education as if it were the latest breakfast food.

Let us now consider seven specific subjects in the field of general education and the contribution each can make toward bettering the performance of duty of every officer.

Knowledge, fundamental to the understanding of America and to the true meaning of our lives, is derived from the study of history. One of our greatest errors in studying history is that we generally study it on a small scale, in textbooks and outlines. History becomes an affair of abstract centuries and the struggles, agonies, passions, and uncertainties of events disappear. Issues which at the time were confused seem clear, outcomes seem obvious and inevitable, and we never realize how near to failure were the triumphs that to us seem easy, or how close to success were complete and disastrous failures.

Deterministic interpretations have confused and clouded the truly universal factor of history, the element of human nature as it struggles with an uncertain or unpredictable future. Geographers have won and lost history, due to geographical or climatical conditions. Marxists have found a class war in every uprising. Interpreting the appearance of an individual genius or the role of intellectual and moral qualities in these terms may satisfy the theorists, but it is no comfort to the human being who wavers, suffers, and sacrifices.

Popular government is based on the decisions of the majority. In the United States, if people are to decide wisely, they must know as many of the useful lessons from the collective memory of mankind as are available. The courage, the wisdom, and the faith of the people who renounced and sacrificed and died for us, inspire us to become worthy of them. This cannot be fully expressed in education, and yet education is the only peaceful method of learning these lessons.

If we are to have the best chance to avoid some fatal error in the conduct of our future affairs, we must break the spell of the purely American past. We need to find out which examples have

shaped men and what real choices lie ahead. Our first and most obvious task is to see that our officers are immersed sufficiently in history to act wisely in relation to Poland, Greece, Iran, China and all other parts of the world in which they are representing this country. Our foreign policy since the end of World War I has been partial and complicated, and our failures have been due to indifference, faulty analysis, and irrelevant emotion.

To know ourselves we must begin with the fact that the United States is the daughter and the hope of Europe, and that our heritage is directly drawn from the society of Western civilization. We must learn that our legal system, our universities, the rise of towns, and the development of modern science, are all intimate parts of our own history which represent marvelous responses to problems which at one time seemed insurmountable.

The second subject of general education is science and mathematics. Some understanding of the physical scheme of the world and the organic life therein is a prerequisite for citizenship in the Air Age. Unfortunately, most science courses in colleges are designed as introductory courses for the professional scientist. This is also true of college mathematics courses. There is no reason why the ordinary man needs this information. Even the professional man, the doctor or the engineer, is burdened in many courses with the study of scientific investigation. Mastery of these professions demands apprenticeship and repetitive practice, but not the attempt to turn people into scientists. The real scientist is a creative person, and his career involves a calling and an asceticism which is quite unworldly.

Even the courses designed for the technical or professional man are far beyond the need of general education in science for an officer. In considering the place of science in general education,

the Harvard Report on *General Education in a Free Society* states, "Most of the time in such courses is devoted to developing a technical vocabulary and technical skills and to a systematic presentation of the accumulated facts and theory which science has inherited from the past. Comparatively little attention is given to the examination of basic concepts, the nature of scientific enterprise, the historical development of the subject, its great literature, or its interrelationship with other areas of interest and activity." The general course in science is taught in very few American colleges, and on the whole science departments contribute the greatest proportion of backward looking, anti-intellectual, mechanic-minded members of the faculty.

We glibly talk about our "scientific age" and the need for the "scientific habit of mind." We mean by this a recognition of the fact that our lives, from the kitchen to the battle line, are shaped by the influence of machinery embodying scientific principles. On a large scale, all major social questions involve scientific matters. Everything from soil erosion and air transport to water supply and public health involves at some point matters of fact and theory from the realm of science. In spite of the fact that the sciences have been taught for fifty years in schools and colleges, the understanding of scientific truth and procedure which is necessary for intelligent leadership in public life is largely lacking. We tend to "leave it to the experts." The result is that we are ruled in public life by scientific ignoramuses and in the scientific laboratory we have, for the most part, political and social illiterates.

In mathematics students should be given an understanding of mathematical systems and their development. The role of mathematics in gaining knowledge of the natural world, its special and quantita-

tive relations, is as important as the mastery of the logical structure of algebra, geometry, trigonometry and calculus. Some conception of the theory of numbers, familiarity with statistical analysis, symbolical representation, and the calculation of chances, may aid in detecting many fallacies in a world that swarms with them.

The physical sciences are probably more obviously related to Air Power than any other subject. Consequently, most Air Force officers will accumulate a large amount of informal knowledge about the physical world. In formal education, however, such fields as the theory of the structure of matter—molecular, atomic, electronic—and theories of its variety and change, will serve to enforce their understanding of the principles employed in the development of the latest weapons. Air Force officers should also be familiar with the fundamental chemical phenomena, concepts, and classification: elements, compounds, affinity and stability, ionization, isomerism, and the periodic table. They should also know the present physical theories of waves and radiation, such as wave-motion, sound, and light; the quantum theory of light and matter, and the theory of relativity, as well as the fundamental laws of energy and the transmutation of matter. Finally, in the physical sciences, some consideration should be devoted to geological fact and theory, and to astrophysical phenomena and theory. All of this is the basis of language in the Air Age.

In the biological sciences, a general course should include the structure, function, variety and relationships of living organisms and the influences of heredity and environment in the evolution of life.

A review of the field of science and mathematics would suggest that treatment could be given in only a survey course or as it is presented now—an introduction to specialization. This is not necessarily

the case. General education calls for a thorough rationalization of the systems of instruction. The methods of descriptive analysis that have been used and are still in use must give way to the task of simplifying and synthesizing without sacrifice to the quality or substantialness of science. In order for a student to grasp the fundamental ideas of any science—the principles, the methods of procedure, the results—it is not necessary that he receive any great amount of formal training or familiarization with the techniques. Science presented in this manner will not be divorced from our first subject, history, for it will continually emphasize the greatness of man's conquests and will enable the student to realize and appreciate the advances of the qualified leaders of the modern scientific world.

The third subject in the general education curriculum might be criticized, but the major social problem of our day is the economic problem, and all Air Force strategy and Air Defense centers around a complete understanding of the rationalization and localization of industry. Economics as terminologically used here is not concerned with the superficial aspects of economics, such as tariff, money, banking, corporations, taxes, or the traditional subjects of an economics department in a college. We should be concerned with the study of the reproductive problems of society; the depersonalization of labor in modern industries; the disintegration of community life under the impact of industry; the organization of the large unindustrialized areas of Africa, China, South America and India; the just allocation of world resources; and the decentralization of industry. These are the unexplored fields of economics that lie beneath the ruins of thirty years of war and revolution. Whether the beliefs that led to the founding of this country can survive in this global economic world where unemployment, impoverishment,

inflation, hunger and forced migration strike all nations, is the outstanding question of our future. The professional soldier must think about these questions, for our society will live or die according to our settlement of these violent problems. How to make our own country invulnerable to the moral and physical onslaught of the new era will either be answered by bold thinking done in the Air Force or not at all. The so-called Air Defense will not protect the United States and its productive plant from the atomic bomb. It may be that this plant has to take on a different shape and for this reason *economics in our sense of the term is a compulsory subject for the Air Force, for in exposing every officer to this subject we may find the true strategist of the Air Forces*.

The fourth subject in the general education of an air officer is philosophy. Men are crushed in all effort today by the commonplace. Mass systems of communication and unconscionable advertising beat on our individuality twenty-four hours a day and further atomize the tenuous organization of life. To attempt to uphold anything sacred, any value, anything of quality, is an almost impossible task. Everything that is different, that is excellent, anyone who holds out for the best, runs the risk of being eliminated.

An awareness of the great purpose of this country, the hope that it holds for its people throughout the world, lies neglected beneath the surface of everyday living. The absence of any common knowledge of the great ideas and aspirations which our best modern philosophers embody, further darkens an obscure future.

The unwillingness to take "time out" for meditation, the continual noisiness of our surroundings, the uncertainty of a drifting course, the immense complexity of modern life, all are provocations to discover and examine the systems, the problems, and the thoughts

of present and past philosophy for guidance in our confusion. Philosophy is the product of men who have suffered, endured, experienced, and comprehended the diversity and universality that underlie all things. William James said, "To know the chief rival attitudes toward life, as the history of human thinking has developed them, and to have heard some of the reasons they can give for themselves, ought to be considered an essential part of liberal education."

Soldiers in the recent war demonstrated that courage, obedience, judgment, and humor are present in our personality today as much as they ever were. But in war the issues are obvious, the choice is narrow and limited. In the times that lie ahead in peace the path is not clear; right and wrong often are hidden in mist. Uncertainty will inevitably lead to indecision. The profuseness of the sciences, far from strengthening our faith, has upset our unity and obscured our sense of values. We must remember that the German army fell an easy victim to a seemingly unbelievable political philosophy. In peace, extraordinary effort is needed to insure that our Air Force is soundly established in harmony with our fundamental beliefs. As Eugen Rosenstock-Huessy says in *The Christian Future*, "Thinking for soldiers is a very new aspect of research and education. But this is the reform of our educational system which . . . (they) demand. . . . Higher education in the future can only be planned for people who serve and fight life's battles, on whatever fighting front, who can see the flame of faith, the rays of thought, the reflexes in acts, all as incarnations of God's works. . . . Otherwise the bodies of the young might be slaughtered for the dated ideas of a senile science, or the mature ideas of truth might be butchered by the rash instincts of brutes."

A final word is necessary to forewarn us against the survey type of course in philosophy. The typical introductory course in college is a dreary and sterile survey which flashes one after another of the great philosophers before the class and produces only a shallow and useless knowledge of men and ideas. We must continually remember that even the most modern of philosophers did not anticipate and prepare us for the rise of Fascism and the fury of war. Our generation was born into a world of pragmatic thought in which every aspect of life, from war to worry, was overanalyzed. If the coming age is to find a faith to keep itself going, it must search out and study the prophets who understand our moral, economic, and philosophical needs and bury the "Freethinkers" who called forth such monstrosities.

Philosophy prepares us for one of the simple functions of our service. There are times when any commander must speak to his men with conviction. He must select examples that impress them as being true and as being espoused by him. Rare as these occasions may be, they deserve a lifelong preparation because they are the decisive moment. The morale of the troops may be ruined by an unconvincing, cynical, ignorant speech at a funeral or a national holiday or before a battle. The most convincing speeches are usually those of men who have been immersed longest and most vitally in history and philosophy. The philosophers to whom an American officer might well turn are the men whose spirit fills and keeps alive our democratic institutions.

The fifth subject in general education of an air officer is the study of languages. Language instruction has been of superficial quality in all phases of American education and until the war it was

not intended to do much more than to allow a student to identify a foreign word when he saw one. Usually, several years of study in a foreign language produced neither the ability to read, speak, nor to understand the language.

Some common misconceptions have undermined the possibility of serious language study in the past. It was commonly felt that languages could not be learned in school. If one would learn French, one must travel to France and live there. When the war made such travel impossible, we found that we could learn at home. Unfortunately, during the war the Armed Forces had to set up their own language schools and cram German, Russian, Japanese, and a score of other languages and dialects into people whose previous immunity to language seemed absolute. Our success in meeting this problem was due to the concentration and seriousness with which it was sponsored. This provides the clue for successful language study. The curriculum at a future Air Academy must be arranged to allow the student exclusive concentration over a period of four or five months in his chosen language. If it cannot be arranged, no time should be wasted on "seeming" to learn the language.

Considering the amount and length of American education, the ignorance that we show of the language and the culture of foreign countries is amazing. This ignorance has made us inept at conference tables, exposed on the battlefield and in enemy territories, conceited before foreigners whose customs and culture we cannot understand, and incapable of catching the drift and trend of current political and social changes in other countries. The general and his aide who were responsible in our zone for the German press, schools, and mentality did not know the German language.

The ultimate educational value of knowing a foreign language is derived from the chance it gives us to watch the workings of other people like and unlike ourselves. It opens up their literature, philosophy, and shows their contributions to science and religion. Thus the study of a language becomes the study of a people, and we who make this study adopt a second home which allows us to transcend any narrow local nationalism.

The sixth subject in general education of an air officer is fine arts, including music. As this article said earlier, vulgarity is a burden today. The fine arts expose the cheapness and shoddiness of radio and movie productions and provide the main fountainhead by which we refresh our sense of proportion outside of nature itself. This study is not ornamental, but absolutely necessary to our health. Sickness is not only caused by the outside attack of disease upon us, but also by the exposure of our bodies to continuous dissipating influences. The pressure of always "doing" and of never seeing, feeling, singing or experiencing directly the great works of art, exhausts our nervous system. Nowhere is man's ability more evident than in the richness, the diversity, the miraculousness of his expression in music, painting, sculpture, and architecture. The pleasures derived from an understanding of form, balance, arrangement, variation, design, and harmony are a tremendous refreshment to life. General education in the fine arts is not concerned with turning out either a performer or a critic. Primarily, it should acquaint the student with the existence and development of visual and auditory languages in which truth is expressed in sound or color better than it could be in any other medium. Fine arts are as much an introduction to passionate feelings and precise expression as philosophy is. All art interprets life, determines values, and

shapes our character. The type and quality of art that we favor reveals our inner nature whether we are aware of it or not. The leisure of an officer will reflect in his performance of duty, and if he develops no deep aesthetic interests, he will turn to cheapness which will weaken his firmness and his influence over his men.

The seventh and final subject of general education of an air officer is literature. All the subjects of general education are interrelated; this is especially true in respect to literature, for all subjects have their classics, and in the teaching of these a tremendous opportunity exists for introducing books that convey ideas of universal significance. Everyone is familiar with the scheme of basing an entire college curriculum on one hundred great classics. This extreme imposes such severe limitations on study that it does not seem practical, but this use of the classics does surround them with an aura of importance that is often lacking in the conventional classroom where analysis has supplanted understanding. However, aside from a judicious use of the classics as texts in all courses, literature should command a field of study in itself, for it is only by familiarity with the classics that they are kept alive by each generation and made permanent possessions of our heritage. Literature provides the common body of stories, phrases, beliefs, heroic lives, imaginative understanding, and drama which accompanies civilization. In the early history of America, a comparatively few books provided the basis for all knowledge. The biographies of the founding fathers continually refer to *Pilgrim's Progress*, Blackstone's *Commentaries*, and the *Bible*. The influence of these books on the thought, the expression, and the values of generation after generation is felt in every custom and law of our own period.

In peace, the years rapidly diminish the number of combat-experienced men on active duty, and the lessons that one generation had to learn in the fire of battle, the next generation must believe on faith. All knowledge that can be acquired in one's own life is experimental, but all knowledge that is acquired from traditions is fundamental and is the knowledge which makes leaders in peacetime. The channels which open up this knowledge are enthusiasm, love, and admiration. Only those officers who can inherit from previous generations unbreakable, unexperimental standards of behavior, can be entrusted with the lives of men or with grave decisions. The good staff officer or the accomplished specialist must be at the beck and call of these leaders because only these men have identified themselves with former generations, and they alone have the right to dispose of the lives of future generations. It is the duty of every officer to equip himself with the tools which such a responsibility requires.

Capt. Robert O'Brien of the Air University's Academic Staff, a Dartmouth graduate and former faculty member in the Philosophy Department of that college, was group bombardier of the 333rd Bomb Group during the war in the Pacific.

We encourage you to e-mail your comments to us at aspj@maxwell.af.mil. We reserve the right to edit your remarks.

TEN THOUSAND FEET AND TEN THOUSAND MILES

Congratulations to Maj Dave Blair ("Ten Thousand Feet and Ten Thousand Miles: Reconciling Our Air Force Culture to Remotely Piloted Aircraft and the New Nature of Aerial Combat," May–June 2012) for his audacity in bringing this topic into the limelight. Truthfully, a veritable need exists for a healthy servicewide discussion regarding the role *and recognition* of remotely piloted aircraft (RPA) or any aircraft without an onboard operator. In my assessment, a noticeable but gradual cultural metamorphosis toward RPA acceptance is occurring within the rank and file. Now, the disquieting question concerns whether the establishment will fully embrace this "wave of the future" community or simply keep it suspiciously at arm's length.

Although well intentioned, I believe that Blair's thesis loses its footing and, in effect, misses the mark. That said, his article is essentially an opening argument—a starting point—for the larger debate. Major Blair's overall assertion is that since RPA crews assume the same legal responsibilities, military authorities, and "combat risk" as their manned counterparts, they should be entitled to identical accolades afforded the crews of manned platforms. Although the Air Force acknowledges the contribution of the RPA community, the service continues to show deference—at its own injury—toward the legacy of manned flight, particularly in terms of recognizing individuals by awarding them decorations.

This argument revisits the age-old tug-of-war between the Army and Air Force regarding priorities and doctrine. Ironically, the ground commander, time and time again, has vocally lavished RPA crews with commendation. If the Air Force decides to repeatedly discount the RPA mission, then it risks the underlying peril of steadily abdicating remotely piloted aircraft to another, more interested, military branch—chiefly the US Army. The latter has made great strides in building a capable RPA fleet and has demonstrated the desire to further increase

its command and control of remotely piloted airborne intelligence, surveillance, and reconnaissance.

Unresponsiveness to the increasing demand for intelligence, surveillance, and reconnaissance has not served the Air Force well, especially in the estimation of civilian oversight. When Secretary of Defense Robert M. Gates publicly chided air leaders in April 2008, his unsettling remark served as a lucid warning: "My concern is that our services are still not moving aggressively in wartime to provide resources needed now on the battlefield. I've been wrestling for months to get more intelligence, surveillance, and reconnaissance assets into the theater. Because people were stuck in old ways of doing business, it's been like pulling teeth" (*Air Force Times*, 21 April 2008). It may have been coincidental that Secretary Gates's rebuke coincided with the resignation of Gen T. Michael Moseley, the Air Force chief of staff, but the acceleration of RPA capability within the area of responsibility was not happenstance.

In defense of Major Blair, Predator crews do have combat responsibility because of their lawful obligations—the same as any armed combatant. Furthermore, the lethal manifestations of combat—whether by dagger, artillery round, Hellfire missile, or space-based laser—have the same physical outcome if properly employed: to rain death and destruction upon the enemy. Whether kinetic or nonkinetic, weapons employment is an identifiable threshold for combat. Technology eliminates the need to witness the effect firsthand. Additionally, the Air Force has struggled to apply a consistent definition of "combat." Institutional contradiction was never more obvious than in the aftermath of 11 September 2001 when combat hours were awarded to fighter crews flying within US airspace under the guise of Operation Noble Eagle. Still, Blair mistakenly implies that effectiveness equates to risk. This is not the case.

The intelligence community utilizes an equation to represent the threat from an adversary: threat = intent + capability. That same qualitative principle, correspondingly, serves to better define the situationally dependent aggregate risk (cumulative risk) encountered by

any friendly combatant. Thus, combat risk = enemy intent + enemy capability. Under this premise, real differences exist between the risk encountered at 10,000 feet and 10,000 miles—significant differential dangers that we as professionals readily recognize.

To offer that RPA operators encounter the same aggregate risks as combatants physically present in a hostile land is an oversimplification. Moreover, it completely disregards the physical and layered defenses beginning at American borders and ports of entry, and thereby marginalizes the Department of Homeland Security, the Department of Justice, state and local law enforcement, and even the US Coast Guard, which often falls under the authority of *United States Code*, title 10. More importantly, it fails to recognize that more civilians than uniformed members have died on US soil from terrorism. Based on history and terrorism's countervalue strategy, I would argue that it's much riskier to be a flight attendant on a commercial airline than a military member waiting in line at the installation gate.

Because of the permissive operational environment in Afghanistan, Iraq, Horn of Africa, and even Libya, RPAs have enjoyed heavy utilization. This trend will continue for similar environments in the future. However, in intense combat environments where the electromagnetic spectrum is compromised and not dominated by the United States or its allies, the utilization of remotely piloted assets could be extremely limited. In such peer-level conflicts with China or Russia, manned assets could potentially be the only useful platforms until the electromagnetic spectrum and air dominance are finally established. Sending the manned fighter or bomber the way of the dinosaur would prove imprudent. As has been our mantra for as long as I can remember, flexibility—in this case, piloted *and* remotely piloted—is the key to airpower.

The most important principle regarding awards and decorations involves realizing that these items are a vehicle to recognize subordinates as determined by the chain of command. Simply, this is a commander's decision and no one else's. Counter to the sentiment of Major Blair's article, RPA crews have not been entirely ignored for their work in the

combat zone. On the contrary, RPA operators—pilots and sensor specialists—have experienced a windfall of decorations. It is a fact that RPA crews were prohibited after the initial days of Operation Iraqi Freedom from receiving the Distinguished Flying Cross or the Air Medal in accordance with US Central Command's decorations guide (more than likely at the behest of traditional aircrew advocates). However, in my observation, combat-mission-ready RPA operators can qualify for an Aerial Achievement Medal based upon cumulative sortie count, typically every 60 calendar days, even after squadron-induced limitations. Only three years ago I served as the awards-and-decorations officer in the same squadron as the author, and I distinctly remember completing a 27th-oak-leaf-cluster decorations package for a particular veteran MQ-1 sensor operator. Undoubtedly, many readers just gasped at this anecdote, but in a grossly neglected community that has received only a modicum of recognition, our leaders resorted to the only avenue available to them. In many ways, it was their attempt to send a clear message to their superiors and naysayers: we are fighting this war from the air too.

Nevertheless, RPA squadrons that are considered "deployed in garrison" do not receive recognition for campaign contributions like their expeditionary equivalents. The advantage of technology is that it compresses time and space and allows for "reachback." Despite their direct impact and effect within the area of responsibility, RPA operators are denied campaign decorations such as the Iraq and Afghanistan Campaign Medals. The criteria for these medals mandate a physical presence within the geographic theater of operations. Unfortunately, this fails to recognize the effects-based paradigm shift that technology brings. This is the crux of Blair's argument, and it would behoove the Air Force to equitably move RPA crews into the decorations scheme.

Still, the dispute here is not about "chest candy" or medals. Instead, the comparison between major weapon systems should be based upon standardized metrics or uniform measures of effectiveness. In this manner, the Air Force can truly comprehend the level of effort and contribution that the RPA community is committing to the fight. Fur-

ther consideration will need to be involved in servicewide-accepted metrics, but they could include basic measurements such as flight hours, mission rates, and/or enemies killed in action. To Blair's point, this would remove the bias of relative performance and set a foundation for RPA community credentials.

My military professor, Lt Col Kristina Young, retired, observed that "all warfare is asymmetrical." In other words, the intent of warfare is to maximize one's comparative advantage. Americans are particularly adept at this concept. If we really wanted a fair fight for the sake of heroics, as the F-22 pilot asserted in Blair's article, then we would limit our footprint in Afghanistan to a small ground contingent armed with AK-47s. Fortunately, a "fair fight" requirement is not in our doctrine. The asymmetry with RPAs is the capability to exact certain effects at much lower levels of aggregate risk.

The truth is that the Air Force must get on board the RPA transformation from the top down. It represents the incipient stage in a complete paradigm shift to a more automated battlefield. In time, remotely piloted technology, including cyber and space, will envelop the other physical domains. The Air Force is obligated to lead the way. It is our legacy.

Maj Christian A. Senn, USAF (Michigan Air National Guard)
Student, National Intelligence University

TEN THOUSAND FEET AND TEN THOUSAND MILES: THE AUTHOR REPLIES

Maj Christian Senn's incisive critique effectively engages the arguments raised in my recent article, and I truly appreciate his analytical rigor and professionalism in moving this discussion forward. I believe that Major Senn and I, by and large, agree on the fundamentals and differ primarily on stylistics. As he astutely observes, the article is intended as an entry point into a larger debate over the trajectory of the RPA culture. Toward advancing that debate, I am grateful for the chance to clarify three points: the contrast between combat responsibility and individual

combat risk, the difference between absolute and marginal risk, and the distinction between objective and relative valuation in recognition.

First, the central point I intended to advance is that combat for an aviator is best described in term of *in situ* collective risk and weapons employment, or "combat responsibility," rather than an atomistic view of individual risk to the aviator. As with officers in our sister services, we are measured by our duties to our comrades and the weight of life-and-death decisions. The idea that I am asserting that RPA crews face the same individual combat risk as manned aviators is mistaken; rather, I argue that individual combat risk is a problematic and incomplete definition for combat. Combat responsibility, which includes individual and corporate risk as well as weapons employment, better captures the nature of contemporary aerial combat.

Lt Col Dave Grossman, author of *On Killing* and *On Combat*, describes a slew of mental and physiological reactions to the weight of these situations.[1] For aviators in a day of beyond-visual-range sensors and weapons, these responses are filtered through a technological lens. Past the threshold of visual range, it is not physical distance but cognitive distance—a function of sensor resolution and dwell time—that forces an aviator to deal with the reality of taking lives. This is true for manned and remotely piloted aircraft alike.

Second, manned aviators are under more absolute risk in all circumstances than remote aviators; the argument I raised compares marginal risk due to combat rather than absolute risk. Major Senn's impression that I held that "RPA operators encounter the same aggregate risks" as manned aviators is due to a misunderstanding of the term *differential risk*. His use of the term *aggregate* implies that I was comparing the absolute risk of manned and remote aviators, whereas in actuality I was comparing the conditional increase of risk due to combat duties. However, given the number of sharp and thoughtful individuals that joined him in that misimpression, I must conclude that this is a result of my own failure to communicate, and for that the blame belongs to me alone.

"Differential combat risk" is the marginal effect of combat, the increase in risk from the baseline of noncombat operations due to combat-specific factors. Hypothetically, if a manned pilot has a peacetime risk of 0.1 percent compared to a remote pilot's 0.0 percent risk and has a risk of 0.11 percent in the course of combat duties compared to a remote pilot's 0.01 percent risk, then the manned pilot's "absolute risk" is higher in both circumstances, but his differential combat risk is an equivalent 0.01 percent. This does not diminish the bravery it takes to "slip the surly bonds of Earth" nor the tragedy of losing friends when the baseline risks of flight manifest themselves. Still, normal flying risks do not constitute combat; hence, only this marginal increase can constitute individual combat risk.[2]

This clarification notwithstanding, Major Senn misapplies the principle of conditional risk and improperly uses Bayesian statistical reasoning in his analysis. He offers a plausible circumstance as an example of manned aircraft risk due to enemy fire, as I did in my article. He then equates a similarly plausible circumstance of a targeted terror attack to a dismissal of the Department of Homeland Security, a non sequitur that seems discordant in light of the recent Fort Hood attacks. The risk to civilians that he discusses, while plausible, is also irrelevant; if anything, this comparison illustrates my point that individual combat risk is an unsatisfactory metric. The scenario of high-altitude-capable enemy fire in post-air-defense Afghanistan relies as much on hypotheticals as a scenario of a targeted terror attack on RPA operators; neither is suitable for a robust comparison.[3]

In formal terms, assessments of manned and remote differential combat risk are based on weak prior probabilities and are therefore not meaningfully different. (I would make two exceptions to this assertion: fixed-wing gunships, due to extended loiter, and rotary-wing aviation, due to low altitude. However, using these caveats to represent modal manned differential combat risk would be a category mistake and a fallacy of composition.) The heroism of Air Force combat rescue has prevented airborne maintenance issues from becoming survival, evasion,

resistance, and escape (SERE) situations, just as the heroism of Air Force Security Forces and the Office of Special Investigations has prevented targeted terror attacks from manifesting. Thankfully, comparisons of individual combat risk are questions about "what could happen" rather than "what has happened." On the other hand, the data are amply clear that allied ground troops are unquestionably at risk, and it is this strong risk that should drive our analyses. Combat responsibility accounts for their risks, but individual combat risk does not. Like the P-51 "little friends" that protected bombers in World War Two and the F-15E crews that defended Combat Outpost Keating in Afghanistan, the first concern of Airmen should be the lives of their friends.

Usefully, Senn's analysis highlights the dangers of cognitive biases in strategic thought. Nobel laureates Daniel Kahneman, Herbert Simon, and Amos Tversky describe how cognitive biases can affect risk perception and decision making.[4] For instance, although the risk from an airliner transit is less than that of an automobile, the dramatic image of aviation mishaps and the regularity of traffic accidents ironically cause air transit risk to figure more prominently in many risk decisions than it statistically ought to. In a darker shade, during the early morning of 11 September 2001 (9/11), most military members would have heuristically assumed that the risk for a Soldier deployed to the Middle East was far greater than for one in the Pentagon; toward the end of the day, after we adjusted our cognitive biases, it became straightforward to see how the American military's nerve center was a far more attractive target. In the same sense, the "unthinkability" of the Pearl Harbor attack made it a possibility—had commanders been thinking about it, they would have taken effective precautions, and it could not have happened.

As Major Senn states, "All warfare is asymmetrical," and the art of strategy is matching strengths to an enemy's weaknesses. These weaknesses are often hidden behind cognitive biases. In *Psychology of Intelligence Analysis*, CIA veteran Richards Heuer describes one of the most pernicious of these cognitive biases: mirror imaging or the "everyone-

thinks-like-us mind-set."[5] This principle allows us to adjust fire and refine Major Senn's invocation of intelligence theory. Senn cites "enemy intent" as a determinant of threat but leaves the concept underspecified—enemy intent is driven by enemy strategy, which is driven in part by enemy perception of threat. It is then likely that enemy intent would vary from one platform to another, based on the enemy's assessment of each platform's effectiveness. Lt Col Liam Collins, director of West Point's Combating Terrorism Center, describes Osama bin Laden's perennial fear of persistent airborne surveillance.[6] It stands to reason that his organization would focus its intent on countering these threats.

A terrorist's acquiring an advanced missile to attack an aircraft is a risk that fits well with our cognitive biases and therefore is amplified in comparison to the expected value of a hypothesized targeted terror attack. Unfortunately, this targeted-attack hypothesis hit close to home in a recent news article describing an al-Qaeda plot against RPA operators in Texas; fortunately, the vigilance of law enforcement thwarted this attempt.[7] Had the plot come to term, it would have seemed obvious after cognitive biases were adjusted, just as the Pearl Harbor and 9/11 attacks were clear in retrospect. That said, lest this specific risk discussion become an airpower version of the Monty Hall back-and-forth, I would note that the central argument of combat responsibility does not turn upon the result.[8]

Third, I wholeheartedly agree with Major Senn that "chest candy" is not the issue. Rather, we must consider the institutional effects of recognition—differences in relative valuation of similar actions send powerful messages throughout the service as to what is important and what is not. Decorations are cultural markers of value and visible manifestations of messages from the institution about what is laudable. The critical question is not whether a group member receives institutional recognition but whether membership in a group changes the degree of institutional recognition for equivalent actions. This is not about absolute valuation of deeds but about differences in the relative valuation of the same deeds.

Accordingly, I engage neither the important distinction between valor and achievement in awards nor the discussion over "counter medals."

The lively debate about the proliferation of decorations is an important one, but it is not central to the implications of combat responsibility. "Equivalent actions merit equivalent recognition" is the crucial point rather than what recognition is merited for a given action. For instance, consider a scenario in which Predator crews track a critical high-value target to a safe house where he is then kinetically struck by a dynamically retasked F-16. In this case, both platforms' crews perform their duties with excellence and professionalism. Perhaps that excellence merits decorations, or perhaps "doing your job" shouldn't merit decoration. Either way, giving the F-16 pilot an award for heroism while excluding the Predator crews from consideration for the same sends a very clear message about what the institution believes is worth recognizing. This message ripples back into commissioning sources and flight-training pipelines, perpetuating perceptions and relative performance discrepancies through selection bias.

I hold that Major Senn's example of the veteran sensor operator with a 27-oak-leaf-cluster Aerial Achievement Medal supports rather than undermines this principle. This is an example of conflicting institutional messages. This warrior's frontline leaders enthusiastically recognized his continuing meritorious achievements while the higher-level institution decreed that this individual's contributions qualified for only the lowest possible level of aerial award, regardless of effect. As Senn points out, these leaders were trying to cancel out a toxic message by max-performing the only tool they had available. Knowing this individual sensor operator personally, I believe that his airmanship and situational awareness directly saved the lives of American Soldiers and that his technical expertise guided Hellfire missiles true against our enemies. Rather than absurd amounts of low-level recognition in lieu of awards befitting his achievements, a spectrum of recognition seems far more appropriate for this warrior and the other Airmen like him. Senn's recommendation for objective measures of combat effects, or perhaps platform-blind qualitative narratives, holds promise toward restoring sanity in this regard.

Major Senn raises a number of additional intriguing points. In short, his vision of manned and remote aircraft in a new synthesis is provident, although the nature of this synthesis should evolve from a caste structure to a true partnership. The key, however, is not only a "top down" transformation but also true pride and bottom-up respect, rooted first in a self-respect that comes only from excellence in mission execution. "Don't accept broke" very much needs to become a creed of the still-nascent RPA community.

Finally, the crucial point of "Ten Thousand Miles" remains: we must expand our view of combat to consider our comrades, both in the air stack and the joint community. Those causally tied together through their interacting effects on the battlefield should be conceptually tied together in the idea of combat. In this, we decrease everyone's risk by expanding our view of it beyond ourselves—ironically, by constructing combat as corporate responsibility, we reinforce the seriousness of combat duties to the RPA community, which reduces individual risk for manned aircraft operating in close proximity to RPAs. Once again, I thank Major Senn for his excellent comments and look forward to continuing the discussion of RPA culture.

Maj Dave Blair, USAF
Student, Air Force Chief of Staff's PhD Program
Georgetown University

Notes

1. Dave Grossman, *On Killing: The Psychological Cost of Learning to Kill in War and Society* (Boston: Little, Brown, 1995); and Grossman with Loren W. Christensen, *On Combat: The Psychology and Physiology of Deadly Conflict in War and in Peace* ([IL]: PPCT Research Publications, 2004).

2. The idea of "normal risk" or "normal accidents" comes from Dr. Charles Perrow's (Yale professor of sociology) research into complex systems. See his book *Normal Accidents: Living with High-Risk Technologies* (Princeton, NJ: Princeton University Press, 1999).

3. General in-theater terror attack / indirect fire risk is broadly a wash between the two platforms because both deploy detachments forward (traditional deployments for manned aircraft; launch and recovery elements for RPAs). Additionally, this analysis does not apply

in a nonpermissive environment, but the current policy does not predicate combat on robust air defenses.

4. Daniel Kahneman and Amos Tversky, "On the Psychology of Prediction," *Psychological Review* 80, no. 4 (1973): 237–51; Kahneman and Tversky, "Subjective Probability: A Judgment of Representativeness," *Cognitive Psychology* 3, no. 3 (1972): 430–54; Kahneman and Tversky, "Prospect Theory: An Analysis of Decision under Risk," *Econometrica: Journal of the Econometric Society* 47, no. 2 (1979): 263–91; Tversky and Kahneman, "Availability: A Heuristic for Judging Frequency and Probability," *Cognitive Psychology* 5, no. 2 (1973): 207–32; Tversky and Kahneman, "Judgment under Uncertainty: Heuristics and Biases," *Science* 185, no. 4157 (1974): 1124–31; and Herbert A. Simon, "Bounded Rationality and Organizational Learning," *Organization Science* 2, no. 1 (1991): 125–34.

5. Richards J. Heuer Jr, *Psychology of Intelligence Analysis* (Washington, DC: Center for the Study of Intelligence, 1999), https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/psychology-of-intelligence-analysis/PsychofIntelNew.pdf.

6. Liam Collins, "The Abbottabad Documents: Bin Ladin's Security Measures," Combating Terrorism Center at West Point, 22 May 2012, http://www.ctc.usma.edu/posts/the-abbottabad-documents-bin-ladins-security-measures; and Jordy Yager, "Brennan: Bin Laden Left Distraught by Drone Strikes, al Qaeda Losses," *Hill*, 30 April 2012, http://thehill.com/blogs/defcon-hill/policy-and-strategy/224569-brennan-bin-laden-feared-drones-sought-to-rebrand-al-qaeda.

7. Dane Schiller, "Accused Terrorist Secretly Recorded Talking Jihad," *Houston Chronicle*, 9 November 2011, http://www.chron.com/news/houston-texas/article/Accused-terrorist-secretly-recorded-talking-jihad-2261274.php#src=fb.

8. The Monty Hall problem is described in the movie *21*: given the choice of three doors, should one change his or her guess if one of the nonchosen doors is revealed to have no prize behind it? Marilyn vos Savant offered the correct answer (yes), but the years-long discussion that followed her answer was so rancorous that she was forced to table it lest it overtake her entire column. For further reading on statistical analysis and risk assessment, I recommend Leonard Mlodinow, *The Drunkard's Walk: How Randomness Rules Our Lives* (New York: Random House Digital, 2009); D. J. Hand, *Statistics: A Very Short Introduction* (Oxford, UK: Oxford University Press, 2008); and Baruch Fischhoff and John Kadvany, *Risk: A Very Short Introduction* (Oxford, UK: Oxford University Press, 2011).

Let us know what you think! Leave a comment!

Stopping Mass Killings in Africa: Genocide, Airpower, and Intervention edited by Douglas C. Peifer, PhD. Air University Press (http://aupress.au.af.mil), 155 N. Twining Street, Maxwell AFB, Alabama 36112-6026, 2008, 188 pages, $17.00 (softcover), ISBN 978-1-58566-182-4. Available free from http://aupress.au.af.mil/digital/pdf/book/peifer_stopping_mass_killings.pdf.

The theme "never again" runs throughout many commentaries on genocide. *Stopping Mass Killings in Africa: Genocide, Airpower, and Intervention* attempts to reinforce the rhetoric with actionable ideas. In this respect, the contributors provide interesting operational concepts that complement an in-depth history of each genocide addressed here. Although necessary, the historical background may divert the true focus of the book: offering concrete, operational advice on stopping mass killings in a continent often ignored by military and political leaders (p. 127).

Editor Douglas Peifer, an associate professor at the US Air War College who has written on German military history and European security issues as well as mass killings, includes an excellent introduction to the history of genocide studies and the various models used to understand them. The four contributors, all of them graduates of Air Command and Staff College, employ case studies that address genocide, airpower, and intervention to illustrate operational lessons that can apply to future conflicts.

Lt Col Aaron Steffens, a career F-16 pilot, writes about the failed attempts to intervene in Somalia in the early 1990s and the way those events not only changed American foreign policy but also influenced future African operations. Maj George Stanley, a career A-10 pilot, offers a cogent history of the Rwandan genocide, exploring how the lack of significant intervention furthered the killing and how it might have been stopped. The case study on Rwanda by Lt Col Keith Reeves, a pilot with experience in both the B-52 and B-2, suggests an operational concept for preventing genocide. Cdr Timothy Boyer, US Navy, a naval

flight officer who flew in the E-2C Hawkeye, uses the final study to explain how French intervention likely prevented disaster in Côte d'Ivoire.

All of the case studies examine alleviating the causes of genocide before they become critical, each one supplying the background and impetus for each event, generally in terms of Gregory Stanton's "Eight Stages of Genocide," and concentrating on the organization, polarization, and preparation phases of the model. These three stages, which encompass the forming of groups and organizations to facilitate killing, separating the groups, and then identifying targets and concentrating the victims, warn of a possible impending genocide

The "process" of genocide can be difficult to understand in its terrible complexity. Peifer, however, adroitly explains both the process and the means by which different international organizations fit into preventing this horrific act. His definition of genocide—killing people simply because they belong to a specific group (p. 8)—is highly political in nature since, legally, the United Nations must act upon instances of genocide. This fact became important when the United States deliberately avoided using the term during the Rwandan episode (p. 6). The authors emphasize that intervention in any of the stages of genocide could save lives, depending on when and how such action takes place.

In terms of using airpower as an intervention tool, all of the contributors note the utility of airlift and intelligence, surveillance, and reconnaissance in a campaign and of firepower supplied by light attack aircraft and helicopters. Major Stanley discusses some of the problems associated with utilizing airpower in Africa, specifically addressing the logistical nightmare of introducing the troops and planes necessary to stop the genocide in Rwanda (pp. 69–71). Colonel Reeves also uses the experience in Rwanda as the basis for calling on airpower to intervene, focusing on an operational concept to target key aspects of the "killing machine" in order to slow or stop it (p. 83). Unfortunately, many questions regarding airpower as an intervention tool—including logistics, time, and capabilities—are left unanswered.

Intervention is both the crux of the matter and the most difficult issue Peifer deals with. Asserting the importance of intervening in the early stages of genocide, he maintains that it is far better to avert the causes of genocide than to stop one in progress. In the case of Rwanda, Colonel Reeves observes that any interruption in the killing machine might have saved countless lives (p. 85). Moreover, proper resources and political motivation spurred the timely intervention of air and ground troops, stopping the genocide in Côte D'Ivoire and helping stabilize that country, as noted by Commander Boyer (p. 101).

Although Dr. Peifer does an excellent job of suggesting who should intervene and how, he largely ignores the political consequences. For example, flying close air support makes sound operational sense but carries multiple political implications that may take that option off the table. Additionally, Colonel Steffens deals with Somalia in terms of its serious political repercussions for future operations, emphasizing that selection of the appropriate kind of force, commander, and rules of engagement all complicate intervention (p. 44). In Somalia these issues doomed the operation and likely affected Western political will to intervene in future conflicts.

Generally, discussions of genocide, airpower, and intervention in Africa occur only after completion of the body counts. This book, however, looks at the successes, failures, and varying approaches taken by different international organizations to prevent genocide from occurring. Nevertheless, although it successfully presents detailed events and operational concepts, the failure of *Stopping Mass Killings in Africa* to devote more space to dissecting those concepts makes the book seem more like a history than a critical analysis.

2d Lt Morgan Bennett
Goodfellow AFB, Texas

Truth, Lies, and O-Rings: Inside the Space Shuttle *Challenger* Disaster by Allan J. McDonald with James R. Hansen. University Press of Florida (http://www.upf.com), 15 Northwest 15th Street, Gainesville, Florida 32611-2079, 2009, 656 pages, $39.95 (hardcover), $27.50 (softcover), ISBN 978-0-8130-3326-6.

What would you do if you were an engineer working for a powerful company that overruled your directive to cancel an upcoming launch due to a faulty part—an action that led to catastrophic results? In *Truth, Lies, and O-Rings*, Allan McDonald addresses the National Aeronautics and Space Administration's (NASA) decision to ignore his warnings, resulting in the destruction of the space shuttle *Challenger* and the deaths of its crew members. *Truth, Lies, and O-Rings* is the firsthand account of a man directly involved in the design tests of the rings, *Challenger*'s launch, and the cover-up that followed the catastrophe.

After outlining his career with the Thiokol Corporation (maker of the parts for the space shuttle), McDonald then describes the flaws that he and fellow engineers discovered in the O-ring, explaining why he refused to support NASA's order to launch the *Challenger* despite those defects. McDonald then details the political and economic consequences for him and his coworkers (e.g., lawsuits against Thiokol by the families of the *Challenger*'s crew and congressional hearings on the decisions), internal fallout, attempted reprisals, and transfers of the people involved in the decision to different departments. The author concludes by discussing the aftereffects of the tragedy and the end of his career with Thiokol.

Although the book explains the how and why of the designs, tests, management decisions, and events leading up to the shuttle's destruction, McDonald not only sidetracks the reader with details about himself and others that are unrelated to the story but also tends to get bogged down in trivial details, such as mentioning people in his department who formerly worked for Senator Orrin Hatch (p. 200). Though interesting, such topics have little to do with the story and detract from its impact.

Furthermore, McDonald and coauthor James R. Hansen include a considerable amount of unnecessary information about the book's subject. The reader doesn't need a chapter devoted to the author and his background or a 28-page bibliographical essay that explores books and conspiracy theories concerning the *Challenger* disaster. Additionally, McDonald and Hansen could have combined several chapters into one or summarized them (e.g., those dealing with the explosion of the Peacekeeper motor, the "Witness" chapter, and the one about his retirement from Thiokol).

Lastly and perhaps most importantly, the author never explains why he waited so long to write the book. The information he presents could have significantly altered the future of the space shuttle program, yet he remained silent for more than 20 years. The reasons for doing so, enumerated in the preface, ring more than a bit hollow.

Although the space shuttle program has now ended, questions about the *Challenger* tragedy linger on. *Truth, Lies, and O-Rings* attempts to explain the how and why but does so long after these revelations might have benefited the program. The book may be of interest to space historians, but its value to military readers remains fairly minimal. I recommend it only to people directly involved in designing, testing, and supervising military flight hardware.

Mel Staffeld
Council Bluffs, Iowa

Allies against the Rising Sun: The United States, the British Nations, and the Defeat of Imperial Japan by Nicholas Evan Sarantakes. University Press of Kansas (http://www.kansaspress.ku.edu), 2502 Westbrooke Circle, Lawrence, Kansas 66045-4444, 2009, 480 pages, $39.95 (hardcover), ISBN 978-0-7006-1669-5.

The image one generally conjures of World War Two in the Pacific is of US naval aviators flying hundreds of planes from flattops or of US Marines wading ashore on contested tropical beaches. One does not

normally associate the British with the war against Imperial Japan. Yet Nicholas Evan Sarantakes reminds us that America did not stand alone, presenting in *Allies against the Rising Sun* a political history of the cooperation among the United States, United Kingdom, Canada, Australia, and New Zealand in the final stages of the struggle against the Japanese Empire. Coalition warfare is a complex undertaking, and Sarantakes examines the challenges faced by the English-speaking nations as they fought together against Japan.

The author asks three important questions concerning British military participation in the Pacific war effort: why did a war-weary United Kingdom want to participate, why did the even more war-weary Commonwealth nations wish to take part, and why did the United States, increasingly able to handle the situation alone, agree to their participation? Sarantakes contends that without the British, Americans would have turned their collective backs on Britain, as they had after the Great War. He argues that "high-placed individuals" in both nations believed that their best interests called for cooperating in the postwar world—an objective that depended upon Great Britain's "contribut[ion] to the decisive operations in Japan" (p. 8). The author concludes that, ultimately, each nation had its own reasons for agreeing to join the cause against Japan, whether stemming from the United Kingdom's looking to regain lost colonies, the Commonwealth nations' seeking a closer relationship with the United States, or American politicians' needing to explain to their constituents why they would not allow other nations to share in the shedding of blood.

By beginning his book with the events of 1943, Sarantakes does not dwell on the early Axis victories but focuses on the enemies in retreat and on Allied planning for a postwar world. During his research, the author mined archives of the five English-speaking nations involved not only for official government documents but also for diaries and memoirs that would facilitate his re-creation of the atmosphere of the various Allied planning conferences, correspondences, and exchanges as the principals worked out the details of cooperation against Imperial Japan. Sarantakes

attends to both mundane issues, such as dates, numbers of soldiers, and types of ships, and more controversial matters such as Russian participation in the final assault against Japan and use of the atomic bomb.

Not simply political history, *Allies against the Rising Sun* is biographical as well, highlighting not only the decisions made by Allied nations but also the men who made those decisions. Sarantakes introduces the reader to major political and military leaders in each of the English-speaking nations, chronicling both their strengths and shortcomings in short biographical sketches that detail their advancement to the positions they held during the war. By giving these men personalities, the author allows readers to view their decisions and positions on issues with the understanding that they were not supermen but imperfect human beings. The book's epilogue briefly summarizes the postwar careers of 25 of these individuals.

Sarantakes writes in a clear, accessible style, even managing a bit of humor when he tells of a trip Winston Churchill wanted to make to Bermuda to meet with Franklin Roosevelt—a junket that his military chiefs opposed. About the chiefs Sarantakes opines, "Apparently, they had never been to Bermuda" (p. 48). The narrative bogs down a bit into operational history during its coverage of the Okinawa campaign. Granted, the stiff defense of Okinawa surprised the Allies and affected planning for the assault on the Japanese home islands, but the operational detail distracts readers from the politics of alliance. Furthermore, the book ends rather abruptly with the Japanese surrender. After making a case for British participation based on the postwar order, Sarantakes never really talks about how the various participants contributed to that order. That omission, however, does not detract much from a significant study of the complexities of alliances and coalition warfare. Nations rarely go to war without partners, and *Allies against the Rising Sun* is an excellent case study for those who ponder the challenges of coalition warfare in the twenty-first century.

Lt Col John L. Minney, Alabama Air National Guard
Montgomery, Alabama

Rivals: How the Power Struggle between China, India, and Japan Will Shape Our Next Decade by Bill Emmott. Mariner Books (a division of Houghton Mifflin Harcourt) (http://www.hmhbooks.com), 222 Berkeley Street, Boston, Massachusetts 02116, 2009, 352 pages, $15.95 (softcover), ISBN 978-0-15-603362-6.

Bill Emmott's *Rivals* preceded the recent flurry of publishing on the rise of China and India, which included Robert Kaplan's *Monsoon: The Indian Ocean and the Future of American Power* and Henry Kissinger's *On China*. Acknowledging the perils of predictive writing, this 2009 paperback edition of *Rivals* contains a foreword updating Emmott's conclusions (originally published in 2008) in light of the Great Recession and the then-recent election of President Obama. The author, an English journalist and former editor in chief of the *Economist*, has published several earlier books about Japanese business and politics. *Rivals* uses historical events, personal anecdotes, and economic data to envision the future of a region defined by rivalry among ascendant China and India as well as a declining but still powerful Japan.

Emmott introduces his theme with a discussion of the US-India Civil Nuclear Agreement of 2005, in which President Bush agreed to sell nuclear fuel and technology to India outside the framework of the Non-Proliferation Treaty. He compares this departure from Bush's counterproliferation objectives to Nixon's courtship of China as a counterweight to the USSR. *Rivals* argues that more than the global war on terrorism, "the most important long-term trend in world affairs does indeed remain the shift in economic and political power to Asia" (p. 7). The author supports this contention with a number of economic statistics, the most telling of which is the 6 percent rise in Asia's share of world gross domestic product (GDP) since 1990. (Other regions lost ground or maintained their share.)

The second chapter gives an account of Asian integration—in terms of ideology, markets, and diplomacy—since the nineteenth century. According to Emmott, to the extent that any pan-Asian ideology has succeeded as a motive force, it is "economic development and the ac-

companying reduction of poverty" (p. 33). He traces the history of Asian economic development through the "flying geese" construct: postwar Japan became an economic powerhouse through export-led trade followed within two decades by the Four Asian Tigers and then Thailand, Malaysia, and Indonesia—and eventually Deng Xiaoping's China. Chapters 3–5 offer an in-depth look at the recent past and the foreseeable future of China, Japan, and India, respectively. Japan will have to deal with an aging population and increasing pressure to amend its pacifist constitution to permit greater military preparedness. In the cases of China and India, the common denominator is that even if the most optimistic forecasts prove accurate, rapid growth can be as socially destabilizing as economic decline. Chapters 6 and 7 examine two different pitfalls for the region as a whole—the disputed politics of climate change and the long shadow of Asia's own history.

Chapter 8 looks at five potential conflict "flash points" throughout the region. The author emphasizes each major player's incentives for seeking stability, noting that the region is home to four states possessing nuclear weapons. Nonetheless, unpredictable future events could lead to conflict in one or more of these areas—for example, a crisis related to the succession of the Dalai Lama or the next leader of North Korea. Indeed, some commentators attributed the artillery bombardment of Yeonpyeong Island by North Korea in November 2010 to succession-related saber rattling. Emmott's final chapter offers nine policy recommendations for securing the peaceful growth and integration of Asia. They include continued American support for India, greater diplomacy between India and its immediate neighbors, and US support for the East Asian Summit and the Association of Southeast Asian Nations Regional Forum as the primary regional vehicles for economic and security cooperation, respectively (in order to supplant several ineffective and duplicative forums).

Rivals is well served by Emmott's extensive experience in the region. Unlike the other works mentioned earlier, Emmott's appropriately emphasizes the importance of Japan. China has passed that country since

the book's publication to become the second-largest economy in the world, but Japan remains a close third. More importantly, China and India are still impoverished. They both lag far behind Japan (and the world average) in terms of GDP per capita. Japan will remain an important diplomatic and economic player for some time, and the author does a good job sketching out what that country's best-case scenario might look like. The governmental bureaucracy will have to continue to reform (Emmott uses the phrase " 'rule by law' rather than 'rule of law' " to describe the bureaucracy at the height of its power, prior to the financial crisis of the 1990s), with "scarce labour [providing] a new source of discipline" (p. 115) for the private sector. As American influence declines, Japan will also have to mend its relationship with South Korea and consider expanding its military.

Readers must understand that *Rivals* is a work of long-form journalism rather than political science as such. In his discussion of Asia's conflict flash points, Emmott chose not to engage a wealth of theoretical literature about the causes of war—an unfortunate choice because some of it (e.g., Charles Doran's Power Cycle Theory) seems tailor made for assessing potential conflicts between established declining powers and newer ascendant ones. Furthermore, events have already supplanted some of Emmott's analysis. For instance, he argues that a G14 or G20 should replace the G8 to give China and India a seat at the table (p. 264). This has since occurred, but the G20 has proven no more successful at promoting freer trade and financial stability than its predecessors.

This well-written book offers extensive insight into a region that is rapidly becoming a central concern to all Airmen. Although Kaplan and Kissinger have trod similar ground in more recent books, only *Rivals* can claim a career Asia specialist as its author. Its ground-level perspective and economic focus more than earn it a place alongside the others.

Capt Joe G. Biles, USAF
Barksdale AFB, Louisiana

The Operators: The Wild and Terrifying Inside Story of America's War in Afghanistan by Michael Hastings. Blue Rider Press (Penguin Group) (http://us.penguingroup.com/), 375 Hudson Street, New York, New York 10014-3657, 2012, 432 pages, $27.95 (hardcover), ISBN 9780399159886.

In his book *The Operators*, Michael Hastings and Blue Rider Press attempt to capitalize on the publicity surrounding the author's explosive *Rolling Stone* article that ultimately led to the dismissal of Gen Stanley McChrystal as head of the North Atlantic Treaty Organization's (NATO) coalition force in Afghanistan. They do so by taking a broader look at the Afghanistan conflict and McChrystal's leadership therein. Throughout his book, Hastings conveys obvious disapproval of the US military's "protect-the-population" counterinsurgency (COIN) tactics used in Iraq by Gen David Petraeus and in Afghanistan by McChrystal. Hastings begins the book by effectively moving back and forth between two time frames: (1) the period in the spring of 2010 leading up to and including his "embedding" with General McChrystal and a handful of senior staff and junior aides who accompanied him on a European trip to several NATO nations, and (2) the transition between Gen David McKiernan's removal from command and the selection of McChrystal and his assumption of command. Gradually, the earlier time frame accelerates, "catching" the later setting, and the book's latter stages summarize General Petraeus's command tenure, the killing of Osama bin Laden, and, finally, President Barack Obama's decision on 24 June 2011 to begin the drawdown of forces from Afghanistan.

Hastings joins General McChrystal and a small team of advisers and aides in the middle of an official trip to Europe where General McChrystal was visiting the leadership of several NATO nations. In what appears to be a "perfect storm," the author captures several salacious quotations, primarily from a small handful of aides, over dinner and other conversations that he openly shares with the reader. It's clear, at least to this reader, that the aides to McChrystal did not expect their comments to appear in an article, despite Hastings's claims in

the book that he occasionally asked questions and took notes during the visit. Several members of McChrystal's team, including the general himself, had their wives fly out to join them during the visit. In fact, the McChrystals' 33rd wedding anniversary added to the festive social atmosphere during meals, travel, and evening hours. Unfortunately for these officers, all this time Hastings was meticulously capturing their social banter for later revelation. In the author's defense, evidently no one in McChrystal's party had the good sense to characterize these social gatherings specifically as "off the record"; furthermore, some of the questionable remarks occurred during meetings and preparations for briefings.

An unbiased reader is left with several conclusions after perusing Hastings's time with McChrystal and his party. First, General McChrystal was very close to his personal aides, his executive officer, and a couple of other advisers on the trip to Europe. A commander who handpicks advisers he trusts and with whom he feels comfortable runs the danger of becoming too friendly and casual with these subordinates and allowing unprofessional fraternization to seep into the daily routine. Moreover, in a deployed environment, the commander and his or her close advisers spend long days together, seven days a week. Throw into this mix a trip to Europe, spouses, and a chance to let off a little steam between official functions, and the further danger emerges of letting down one's guard. Additionally, perhaps fueled by a series of generally favorable profiles published by other writers, McChrystal and his team completely dropped their guard and seemed to assume that this young *Rolling Stone* writer would jump on board with the team and ignore the occasional "locker-room" trash talking that occurs among the staff, including the occasional disrespectful comments towards officials of the US government and others.

Unfortunately for Hastings, he and his publisher's "gotcha" approach to journalism distracts the reader from the broader and predominantly unrelated message he attempts to convey in the book—that the current COIN tactics employed by US, coalition, and Afghan security forces

are folly and doomed to failure. Furthermore, Hastings believes that any actions beyond hunting terrorists are wrongheaded, and he loosely ties his perception of the United States' COIN failures in Vietnam and Iraq to its COIN strategy in Afghanistan. However, to get to his thesis, readers have to slog through tabloid-style hyperbole, starting with the book's covers. Both the front and back covers contain outrageously misleading and disrespectful pictures of a four-star general—presumably McChrystal, with the head portion conveniently cut off at the top of the page—holding a bottle of booze in one hand and a weapon in the other. Furthermore, the inside jacket speaks of "hotel bars where spies and expensive hookers participate in nation building gone awry," implying some sort of untoward involvement by the McChrystal team with prostitutes and spies—an assertion unsupported by any material in the book. Additionally, *The Operators* includes a photo of a hand-drawn pornographic sex act from a US combat outpost not mentioned in the text, seemingly serving no purpose other than implicitly shouting, "Wow! Look what these GIs think up in their spare time!" This salacious photo is a cheap shot at deployed Soldiers and their families, adding nothing of value to the narrative's main point and reinforcing the stereotyped image of the immoral Western occupier soiling the Islamic nation of Afghanistan. Overall, for readers interested in a balanced portrayal of General McChrystal, his team, and the US strategy in Afghanistan, I suggest they find a different book to read—one that presents both sides of the debate in a more mature fashion and without the tabloid-style journalism that accompanies the narrative in *The Operators*.

Col Matthew C. Brand, USAF
Air War College
Maxwell AFB, Alabama

The Rise and Fall of Al-Qaeda by Fawaz A. Gerges. Oxford University Press (http://www.oup.com/us/), 198 Madison Avenue, New York, New York 10016, 2011, 272 pages, $24.95 (hardcover), ISBN 9780199790654.

Fawaz Gerges is a leading scholar of social movements and a renowned regional expert on the Middle East. He has established a reputation as a unique scholar in his unparalleled access to actors in the Middle East region who have been pivotal in influencing the historical jihadist movement and developing foundational theories in the movement. Gerges's *Journey of the Jihadist: Inside Muslim Militancy* (Harcourt, 2006) chronicled the jihadist movement over the span of three generations, focusing on and illuminating differences between intergenerational elites and the evolving emphasis of the movement. The book proved particularly instructive in explaining the shortcomings of the US war in Iraq and against al-Qaeda in terms of attaining stated US strategic goals. Further, the study served as a corrective to some of the excesses and misconceptions of the war on terrorism as defined by US national strategy.

The author's keen insight is reflected anew by his understanding and discussion of the diversity within the jihadist movement, a theme in *Journey of the Jihadist* that has become the centerpiece of his latest book, *The Rise and Fall of Al-Qaeda*. Gerges explores the important rift inside the movement that burgeoned during Osama bin Laden's reign over al-Qaeda. He develops the central theme that from al-Qaeda's inception, prominent Islamic thinkers and elites within and outside the movement have viewed it as too extremist and/or unreflective of true Islam. One prominent jihadist, Sayyid Imam al-Sharif Fadl, proclaimed in 2007 that "Al-Qaeda committed suicide on 9/11" (p. 121), that bin Laden and Ayman al-Zawahiri were "false prophets" (p. 209), and that al-Qaeda was "an empty shell which lacks a popular base of support and a religiously sanctioned mandate" (p. 122). The schism within the movement meant that al-Qaeda's ability to sway the Islamic world was tenuous from the start and collapsing by the end of the millennium.

Gerges argues that al-Qaeda's excesses in Iraq, including the violence and dogmatism of its members and affiliates, were especially harmful to the movement in deepening its negative image among Islamic elites and throughout the Islamic world. That al-Qaeda has killed innocent Muslims alongside potential enemies of Islam inside Iraq produced revulsion for the organization among many Muslims and detracted from any perceived legitimate grievance that may have been expressed concerning Western and/or US imperialism. The author carefully traces and explains the collapse of support for al-Qaeda among Muslims throughout the Islamic world. By the time of bin Laden's death, reliable public opinion polls and Gerges's own interviews revealed that al-Qaeda as an organization and movement was already in deep crisis. From Saudi Arabia to Iraq to Pakistan to Indonesia and Turkey, confidence in bin Laden had plummeted from earlier levels of support. Gerges concludes that "overwhelming evidence . . . suggest[s] that the original menace of al-Qaeda is winding down" (p. 189).

Al-Qaeda remains a factor in Yemen and along the Afghan and Pakistan borders. As to al-Qaeda in Yemen (al-Qaeda in the Arabian Peninsula [AQAP]), Gerges argues that its influence will be decided by the organization's usefulness to the tribes that predominate. The latter will ally with AQAP for pragmatic rather than ideological reasons in contesting the unpopular national government. In keeping with past prescriptions, the author advises US policy makers against applying only military force to counter AQAP because such a strategy could backfire and actually enhance the organization's popular support. Gerges analyzes the situation in Pakistan and Afghanistan as one in which "the current marriage of convenience between the Taliban fighters and al-Qaeda operatives will hold as long as the West confuses and conflates them, and wages all-out war against them" (p. 183). In noting approvingly a shift in the Obama administration's approach in Afghanistan to one that emphasizes reconciliation between the Taliban and the national government, Gerges reiterates one of his key points: "There is no military solution to the civil strife in Afghanistan" (p. 187).

He concludes by critically commenting on the disjuncture between the reality of al-Qaeda's mortal weakening and the continued inclination of US counterterrorism experts as well as the US government to emphasize the organization "as a strategic, existential threat" (p. 192). Gerges elaborates on the theme that both American elites and the public have become captive to the fear of terrorism, which then amplifies any piece of evidence into confirming the narrative. Thus, the reality of al-Qaeda's operational, organizational, and popular decline has not yet diminished the perception of existential threat that has become habituated across the American elite and public, much as Cold War thinking did previously. He prescribes that the United States step out from behind the approach it has taken in the Middle East that has emphasized counterterrorism and stability, and unleash the liberal-democratic universalistic impulses that would enable it to play a constructive role in the democratic movements that have erupted across the region: "The United States can help transform the Middle East" (p. 205). This statement captures the greater strategic vision that Gerges presents through his deep analysis of al-Qaeda and its shortcomings. In the end, such movements feed off the effects of authoritarianism, tyranny, and oppression. The resultant "absence of hope provide[s] the fuel that powers radical, absolutist ideologies in the Muslim world; they are the mother of all ailments that afflict the region, including al-Qaeda, a parasite that feeds on political and social turmoil and repression" (p. 213). The beacon of hope and light that the United States historically has professed to represent in the world should be allowed to glow brightly in its approach to the Middle East and help redirect national strategy and policy toward this mission. Doing so would redefine US-Israeli relations as well as the ability of the United States to influence the direction of social and political movements in the greater Middle East.

The Rise and Fall of Al-Qaeda challenges the reader to acknowledge and understand the diversity that has existed within the jihadist movement and to realize that bin Laden and al-Qaeda never represented majority Muslim or even Islamist opinion. The author's deep under-

standing of Islamic thinkers and activists enables him to elaborate and chronicle the path over which al-Qaeda and its leadership traversed, ending with bin Laden's failure and death. Gerges's expertise in social movements also enables him to address the strategic environment of change in the Middle East with clarity; moreover, it underwrites the prescriptions he offers for changing the discourse and direction of US policy in the region. Although some readers may consider the book provocative, it should be read by regional analysts of the Middle East, academics who study social movements, policy makers, and individuals interested in Middle East politics and the threat of terrorism.

Dr. Mary N. Hampton
Associate Dean for Academics
Air Command and Staff College
Maxwell AFB, Alabama

Airpower for Strategic Effect by Colin S. Gray. Air University Press, Air Force Research Institute (http://aupress.au.af.mil/), 155 N. Twining Street, Maxwell AFB, Alabama 36112-6026, 2012, 367 pages. Available free at http://aupress.au.af.mil/digital/pdf/book/b_122_Airpower.pdf.

In this expansive assessment of airpower's steady rise in salience from its fledgling days to today's combat involvements, Colin Gray, a prolific strategist of long-standing scholarly repute, has produced an outstanding tutorial for airmen by addressing the air weapon in the context of what he calls its abiding "strategic narrative" (p. 1). His book is not about the tangibles of airpower—the platforms, munitions, and associated support systems—that make up its hardware ingredients. Rather, it is about how one should think about airpower's larger meaning and significance.

This important new book begs to be read by airpower's doers as well as thinkers—and at all rank and command levels. In explaining why, Gray notes that his intent in writing it was "to contribute to a better strategic understanding of airpower to improve the *practice* of airpower"

(emphasis added, p. 2). Toward that end, he stresses that his purpose was not to indulge in debate over air doctrine but "to help sharpen the ability of readers themselves to engage in such debate" (p. 4)—most notably in the all-important policy arena in which the most intractable cross-service disagreements over roles and resources get adjudicated.

Gray's central theme is that airpower generates strategic effect. More to the point, he maintains, it is a tactical equity that operates—ideally—with strategic consequences. To him, "strategic" does not inhere in the equity's physical characteristics, such as an aircraft's range or payload, but in what it can do by way of producing desired results. From his perspective, a strategic effect is, first and foremost, that which enables outcome-determining results. And producing such results is quintessentially the stock in trade of American airpower as it has progressively evolved since Vietnam.

With this unifying principle as his point of departure, Gray improves on Brig Gen William "Billy" Mitchell's definition of airpower by characterizing it more helpfully as "the ability to do something [*strategically useful*] in the air" (emphasis in original, p. 9). He further stresses—as his book's title well reflects—that only by producing desired *effects* can airpower's use in warfare be deemed successful.

In addressing the predominance of today's low-intensity insurgent challenges, in which kinetic air attacks have largely been overshadowed by ground forces in the starring role, Gray takes a long view of airpower's relevance and potential by appraising the air weapon in the broader context in which its payoff will ultimately be registered. His survey of airpower's combat use over time shows convincingly how the relative importance of the air weapon is neither universal nor unchanging but totally dependent on the circumstances of a confrontation.

More to the point here, when viewed operationally, airpower can be everything from single-handedly decisive to wholly supportive of a combatant commander's needs. Because its relative import, like that of all other force elements, hinges directly on how its comparative advantages relate to a commander's most immediate concerns, Gray reminds

us that airpower need not disappoint when it is not the main producer of desired outcomes. Indeed, he rightly notes, the notion that airpower should be able to perform effectively in all forms of combat unaided by other force elements is both an absurd measure of its value and a baseless arguing point. By misguidedly espousing this point over many decades, airpower's most outspoken advocates have done their cause a major disservice.

It naturally follows from this, Gray adds, that whenever airpower has been said to have "failed," it has only been because more was expected of it than it could deliver. After all, *any* tool can appear deficient if used unwisely or irresponsibly. In this regard, Gray notes how a long history of overpromising on the part of airpower's most vocal proponents has needlessly sold the air weapon short for what it is actually able to deliver to joint force commanders today—and not just in high-intensity combat but in *all* forms of operations across the conflict spectrum.

To be sure, airmen of action may find it trying at times to remain patient with Gray's always purposeful but also often discursive walk through the intellectual thickets of airpower theory. In a frank admission of his own appreciation of those readers who will be all too eager for him to get to his point, Gray freely concedes how "theory and theorists often are regarded with disdain by the people 'out there, doing it,' when in truth the purpose of the theory enterprise is both to reduce the risks to the warriors and to help make their efforts more useful vis-à-vis the operational goals that are set" (p. 41).

Yet were there ever an instance in which patience should have its rewards for mission-oriented airmen of action, it is plainly here, for *Airpower for Strategic Effect* offers an uncommonly thoughtful application of informed intellect to an explanation of how modern air warfare capabilities should be understood. In his last chapter, Gray underscores in this regard the important truth that "airpower theory helps educate airpower strategists," rightly calling it "theory for practice" (p. 275). Furthermore, he instructively adds, it "educates those who write airpower doctrine and serves as a filter against dangerous viruses" (p. 276).

At bottom, the purpose of Gray's treatise is not to extol airpower but to make coherent sense of it by providing informed insights into it and about it that are timeless. For airmen of all ranks, the greatest value that its appreciation of the air weapon can offer is to help them think more reflectively about their calling and to articulate its foundational principles more effectively in the councils of war planning. For woven throughout the book is a compelling explication of what modern airpower entails in its most inner strategic essence. The ultimate aim of that explication is to improve the real-world *practice* of airpower by operators at all levels most responsible for its effective use.

Benjamin S. Lambeth, PhD
Senior Fellow, Center for Strategic and Budgetary Assessments
Washington, DC

Golden Nuggets: A Practitioner's Reflections on Leadership, Management and Life by Dr. Raymond A. Shulstad. Xlibris (http://www2.xlibris.com/), 1663 Liberty Drive, Suite 200, Bloomington, Indiana 47403, 2012, 182 pages, $29.99 (hardcover), ISBN 978-1-46914-546-4; $19.99 (softcover), ISBN 978-1-46914-545-7.

In *Golden Nuggets*, Dr. Raymond A. Shulstad identifies performance, professionalism, and professional development as essential to a successful career. Because the path to that objective, however, can present many twists and turns, one must distinguish between the theoretical and practical aspects of those three elements. The author, who retired from the US Air Force as a brigadier general, highlights a number of these struggles in his book as well as ways of overcoming them.

Specifically, Dr. Shulstad presents 31 noteworthy principles and practices essential to leadership, management, and personal endeavors. He does so by dividing the book into sections, each one including stand-alone vignettes that address the aforementioned disciplines. Taken collectively, these sketches provide a multifaceted view of the topics, or, if the reader so desires, he or she may easily explore only those that hold the most appeal. Readers should find especially inter-

esting the author's own vignette, which offers his personal reflections on leadership and management.

Gratifyingly, *Golden Nuggets* is written in such a way that one can readily follow Dr. Shulstad's reasoning on various topics. Furthermore, his use of plain, straightforward language facilitates the reader's understanding of the author's practical insights into leadership, management, and a successful career. Indeed, after all is said and done, one wishes for more pages to read. I highly recommend this book to all career-minded professionals. Learning from Dr. Shulstad's experiences is not only enjoyable but also essential to advancement in today's competitive world.

Dr. Amir S. Gohardani
Stockholm, Sweden

Shooting the Front: Allied Aerial Reconnaissance and Photographic Interpretation on the Western Front—World War I by Terrence J. Finnegan. National Defense Intelligence College Press (http://www.ndic.edu/press/press.htm), National Defense Intelligence College, Bolling AFB, Washington, DC 20340-5100, 2006, 508 pages, $29.99 (softcover), ISBN 1-932946-04-7.

Let no one think the observation plane
Inferior to pursuit. Eyes of the army
And backbone of the Air Force it remains.

—Leighton Brewer
"Riders of the Sky" (1934)

Leighton Brewer's admonishment notwithstanding, tales of World War I fighter pilots continue to dominate the literature on aviation in that war. In contrast, writers have paid far less attention to the contributions of airmen involved in the less glamorous mission of aerial reconnaissance—or "observation," as it originally was known. And virtually nothing has been written about the World War I origins and rapid evolution of "photographic interpretation"—the art and science of analyzing aerial photographs for useful information. At over 500 pages and based on pro-

digious research in US and European archives, *Shooting the Front* represents a monumental effort to provide an in-depth examination of these important but understudied aspects of the air war as practiced by the major Western allies: France, Britain, and the United States. (Aside from noting the existence of "parallel developments" on the other side of No Man's Land, this study largely ignores aerial reconnaissance and photographic interpretation as practiced by the Central Powers.)

As author and retired Air Force intelligence officer Col Terrence J. Finnegan makes clear, the operational impasse associated with trench warfare propelled the marriage of the camera and the airplane. Locked in a static front extending from Switzerland to the North Sea, ground commanders demanded information that could help them break the stalemate on the Western Front—hence their growing dependence on aerial observation and its handmaiden, photographic interpretation, and the rapid maturation of each under the pressure of war.

Both a historical narrative and a comprehensive reference work, *Shooting the Front* maintains that aerial reconnaissance and photographic interpretation together constituted a military information revolution that "reinvented the way modern battle was envisaged, planned, and executed" (p. 3). In support of that claim, Finnegan argues that aerial photography offered a reliable means to validate what is now known as "fused" intelligence (information drawn from multiple sources), inspired such cartographic innovations as maps composed of numbered and lettered squares (i.e., grid maps), and facilitated an enormous increase in artillery effectiveness by pinpointing the location of ground targets. Few would dispute either these assertions or Finnegan's broader conclusion that aerial observation "created an air of greater confidence for the front line combatant in what often seemed a fruitless and never-ending endeavor" (p. 4). On the other hand, students of World War I aviation will note that the author fails to recognize a more troubling impact of aerial observation on the nature of combat in the Great War: by diminishing the possibility of surprise, air reconnaissance contributed substantially to the murderous stalemate on the Western Front.

That omission aside, this study has many virtues. Chief among them is its detailed examination of the emerging craft of photographic interpretation. Finnegan's treatment of that subject is further enlivened by his informed appraisals of the exceptional individuals—military men, scientists, and even artists—who promoted the rapid development of this fledgling military specialty between 1914 and 1918. Another key finding involves the close, nurturing relationship between French airmen and intelligence personnel and their eager but inexperienced American counterparts. Contrary to the received wisdom that emphasizes the importance of British tutelage, Finnegan convincingly argues that a Franco-American entente cordiale played the largest part in the success of the US Air Service's observation efforts. In turn, this close partnership resulted in lessons learned that established the basic operational framework for aerial reconnaissance and photo interpretation for the remainder of the twentieth century.

In sum, *Shooting the Front* is a vast storehouse of useful information and cogent analysis on a long-neglected subject. It is well written throughout and graced by numerous period photographs, maps, and drawings. Especially worthy of note is the author's skill at rendering the more arcane aspects of his study comprehensible to nonspecialist readers. *Shooting the Front* is highly recommended to anyone seriously interested in the evolution of air intelligence or World War I aviation history. Other students of modern warfare will find it a useful reference source.

Dr. James Titus
US Air Force Academy